CANADA • ALBERTA • SASKATCHEWAN • MANITOBA

PRAIRIE PROVINCES WATER BOARD

Report #174 A

Review of the 1992 Interprovincial Water Quality Objectives and Recommendations for Change APPENDICES 1 to 10

Prepared for the Prairie Provinces Water Board
By the Committee on Water Quality

November 2015

Appendix 1: Schedule E to the Master Agreement on Apportionment

AGREEMENT ON WATER QUALITY (Schedule "E" to the Master Agreement on Apportionment)

THIS AGREEMENT made this SECOND day of APRIL, A.D. 1992.

BETWEEN:

The Government of Canada, as represented by the Minister of the Environment, (hereinafter called "Canada")

-and-

The Government of Alberta, as represented by the Minister of the Environment and by the Minister of Federal and Intergovernmental Affairs, (hereinafter called "Alberta")

-and-

The Government of Manitoba, as represented by the Minister of Natural Resources, (hereinafter called "Manitoba")

- and -

The Government of Saskatchewan, as represented by the Minister for the Saskatchewan Water Corporation, (hereinafter called "Saskatchewan").

WHEREAS under natural conditions the waters of the watercourses hereinafter referred to arising in or flowing through the Province of Alberta would flow into the Province of Saskatchewan and under the said conditions the waters of some of the said watercourses arising in or flowing through the Province of Saskatchewan would flow into the Province of Manitoba;

AND WHEREAS the water quality of the said watercourses is important to the social and economic development as well as the environmental and public protection of all of the parties to this Agreement;

AND WHEREAS the parties entered into an agreement dated October 30, 1969, and an Amending Agreement on April 30, 1984, collectively referred to herein as the "Master Agreement", providing for the apportionment of water in watercourses arising in or flowing through the Provinces of Alberta, Saskatchewan, and Manitoba and providing for the reconstitution of the Prairie Provinces Water Board, hereinafter referred to as the "Board", which is responsible for the administration of the Master Agreement;

AND WHEREAS the parties have in paragraph 6 of the Master Agreement agreed to consider water quality problems, to refer such problems to the Board, and to consider recommendations of the Board thereon;

AND WHEREAS, in furtherance of the provisions of paragraph 6 of the Master Agreement, and on the recommendation of the Board, the parties consider it is in their mutual interest that an agreement be entered into on certain water quality objectives for the water in the said watercourses;

AND WHEREAS the parties intend to define the mandate of the Board in respect of interprovincial management of water quality of the said watercourses;

NOW THEREFORE THIS AGREEMENT witnesseth that the parties mutually agree as follows:

DEFINITIONS

1. IN THIS AGREEMENT:
   (a) "aquatic environment" means water and the environment containing all living things upon or in water including

all bottom substrates and physical, chemical and biological constituents;

(b) "ecosystem" means a system made up of a community of animals, plants and microbes and its interrelated physical and chemical environment;

(c) "interprovincial water quality management" means management of the water in accordance with the water quality objectives agreed to herein by the parties as set out in the Tables referred to in Attachment "A";

(d) "monitoring" means the process of developing plans for the collection of samples from the aquatic environment, conducting analyses and interpretation of data that is provided by Canada pursuant to paragraph 7 of the Master Agreement;

(e) "objective" means a numerical concentration or narrative statement of limit or limits, to a chemical, physical or biological variable within a river reach, that will support and protect uses of water, as such limit or limits are more particularly specified in each of the Tables referred to in Attachment A annexed hereto and forming a part hereof;

(f) "river reach" means each section of a river of a predetermined length that is identified in Attachment A;

(g) "watercourse" means any river, stream, creek, or other natural channel which from time to time carries a flowing body of water from the Province of Alberta to the Province of Saskatchewan, or from the Province of Saskatchewan to the Province of Manitoba, and includes all tributaries of each such river, stream, creek or natural channel which do not themselves cross the common boundary between the Provinces of Alberta, Saskatchewan, and Manitoba. Such tributaries as do themselves cross the said common boundaries between the Provinces of Alberta, Saskatchewan, and Manitoba shall be deemed to be "watercourses" for the purpose of this Agreement.

WATER QUALITY MANDATE

2. The mandate of the Board with respect to water quality in the watercourses shall be to foster and facilitate interprovincial water quality management among the parties that encourages the protection and restoration of the aquatic environment.

WATER QUALITY OBJECTIVES

3. The objectives specified in the Tables that are referred to in Attachment A are considered by the parties to be appropriate and acceptable water quality objectives in each river reach.

4. If the concentration of a chemical, physical or biological variable in a river reach, as a result of human activities, is not within the acceptable limit or limits when compared to the agreed objective for that chemical, physical or biological variable, reasonable and practical measures will be taken by the party in whose jurisdiction the chemical, physical or biological variable originates so that the quality of the water in the river reach is within the acceptable limit or limits.

5. If the concentration of a chemical, physical or biological variable in a river reach is within the acceptable limit or limits when compared to the agreed objective for that chemical, physical or biological variable, and if trend analysis or an assessment of the impact of a proposed development indicates that water quality has been or may be significantly altered within the acceptable limit or limits, the parties shall agree as to the reasonable and practical measures that will be taken by the party in whose jurisdiction the chemical, physical or

biological variable originates to endeavour to maintain the water quality in the river reach.

6. The objectives for each river reach should be reviewed on a periodic basis of at least every five (5) years.

7. Attachment "A" hereto and the numbered Tables may be amended, from time to time, by the written agreement of all the Ministers, which amendment shall be effective on the date and year of execution by the Minister last signing.

<u>WATER QUALITY DUTIES OF THE BOARD</u>

8. The duties of the Board with respect to its water quality mandate shall be as follows:

   (a) monitoring the quality of the aquatic environment in the river reaches and making comparisons with the objectives established herein;

   (b) providing a written report to the parties annually, and from time to time as the Board considers necessary, on the quality of the water in the river reaches, and providing such other reports or information as may be requested by any of the parties to this Agreement;

   (c) reviewing the appropriateness of the objectives and making recommendations to the parties based on available water quality data and scientific information;

   (d) promoting through consultation and the exchange of information the establishment by the parties of compatible water quality objectives in the Provinces of Alberta, Saskatchewan and Manitoba;

   (e) promoting through consultation and the exchange of information a preventive and proactive ecosystem approach to interprovincial water quality management; and

   (f) promoting through consultation and the exchange of information the recognition of the interdependence of quality and quantity of water in the management of the watercourses.

9. This Agreement shall take effect on the date and year of execution by the party last signing, and shall continue in full force and effect until termination of the Master Agreement, or upon any of the parties giving one years notice to the other parties of their intention to withdraw from this Agreement.

10. The headings used in this Agreement are for convenience only and are not to be considered a part of this Agreement and do not in any way limit or amplify the terms and provisions of this Agreement.

11. No member of the Parliament of Canada or Member of the Legislative Assemblies of the Provinces party to this Agreement shall hold, enjoy, or be admitted to any share or part of any contract, agreement, commission or benefit arising out of this Agreement.

IN WITNESS WHEREOF Alberta has caused these presents to be executed by the Minister of the Environment and the Minister of Federal and Intergovernmental Affairs, and Manitoba has caused these presents to be executed by the Minister of Natural Resources, and Saskatchewan has caused these presents to be executed by the Minister responsible for the Saskatchewan Water Corporation, and Canada has caused these presents to be executed by the Minister of the Environment, on the day and year first mentioned above.

THE GOVERNMENT OF CANADA

<u>"T. Price"</u> per: <u>"Jean J. Charest"</u>
Witness Minister of the Environment

January 23, 1992
Date

THE GOVERNMENT OF ALBERTA

"S. Burns" per: "Ralph Klein"
Witness Minister of the Environment

February 21, 1992
Date

Approved Pursuant to
the
Alberta Department of
Federal and
Intergovernmental
Affairs Act

"James D. Horsman"
Minister of Federal and
Intergovernmental
Affairs

March 11, 1992
Date

THE GOVERNMENT OF SASKATCHEWAN

"J. Samuelson" per: "Darrel Cunningham"
Witness Minister
responsible for the
Saskatchewan Water
Corporation

March 25, 1992
Date

THE GOVERNMENT OF MANITOBA

"L.J. Whitney" per: "Harry Enns"
Witness Minister of
Natural Resources

April 2, 1992
Date

ATTACHMENT "A"

To Schedule E
(LISTING OF RIVER REACHES AND
REFERENCE TO TABLES OF WATER QUALITY OBJECTIVES)

RIVER	REACH (predetermined length)	TABLE LISTING WATER QUALITY OBJECTIVES (FOR RIVER REACH)
Beaver River	Beaver Crossing to the Border	1
North Saskatchewan River	Lea Park to Lloydminster Ferry	2
Red Deer River A/S	Bindloss to Confluence with the South Saskatchewan River	3
South Saskatchewan River	Highway #41 to Confluence with Red Deer River	4
Battle River	Blackfoot Creek to Unwin	5
Churchill River	Island Falls to Pukatawagan Lake	6
Saskatchewan River	Outlet of Cumberland Lake to Mouth of Carrot River	7
Carrot River	Turnberry to Mouth of Carrot River	8
Red Deer S/M	Etomami River to Red Deer Lake	9
Assiniboine River	Whitesand River to Outlet of Shellmouth Reservoir	10
Qu'Appelle River	Kaposvar Creek to Assiniboine River	11

TABLE 1

WATER QUALITY OBJECTIVES	
BEAVER RIVER REACH: BEAVER CROSSING TO THE BORDER	
CHEMICAL, PHYSICAL OR BIOLOGICAL VARIABLE	**ACCEPTABLE LIMIT OR LIMITS**
ARSENIC (diss)	0.05
BARIUM (total)	1.0
BORON (diss)	5.0
CADMIUM (total)	0.001
CHLORIDE (diss.)	100.
CHROMIUM (total)	0.011
COPPER (total)	0.004
FECAL COLIFORM	100/100ml
FLUORIDE (diss)	1.5
IRON (diss)	1.0
LEAD (total)	0.007
MANGANESE (diss)	0.2
NICKEL (total)	0.1
NO_2+NO_3 (as N)	10.0
SELENIUM (diss)	0.001
SODIUM (diss)	100.
SULPHATE (diss)	500.
URANIUM	0.02
ZINC (total)	0.03
AMMONIA (total)	TABLE BACK SIDE
OXYGEN (diss)	OW 6.0
pH (pH units)	6.5-9.0
LINDANE	0.0001
2,4-D	0.004
2,4,5-TP	0.01
CHLOROPHENOLS (total)	0.001
CHLORINE	0.002
CYANIDE (free)	0.005
SILVER (total)	0.0001
PCP	0.0005
MERCURY IN FISH (ug/g)	0.5
PCB IN FISH (ug/g)	2.0

SYMBOLS:
- all units are in mg/L unless otherwise noted.
- OW - open water objective only.

TABLE 2

WATER QUALITY OBJECTIVES	
NORTH SASK. R. REACH: LEA PARK TO LLOYDMINSTER FERRY	
CHEMICAL, PHYSICAL OR BIOLOGICAL VARIABLE	**ACCEPTABLE LIMIT OR LIMITS**
ARSENIC (diss)	0.05
BARIUM (total)	1.0
BORON (diss)	5.0
CADMIUM (total)	0.001
CHLORIDE	100
CHROMIUM (total)	0.011
COPPER (total)	0.004
FECAL COLIFORM	100/100ml
FLUORIDE (diss)	1.5
IRON (diss)	0.3
LEAD (total)	0.007
MANGANESE (diss)	0.05
NICKEL (total)	0.1
NO_2+NO_3 (as N)	10.0
SELENIUM (diss)	0.001
SODIUM	100
SULPHATE (diss)	500.
URANIUM	0.02
ZINC (total)	0.03
ALUMINUM (total)	5.0
COBALT	0.05
TOTAL DISS. SOLIDS	500
VANADIUM (TOTAL)	0.1
AMMONIA (total)	TABLE BACK SIDE
OXYGEN	6.5
pH (pH UNITS)	6.5-9.0
LINDANE	0.0001
2,4-D	0.004
2,4,5-TP	0.01
CHLOROPHENOLS (total)	0.001
CHLORINE	0.002
CYANIDE (free)	0.005
PCP	0.0005
MERCURY IN FISH (ug/g)	0.5
PCB IN FISH (ug/g)	2.0

SYMBOLS:
- all units are in mg/L unless otherwise noted.

TABLE 3

WATER QUALITY OBJECTIVES	
RED DEER RIVER A/S REACH: BINDLOSS TO CONFLUENCE WITH THE S. SASK. R.	
CHEMICAL, PHYSICAL OR BIOLOGICAL VARIABLE	**ACCEPTABLE LIMIT OR LIMITS**
ARSENIC (diss)	0.05
BARIUM (total)	1.0
BORON (diss)	5.0
CADMIUM (total)	0.001
CHROMIUM (total)	0.011
COPPER (total)	0.004
FECAL COLIFORM	100/100ml
FLUORIDE (diss)	1.5
IRON (diss)	0.3
LEAD (total)	0.007
MANGANESE (diss)	0.05
NICKEL (total)	0.025
NO_2+NO_3 (as N)	10.0
SELENIUM (diss)	0.001
SULPHATE (diss)	500.
ZINC (total)	0.03
COBALT	1.0
SAR	3.0
TOTAL DISS. SOLIDS	500
VANADIUM	0.1
AMMONIA (total)	TABLE BACK SIDE
LINDANE	0.0001
2,4-D	0.004
2,4,5-TP	0.01
CHLOROPHENOLS (total)	0.001
CYANIDE (free)	0.005
MERCURY IN FISH (ug/g)	0.5
PCB IN FISH (ug/g)	2.0

SYMBOLS:
- all units are in mg/L unless otherwise noted.

TABLE 4

WATER QUALITY OBJECTIVES	
SOUTH SASK. R. REACH: HIGHWAY #41 TO CONFLUENCE WITH RED DEER RIVER	
CHEMICAL, PHYSICAL OR BIOLOGICAL VARIABLE	**ACCEPTABLE LIMIT OR LIMITS**
ARSENIC (diss)	0.05
BARIUM (total)	1.0
BORON (diss)	5.0
CADMIUM (total)	0.001
CHROMIUM (total)	0.011
COPPER (total)	0.01
FECAL COLIFORM	100/100ml
FLUORIDE (diss)	1.5
IRON (diss)	1.0
LEAD (total)	0.02
MANGANESE (diss)	0.05
NICKEL (total)	0.025
NO_2+NO_3 (as N)	10.0
SELENIUM (diss)	0.002
SULPHATE (diss)	500.
ZINC (total)	0.05
COBALT	1.0
SAR	3.0
TOTAL DISS. SOLIDS	500
VANADIUM (TOTAL)	0.1
AMMONIA (total)	TABLE BACK SIDE
LINDANE	0.0001
2,4-D	0.004
2,4,5-TP	0.01
CHLOROPHENOLS (total)	0.001
CYANIDE (free)	0.005
MERCURY IN FISH (ug/g)	0.5
PCB IN FISH (ug/g)	2.0

SYMBOLS:
- all units are in mg/L unless otherwise noted.

TABLE 5

WATER QUALITY OBJECTIVES	
BATTLE RIVER REACH: BLACKFOOT CREEK TO UNWIN	
CHEMICAL, PHYSICAL OR BIOLOGICAL VARIABLE	**ACCEPTABLE LIMIT OR LIMITS**
ARSENIC (diss)	0.05
BARIUM (total)	1.0
BORON (diss)	5.0
CADMIUM (total)	0.001
CHLORIDE	100
CHROMIUM (total)	0.011
COPPER (total)	0.004
FECAL COLIFORM	100/100ml
FLUORIDE (diss)	1.5
IRON (diss)	0.3
LEAD (total)	0.007
MANGANESE (diss)	0.05
NICKEL (total)	0.1
NO_2+NO_3 (as N)	10.0
SELENIUM (diss)	0.001
SODIUM	100
SULPHATE (diss)	500.
URANIUM	0.02
ZINC (total)	0.03
ALUMINUM (total)	5.0
COBALT	0.05
TOTAL DISS. SOLIDS	500
VANADIUM	0.1
AMMONIA (total)	TABLE BACK SIDE
OXYGEN	OW 6.0
pH (pH UNITS)	6.5-9.0
LINDANE	0.0001
2,4-D	0.004
2,4,5-TP	0.01
CHLOROPHENOLS (total)	0.001
CHLORINE	0.002
CYANIDE (free)	0.005
PCP	0.0005
MERCURY IN FISH (ug/g)	0.5
PCB IN FISH (ug/g)	2.0

SYMBOLS:
- all units are in mg/L unless otherwise noted.
- OW - indicates open water period

.TABLE 6

WATER QUALITY OBJECTIVES	
CHURCHILL RIVER REACH: ISLAND FALLS TO PUKATAWAGAN LAKE	
CHEMCIAL, PHYSICAL OR BIOLOGICAL VARIABLE	**ACCEPTABLE LIMIT OR LIMITS**
ARSENIC (diss)	0.05
BARIUM (total)	1.0
BORON (diss)	5.0
CADMIUM (total)	0.00058
CHLORIDE (diss.)	250.
CHROMIUM (total)	0.011
COPPER (total)	0.0057
FECAL COLIFORM	200/100ml
FLUORIDE (diss)	1.5
IRON (diss)	0.3
LEAD (total)	0.011
MANGANESE (diss)	0.05
NICKEL (total)	0.025
NO_2+NO_3 (as N)	10.0
SELENIUM (diss)	0.01
SODIUM (diss)	300.
SULPHATE (diss)	500.
URANIUM	0.02
ZINC (total)	0.047
PHOSPHORUS (total)	0.05
AMMONIA (total)	TABLE BACK SIDE
OXYGEN (diss)	6.5
pH (pH units)	6.5-9.0
LINDANE	0.00008
2,4-D	0.004
2,4,5-TP	0.01
CHLOROPHENOLS (total)	0.001
CHLORINE	0.002
CYANIDE (free)	0.005
PCP	0.0005
CESIUM-137 (Bq/L)	50.
IODINE-131 (Bq/L)	10.
RADIUM-226 (Bq/L)	1.0
STRONTIUM-90 (Bq/L)	10.
TRITIUM (Bq/L)	40000.
MERCURY IN FISH (ug/g)	0.2
PCB in Fish (ug/g)	2.0

SYMBOLS:
- all units are in mg/L unless otherwise noted.

TABLE 7

WATER QUALITY OBJECTIVES	
SASKATCHEWAN RIVER REACH: OUTLET OF CUMBERLAND LAKE TO MOUTH OF CARROT RIVER	
CHEMICAL, PHYSICAL OR BIOLOGICAL VARIABLE	**ACCEPTALBE LIMIT OR LIMITS**
ARSENIC (diss)	0.05
BARIUM (total)	1.0
BORON (diss)	0.5
CADMIUM (total)	0.001
CHLORIDE (diss.)	68.
CHROMIUM (total)	0.011
COPPER (total)	0.01
FECAL COLIFORM	200/100ml
FLUORIDE (diss)	1.0
IRON (diss)	0.3
LEAD (total)	0.0061
MANGANESE (diss)	0.05
NICKEL (total)	0.10
NO_2+NO_3 (as N)	10.0
SELENIUM (diss)	0.01
SODIUM (diss)	100.
SULPHATE (diss)	250.
URANIUM	0.02
ZINC (total)	0.047
PHOSPHORUS (total)	0.05
AMMONIA (total)	TABLE BACK SIDE
OXYGEN (diss)	6.5
pH (pH units)	6.5-9.0
LINDANE	0.00008
2,4-D	0.004
2,4,5-TP	0.01
CHLOROPHENOLS (total)	0.001
CHLORINE	0.002
CYANIDE (free)	0.005
PCP	0.0005
CESIUM-137 (Bq/L)	50.
IODINE-131 (Bq/L)	10.
RADIUM-226 (Bq/L)	1.0
STRONTIUM-90 (Bq/L)	10.
TRITIUM (Bq/L)	40000.
MERCURY IN FISH (ug/g)	0.2
PCB in Fish (ug/g)	2.0

SYMBOLS:
- all units are in mg/L unless otherwise noted.

TABLE 8

WATER QUALITY OBJECTIVES	
CARROT RIVER REACH: TURNBERRY TO MOUTH OF CARROT RIVER	
CHEMICAL, PHYSICAL OR BIOLOGICAL VARIABLE	**ACCEPTABLE LIMIT OR LIMITS**
ARSENIC (diss)	0.05
BARIUM (total)	1.0
BORON (diss)	2.0
CADMIUM (total)	0.001
CHLORIDE (diss.)	100.
CHROMIUM (total)	0.011
COPPER (total)	0.01
FECAL COLIFORM	200/100ml
FLUORIDE (diss)	1.0
IRON (diss)	0.3
LEAD (total)	0.015
MANGANESE (diss)	0.05
NICKEL (total)	0.10
NO_2+NO_3 (as N)	10.0
SELENIUM (diss)	0.01
SODIUM (diss)	100.
SULPHATE (diss)	500.
URANIUM	0.02
ZINC (total)	0.047
PHOSPHORUS (total)	0.05
AMMONIA (total)	TABLE BACK SIDE
OXYGEN (diss)	OW 6.5
pH (pH units)	6.5-9.0
LINDANE	0.00008
2,4-D	0.004
2,4,5-TP	0.01
CHLOROPHENOLS (total)	0.001
CHLORINE	0.002
CYANIDE (free)	0.005
PCP	0.0005
CESIUM-137 (Bq/L)	50.
IODINE-131 (Bq/L)	10.
RADIUM-226 (Bq/L)	1.0
STRONTIUM-90 (Bq/L)	10.
TRITIUM (Bq/L)	40000.
MERCURY IN FISH (ug/g)	0.5
PCB in Fish (ug/g)	2.0

SYMBOLS:
- all units are in mg/L unless otherwise noted.
- OW - indicates open water period.

TABLE 9

WATER QUALITY OBJECTIVES	
RED DEER RIVER S/M REACH: ETOMAMI RIVER TO RED DEER LAKE	
CHEMICAL, PHYSICAL OR BIOLOGICAL VARIABLE	**ACCEPTABLE LIMIT OR LIMITS**
ARSENIC (diss)	0.05
BARIUM (total)	1.0
BORON (diss)	5.0
CADMIUM (total)	0.00058
CHLORIDE (diss.)	100.
CHROMIUM (total)	0.011
COPPER (total)	0.01
FECAL COLIFORM	200/100ml
FLUORIDE (diss)	1.0
IRON (diss)	0.3
LEAD (total)	0.0118
MANGANESE (diss)	0.05
NICKEL (total)	0.10
NO_2+NO_3 (as N)	10.0
SELENIUM (diss)	0.01
SODIUM (diss)	100.
SULPHATE (diss)	500.
URANIUM	0.02
ZINC (total)	0.047
PHOSPHORUS (total)	0.05
AMMONIA (total)	TABLE BACK SIDE
OXYGEN (diss)	6.0
pH (pH units)	6.5-9.0
LINDANE	0.00008
2,4-D	0.004
2,4,5-TP	0.01
CHLOROPHENOLS (total)	0.001
CHLORINE	0.002
CYANIDE (free)	0.005
PCP	0.0005
CESIUM-137 (Bq/L)	50.
IODINE-131 (Bq/L)	10.
RADIUM-226 (Bq/L)	1.0
STRONTIUM-90 (Bq/L)	10.
TRITIUM (Bq/L)	40000.
MERCURY IN FISH (ug/g)	0.5
PCB in Fish (ug/g)	2.0

SYMBOLS:
- all units are in mg/L unless otherwise noted.

TABLE 10

WATER QUALITY OBJECTIVES	
ASSINIBOINE RIVER REACH: WHITESAND RIVER TO OUTLET OF SHELLMOUTH RESERVOIR	
CHEMICAL, PHYSICAL OR BIOLOGICAL VARIABLE	**ACCEPTABLE LIMIT OR LIMITS**
ARSENIC (diss)	0.05
BARIUM (total)	1.0
BORON (diss)	2.0
CADMIUM (total)	0.001
CHLORIDE (diss.)	100.
CHROMIUM (total)	0.011
COPPER (total)	0.01
FECAL COLIFORM	200/100ml
FLUORIDE (diss)	1.0
IRON (diss)	0.3
LEAD (total)	0.02
MANGANESE (diss)	0.05
NICKEL (total)	0.10
NO_2+NO_3 (as N)	10.0
SELENIUM (diss)	0.01
SODIUM (diss)	100.
SULPHATE (diss)	500.
URANIUM	0.02
ZINC (total)	0.047
PHOSPHORUS (total)	0.05
AMMONIA (total)	TABLE BACK SIDE
OXYGEN (diss)	6.0
pH (pH units)	6.5-9.0
LINDANE	0.00008
2,4-D	0.004
2,4,5-TP	0.01
CHLOROPHENOLS (total)	0.001
CHLORINE	0.002
CYANIDE (free)	0.005
PCP	0.0005
CESIUM-137 (Bq/L)	50.
IODINE-131 (Bq/L)	10.
RADIUM-226 (Bq/L)	1.0
STRONTIUM-90 (Bq/L)	10.
TRITIUM (Bq/L)	40000.
MERCURY IN FISH (ug/g)	0.5
PCB in Fish (ug/g)	2.0

SYMBOLS:
- all units are in mg/L unless otherwise noted.

TABLE 11

WATER QUALITY OBJECTIVES	
QU'APPELLE RIVER REACH: KAPOSVAR CREEK TO ASSINIBOINE RIVER	
CHEMICAL, PHYSICAL OR BIOLOGICAL VARIABLE	**ACCEPTABLE LIMIT OR LIMITS**
ARSENIC (diss)	0.05
BARIUM (total)	1.0
BORON (diss)	2.
CADMIUM (total)	0.001
CHLORIDE (diss.)	100.
CHROMIUM (total)	0.011
COPPER (total)	0.01
FECAL COLIFORM	100/100ml
FLUORIDE (diss)	1.0
IRON (diss)	0.3
LEAD (total)	0.02
MANGANESE (diss)	0.05
MERCURY (total) (ug/L)	0.006
NICKEL (total)	0.10
NO_2+NO_3 (as N)	10.0
SELENIUM (diss)	0.01
SODIUM (diss)	100.
SULPHATE (diss)	500.
URANIUM	0.02
ZINC (total)	0.047
PHOSPHORUS (total)	0.05
AMMONIA (total)	TABLE BACK SIDE
OXYGEN (diss)	6.0
pH (pH units)	6.5-9.0
LINDANE	0.00008
2,4-D	0.004
2,4,5-TP	0.01
CHLOROPHENOLS (total)	0.001
CHLORINE	0.002
CYANIDE (free)	0.005
PCP	0.0005
CESIUM-137 (Bq/L)	50.
IODINE-131 (Bq/L)	10.
RADIUM-226 (Bq/L)	1.0
STRONTIUM-90 (Bq/L)	10.
TRITIUM (Bq/L)	40000.
MERCURY IN FISH (ug/g)	0.5
PCB in Fish (ug/g)	2.0

SYMBOLS:
- all units are in mg/L unless otherwise

Appendix 10: Total Suspended Solids Background Objectives (Open Season Only)

Appendix 10-a: Time Series Graphs

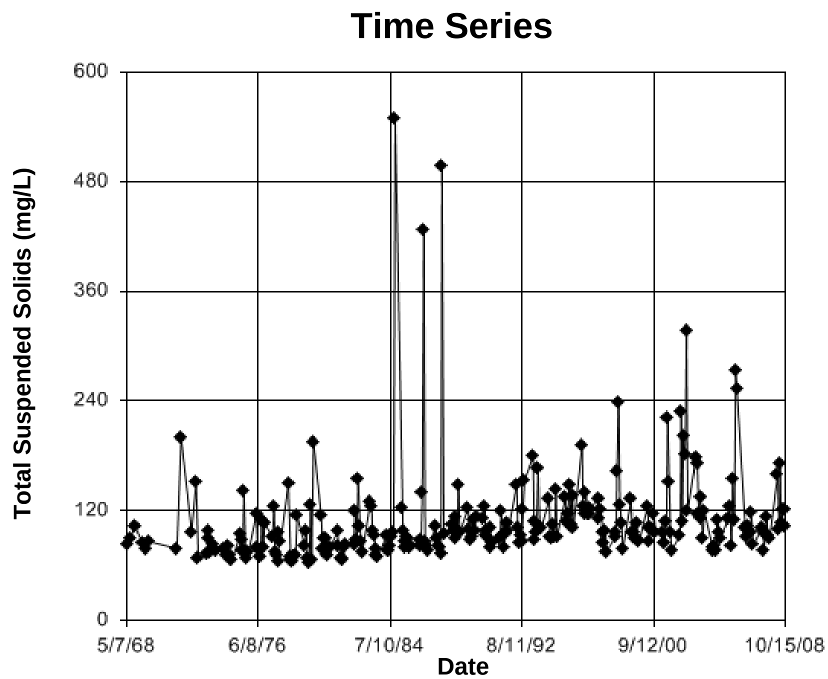

Figure 10-a1: Battle River TSS Open Season Only

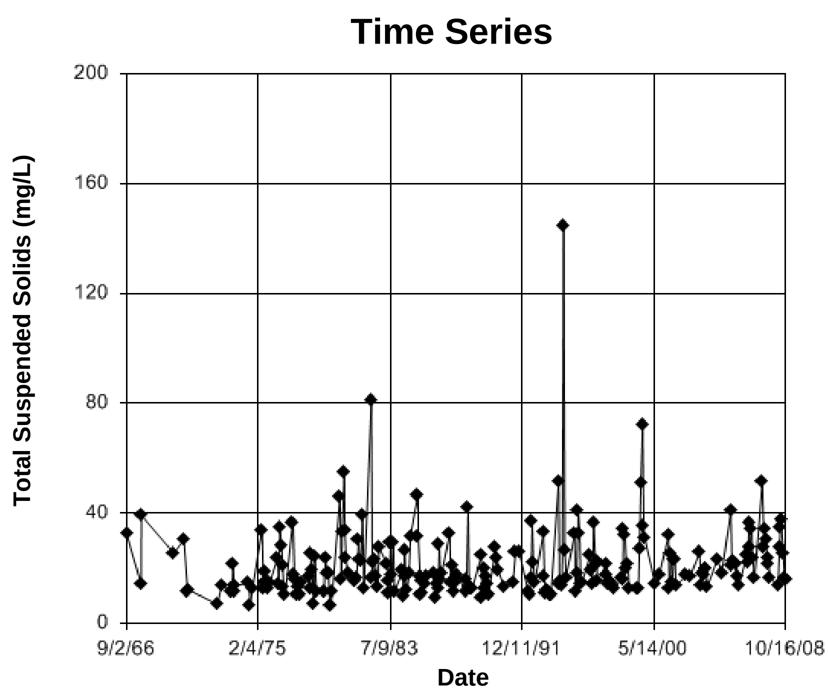

Figure 10-a2: Beaver River TSS Open Season Only

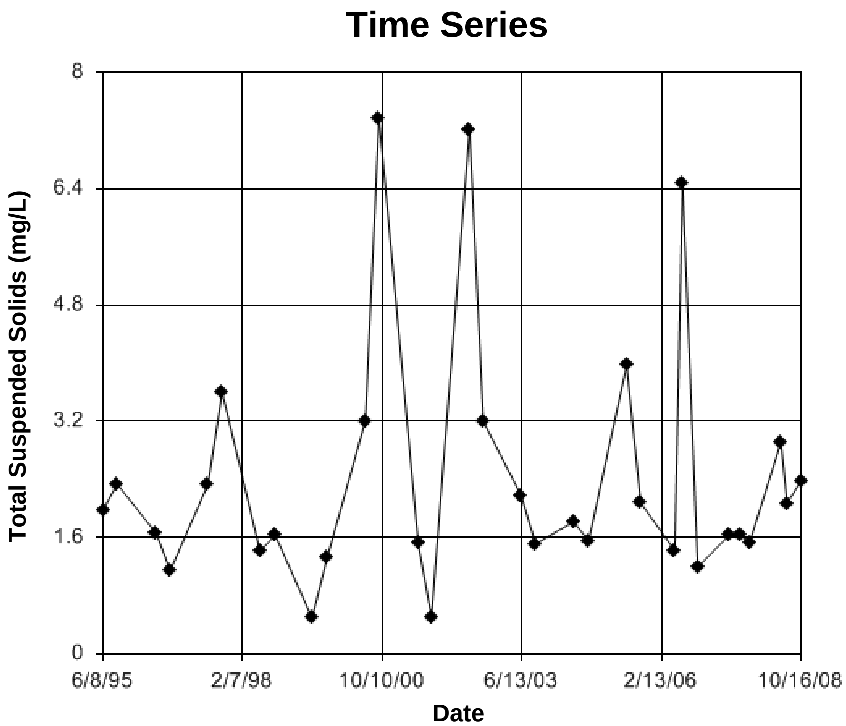

Figure 10-a3: Cold River TSS Open Season Only

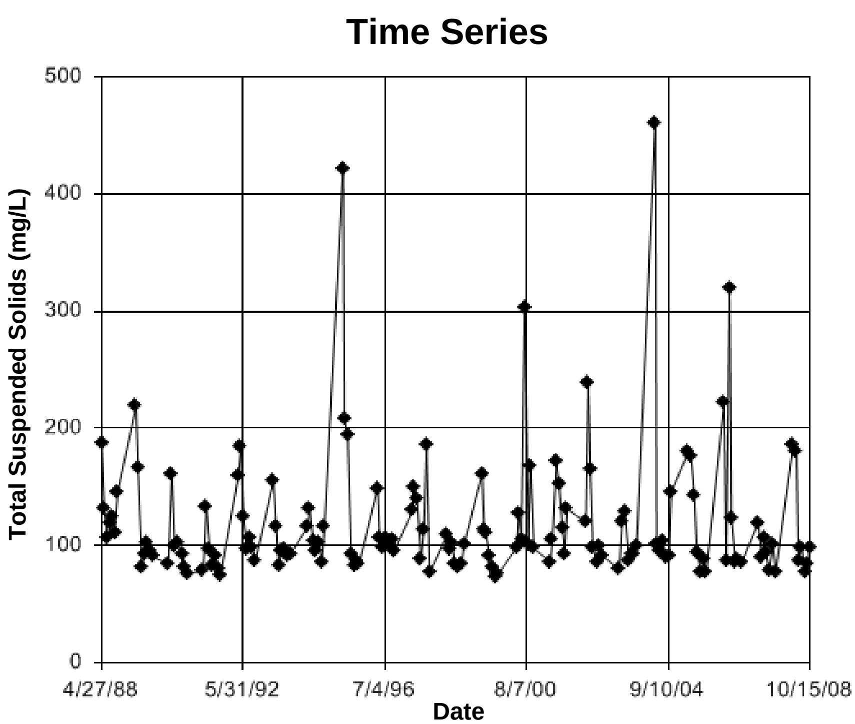

Figure 10-a4: North Saskatchewan River TSS Open Season Only

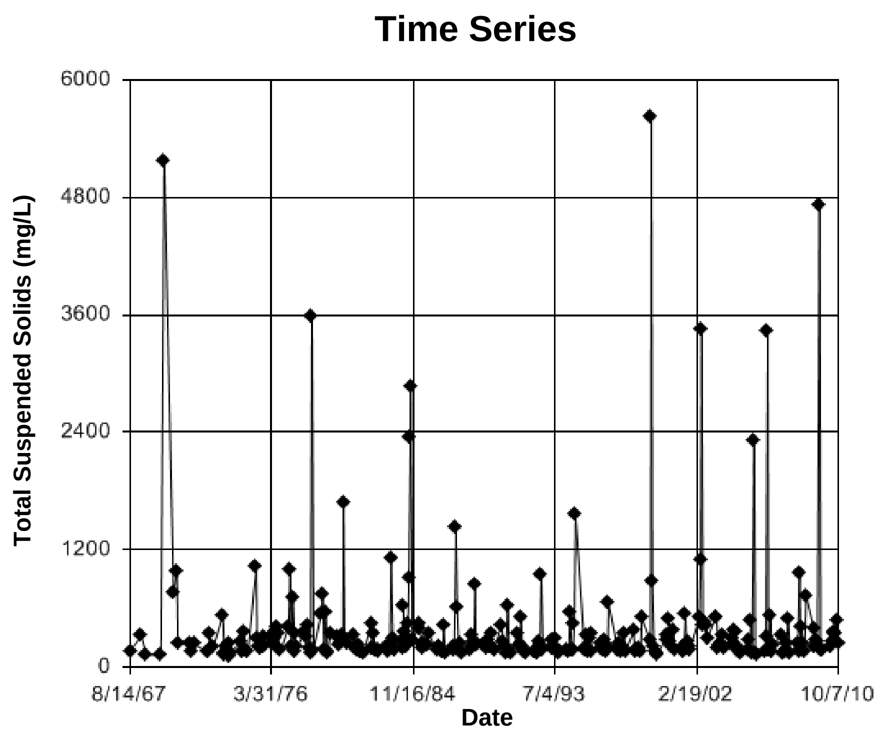

Figure 10-a5: Red Deer River (AB-SK) TSS Open Season Only

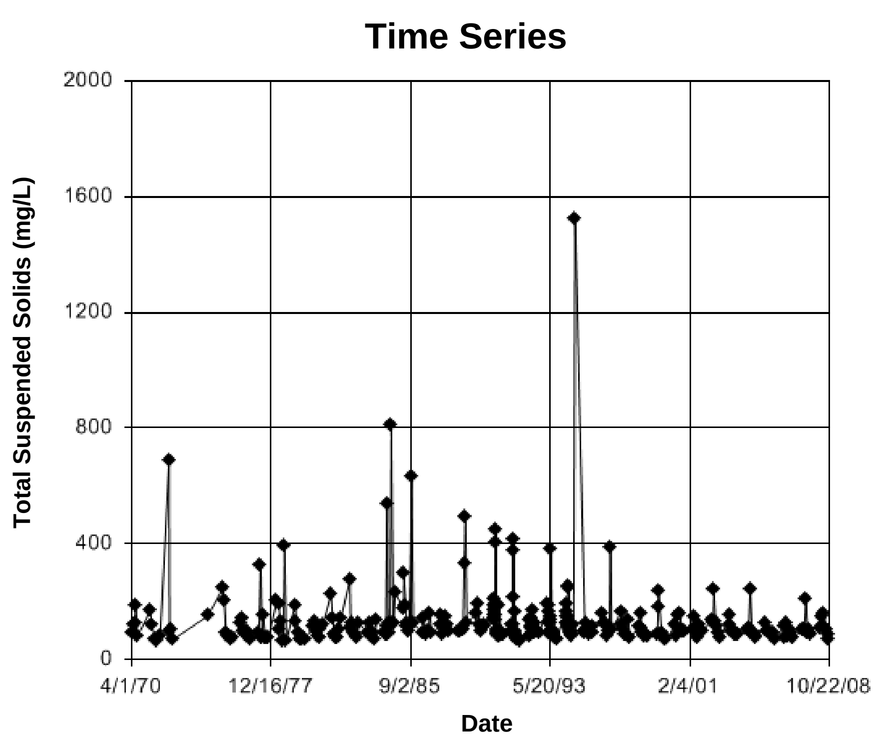

Figure 10-a6: South Saskatchewan River TSS Open Season Only

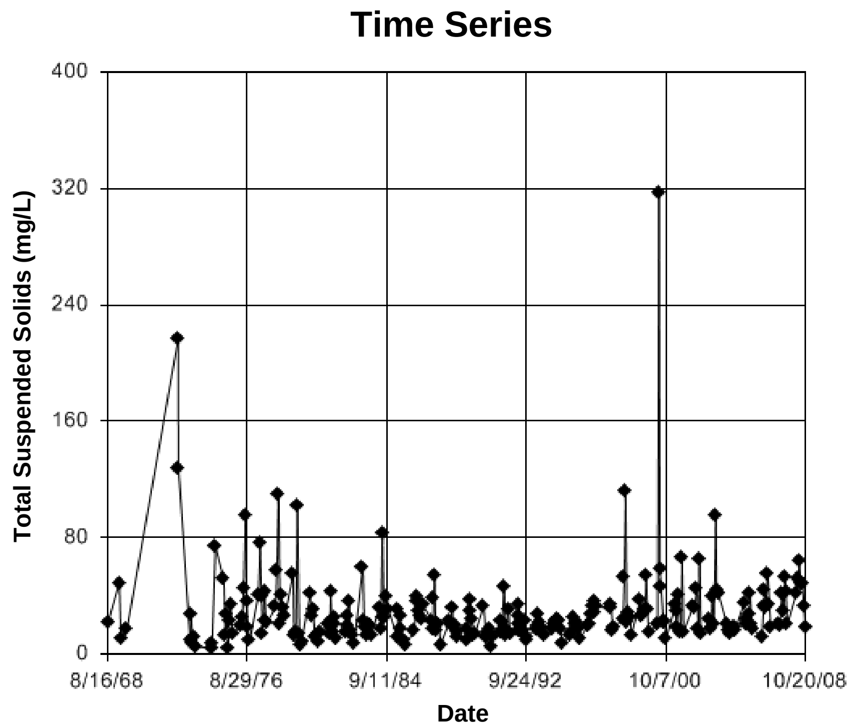

Figure 10-a7: Assiniboine River TSS Open Season Only

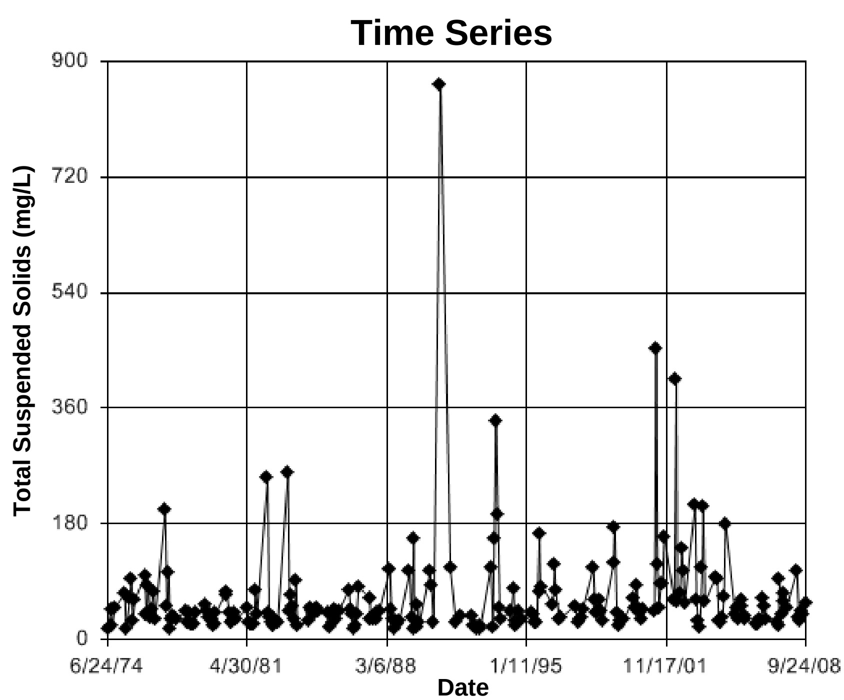

Figure 10-a8: Carrot River TSS Open Season Only

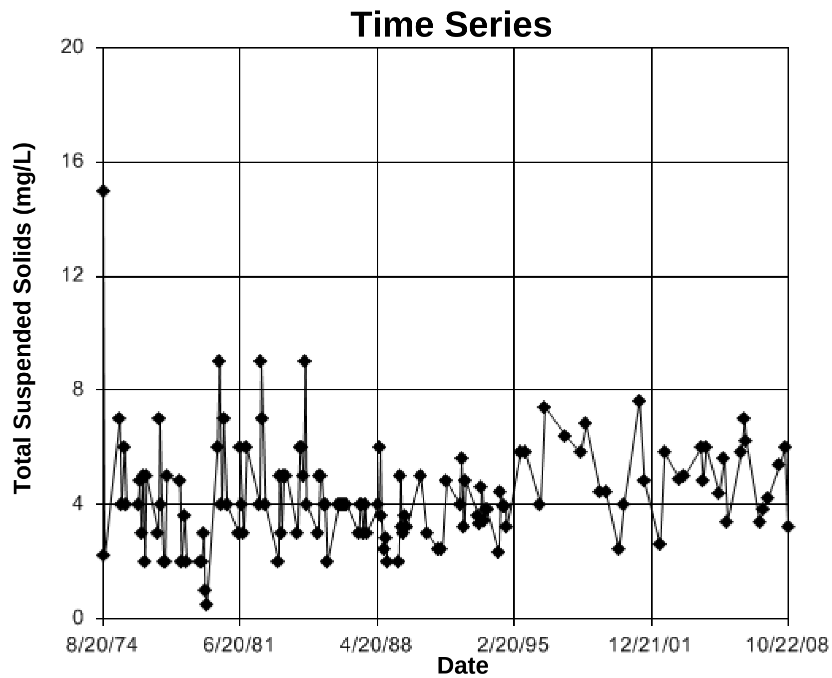

Figure 10-a9: Churchill River TSS Open Season Only

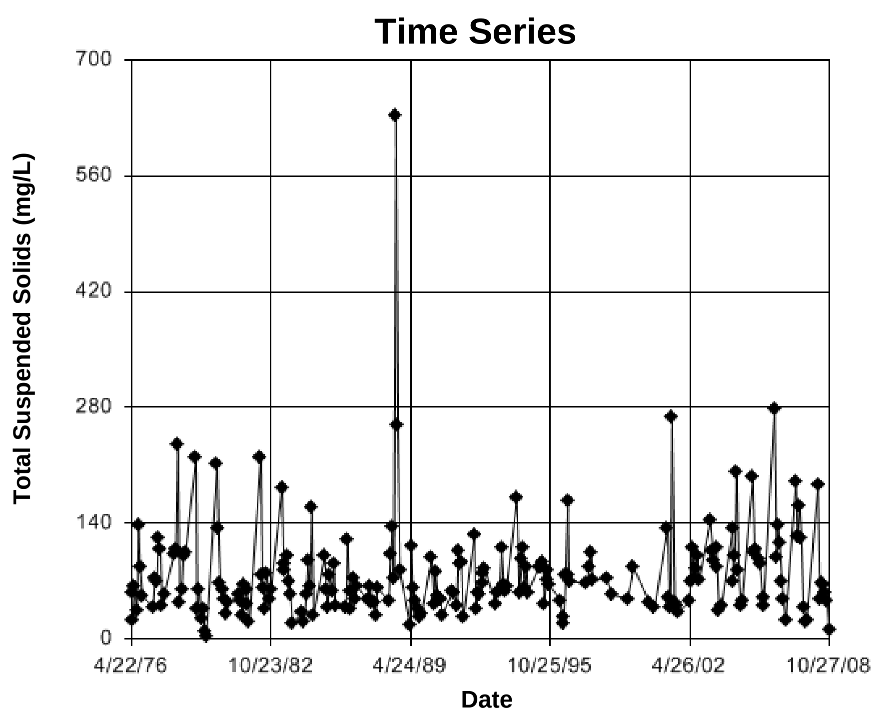

Figure 10-a10: Qu'Appelle River TSS Open Season Only

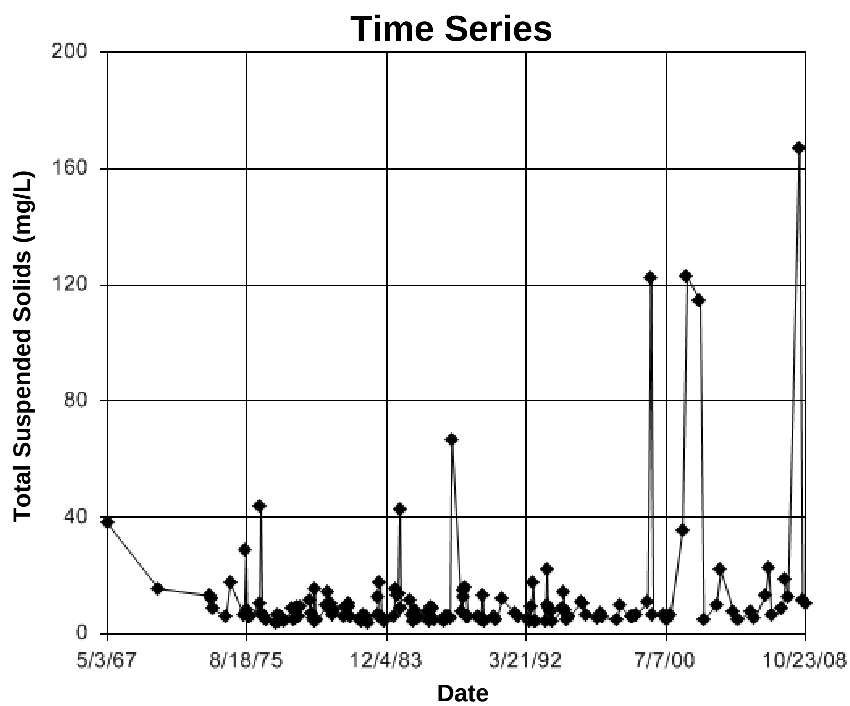

Figure 10-a11: Red Deer River (SK-MB) TSS Open Season Only

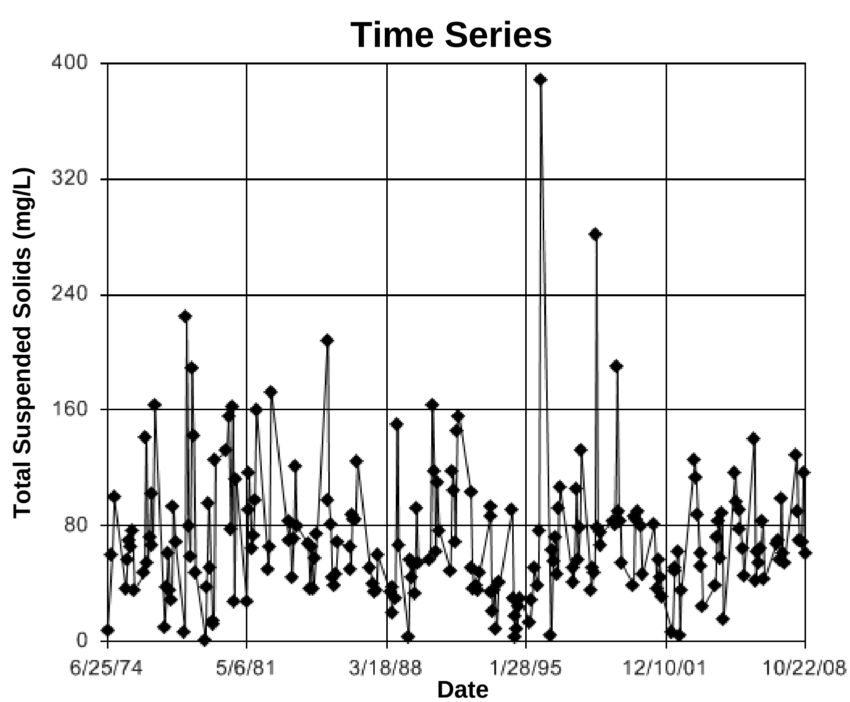

Figure 10-a12: Saskatchewan River TSS Open Season Only

Appendix 10-b: Sen's Slope Graphs

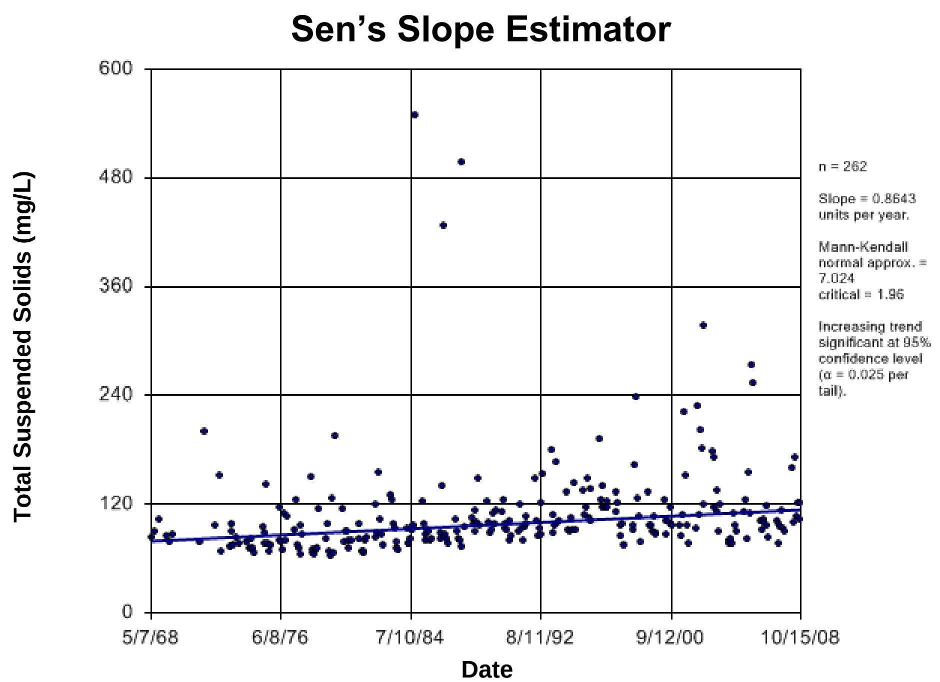

Figure 10-b1: Battle River TSS Open Season Only

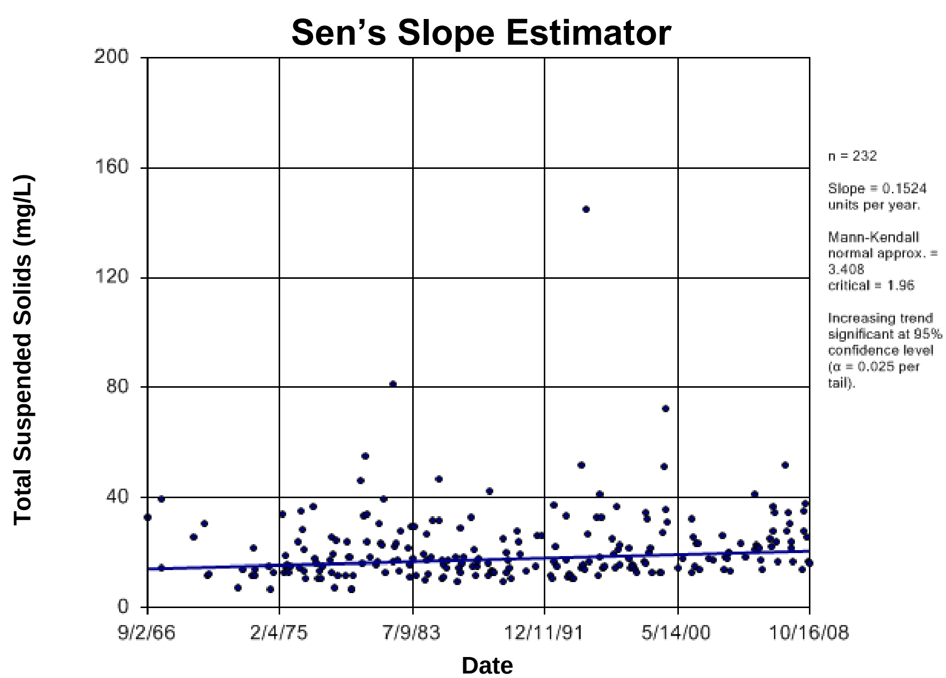

Figure 10-b2: Beaver River TSS Open Season Only

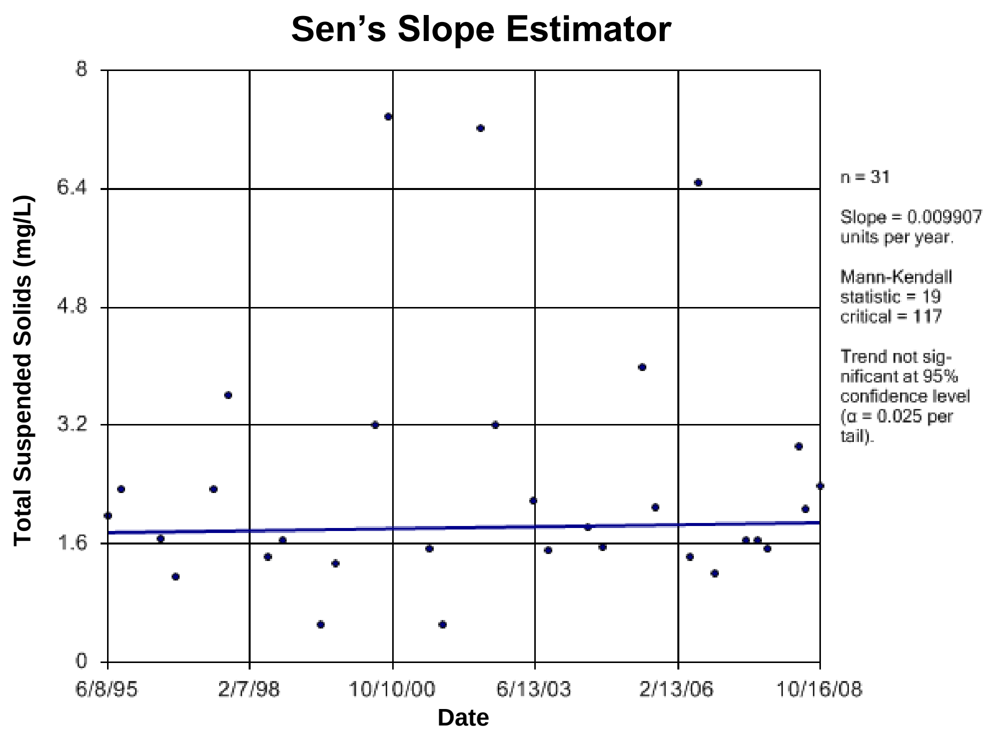

Figure 10-b3: Cold River TSS Open Season Only

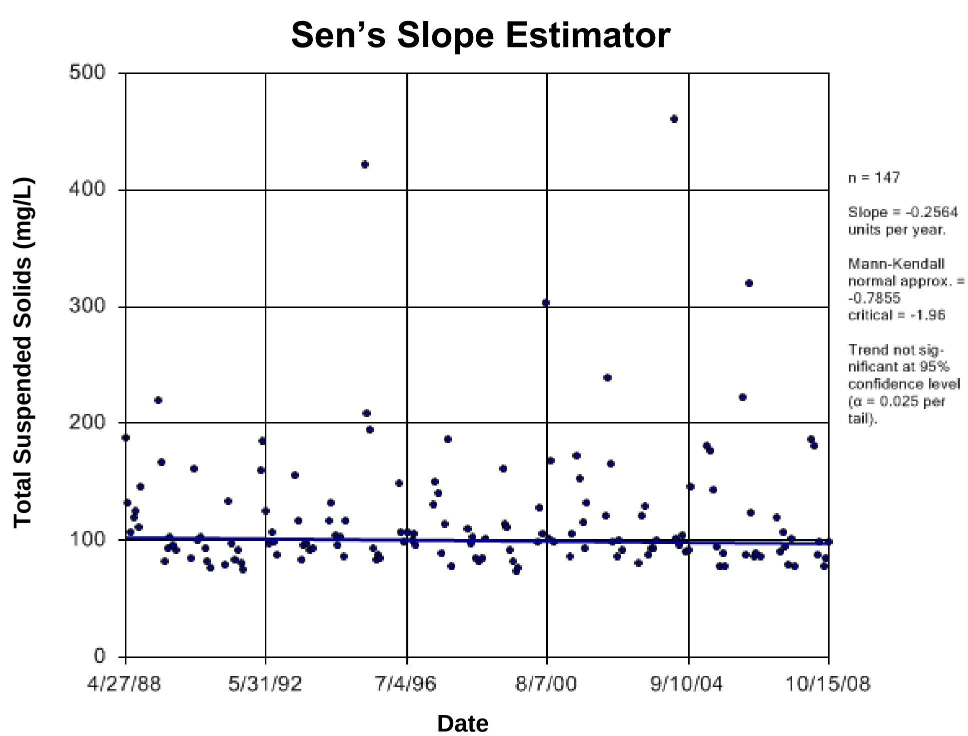

Figure 10-b4: North Saskatchewan River TSS Open Season Only

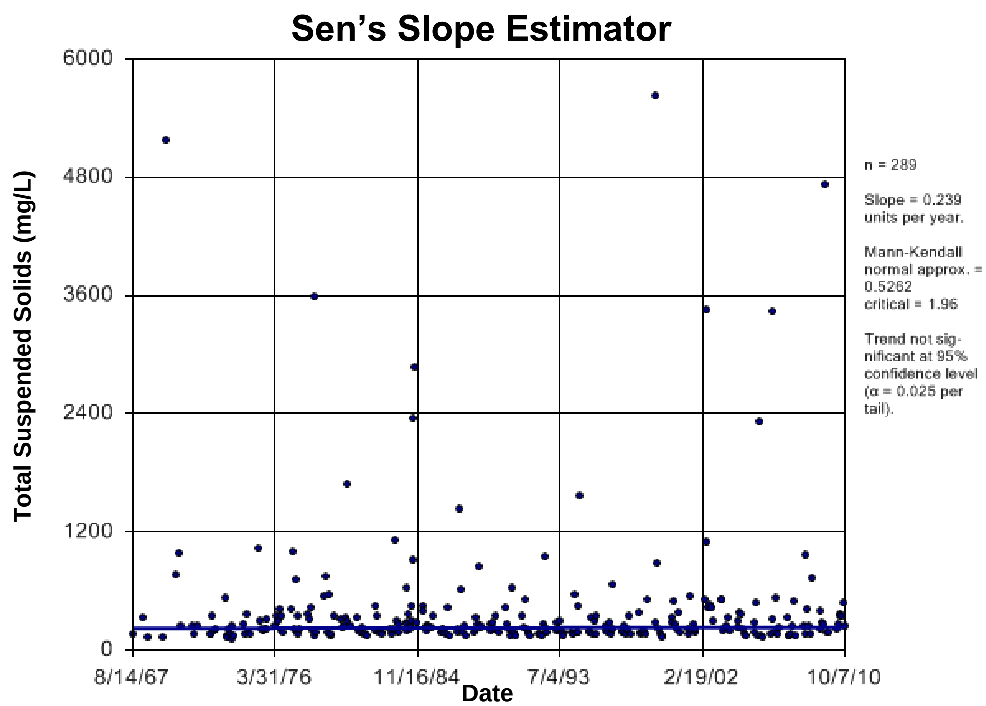

Figure 10-b5: Red Deer River (AB-SK) TSS Open Season Only

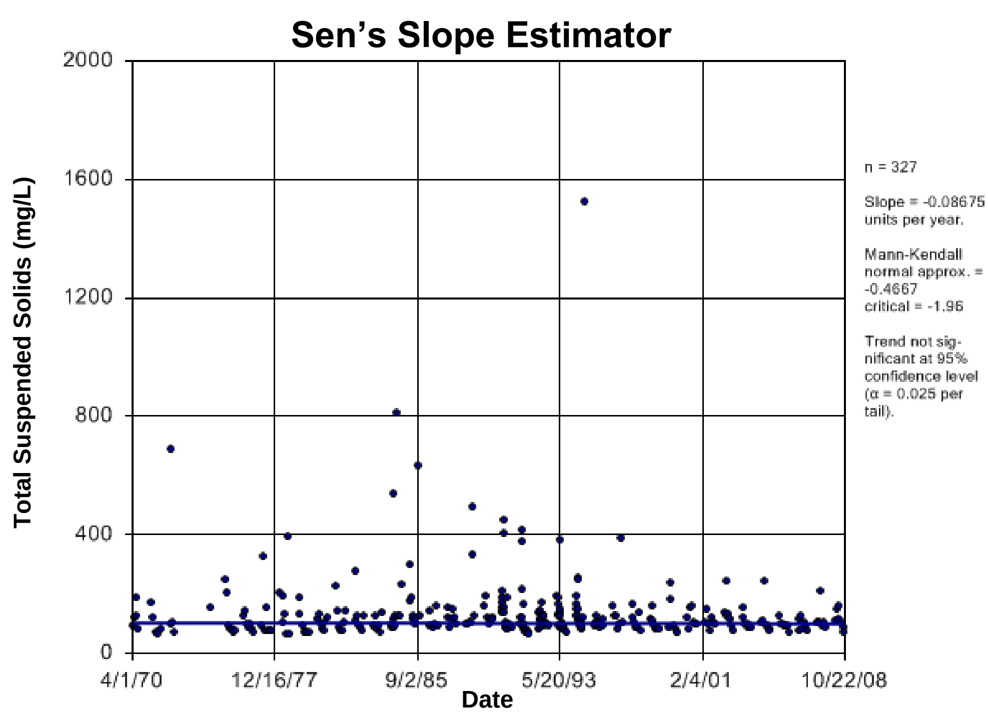

Figure 10-b6: South Saskatchewan River TSS Open Season Only

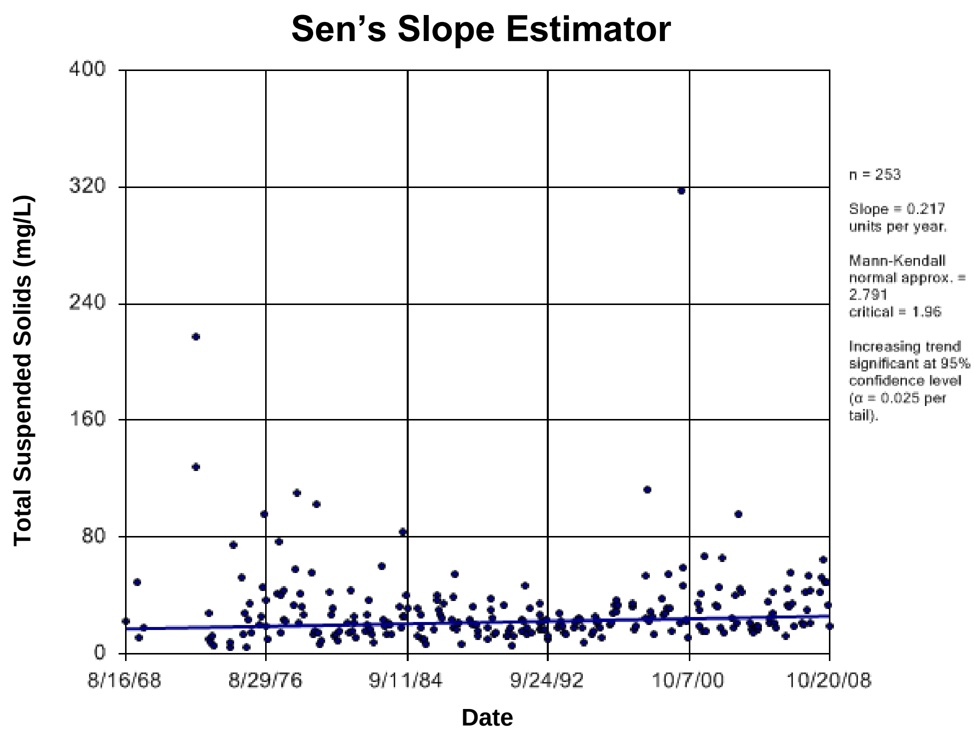

Figure 10-b7: Assiniboine River TSS Open Season Only

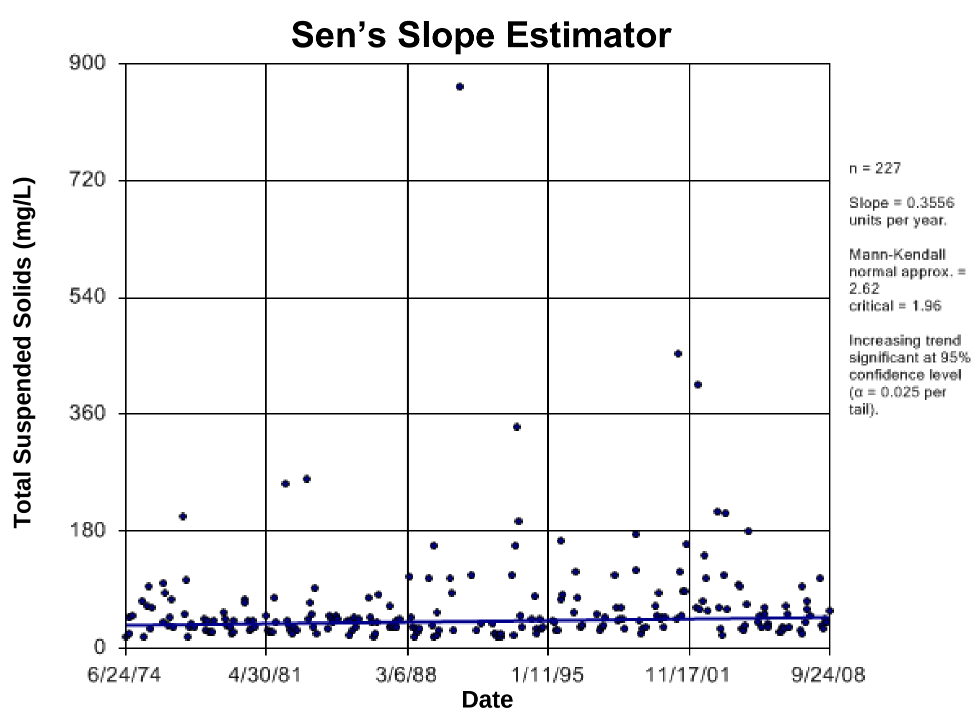

Figure 10-b8: Carrot River TSS Open Season Only

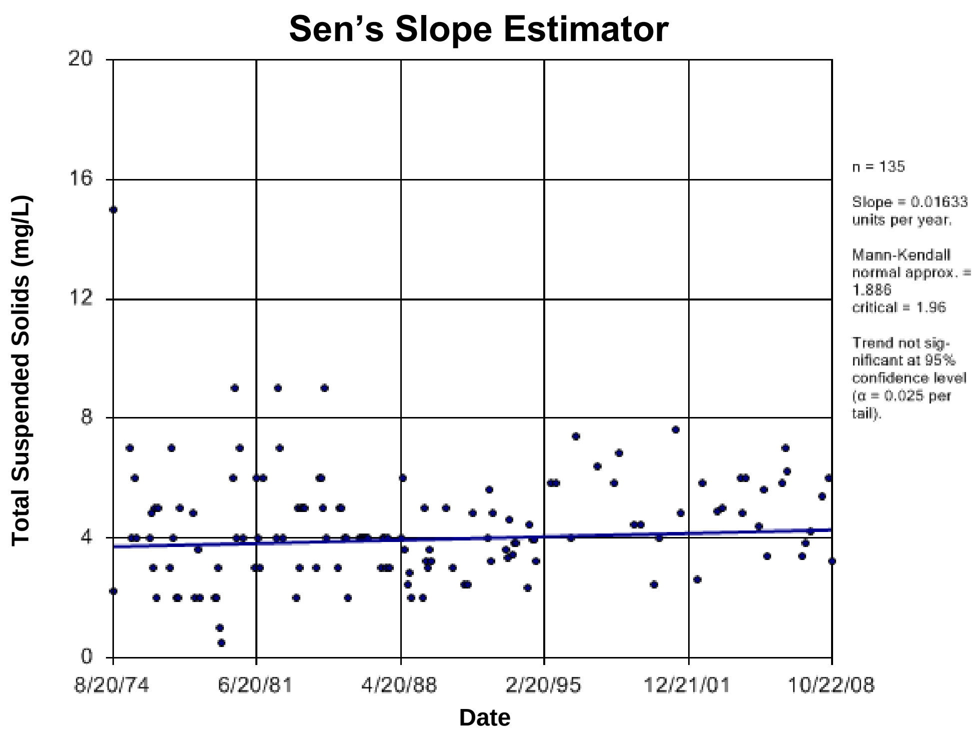

Figure 10-b9: Churchill River TSS Open Season Only

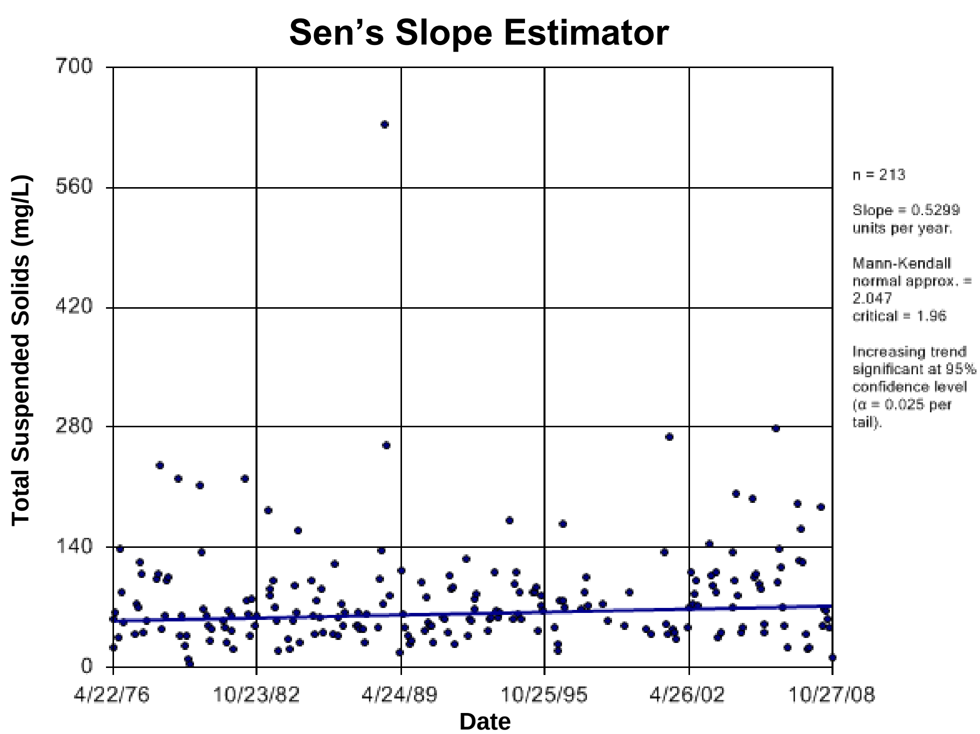

Figure 10-b10: Qu'Appelle River TSS Open Season Only

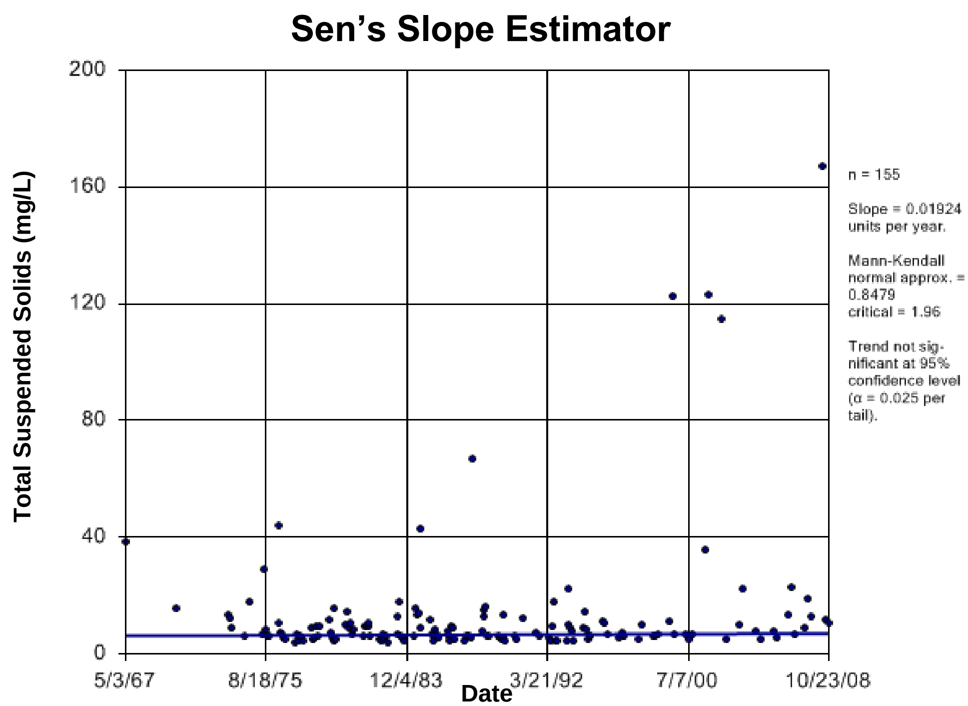

Figure 10-b11: Red Deer River (SK-MB) TSS Open Season Only

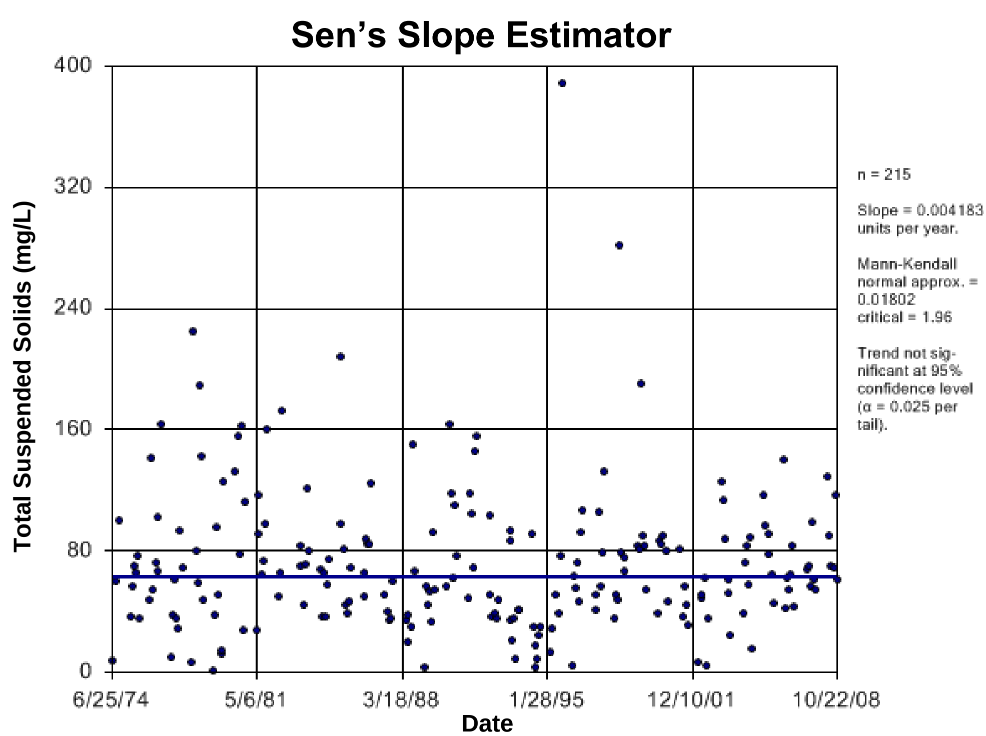

Figure 10-b12: Saskatchewan River TSS Open Season Only

Appendix 10-c: Trend Summary Table

Trend Analysis Summary - Flow Weighted Concentration Trend				
Total Suspended Solids – Open Season Only				
	Z Critical = 1.960			
River	n	Z Calc	p<0.05	Slope units/yr
Battle	262	7.024	Sig	0.8643
Beaver	232	3.408	Sig	0.1524
Cold	31	19[a]	Not Sig	0.009907
North Saskatchewan	147	-0.7855	Not Sig	-0.2564
Red Deer (AB-SK)	289	0.5262	Not Sig	0.239
South Saskatchewan	327	-0.4667	Not Sig	-0.08675
Assiniboine	253	2.791	Sig	0.217
Carrot	227	2.62	Sig	0.3556
Churchill	135	1.886	Not Sig	0.01633
Qu'Appelle	213	2.047	Sig	0.5299
Red Deer (SK-MB)	155	0.8479	Not Sig	0.01924
Saskatchewan	215	0.01802	Not Sig	0.004183

Superscript
a: Z critical for Cold River is 117.

Appendix 10-d: 10^{th} and 90^{th} Percentiles

Total Suspended Solids (TSS) Percentiles				
	Open Season Only 1974-2008			
River	**5th Percentile**	**10th Percentile***	**90th Percentile***	**95th Percentile**
Battle	3.90	5.00	320.00	532.00
Beaver	2.00	3.00	48.76	77.55
Cold	0.53	1.16	4.80	7.35
North Saskatchewan	4.09	5.04	295.80	466.85
Red Deer (AB-SK)	24.84	30.00	832.60	1642.70
South Saskatchewan	3.12	5.64	339.80	554.20
Assiniboine	3.00	5.00	69.20	87.40
Carrot	3.96	6.08	98.16	147.70
Churchill	2.00	2.20	6.20	7.00
Qu'Appelle	18.00	22.60	122.20	144.40
Red Deer (SK-MB)	0.50	1.00	19.70	41.20
Saskatchewan	9.50	27.00	125.00	159.50

* The 10^{th} and 90^{th} percentiles of the open season only from 1974 onwards were chosen by PPWB as a range for the background objectives.

Appendix 2: Day of Year Charts for Nutrients, TDS, & TSS

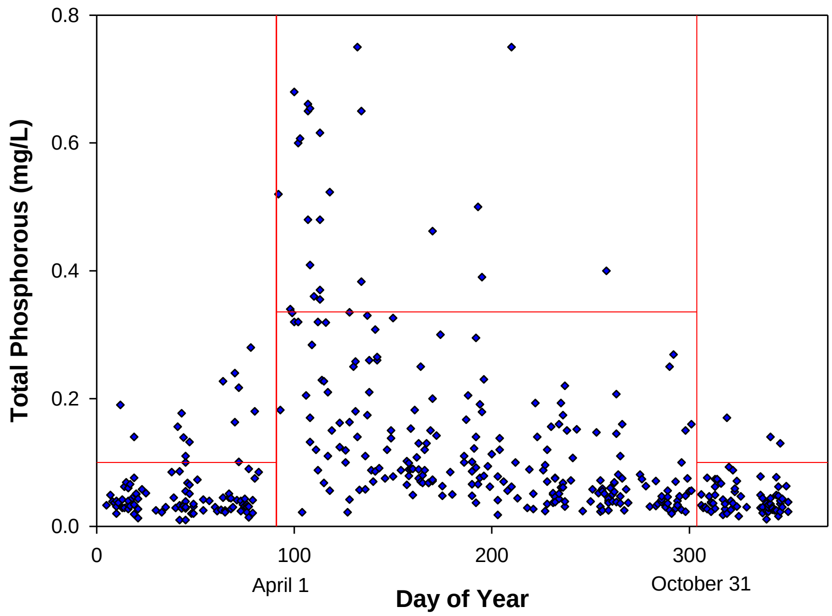

Figure 2-1: Battle River Total Phosphorous

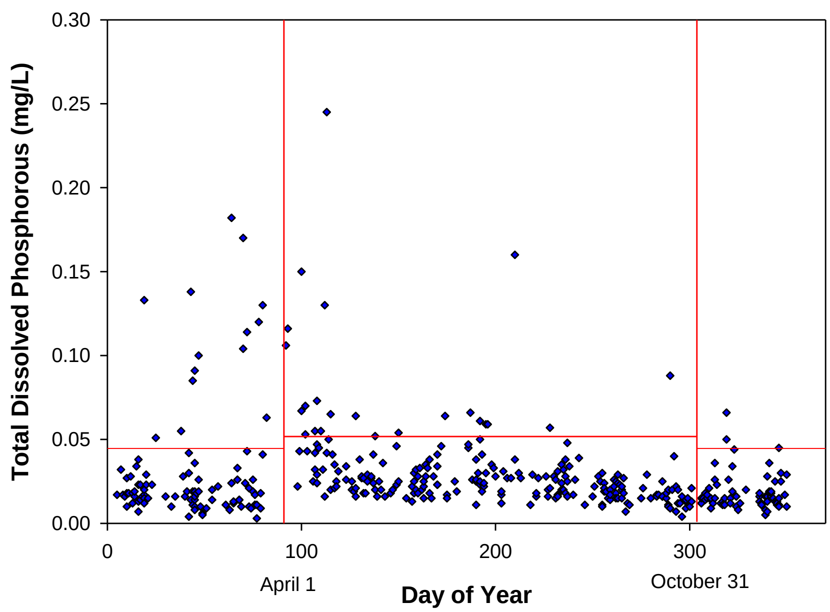

Figure 2-2: Battle River Total Dissolved Phosphorous

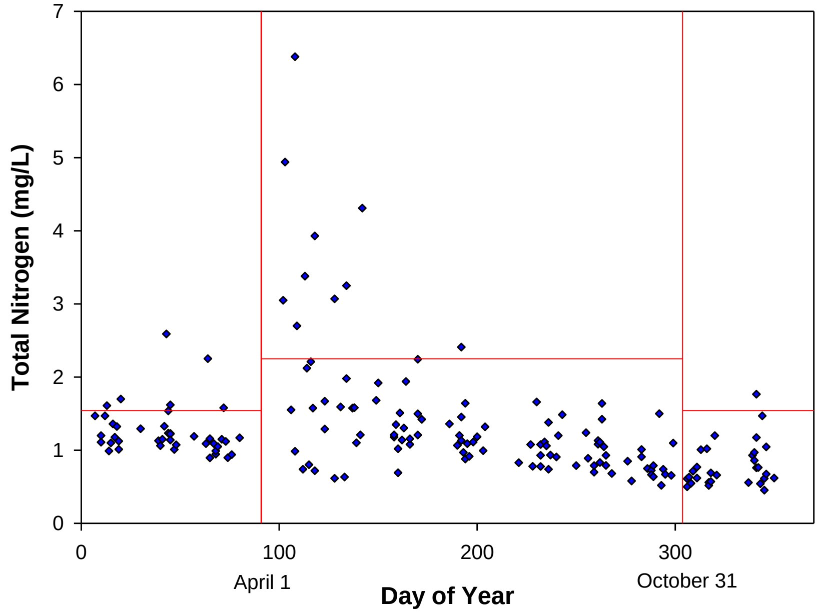

Figure 2-3: Battle River Total Nitrogen

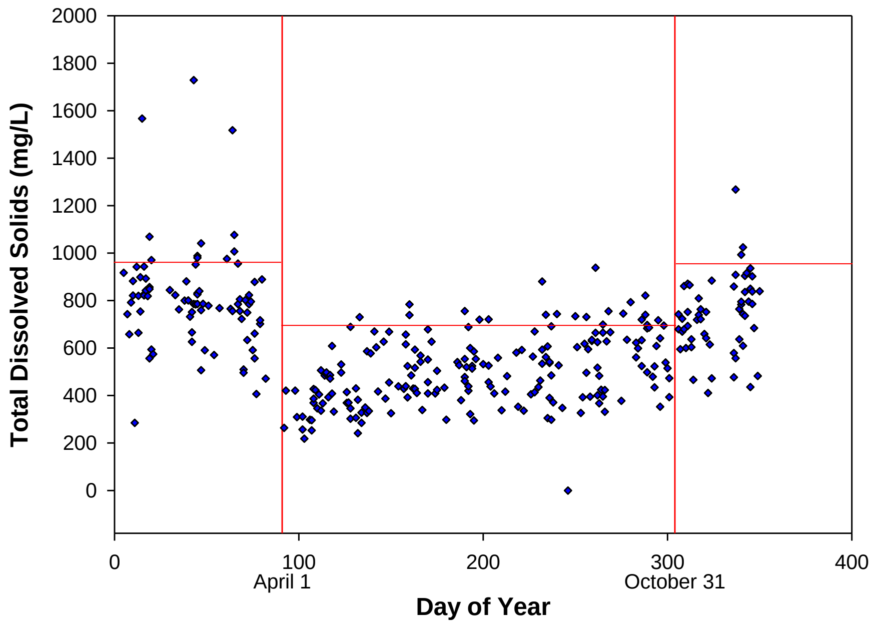

Figure 2-4: Battle River Total Dissolved Solids (TDS)

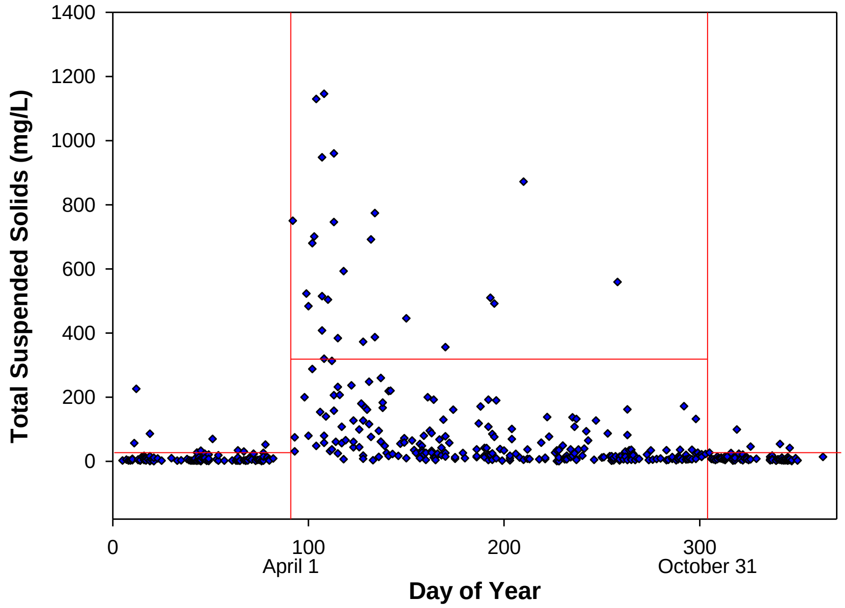

Figure 2-5: Battle River Total Suspended Solids (TSS)

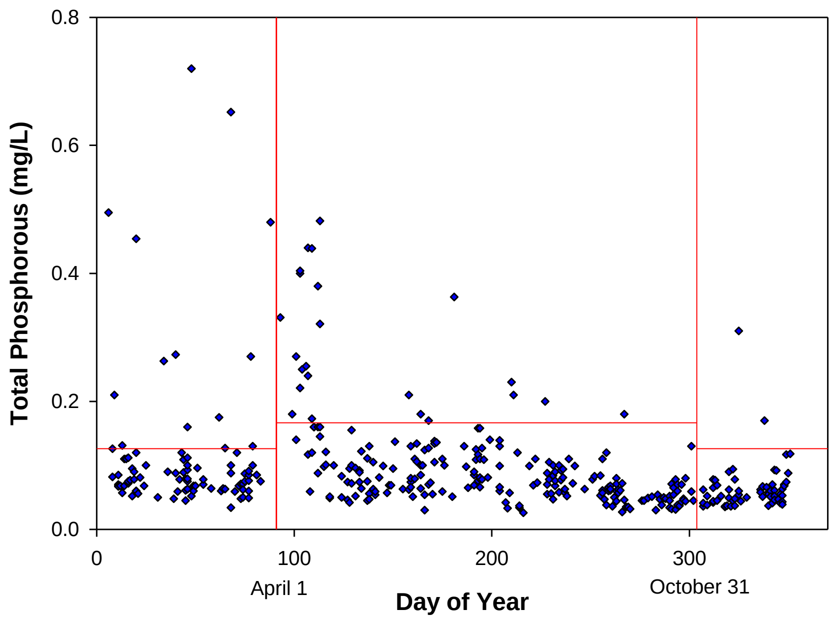

Figure 2-6: Beaver River Total Phosphorous

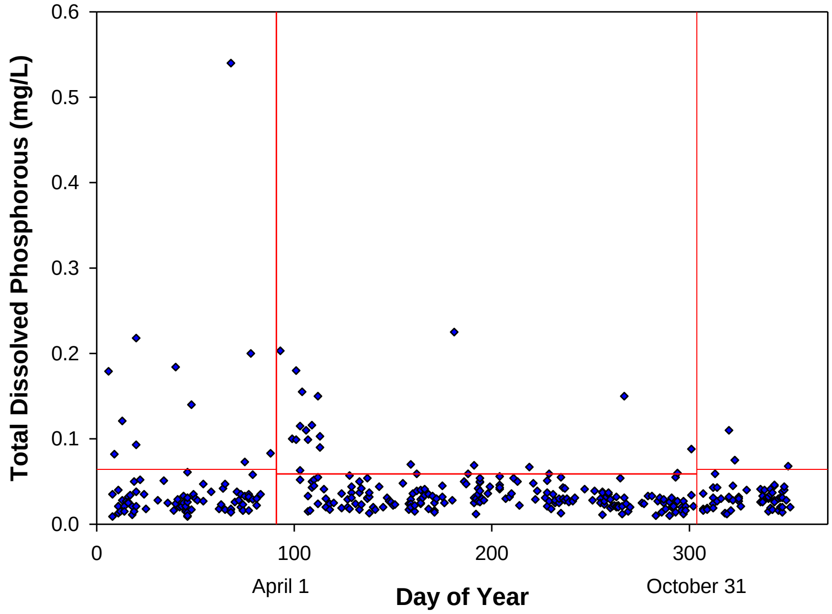

Figure 2-7: Beaver River Total Dissolved Phosphorous

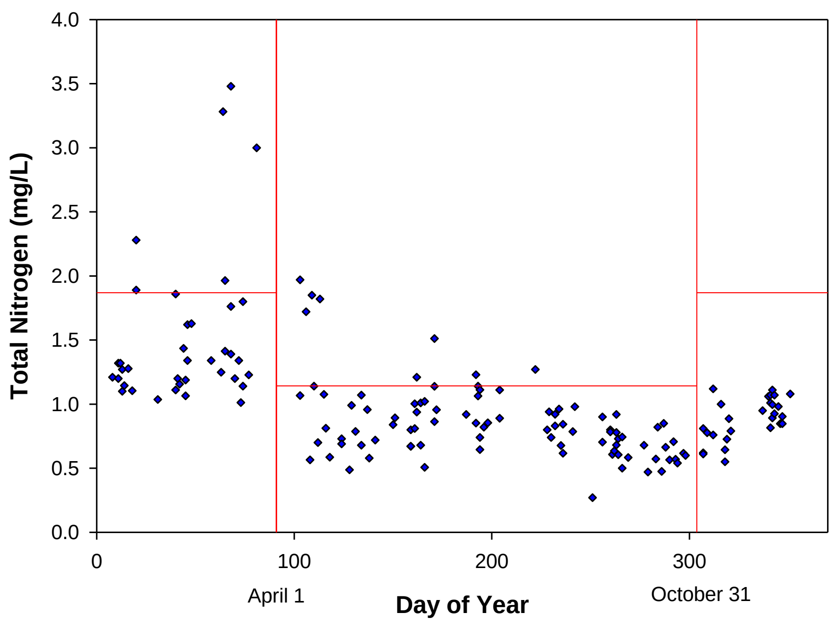

Figure 2-8: Beaver River Total Nitrogen

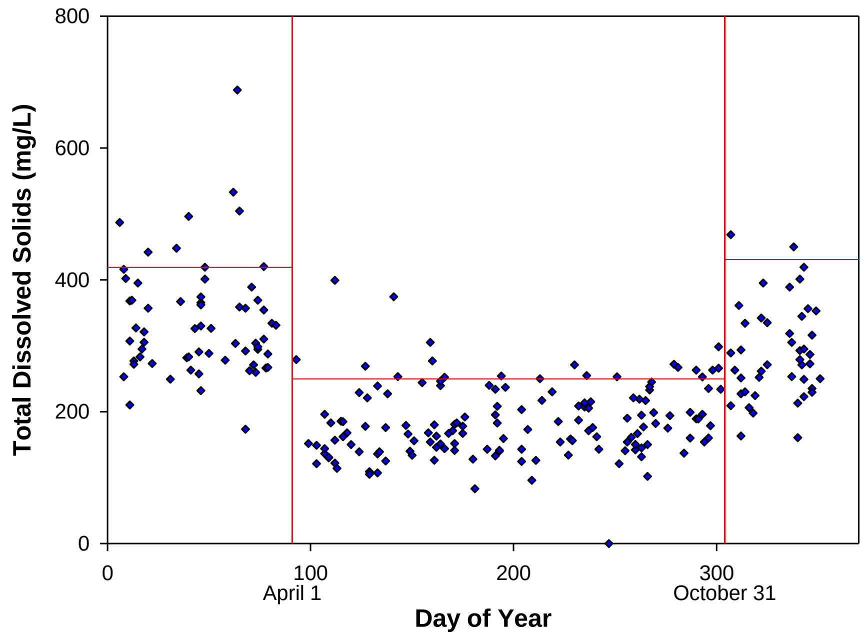

Figure 2-9: Beaver River Total Dissolved Solids (TDS)

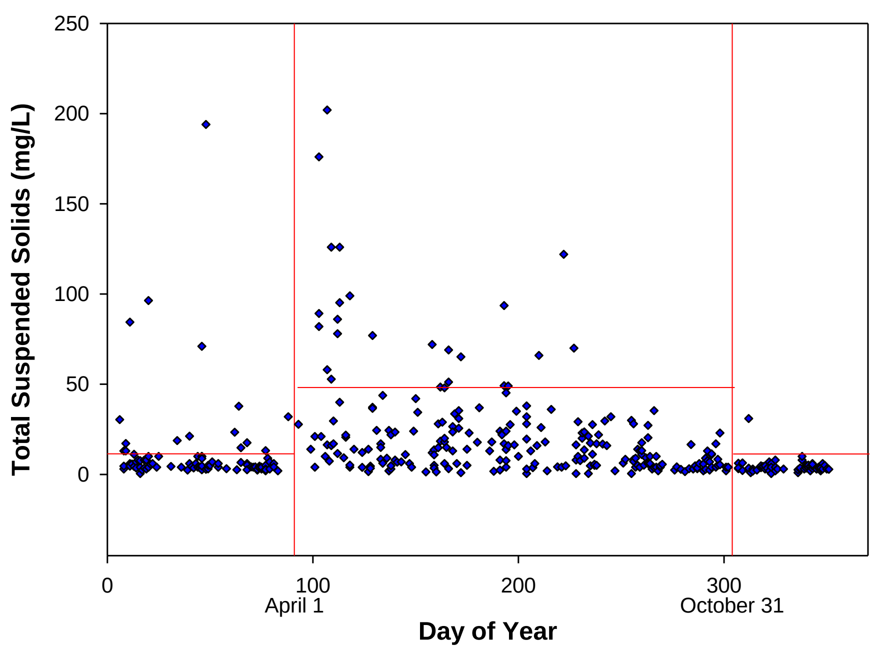

Figure 2-10: Beaver River Total Suspended Solids (TSS)

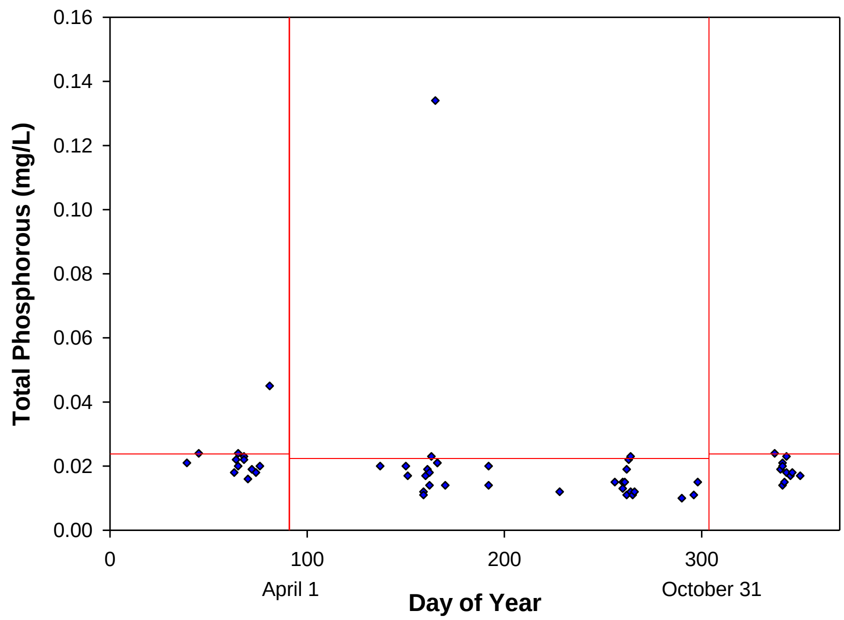

Figure 2-11: Cold River Total Phosphorous

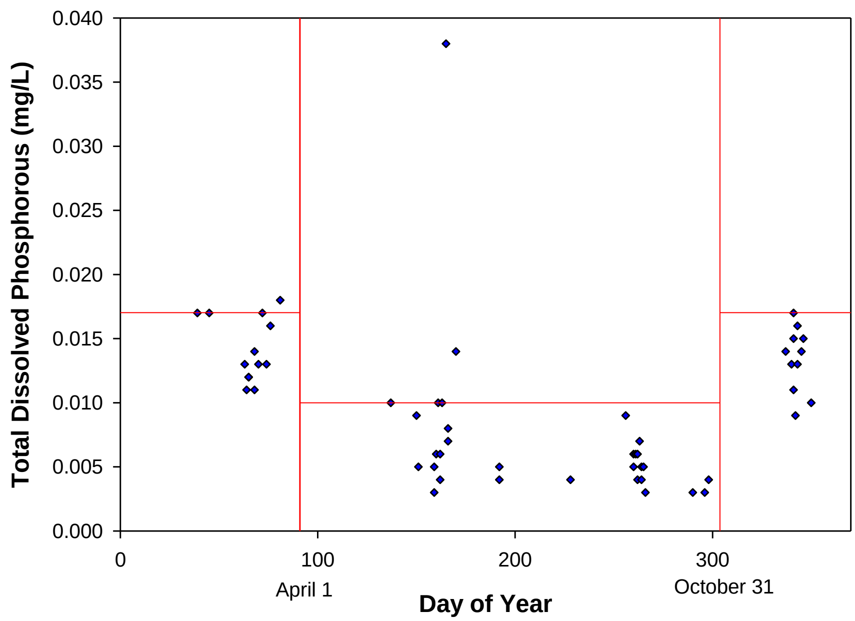

Figure 2-12: Cold River Total Dissolved Phosphorous

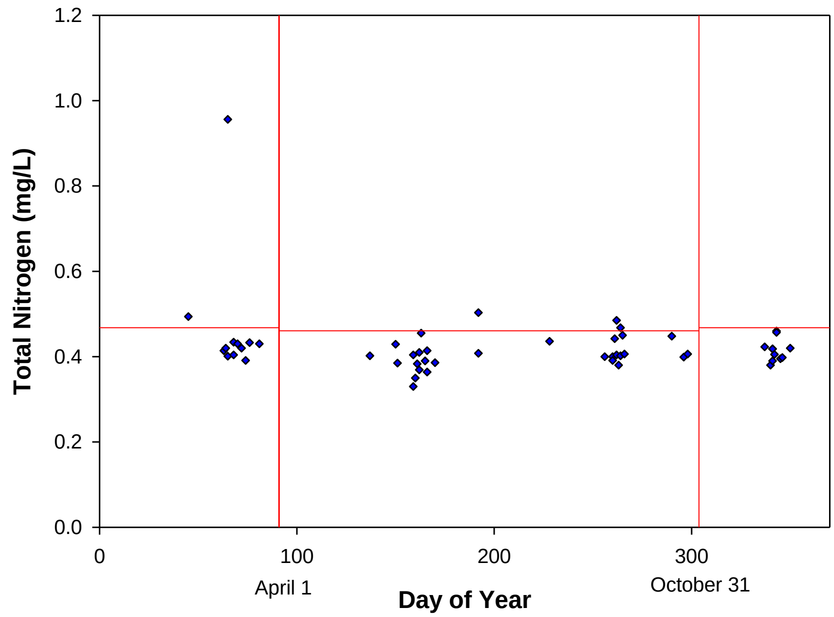

Figure 2-13: Cold River Total Nitrogen

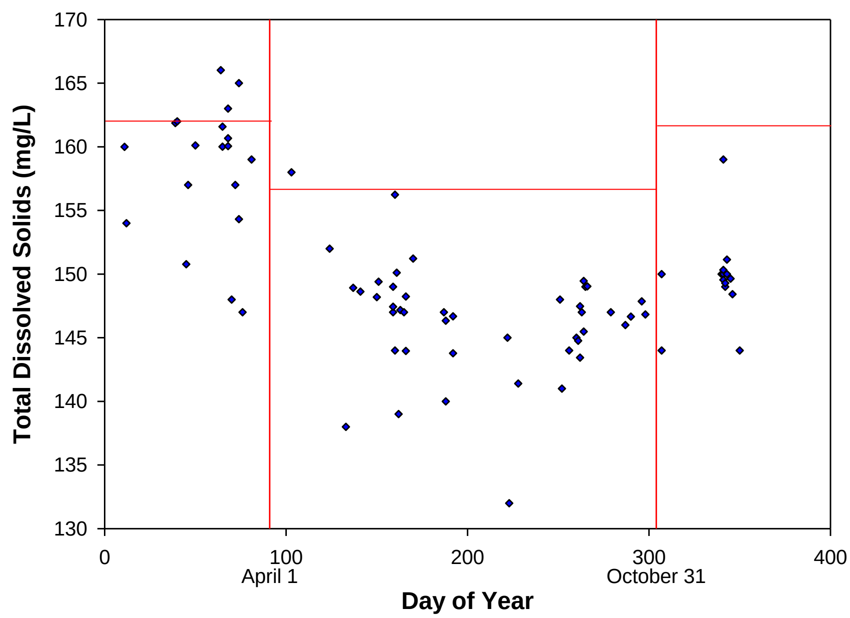

Figure 2-14: Cold River Total Dissolved Solids (TDS)

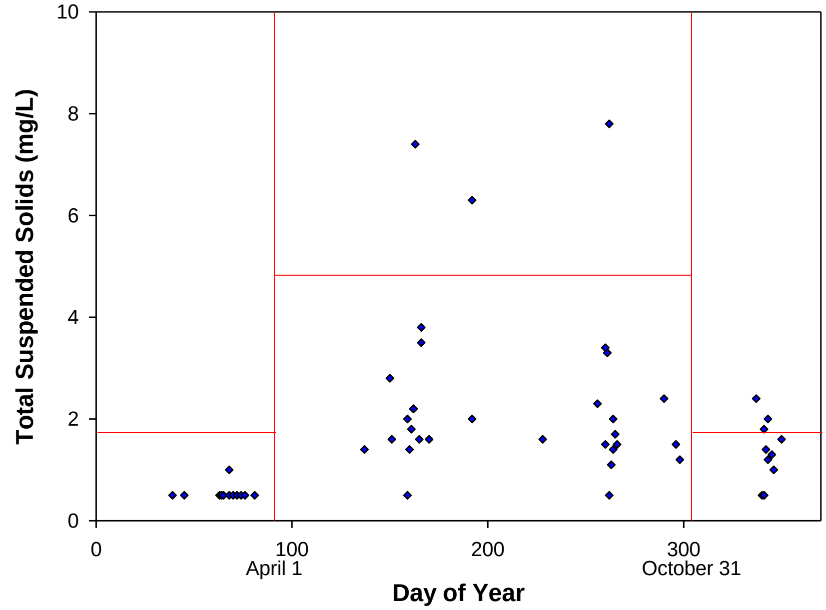

Figure 2-15: Cold River Total Suspended Solids (TSS)

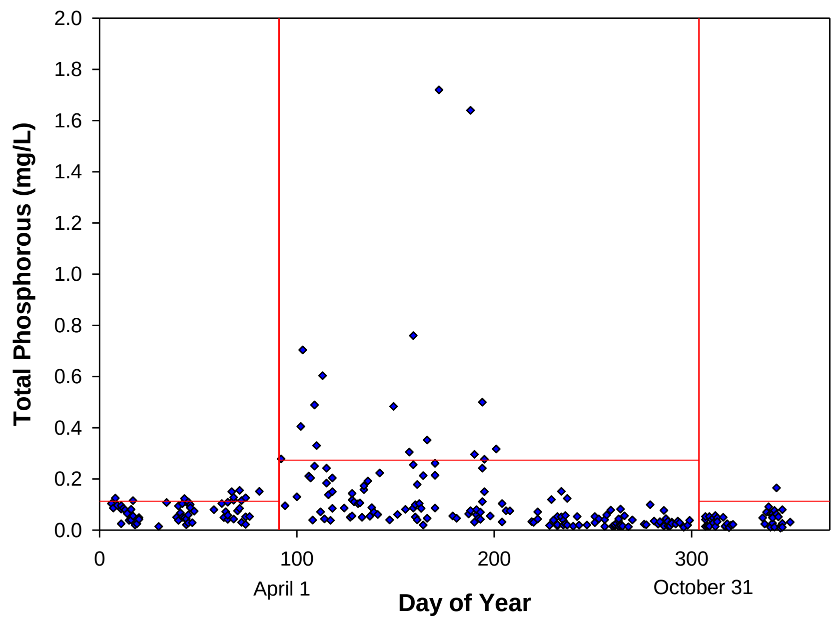

Figure 2-16: North Saskatchewan River Total Phosphorous

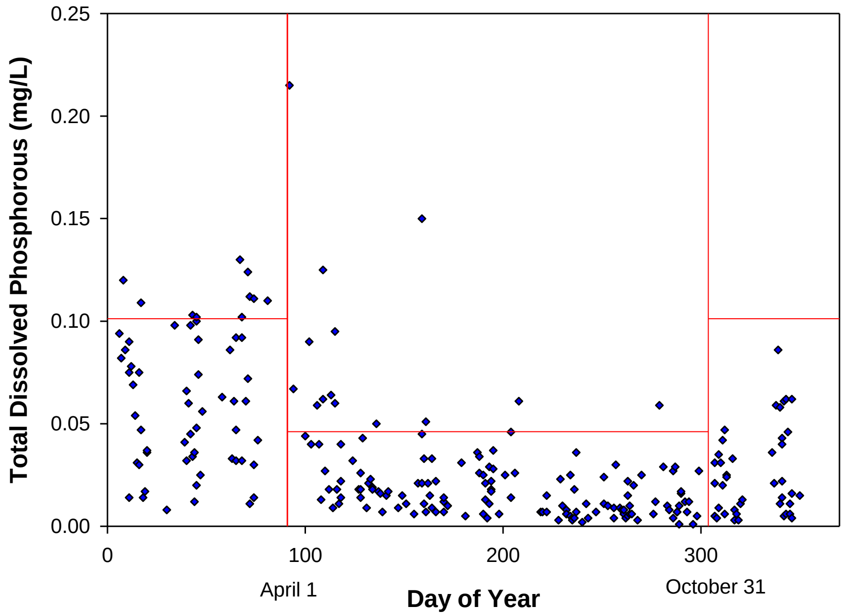

Figure 2-17: North Saskatchewan River Total Dissolved Phosphorous

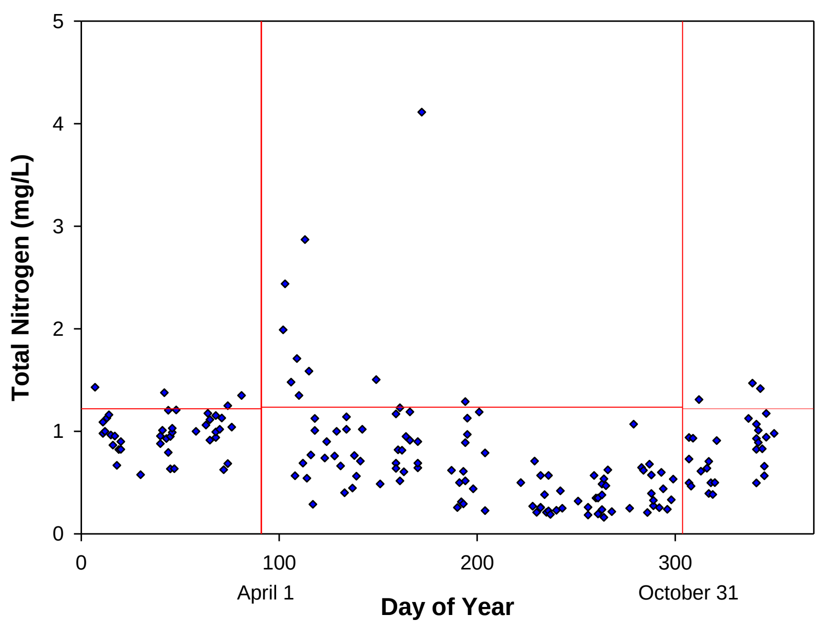

Figure 2-18: North Saskatchewan River Total Nitrogen

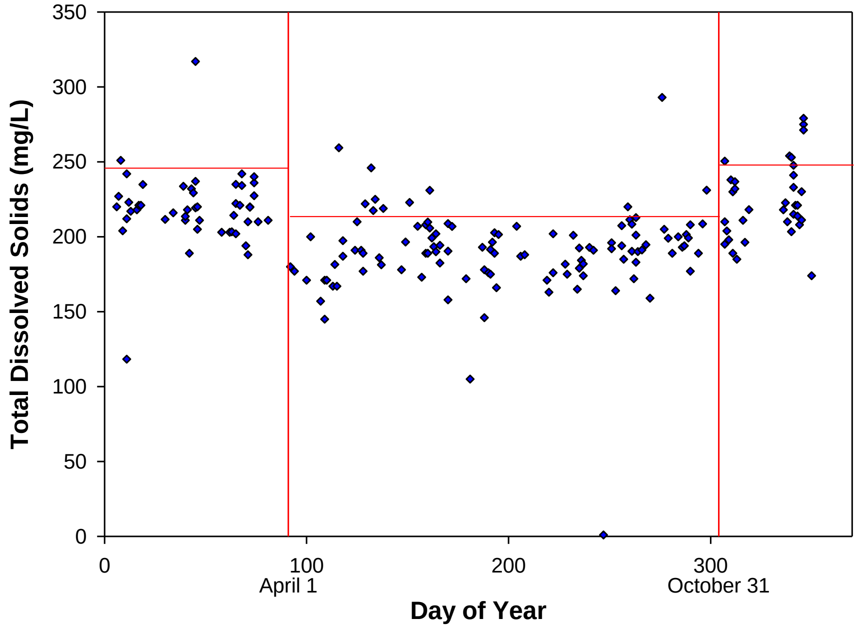

Figure 2-19: North Saskatchewan River Total Dissolved Solids (TDS)

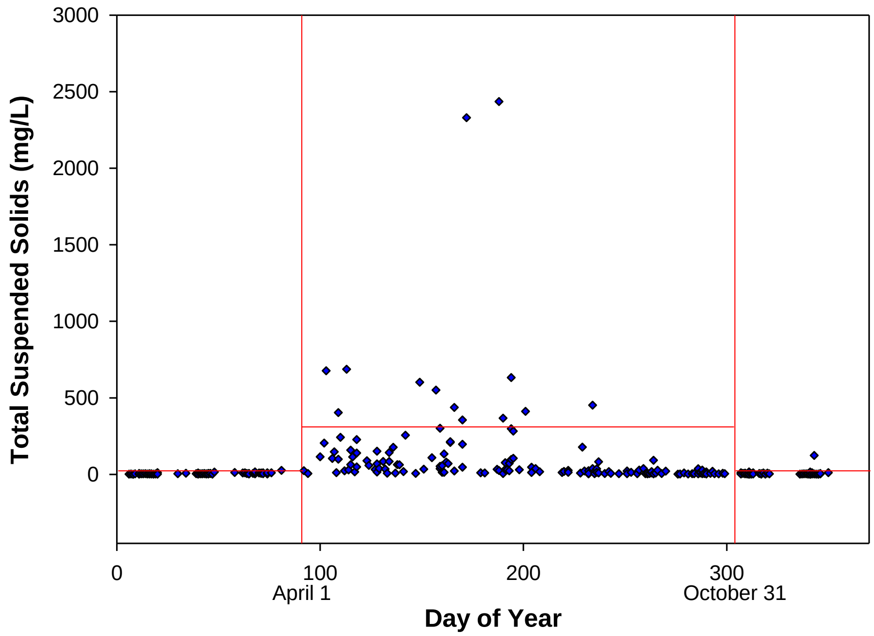

Figure 2-20: North Saskatchewan River Total Suspended Solids (TSS)

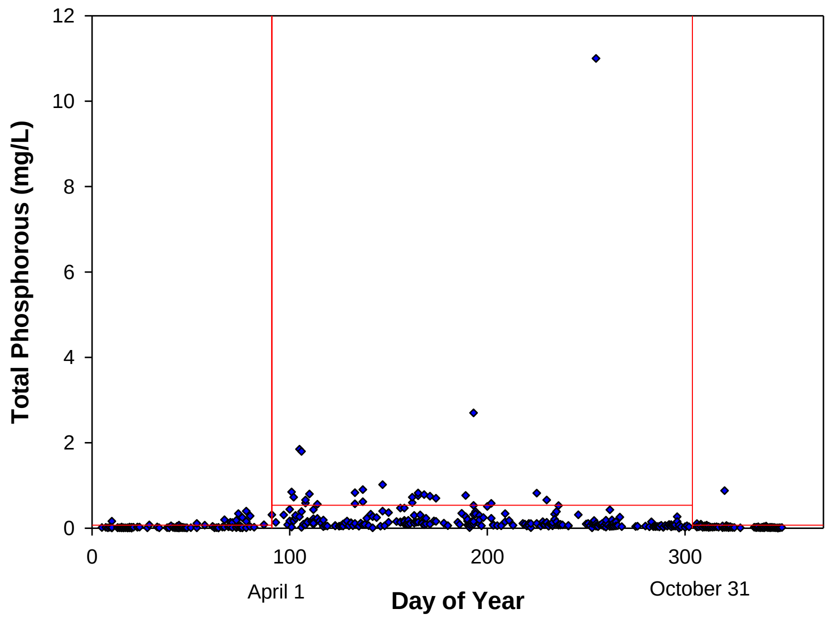

Figure 2-21: Red Deer River (AB-SK) Total Phosphorous

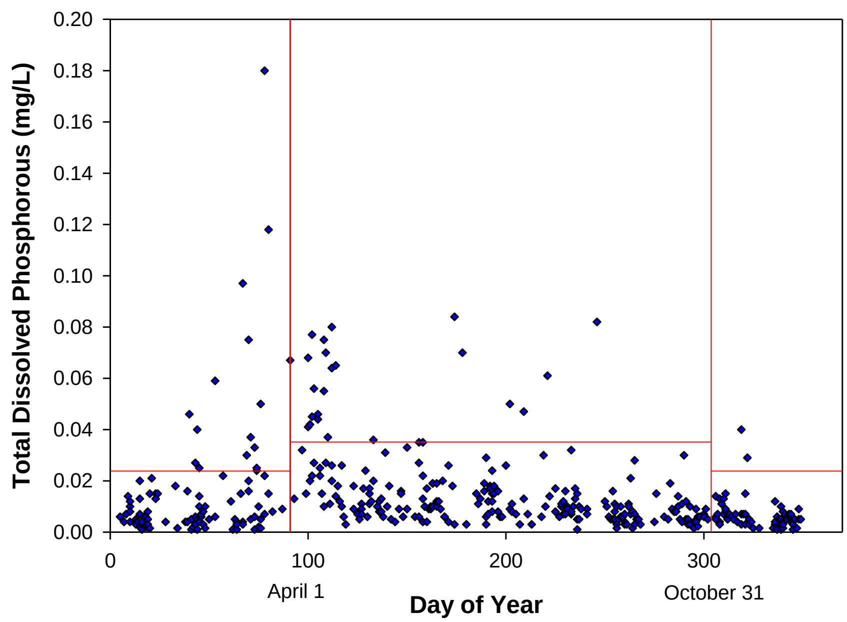

Figure 2-22: Red Deer River (AB-SK) Total Dissolved Phosphorous

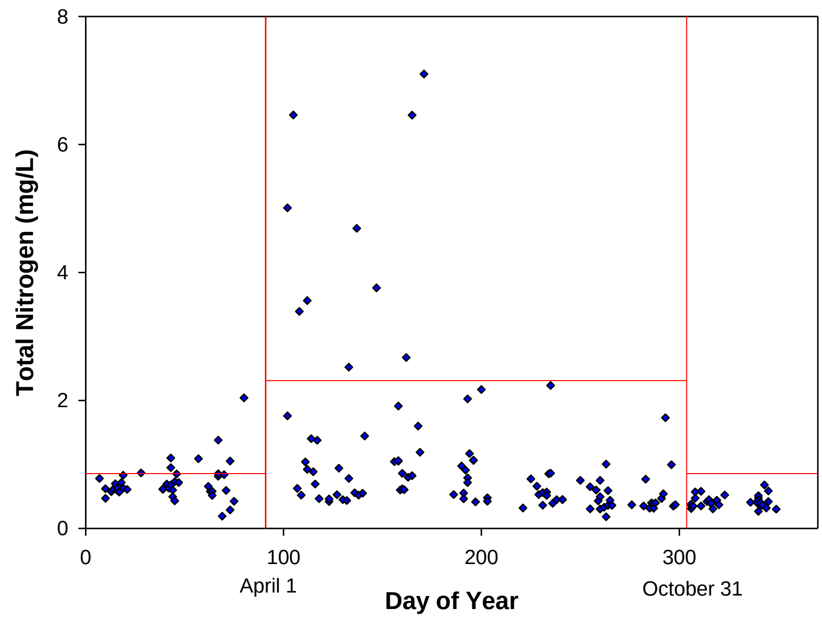

Figure 2-23: Red Deer River (AB-SK) Total Nitrogen

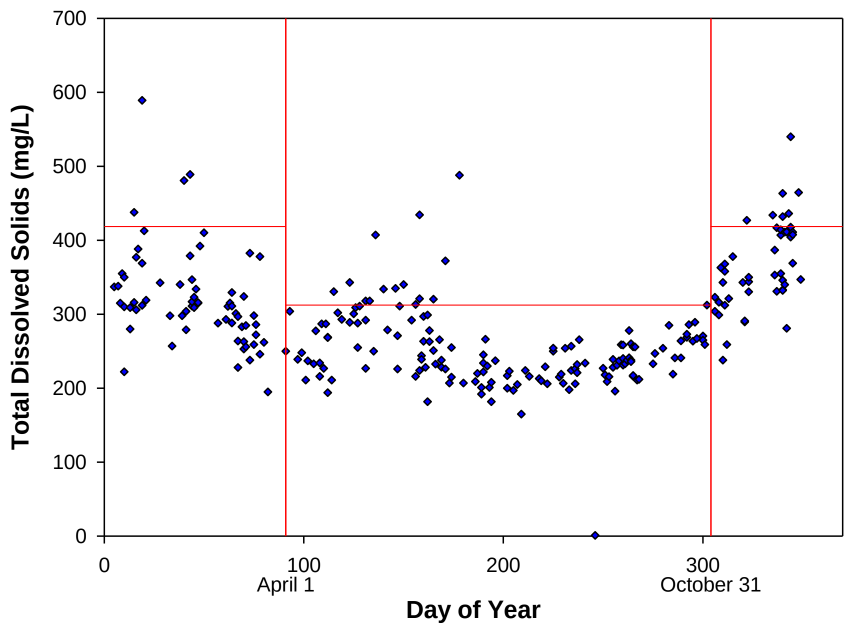

Figure 2-24: Red Deer River (AB-SK) Total Dissolved Solids (TDS)

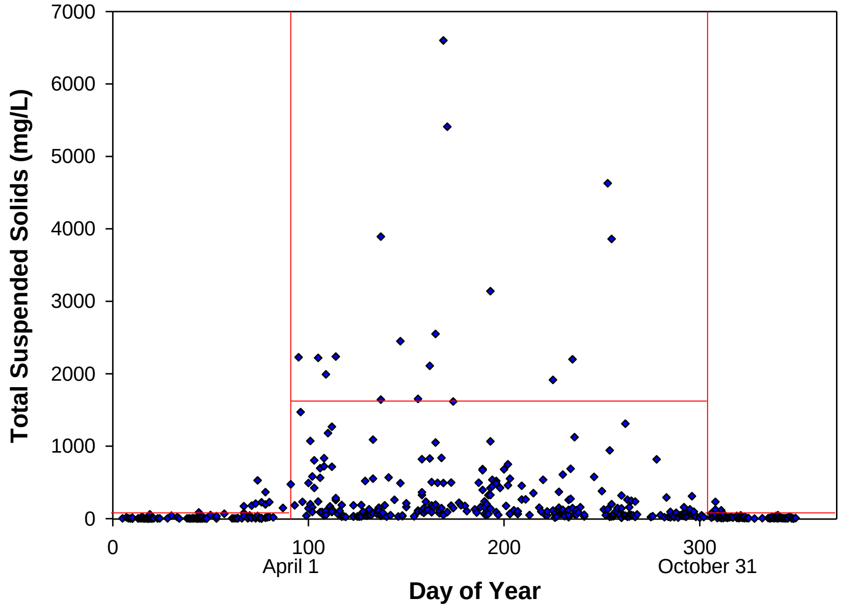

Figure 2-25: Red Deer River (AB-SK) Total Suspended Solids (TSS)

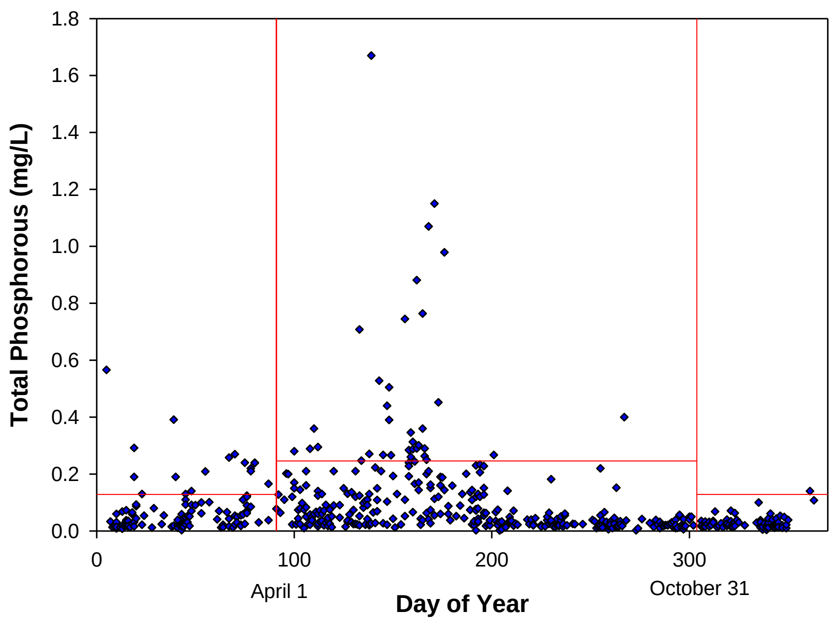

Figure 2-26: South Saskatchewan River Total Phosphorous

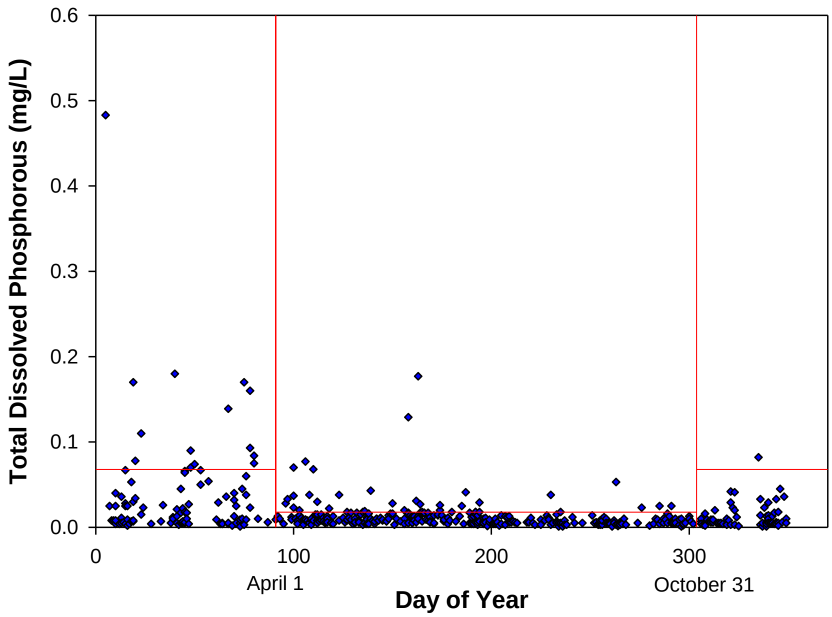

Figure 2-27: South Saskatchewan River Total Dissolved Phosphorous

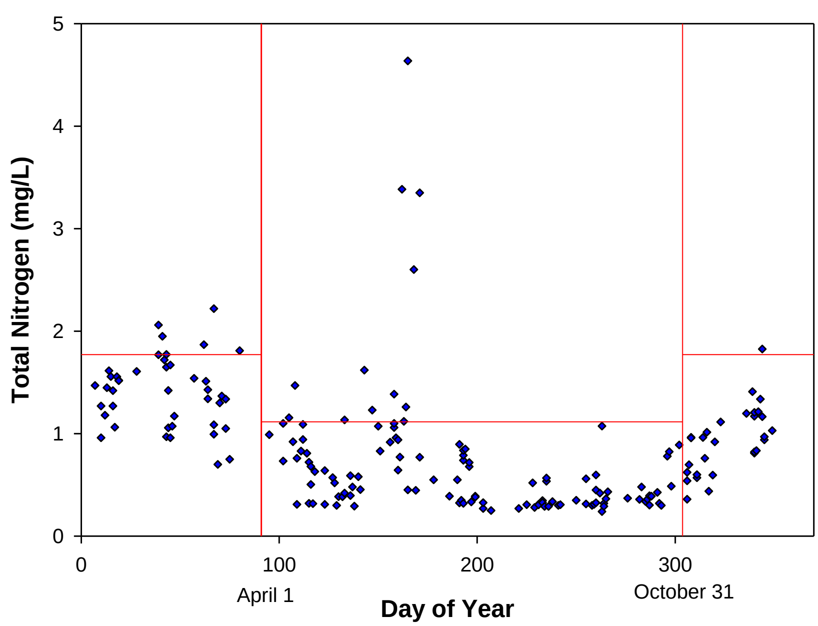

Figure 2-28: South Saskatchewan River Total Nitrogen

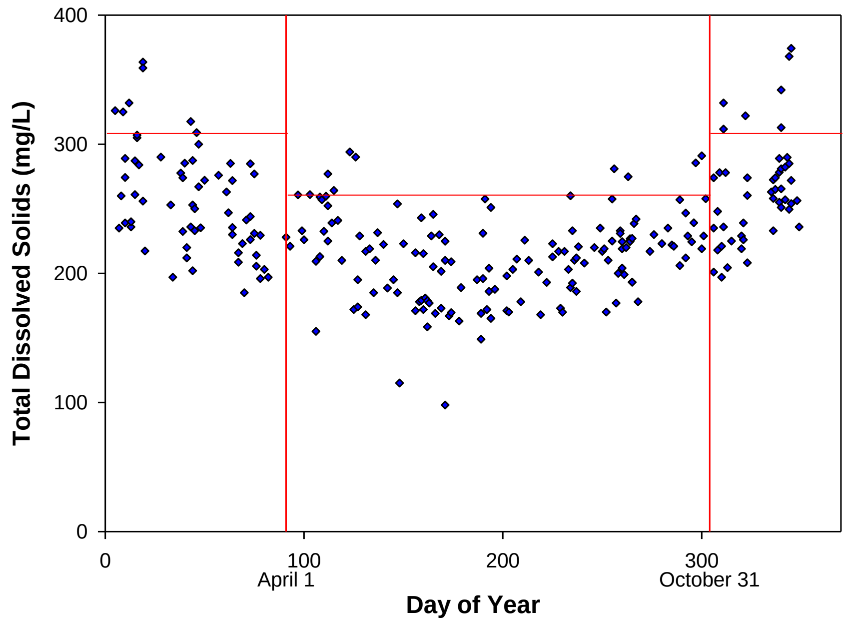

Figure 2-29: South Saskatchewan River Total Dissolved Solids (TDS)

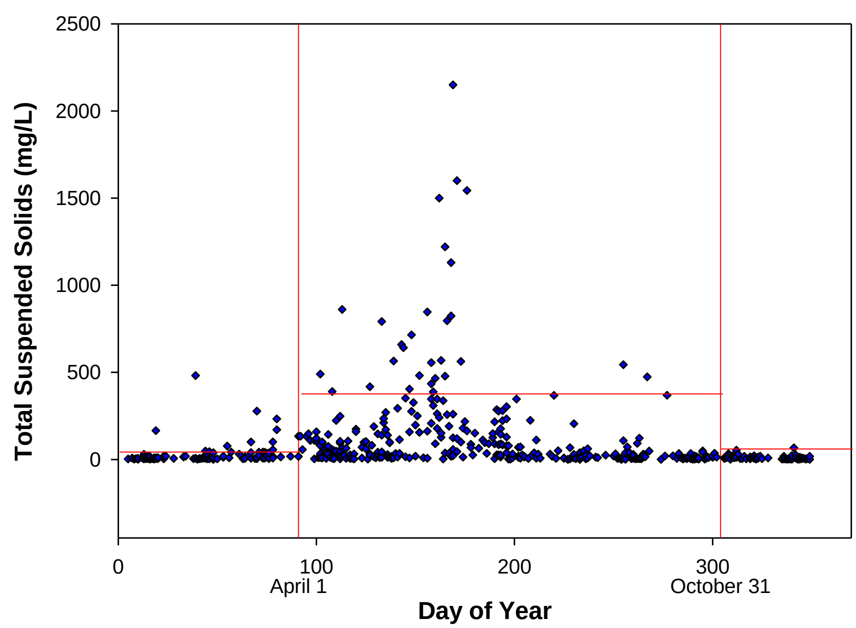

Figure 2-30: South Saskatchewan River Total Suspended Solids (TSS)

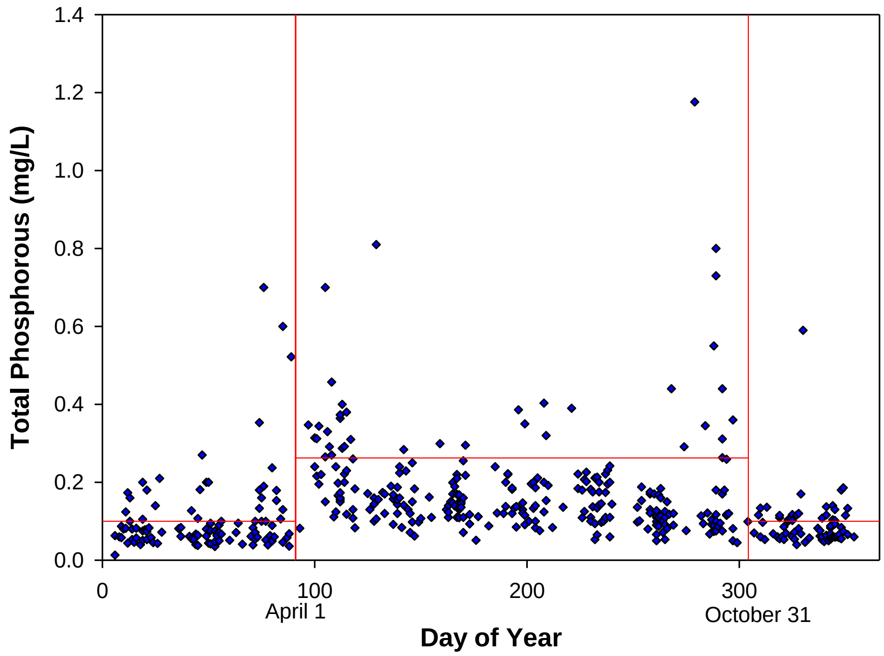

Figure 2-31: Assiniboine River Total Phosphorous

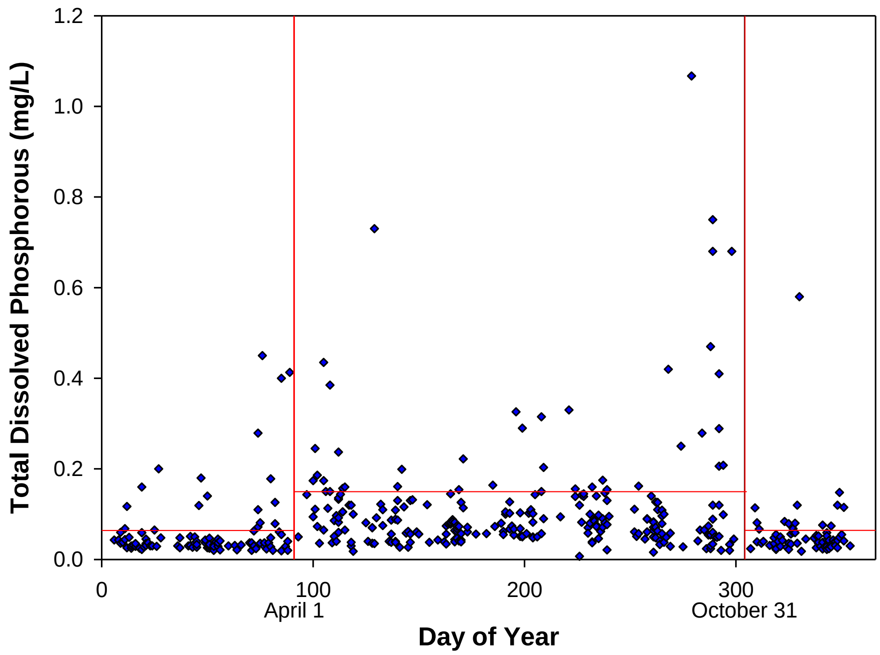

Figure 2-32: Assiniboine River Total Dissolved Phosphorous

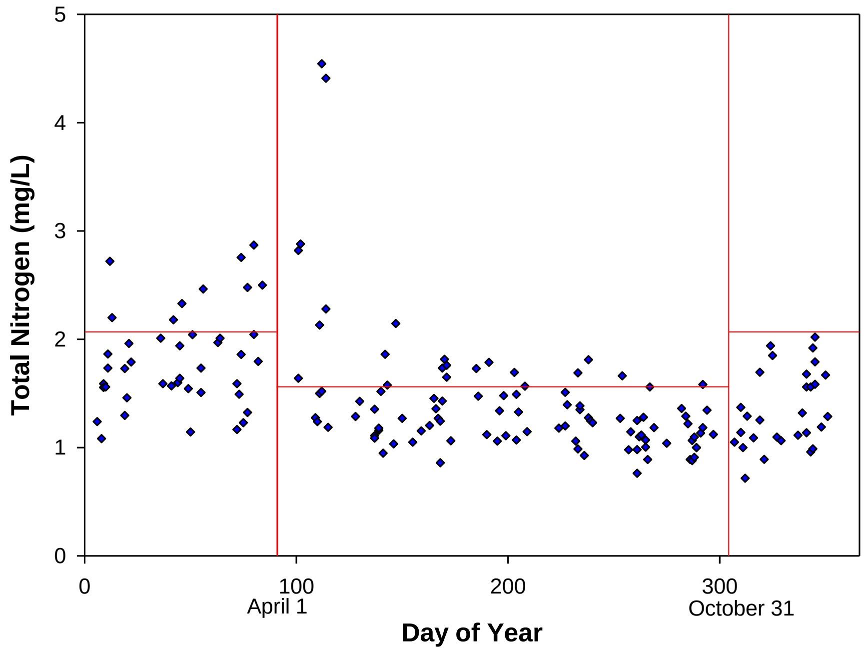

Figure 2-33: Assiniboine River Total Nitrogen

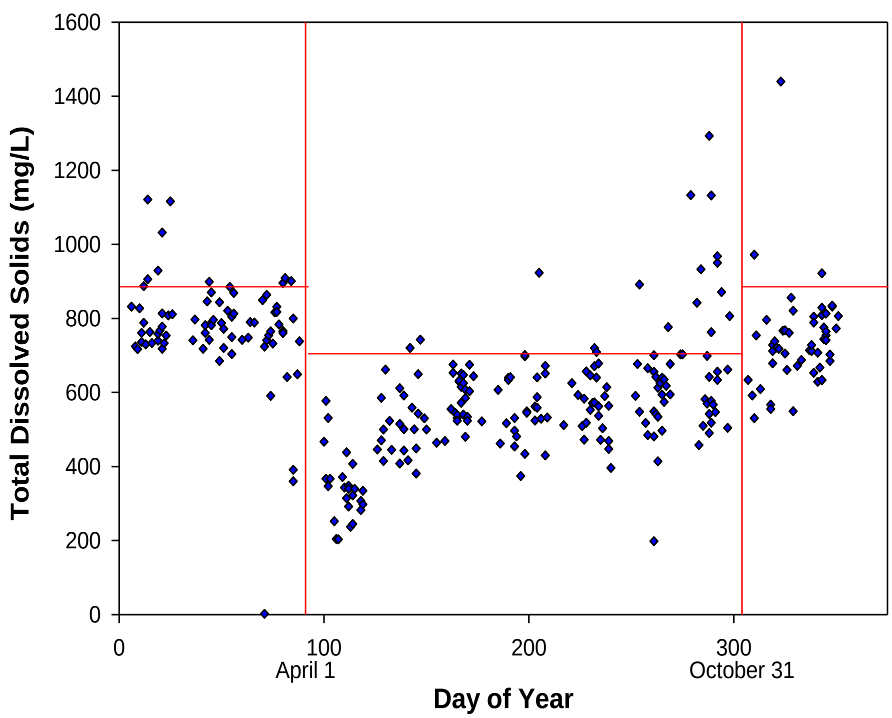

Figure 2-34: Assiniboine River Total Dissolved Solids (TDS)

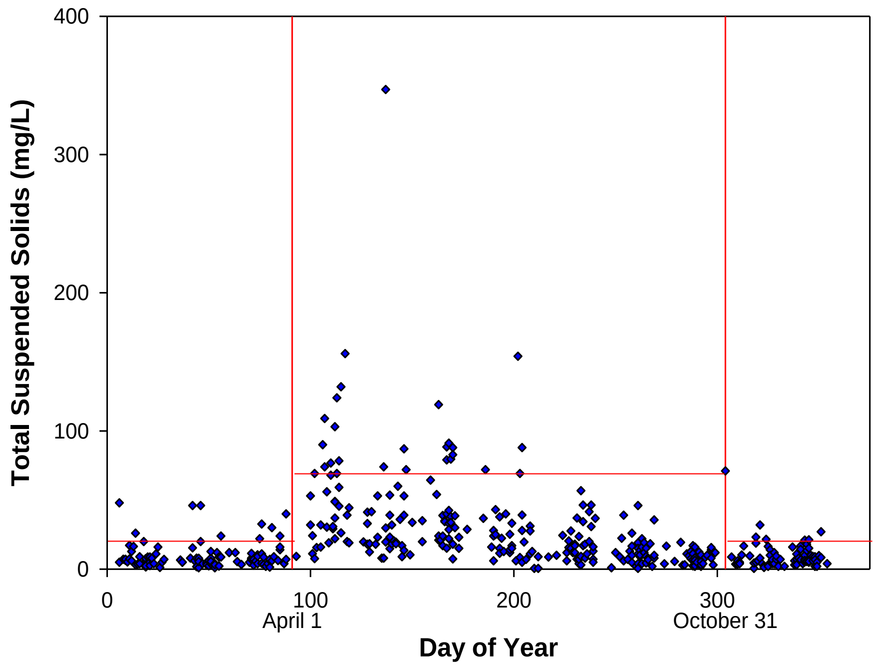

Figure 2-35: Assiniboine River Total Suspended Solids (TSS)

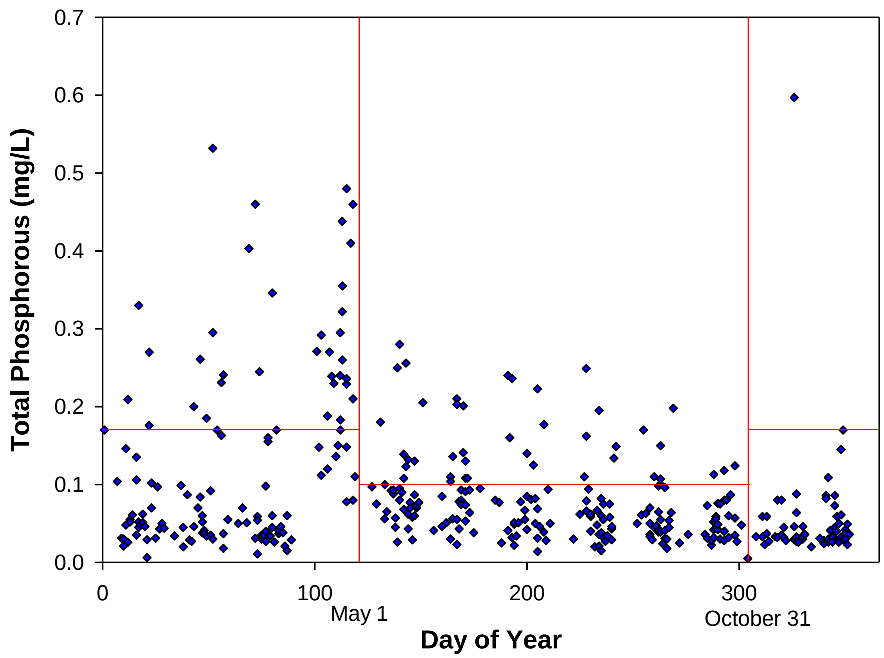

Figure 2-36: Carrot River Total Phosphorous

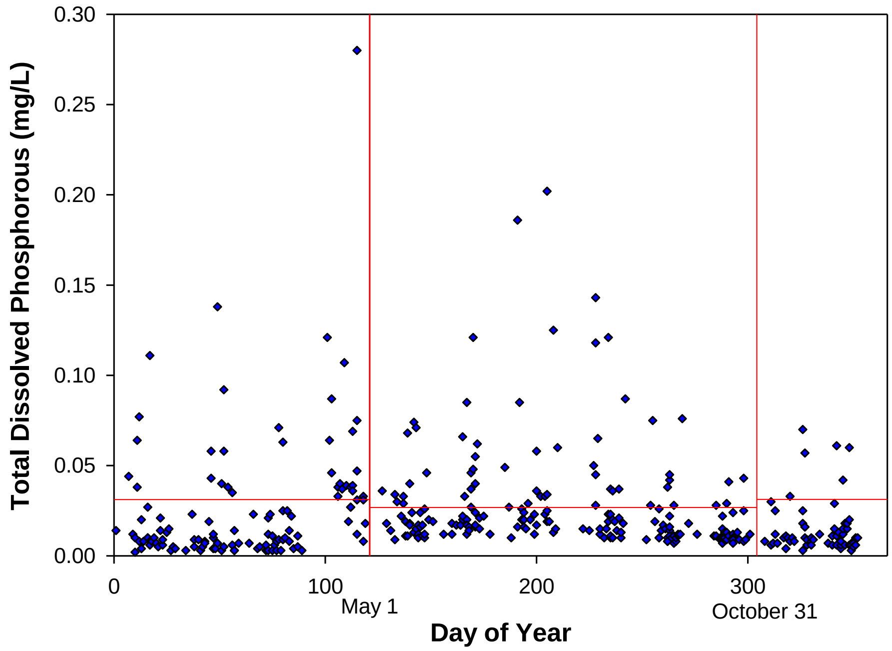

Figure 2-37: Carrot River Total Dissolved Phosphorous

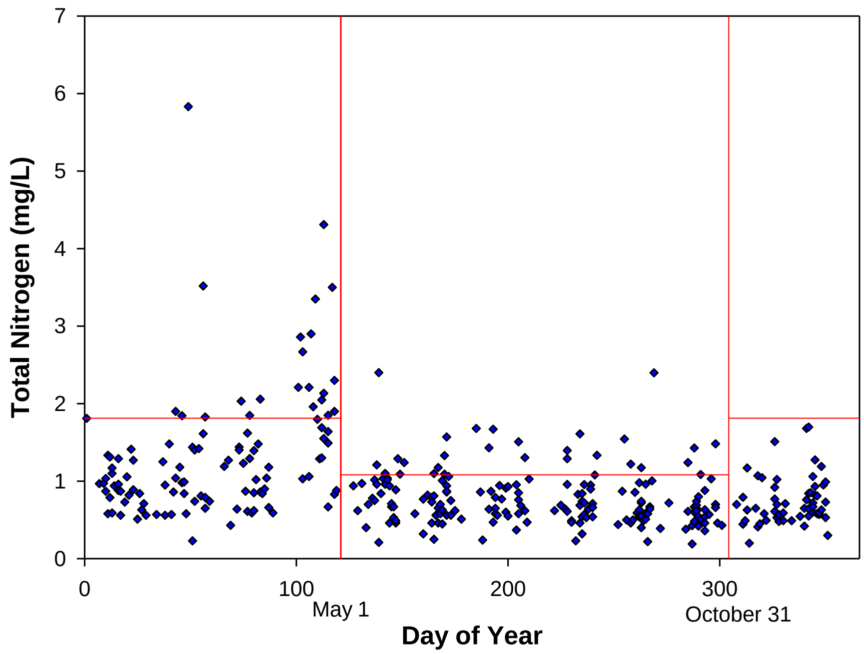

Figure 2-38: Carrot River Total Nitrogen

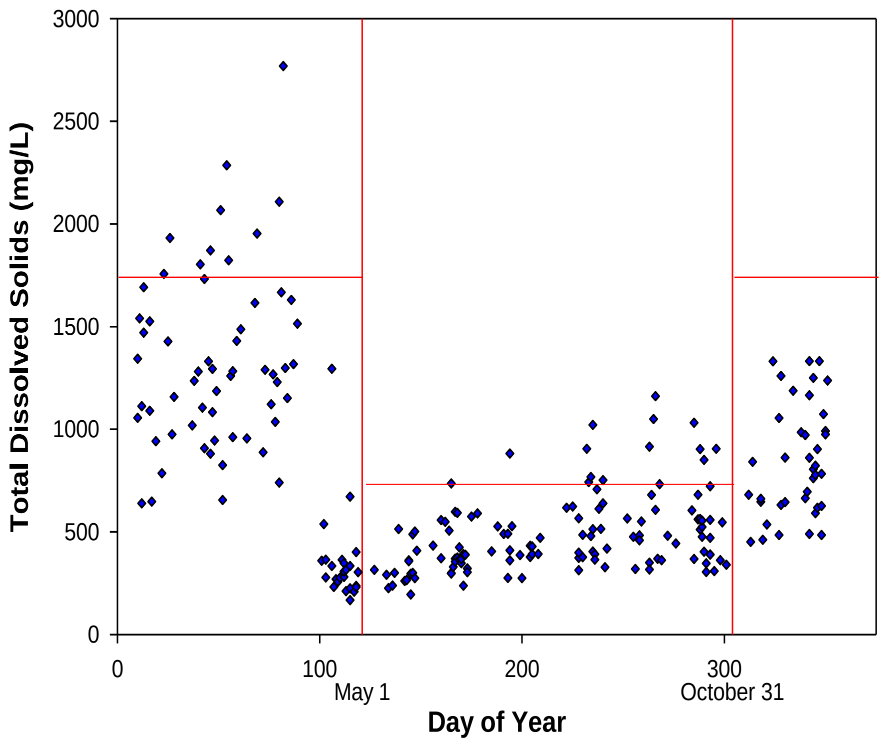

Figure 2-39: Carrot River Total Dissolved Solids (TDS)

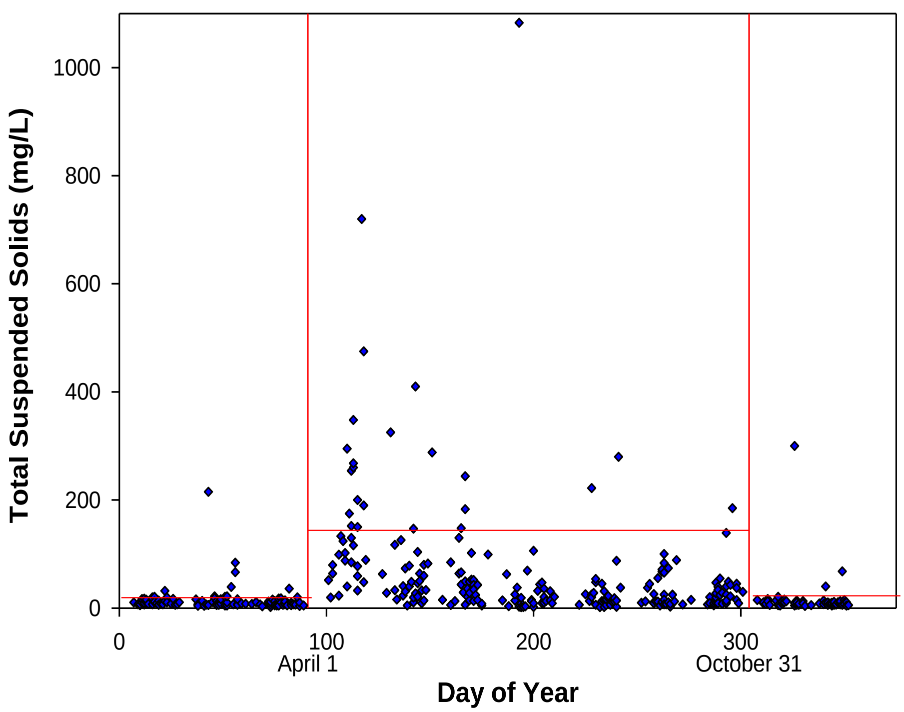

Figure 2-40: Carrot River Total Suspended Solids (TSS)

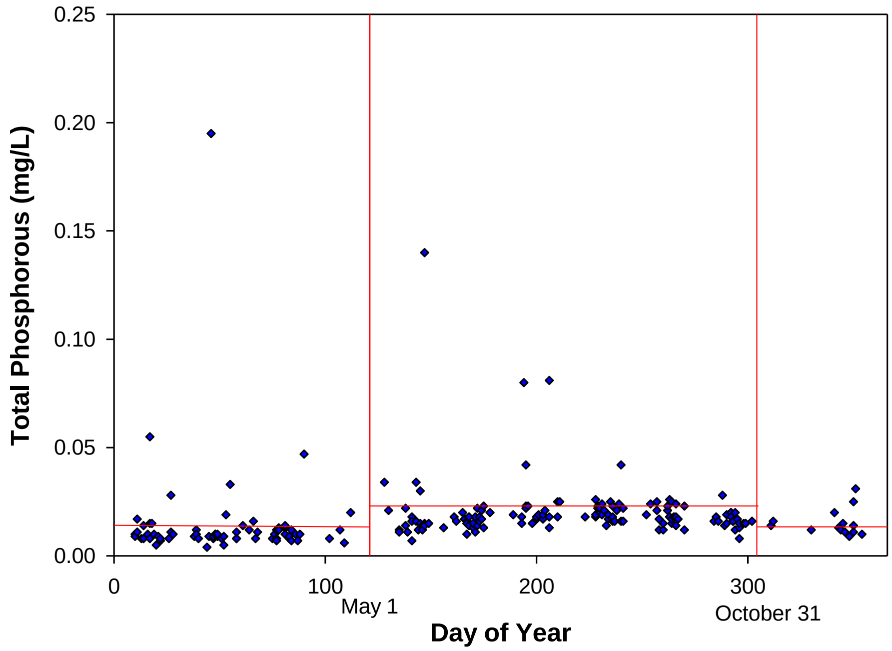

Figure 2-41: Churchill River Total Phosphorous

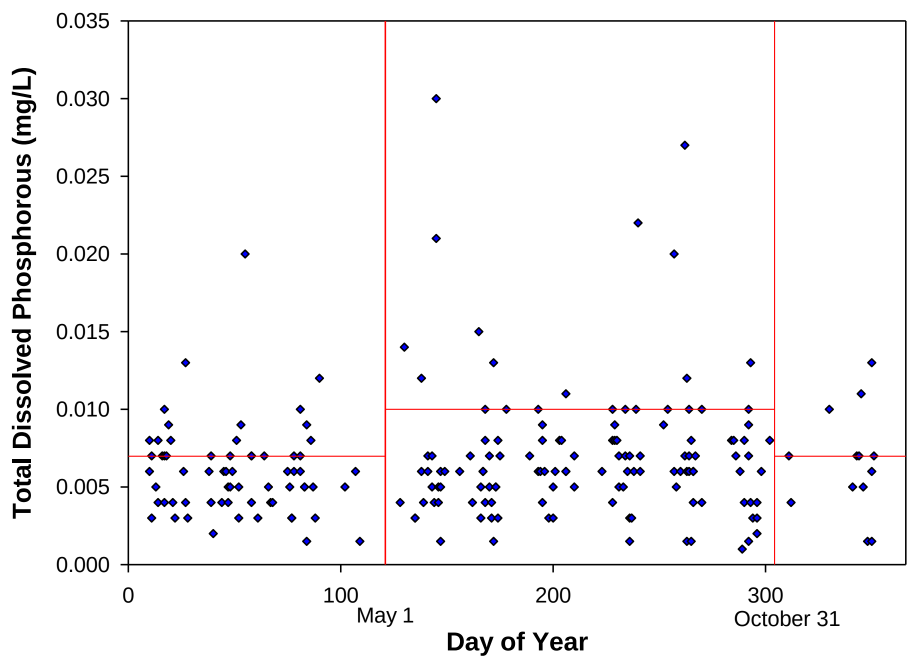

Figure 2-42: Churchill River Total Dissolved Phosphorous

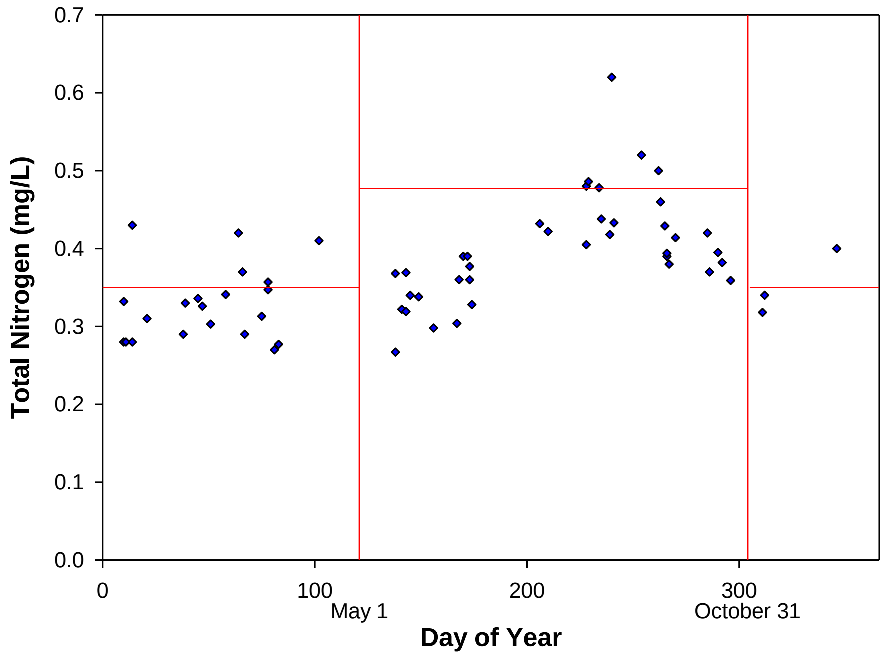

Figure 2-43: Churchill River Total Nitrogen

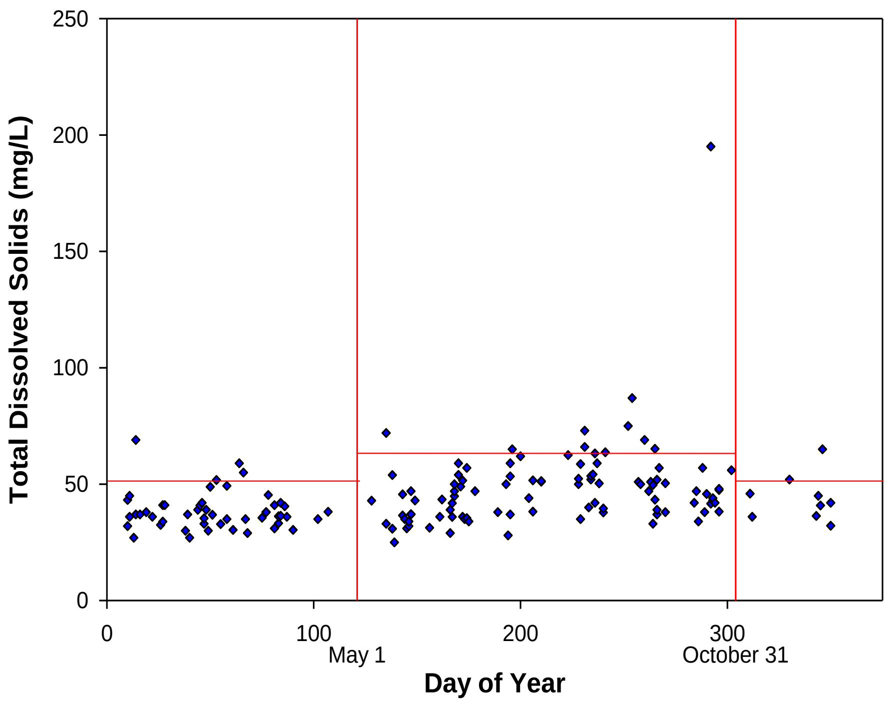

Figure 2-44: Churchill River Total Dissolved Solids (TDS)

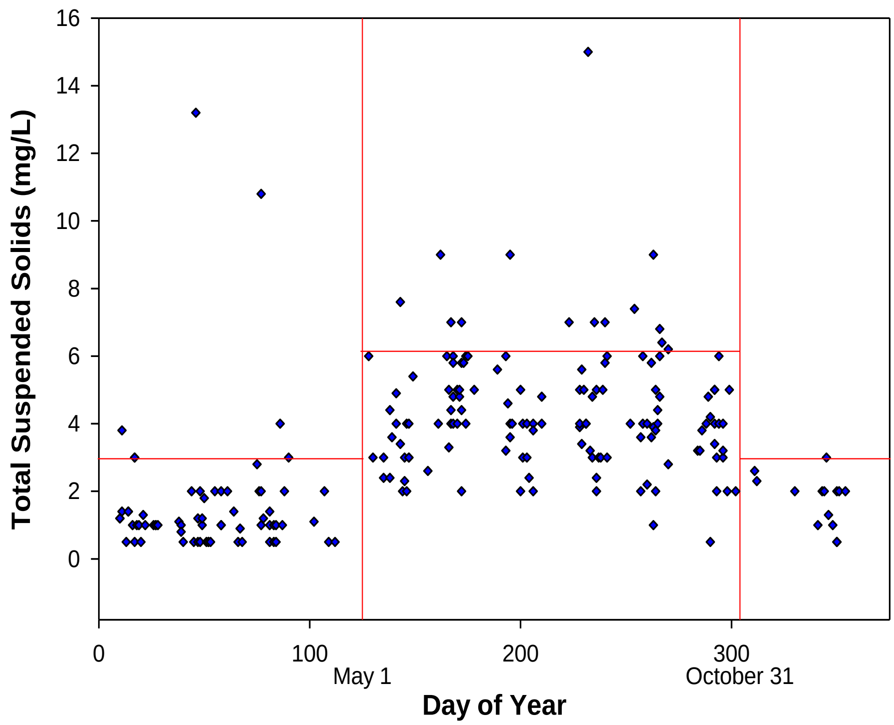

Figure 2-45: Churchill River Total Suspended Solids (TSS)

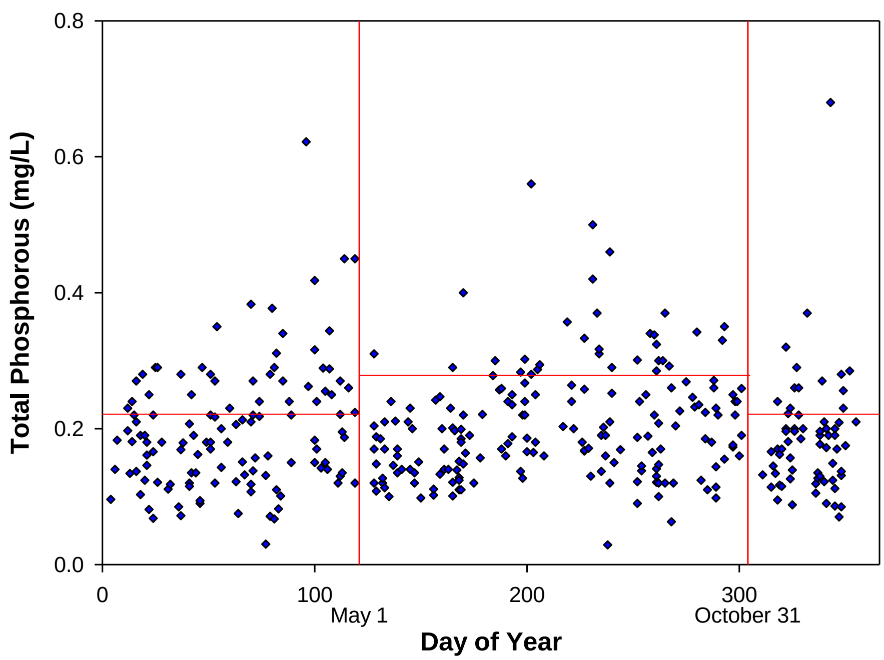

Figure 2-46: Qu'Appelle River Total Phosphorous

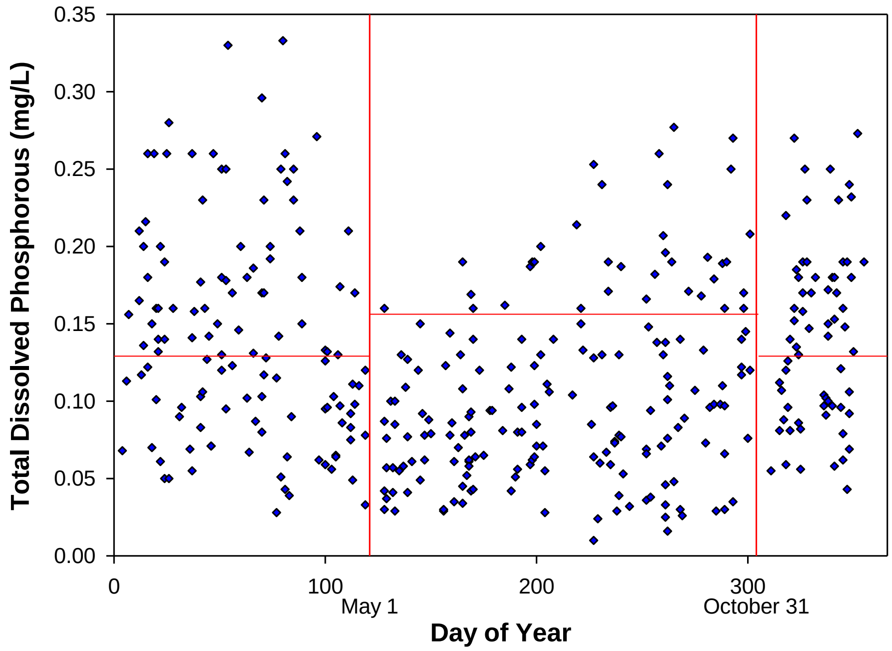

Figure 2-47: Qu'Appelle River Total Dissolved Phosphorous

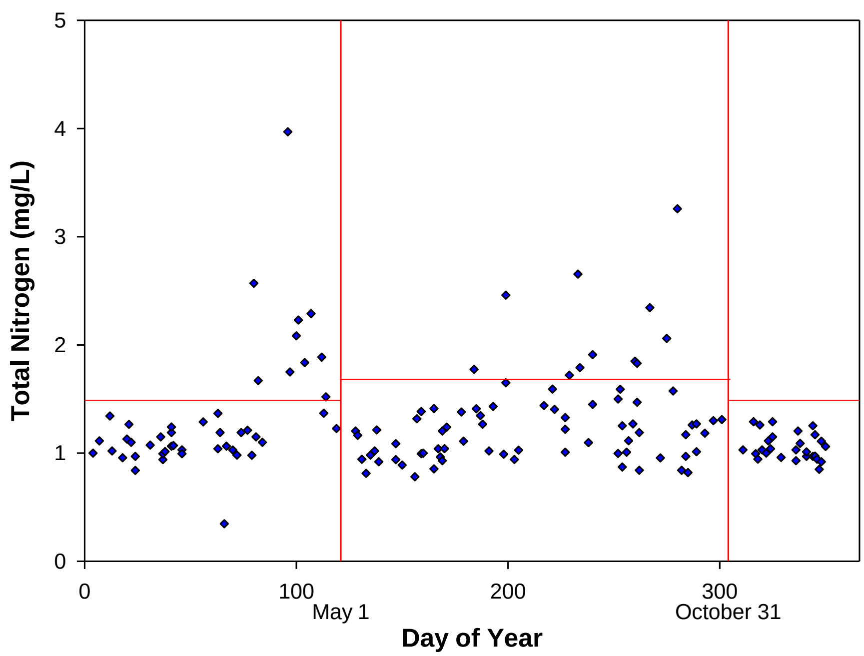

Figure 2-48: Qu'Appelle River Total Nitrogen

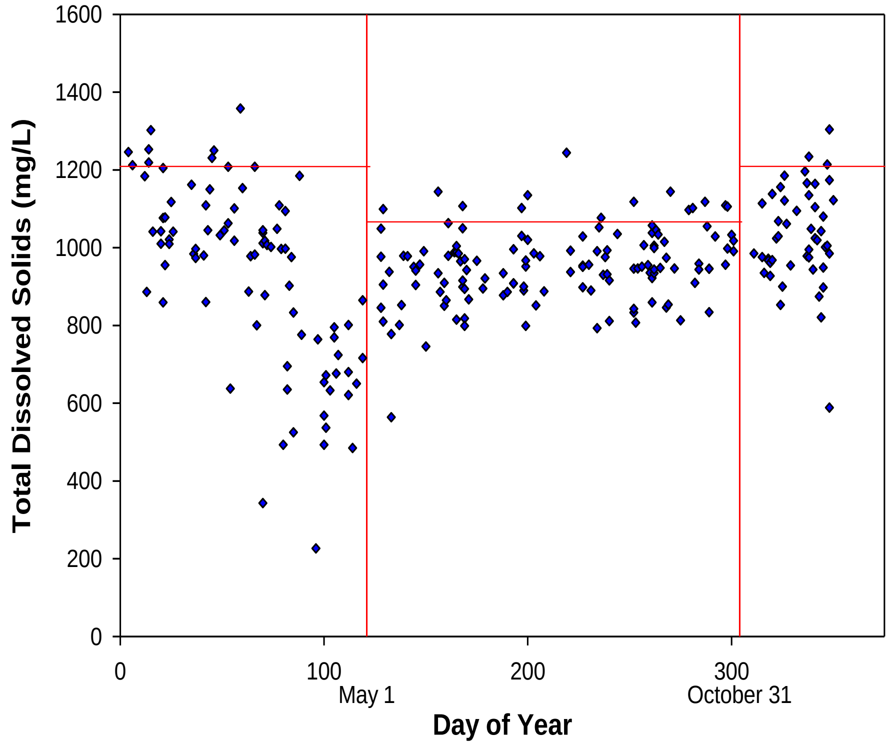

Figure 2-49: Qu'Appelle River Total Dissolved Solids (TDS)

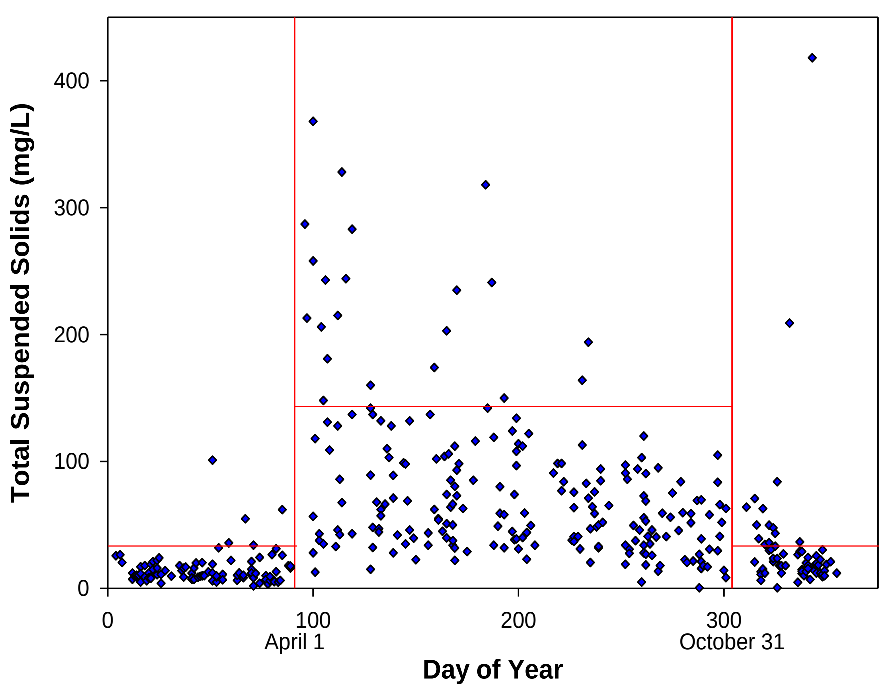

Figure 2-50: Qu'Appelle River Total Suspended Solids (TSS)

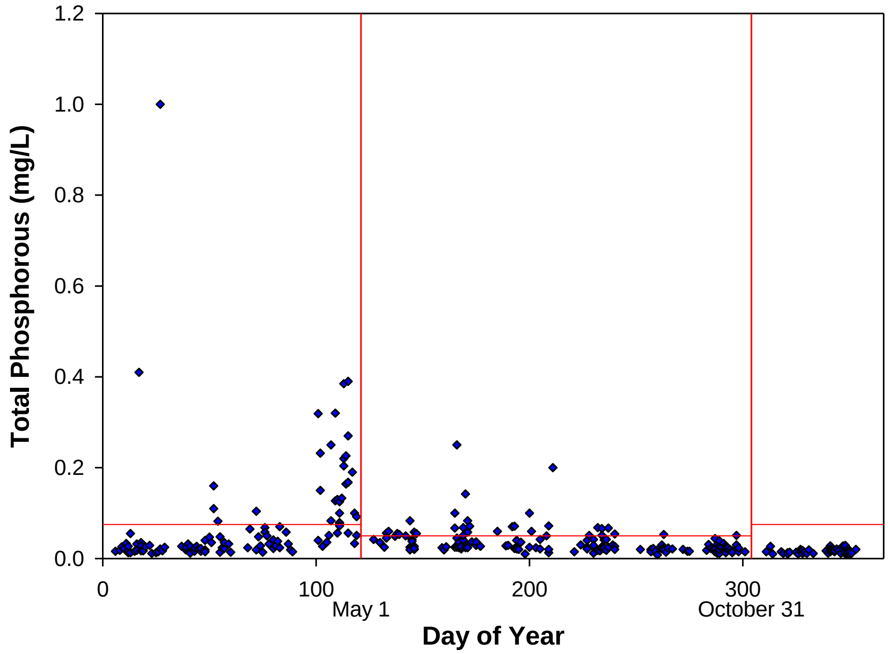

Figure 2-51: Red Deer River (SK-MB) Total Phosphorous

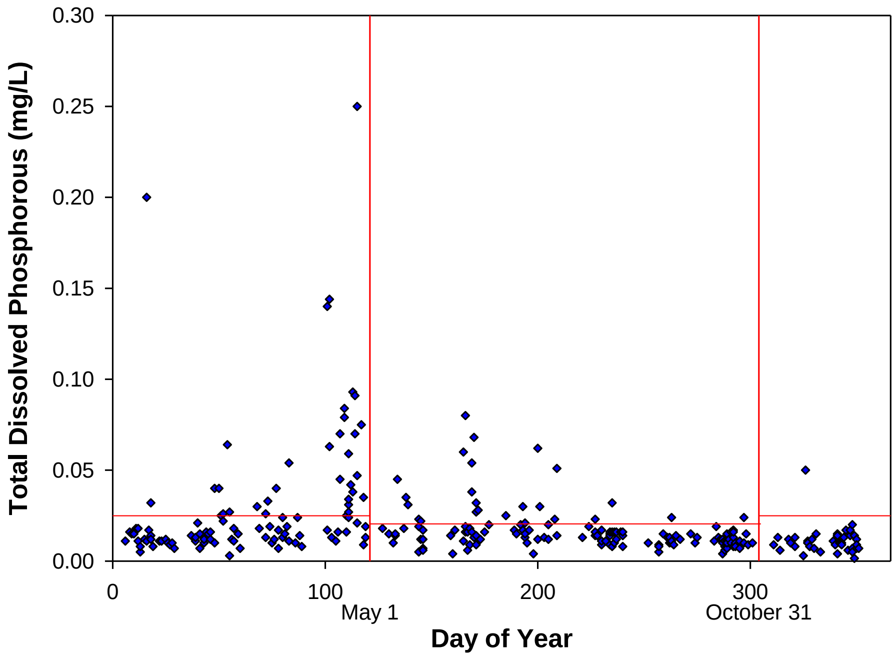

Figure 2-52: Red Deer River (SK-MB) Total Dissolved Phosphorous

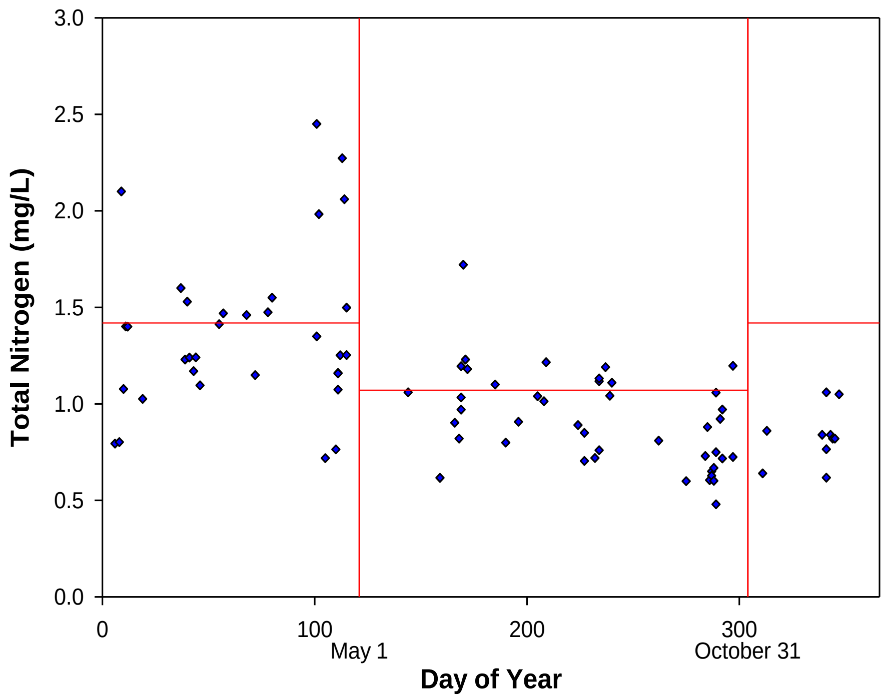

Figure 2-53: Red Deer River (SK-MB) Total Nitrogen

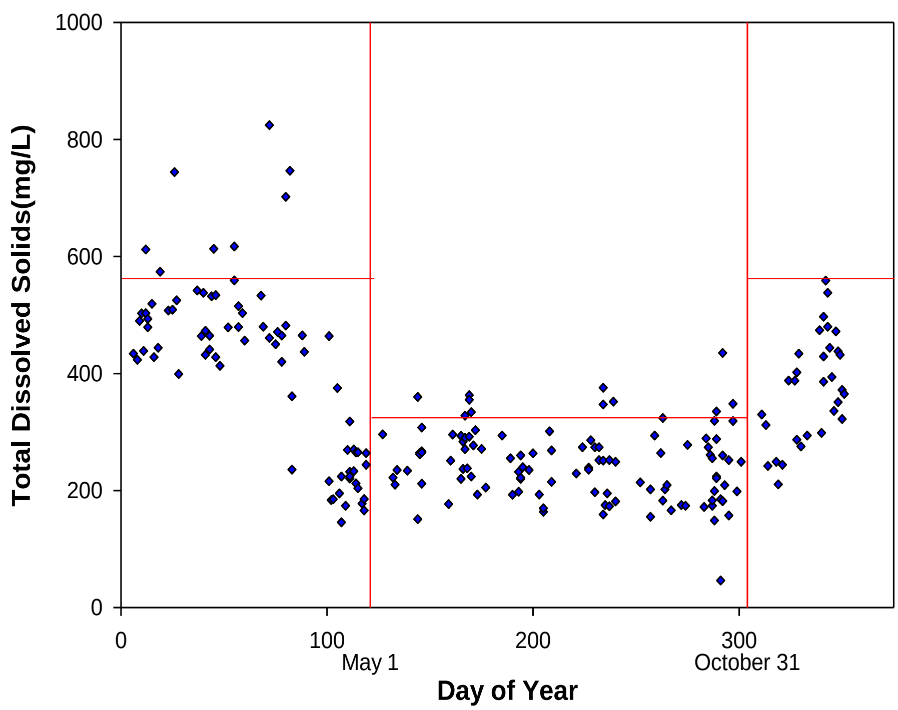

Figure 2-54: Red Deer River (SK-MB) Total Dissolved Solids (TDS)

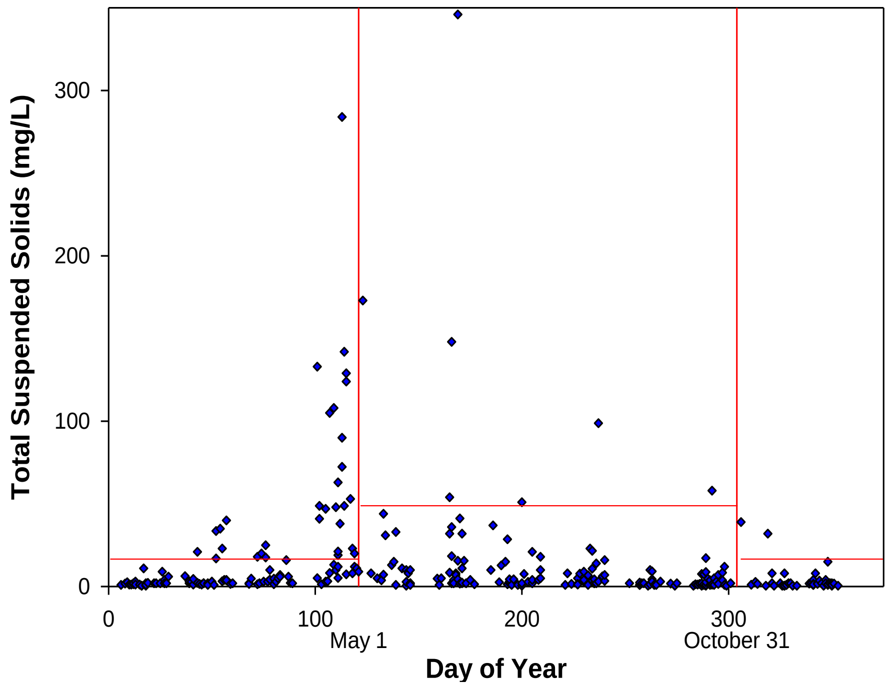

Figure 2-55: Red Deer River (SK-MB) Total Suspended Solids (TSS)

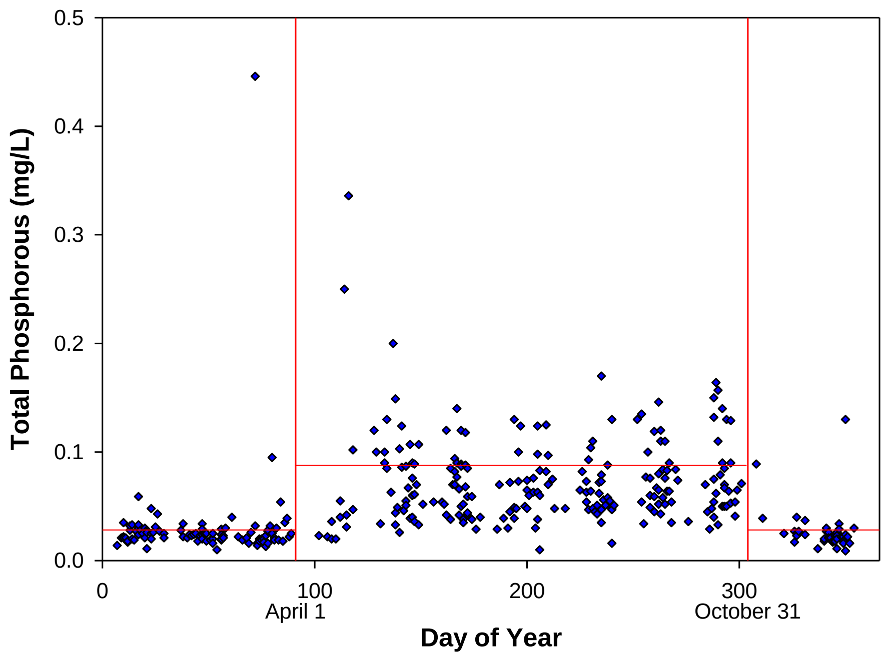

Figure 2-56: Saskatchewan River Total Phosphorous

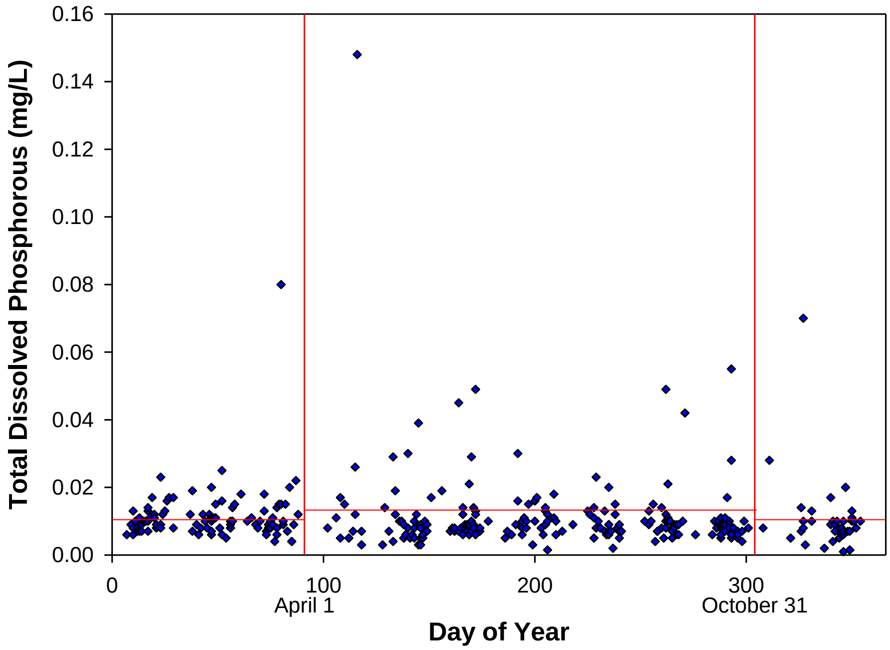

Figure 2-57: Saskatchewan River Total Dissolved Phosphorous

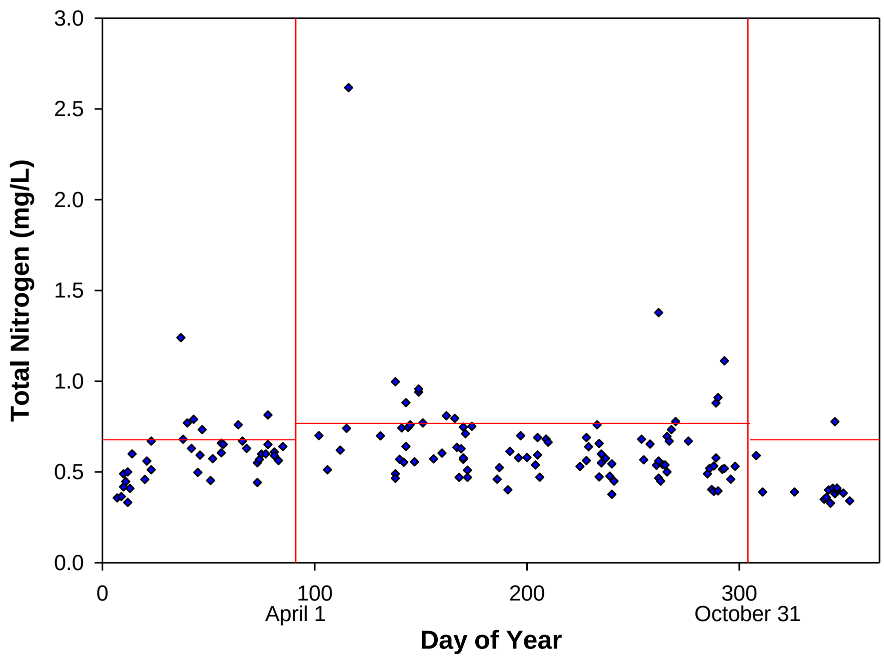

Figure 2-58: Saskatchewan River Total Nitrogen

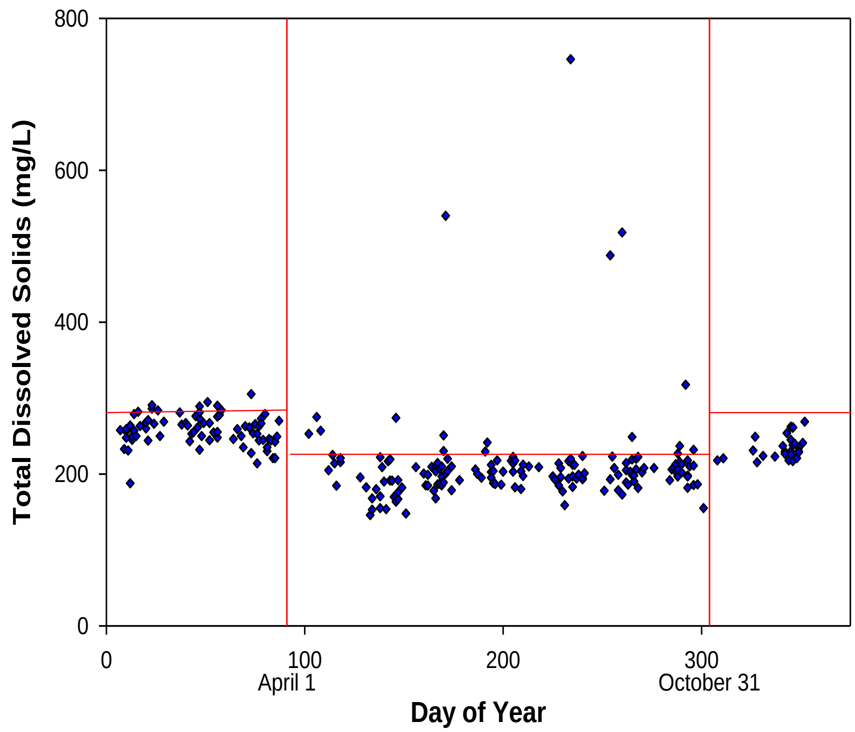

Figure 2-59: Saskatchewan River Total Dissolved Solids (TDS)

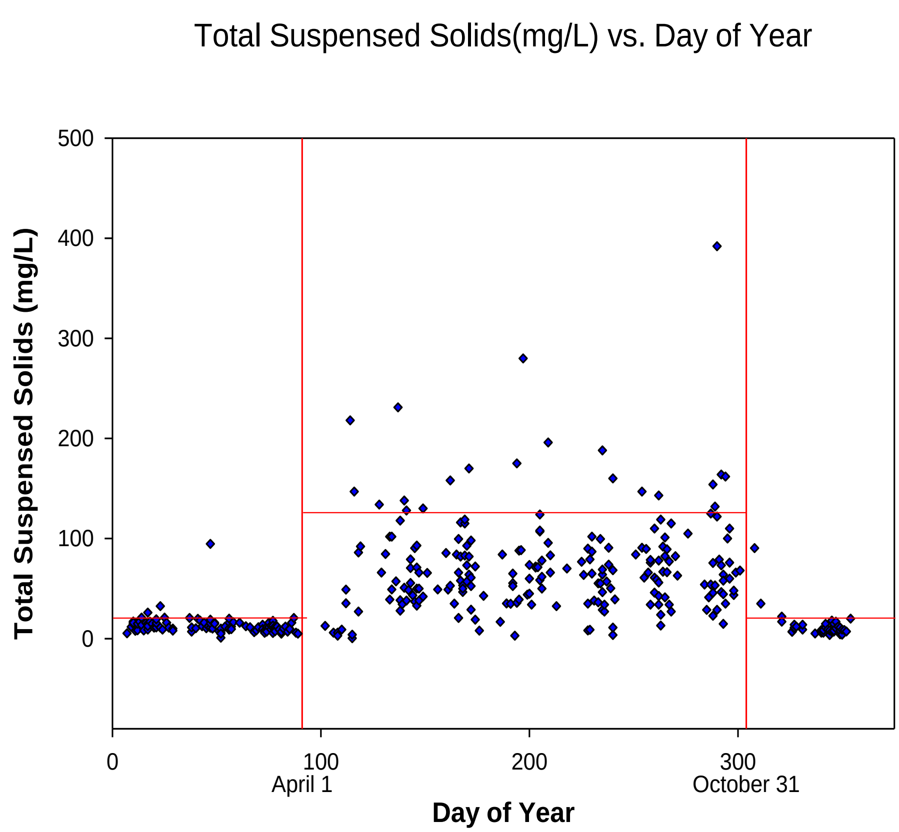

Figure 2-60: Saskatchewan River Total Suspended Solids (TSS)

Appendix 3: Objective Tables

Protection of Aquatic Life Guidelines/Objectives							
Parameter	Jurisdiction						
	CCME	USEPA		Alberta	Saskatchewan	Manitoba	PPWB
		CMC (acute)	CCC (chronic)				
Nutrients							
Aluminum (total) (µg/L)	5–100[a]	750 [b]	87 [b]	5–100[a]	5–100[a]	5-100[a]	N/A
Arsenic (total) (µg/L)	5	N/A	N/A	5	5	N/A	N/A
Arsenic (dissolved) (µg/L)	N/A	340	150	N/A	N/A	150-340	50
Boron (total) (µg/L)	1500	N/A	N/A	N/A	1500	1500	N/A
Cadmium (total) (µg/L)	calculated[c,d]	N/A	N/A	calculated[c,d]	calculated[c,d]	N/A	0.58-1[f]
Cadmium (dissolved) (µg/L)	N/A	2 [d]	0.25 [d]	0.25 [d]	N/A	0.25 [d,g]	N/A
Chromium (total) (µg/L)	N/A	N/A	N/A	N/A	N/A	N/A	11
Chromium III (µg/L)	8.9	N/A	N/A	8.9	8.9	N/A	N/A
Chromium III (dissolved) (µg/L)	N/A	570 [d]	74 [d]	74 [d]	N/A	74 [d,g]	N/A
Chromium VI (µg/L)	1	N/A	N/A	1	1	N/A	N/A
Chromium VI (dissolved) (µg/L)	N/A	16	11	11	N/A	11	N/A
Copper (total) (µg/L)	calculated[d]	N/A	N/A	7	calculated[d]	N/A	4.0-10[f]
Copper (dissolved) (µg/L)	N/A	calculated[d]		calculated[d]	N/A	calculated[d,g]	N/A
Iron (total) (µg/L)	300	N/A	1000	300	300	300	N/A
Iron (dissolved) (µg/L)	N/A	N/A	N/A	N/A	N/A	N/A	1000 [e]
Lead (total) (µg/L)	calculated[d]	N/A	N/A	calculated[d]	calculated[d]	N/A	6.1-20[f]
Lead (dissolved) (µg/L)	N/A	65 [d]	2.5 [d]	2.5 [d]	N/A	2.5 [d,g]	N/A
Mercury (total) (µg/L)	N/A	N/A	N/A	0.005-0.013	N/A	N/A	N/A
Mercury (dissolved) (µg/L)	N/A	1.4	0.77	0.77	N/A	N/A	N/A
Inorganic Mercury [h,i] (µg/L)	0.026	N/A	N/A	N/A	0.026	0.026	N/A
Methylmercury [h] (µg/L)	0.004 [j]	N/A	N/A	0.001-0.002	0.004 [j]	N/A	N/A
Molybdenum (total) (µg/L)	73	N/A	N/A	73	73	73	N/A
Nickel (total) (µg/L)	calculated[d]	N/A	N/A	calculated[d]	calculated[d]	N/A	25-100[f]
Nickel (dissolved) (µg/L)	N/A	470 [d]	52 [d]	52 [d]	N/A	52 [d,g]	N/A
Selenium (total) (µg/L)	1	[k]	5	1	1	1	N/A
Selenium (dissolved) (µg/L)	N/A	N/A	N/A	N/A	N/A	N/A	1.0-10[f]
Silver (total) (µg/L)	0.1	N/A	N/A	0.1	0.1	0.1	0.1 [e]
Silver (dissolved) (µg/L)	N/A	3.2 [d]	N/A	3.2 [d]	N/A	N/A	N/A
Thallium (total) (µg/L)	0.8	N/A	N/A	0.8	0.8	0.8	N/A
Uranium (total) (µg/L)	15	N/A	N/A	N/A	15	15	N/A
Zinc (total) (µg/L)	30	N/A	N/A	30	30	N/A	30-50[f]
Zinc (dissolved) (µg/L)	N/A	120 [d]	120 [d]	120 [d]	N/A	120 [d,g]	N/A
Nutrients							
Ammonia (total) (as N) (mg N/L)	See Table[l]	[m]	[m]	1.13 [s]	See Table[l]	[o]	1.13 [n]
Ammonia (un-ionized) (µg/L)	19 [p]	N/A	N/A	N/A	19 [p]	N/A	N/A
Nitrate (as N) (mg N/L)	3 [q,r,s]	N/A	N/A	3 [q,r,s]	3 [q,r,s]	13	N/A
Nitrite (as N) (mg N/L)	0.06 [t]	N/A	N/A	0.06 [t]	0.06 [t]	0.06 [t]	N/A
Phosphorus (total) (mg/L)	Guidance Framework[u]	N/A	N/A	0.05	Guidance Framework[u]	N/A	N/A
Major Ions							
Chloride (mg/L)	120	860	230	230	120	N/A	N/A
Fluoride (dissolved) (mg/L)	0.12	N/A	N/A	0.12	0.12	0.12	N/A
Physicals							
pH (pH units)	6.5-9	N/A	6.5-9	6.5-8.5	6.5-9	6.5-9	6.5–9 [e]

Protection of Aquatic Life Guidelines/Objectives

Parameter	Jurisdiction						
	CCME	USEPA		Alberta	Saskatchewan	Manitoba	PPWB
		CMC (acute)	CCC (chronic)				
Oxygen (dissolved) (mg/L)	5.5–9.5[v]	3-9.5 [w]		5.0-9.5[x]	5.5–9.5[v]	3-9.5[w]	6-6.5[e,f,y]
SAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Suspended Solids (mg/L)	Increase of 5 mg/L over background value	N/A	N/A	Increase of 10 mg/L over background value	Increase of 5 mg/L over background value	Increase of 5 mg/L over background value	N/A
Acid Herbicides							
2,4-D (µg/L)	4	N/A	N/A	4	4	N/A	4 [a]
Bromoxynil (µg/L)	5	N/A	N/A	5	5	5	N/A
Dicamba (µg/L)	10	N/A	N/A	10	10	10	N/A
MCPA (µg/L)	2.6	N/A	N/A	2.6	2.6	2.6	N/A
Picloram (µg/L)	29	N/A	N/A	29	29	29	N/A
Organochlorine Pesticides in Water							
Aldrin (µg/L)	~~0.004~~[aa,bb]	3	N/A	~~0.004~~[aa,bb]	~~0.004~~[aa,bb]	N/A	N/A
Chlordane (µg/L)	~~0.006~~[aa,bb]	2.4	0.0043	~~0.006~~[aa,bb]	~~0.006~~[aa,bb]	N/A	N/A
Dieldrin (µg/L)	~~0.004~~[aa,bb]	0.24	0.056	~~0.004~~[aa,bb]	~~0.004~~[aa,bb]	N/A	N/A
Endosulfan (µg/L)	0.003	N/A	N/A	N/A	0.003	0.003	N/A
Alpha-Endosulfan (µg/L)	N/A	0.22	0.056	0.02	N/A	N/A	N/A
Beta-Endosulfan (µg/L)	N/A	0.22	0.056	0.02	N/A	N/A	N/A
Endrin (µg/L)	~~0.0023~~[aa,bb]	0.086	0.036	~~0.0023~~[aa,bb]	~~0.0023~~[aa,bb,]	N/A	N/A
Heptachlor (µg/L)	~~0.01~~[aa,bb]	0.52	0.0038	~~0.01~~[aa,bb]	~~0.01~~[aa,bb]	N/A	N/A
Heptachlor Epoxide (µg/L)	~~0.01~~[aa,bb]	0.52	0.0038	~~0.01~~[aa,bb]	~~0.01~~[aa,bb]	N/A	N/A
Gamma-HCH (Lindane) µg/L)	0.01	0.95	N/A	0.01	0.01	0.01	0.08-0.1[cc]
Mirex (µg/L)	N/A	N/A	0.001	0.001	N/A	N/A	N/A
Neutral Herbicides in Water							
Atrazine (µg/L)	1.8	N/A	N/A	1.8	1.8	1.8	N/A
Diclofopmethyl (Hoegrass)* (µg/L)	6.1	N/A	N/A	6.1	6.1	6.1	N/A
Metolachlor (µg/L)	7.8	N/A	N/A	7.8	7.8	7.8	N/A
Metribuzin (µg/L)	1	N/A	N/A	1	1	1	N/A
Simazine (µg/L)	10	N/A	N/A	10	10	10	N/A
Triallate (µg/L)	0.24	N/A	N/A	0.24	0.24	0.24	N/A
Trifluralin (µg/L)	0.2	N/A	N/A	0.2	0.2	0.2	N/A
Other							
Glyphosate (µg/L)	65	N/A	N/A	65	65	65	N/A

Abbreviations
CMC = Criteria Maximum Concentration - an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect
CCC = Criterion Continuous Concentration - an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect

Alberta water quality guidelines for the protection of aquatic life are based on available Alberta, CCME, and USEPA guidelines. When there is more than one guideline for a water quality variable, the Alberta guidelines developed after 1996 are given preference over the CCME and USEPA values, and in other circumstances the most stringent of the guidelines is usually applied. When draft Alberta guidelines exist, i.e. for copper and mercury, the CCME or USEPA guidelines may be given precedence.

~~aabb~~ = This guideline is no longer recommended and the value is withdrawn.
* Diclofopmethyl exhibits rapid degradation (< 3 days) in non-preserved samples.

Superscripts

a. Aluminum guideline = 5 µg·L^{-1} at pH <6.5

= 100 $\mu g \cdot L^{-1}$ at pH ≥6.5

b. Aluminum - pH 6.5 – 9

c. Cadmium guideline = 10{0.86[log(hardness)] - 3.2}

d. Value is a function of hardness (mg/L) in the water column. The value given here corresponds to a hardness of 100 mg/L. See Appendix B - Table 1 for conversion factors in calculating total recoverable metal from dissolved metal criteria. See Appendix B - Table 2 for calculating freshwater dissolved metals criteria that are hardness-dependent.

e. Objective does not pertain to all rivers.

f. Objective is river dependent.

g. Value is a function of hardness. See Tier II Water Quality Objectives from the Manitoba Water Quality Standards, Objectives, and Guidelines at http://www.gov.mb.ca/waterstewardship/water_quality/quality/mwqsog_2002.pdf

h. May not prevent accumulation of methylmercury in aquatic life, therefore, may not protect wildlife that consume aquatic life.

i. Referred to in total recoverable form, not a dissolved metal.

j. May not fully protect higher trophic level fish.

k. The CMC = $1/[(f_1/CMC_1) + (f_2/CMC_2)]$ where f_1 and f_2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC_1 and CMC_2 are 185.9 g/L and 12.82 g/L, respectively.

l. Objective is pH and Temperature dependent. Water quality guidelines for total ammonia for the protection of aquatic life (mg/L NH_3).

		pH							
		6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0
Temp (°C)	0	231	73.0	23.1	7.32	2.33	0.749	0.25	0.042
	5	153	48.3	15.3	4.84	1.54	0.502	0.172	0.034
	10	102	32.4	10.3	3.26	1.04	0.343	0.121	0.029
	15	69.7	22.0	6.98	2.22	0.715	0.239	0.089	0.026
	20	48.0	15.2	4.82	1.54	0.499	0.171	0.067	0.024
	25	33.5	10.6	3.37	1.08	0.354	0.125	0.053	0.022
	30	23.7	7.50	2.39	0.767	0.256	0.094	0.043	0.021

Note: Measurements of total ammonia in the aquatic environment are often expressed as mg/L total ammonia-N. The present guideline values (mg/L NH3) can be converted to mg/L total ammonia-N by multiplying the corresponding guideline value by 0.8224. Values falling outside of shaded area should be used with caution.

m. pH, Temperature and Life-stage dependent - see Appendix B - Calculation of Freshwater Ammonia Criterion.

n. CEQG guideline for ammonia (as N): 1.13 mg/L at pH 8.0, 10ºC; 1.81 mg/L at pH 6.5, 10ºC. See Appendix C - Table 2 for the Ammonia Guidelines for the Protection of Freshwater Aquatic Life (USEPA).

o. pH dependent - see Tier II Water Quality Objectives from the Manitoba Water Quality Standards, Objectives, and Guidelines at http://www.gov.mb.ca/waterstewardship/water_quality/quality/mwqsog_2002.pdf

p. Ammonia guideline: Expressed as µg unionized ammonia$\cdot L^{-1}$. This would be equivalent to 15.2 µg ammonia-nitrogen$\cdot L^{-1}$. Guideline for total ammonia is temperature and pH dependent, please consult factsheet for more information.

q. For protection from direct toxic effects; the guidelines do not consider indirect effects due to eutrophication.

r. Guidelines are expressed in mg nitrate-nitrogen$\cdot L^{-1}$. These values are equivalent to 13 mg nitrate $\cdot L^{-1}$.

s. CEQG guideline for nitrate: concentrations that stimulate weed growth should be avoided.

t. Guideline is expressed as mg nitrite-nitrogen$\cdot L^{-1}$. This value is equivalent to 0.197 mg nitrite$\cdot L^{-1}$.

u. Canadian Guidance Framework for Phosphorus is for developing phosphorus guidelines (does not provide guidance on other freshwater nutrients). It provides Trigger Ranges for Total Phosphorus (see Guidance Framework for Phosphorus factsheet):

ultra-oligotrophic <4 µg·.L^{-1}
oligotrophic 4-10 µg·.L^{-1}
mesotrophic 10-20 µg·.L^{-1}
meso-eutrophic 20-35 µg·.L^{-1}
eutrophic 35-100 µg·.L^{-1}
hyper-eutrophic >100 µg·.L^{-1}

v. Dissolved oxygen for warm-water biota: early life stages = 6 mg$\cdot L^{-1}$
other life stages = 5.5 mg$\cdot L^{-1}$
for cold-water biota: early life stages = 9.5 mg$\cdot L^{-1}$
other life stages = 6.5 mg$\cdot L^{-1}$

w. Value is temperature and life-stage dependendent. See Tier II Water Quality Objectives from the Manitoba Water Quality Standards, Objectives, and Guidelines at http://www.gov.mb.ca/waterstewardship/water_quality/quality/mwqsog_2002.pdf

x. acute = 5.0 (1day minimum)
chronic = 6.5 (7-day mean)

The chronic guideline should be increased to 8.3 from mid May to the end of June to protect emergence of mayfly species into adults. The chronic guideline should be increased to 9.5 mg/L for those areas and times where embryonic and larval stages (from spawning to 30 day after hatching) develop within gravel beds. The chronic guideline is increased by 3 mg/L to account for the depletion of dissolved oxygen within the gravel. Where natural conditions alone create dissolved oxygen concentrations less than 110% of the applicable criteria means or minima or both, the minimum acceptable concentration is 90% of the natural concentrations.

y. Includes Open Water Objectives (OW)

z. Objective does not pertain to all rivers.

aa. This guideline is no longer recommended and the value is withdrawn. A water quality guideline is not recommended.

bb. This substance meets the criteria for Track 1 substances under the national CCME Policy for the Management of Toxic Substances (PMTS) (i.e., persistent, bioaccumulative, primarily the result of human activity, and CEPA-toxic or equivalent), and should be subject to virtual elimination strategies. Guidelines can serve as action levels or interim management objectives towards virtual elimination.
cc. Objective is 0.1 µg/L on Alberta-Saskatchewan border and 0.08 µg/L on Saskatchewan-Manitoba border.

Agricultural Uses - Livestock Watering						
Parameter	Jurisdiction					
	CCME	USEPA	Alberta	Saskatchewan	Manitoba	PPWB
Metals						
Aluminum (total) (µg/L)	5000	N/A	5000	5000	5000	5000 [a]
Arsenic (total) (µg/L)	25	N/A	25	25	25	N/A
Beryllium (total) (µg/L)	100	N/A	100	100	100	N/A
Beryllium (dissolved) (µg/L)	N/A	N/A	N/A	N/A	N/A	N/A
Boron (total) (µg/L)	5000	N/A	5000	5000	5000	N/A
Boron (dissolved) (µg/L)	N/A	N/A	N/A	N/A	N/A	500-5000 [a,b]
Cadmium (total) (µg/L)	80	N/A	80	80	80	N/A
Chromium III (µg/L)	50	N/A	50	50	50	N/A
Chromium VI (µg/L)	50	N/A	50	50	50	N/A
Cobalt (total) (µg/L)	1000	N/A	1000	1000	1000	50-1000 [a,b]
Copper (total) (µg/L)	500-5000 [c]	N/A	500-5000 [c]	500-5000 [c]	500-5000 [c]	N/A
Lead (total) (µg/L)	100	N/A	100	100	100	N/A
Manganese (dissolved) (µg/L)	N/A	N/A	N/A	N/A	N/A	200 [a]
Mercury (total) (µg/L)	3	N/A	3	3	3	N/A
Molybdenum (total) (µg/L)	500	N/A	500	500	500	N/A
Nickel (total) (µg/L)	1000	N/A	1000	1000	1000	N/A
Selenium (total) (µg/L)	50	N/A	50	50	50	N/A
Uranium (total) (µg/L)	200	N/A	200	200	200	N/A
Vanadium (total) (µg/L)	100	N/A	100	100	100	100 [a]
Zinc (total) (µg/L)	50,000	N/A	50,000	50,000	50,000	N/A
Nutrients						
Nitrate & Nitrite (as N) (mg N/L)	100	N/A	100	100	100	N/A
Nitrite (as N) (mg N/L)	10	N/A	10	10	10	N/A
Major Ions						
Chloride (mg/L)	N/A	N/A	N/A	N/A	N/A	68-100 [a,b]
Fluoride (dissolved) (mg/L)	1-2 [d]	N/A	1-2 [d]	1-2 [d]	1-2 [d]	1 [a]
Sodium (dissolved) (mg/L)	N/A	N/A	N/A	N/A	N/A	100 [a]
Sulphate (dissolved) (mg/L)	1,000	N/A	1,000	1,000	1,000	250 [a]
Total Dissolved Solids (mg/L)	3,000	N/A	3,000	3,000	3,000	N/A
Physicals						
SAR	N/A	N/A	N/A	N/A	N/A	3 [a]
Biota						
Fecal Coliforms (No./100 mL)	N/A	N/A	N/A	N/A	N/A	100 [a]
Acid Herbicides						
2,4-D (µg/L)	100	N/A	N/A	100	N/A	N/A
Bromoxynil (µg/L)	11	N/A	11	11	11	N/A
Dicamba (µg/L)	122	N/A	122	122	122	N/A
MCPA (µg/L)	25	N/A	25	25	25	N/A
Picloram (µg/L)	190	N/A	190	190	190	N/A
Organochlorine Pesticides in Water						
Chlordane (µg/L)	~~7~~ [e,f]	N/A	~~7~~ [e,f]	~~7~~ [e,f]	N/A	~~7~~ [e,f]
Endrin (µg/L)	~~0.2~~ [e,f]	N/A	~~0.2~~ [e,f]	~~0.2~~ [e,f]	N/A	N/A
Heptachlor Epoxide (µg/L)	~~3~~ [e,f]	N/A	~~3~~ [e,f]	~~3~~ [e,f]	N/A	N/A
Hexachlorocyclohexane (µg/L)	0.52	N/A	0.52	0.52	0.52	N/A
Gamma-HCH (Lindane) (µg/L)	4 [g]	N/A	4 [g]	4 [g]	4 [g]	N/A

Agricultural Uses - Livestock Watering						
Parameter	**Jurisdiction**					
	CCME	**USEPA**	**Alberta**	**Saskatchewan**	**Manitoba**	**PPWB**
Neutral Herbicides in Water						
Atrazine (µg/L)	5 [h]	N/A	5 [h]	5 [h]	5 [h]	N/A
Diclofopmethyl (Hoegrass)* (µg/L)	9	N/A	9	9	9	N/A
Metolachlor (µg/L)	50	N/A	50	50	50	N/A
Metribuzin (µg/L)	80	N/A	80	80	80	N/A
Simazine (µg/L)	10	N/A	10	10	10	N/A
Triallate (µg/L)	230	N/A	230	230	230	N/A
Trifluralin (µg/L)	45	N/A	45	45	45	N/A
Other						
Glyphosate (µg/L)	280	N/A	280	280	280	N/A

Legend

- Diclofopmethyl exhibits rapid degradation (< 3 days) in non-preserved samples.

Superscripts

a. Objective does not pertain to all rivers.
b. Objective is river dependent.
c. Guideline is animal-specific.
d. Fluoride guideline = 1 $mg \cdot L^{-1}$ if feed contains fluoride.
e. This guideline is no longer recommended and the value is withdrawn. A water quality guideline is not recommended
f. This substance meets the criteria for Track 1 substances under the national CCME Policy for the Management of Toxic Substances (PMTS) (i.e., persistent, bioaccumulative, primarily the result of human activity, and CEPA-toxic or equivalent), and should be subject to virtual elimination strategies. Guidelines can serve as action levels or interim management objectives towards virtual elimination.
g. Guidelines can serve as action levels or interim management objectives towards virtual elimination
h. During the initial development of this guideline, insufficient data were available to derive a livestock watering guideline value. Therefore, the Canadian drinking water quality guideline (Health and Welfare Canada 1987) was adopted. Since then, this value has been revised by Health Canada (1996). This revised drinking water quality guideline in now adopted as the guideline for livestock water.

Agricultural Uses - Irrigation						
Parameter	**Jurisdiction**					
	CCME	**USEPA**	**Alberta**	**Saskatchewan**	**Manitoba**	**PPWB**
Metals						
Aluminum (total) (µg/L)	5000	N/A	5000	5000	5000	5000 [a]
Arsenic (total) (µg/L)	100	N/A	100	100	100	N/A
Beryllium (total) (µg/L)	100	N/A	100	100	100	N/A
Boron (total) (µg/L)	500-6000 [c]	N/A	500-6000 [c]	500-6000 [c]	500-6000 [c]	N/A
Boron (dissolved) (µg/L)	N/A	N/A	N/A	N/A	N/A	500-5000 [a,b]
Cadmium (total) (µg/L)	5.1 [c]	N/A	5.1 [c]	5.1 [c]	5.1 [c]	N/A
Chromium III (µg/L)	4.9	N/A	4.9	4.9	4.9	N/A
Chromium VI (µg/L)	8	N/A	8	8	8	N/A
Cobalt (total) (µg/L)	50	N/A	50	50	50	50-1000 [a,b]
Copper (total) (µg/L)	200-1000 [c]	N/A	200-1000 [c]	200-1000 [c]	200-1000 [c]	N/A
Iron (total) (µg/L)	5000	N/A	5000	5000	5000	N/A
Lead (total) (µg/L)	200	N/A	200	200	200	N/A
Lithium (total) (µg/L)	2500	N/A	2500	2500	2500	N/A
Manganese (total) (µg/L)	200	N/A	200	200	200	N/A
Manganese (dissolved) (µg/L)	N/A	N/A	N/A	N/A	N/A	200 [a]
Molybdenum (total) (µg/L)	10- 50 [d]	N/A	10- 50 [d]	10- 50 [d]	10- 50 [d]	N/A
Nickel (total) (µg/L)	200	N/A	200	200	200	N/A
Selenium (total) (µg/L)	20-50 [e]	N/A	20-50 [e]	20-50 [e]	20-50 [e]	N/A
Uranium (total) (µg/L)	10	N/A	10	10	10	N/A
Vanadium (total) (µg/L)	100	N/A	100	100	100	100 [a]
Zinc (total) (µg/L)	1000-5000 [f]	N/A	1000-5000 [f]	1000-5000 [f]	1000-5000 [f]	N/A
Major Ions						
Chloride (mg/L)	100-900 [c]	N/A	100-900 [c]	100-900 [c]	100-900 [c]	68-100 [a,b]
Fluoride (dissolved) (mg/L)	1	N/A	1	1	1	1 [a]
Sodium (dissolved) (mg/L)	N/A	N/A	N/A	N/A	N/A	100 [a]
Sulphate (dissolved) (mg/L)	N/A	N/A	N/A	N/A	N/A	250 [a]
Total Dissolved Solids (mg/L)	500–3,500 [c]	N/A	500–3,500 [c]	500–3,500 [c]	500-3500 [c]	N/A
Physicals						
SAR	N/A	N/A	N/A	N/A	4	3 [a]
Biota						
Fecal Coliforms (No./100 mL)	100	N/A	100	100	200	100 [a]
Acid Herbicides						
Bromoxynil (µg/L)	0.33	N/A	0.33	0.33	0.33	N/A
Dicamba (µg/L)	0.006	N/A	0.006	0.006	0.006	N/A
MCPA (µg/L)	0.025	N/A	0.025	0.025	0.025	N/A
Neutral Herbicides in Water						
Atrazine (µg/L)	10	N/A	10	10	10	N/A
Diclofopmethyl (Hoegrass)* (µg/L)	0.18	N/A	0.18	0.18	0.18	N/A
Metolachlor (µg/L)	28	N/A	28	28	28	N/A
Metribuzin (µg/L)	0.5	N/A	0.5	0.5	0.5	N/A
Simazine (µg/L)	0.5	N/A	0.5	0.5	0.5	N/A

Legend

* Diclofopmethyl exhibits rapid degradation (< 3 days) in non-preserved samples.

Superscripts

a. Objective does not pertain to all rivers.
b. Objective is river dependent.
c. Guideline is crop-specific.
d. Molybdenum guideline = 50 $\mu g \cdot L^{-1}$ for short-term use on acidic soils.
e. Selenium guideline = 20 $\mu g \cdot L^{-1}$ for continuous use
= 50 $\mu g \cdot L^{-1}$ for intermittent use
f. Zinc guideline = 1000 $\mu g \cdot L^{-1}$ when soil pH < 6.5
= 5000 $\mu g \cdot L^{-1}$ when soil pH > 6.5

Recreation						
Parameter	**Jurisdiction**					
	Health Canada (CCME)	**USEPA**	**Alberta**	**Saskatchewan**	**Manitoba**	**PPWB**
Nutrients						
Phosphorus (dissolved) (mg/L)	N/A	N/A	N/A	N/A	N/A	0.05 [a]
Physicals						
pH (pH units)	6.5-8.5	N/A	5.0 - 9.0 [c]	6.5-8.5	5.0-9.0	N/A
Biota						
Fecal Coliforms (No./100 mL)	N/A	N/A	N/A	N/A	200 [d]	100-200 [a,b]
Escherichia Coli (No./100mL)	200 [d]	N/A	200 [d]	200 [d]	N/A	N/A

Superscripts

a. Objective does not pertain to all rivers.
b. Objective is river dependent.
c. When the buffering capacity of the water is very low, 6.5 to 8.5; range of 5.0 to 9.0 is acceptable (CCME 1999).
d. E. Coli - geometric mean of at least 5 samples.

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Drinking Water (Treatability)	Jurisdiction													
Parameter	Health Canada (CCME)			USEPA		Alberta			Saskatchewan			Manitoba		PPWB
Metals	MAC	IMAC	AO or OG	MCLG	MCLorTT	MAC	IMAC	AO or OG	MAC	IMAC	AO or OG	MAC	AO	
Aluminum (total) (µg/L)	N/A	N/A	100/200[a]	50-200[b]	N/A	N/A	N/A	100/200[a]	N/A	N/A	100/200[a]	N/A	N/A	N/A
Antimony (total) (µg/L)	N/A	6	N/A	6	6	N/A	6	N/A	N/A	6	N/A	6	N/A	N/A
Arsenic (total) (µg/L)	10	N/A	N/A	0	10	10	N/A	N/A	10	N/A	N/A	10	N/A	N/A
Barium (total) (µg/L)	1000	N/A	N/A	2000	2000	1000	N/A	N/A	1000	N/A	N/A	1000	N/A	1000
Beryllium (total) (µg/L)	N/A	N/A	N/A	4	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Boron (total) (µg/L)	N/A	5000	N/A	N/A	N/A	N/A	5000	N/A	N/A	5000	N/A	5000	N/A	N/A
Boron (dissolved) (µg/L)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5000 [c]
Cadmium (total) (µg/L)	5	N/A	N/A	5	5	5	N/A	N/A	5	N/A	N/A	5	N/A	N/A
Chromium (total) (µg/L)	50	N/A	N/A	100	100	50	N/A	N/A	50	N/A	N/A	50	N/A	N/A
Copper (total) (µg/L)	N/A	N/A	≤1000	1300	1300	N/A	N/A	≤1000	N/A	N/A	≤1000	N/A	≤1000	N/A
Iron (total) (µg/L)	N/A	N/A	≤300	300 [b]	N/A	N/A	N/A	≤300	N/A	N/A	≤300	N/A	≤300	N/A
Iron (dissolved) (µg/L)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	300-1000[c,d]
Lead (total) (µg/L)	10	N/A	N/A	0	15	10	N/A	N/A	10	N/A	N/A	10	N/A	N/A
Manganese (total) (µg/L)	N/A	N/A	≤50	50 [b]	N/A	N/A	N/A	≤50	N/A	N/A	≤50	N/A	≤50	N/A
Manganese (dissolved) (µg/L)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50 [c]
Mercury (total) (µg/L)	1	N/A	N/A	2	2	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A
Selenium (total) (µg/L)	10	N/A	N/A	50	50	10	N/A	N/A	10	N/A	N/A	10	N/A	N/A
Silver (total) (µg/L)	N/A	N/A	N/A	100 [b]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thallium (total) (µg/L)	N/A	N/A	N/A	0.5	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Uranium (total) (µg/L)	N/A	20	N/A	0	30	N/A	20	N/A	N/A	20	N/A	20	N/A	20 [c]
Zinc (total) (µg/L)	N/A	N/A	≤5000	5000 [b]	N/A	N/A	N/A	≤5000	N/A	N/A	≤5000	N/A	≤5000	N/A
Nutrients														
Ammonia (total) (as N) (µg N/L)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nitrate & Nitrite (as N) (mg N/L)	10 [e]	N/A	N/A	N/A	N/A	10 [e]	N/A	N/A	10 [e]	N/A	N/A	10 [e]	N/A	10
Nitrate (as N) (mg N/L)	10	N/A	N/A	10 [f]	10 [f]	10	N/A	N/A	10	N/A	N/A	10	N/A	N/A
Nitrite (as N) (mg N/L)	3.2	N/A	N/A	1	1	3.2	N/A	N/A	3.2	N/A	N/A	3.2	N/A	N/A
Phosphorus (total) (mg/L)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Phosphorus (dissolved) (mg/L)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Major Ions														
Chloride (mg/L)	N/A	N/A	≤250	250 [b]	N/A	N/A	N/A	≤250	N/A	N/A	≤250	N/A	≤250	250 [c]
Fluoride (dissolved) (mg/L)	1.5	N/A	N/A	4	4	1.5	N/A	N/A	1.5	N/A	N/A	1.5	N/A	1.5 [c]
Sodium (dissolved) (mg/L)	N/A	N/A	≤200	N/A	N/A	N/A	N/A	≤200	N/A	N/A	≤200	N/A	≤200	300 [c]
Sulphate (dissolved) (mg/L)	N/A	N/A	≤500	250 [b]	N/A	N/A	N/A	≤500	N/A	N/A	≤500	N/A	≤500	500 [c]
Total Dissolved Solids (mg/L)	N/A	N/A	≤500	500 [b]	N/A	N/A	N/A	≤500	N/A	N/A	≤500	N/A	≤500	500 [c]
Physicals														
pH (pH units)	N/A	N/A	6.5–8.5	6.5-8.5[b]	N/A	N/A	N/A	6.5–8.5	N/A	N/A	6.5–8.5	N/A	6.5-8.5	N/A
Biota														
Fecal Coliforms (No./100 mL)	0	N/A	N/A	0	5%[g]	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A

Drinking Water (Treatability)														
Parameter	**Jurisdiction**													
	Health Canada (CCME)			**USEPA**		**Alberta**			**Saskatchewan**			**Manitoba**		**PPWB**
Acid Herbicides	MAC	IMAC	AO or OG	MCLG	MCL or TT	MAC	IMAC	AO or OG	MAC	IMAC	AO or OG	MAC	AO	
2,4-D (µg/L)	N/A	100	N/A	70	70	N/A	100	N/A	N/A	100	N/A	100	N/A	4[h]
Bromoxynil (µg/L)	N/A	5	N/A	N/A	N/A	N/A	5	N/A	N/A	5	N/A	5	N/A	N/A
Dicamba (µg/L)	120	N/A	N/A	N/A	N/A	120	N/A	N/A	120	N/A	N/A	120	N/A	N/A
MCPA (µg/L)	100	N/A	N/A	N/A	N/A	100	N/A	N/A	100	N/A	N/A	N/A	N/A	N/A
Picloram (µg/L)	N/A	190	N/A	500	500	N/A	190	N/A	N/A	190	N/A	N/A	N/A	N/A
Silvex (µg/L)	N/A	N/A	N/A	50	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10
Organochlorine Pesticides in Water														
Aldrin+Dieldrin (µg/L)	0.7	N/A	N/A	N/A	N/A	0.7	N/A	N/A	0.7	N/A	N/A	0.7	N/A	N/A
Chlordane (µg/L)	N/A	N/A	N/A	0	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Endrin (µg/L)	N/A	N/A	N/A	2	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Heptachlor (µg/L)	N/A	N/A	N/A	0	0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Heptachlor Epoxide (µg/L)	N/A	N/A	N/A	0	0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hexachlorocyclohexane (µg/L)	N/A	N/A	N/A	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gamma-HCH (Lindane) (µg/L)	N/A	N/A	N/A	0.2	0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Neutral Herbicides in Water														
Atrazine (µg/L)	N/A	5	N/A	3	3	N/A	5	N/A	N/A	5	N/A	5	N/A	N/A
Diclofopmethyl (Hoegrass)* (µg/L)	9	N/A	N/A	N/A	N/A	9	N/A	N/A	9	N/A	N/A	9	N/A	N/A
Metolachlor (µg/L)	N/A	50	N/A	N/A	N/A	N/A	50	N/A	N/A	50	N/A	50	N/A	N/A
Metribuzin (µg/L)	80	N/A	N/A	N/A	N/A	80	N/A	N/A	80	N/A	N/A	80	N/A	N/A
Simazine (µg/L)	N/A	10	N/A	4	4	N/A	10	N/A	N/A	10	N/A	N/A	N/A	N/A
Trifluralin (µg/L)	N/A	45	N/A	N/A	N/A	N/A	45	N/A	N/A	45	N/A	N/A	N/A	N/A
Other														
Glyphosate (µg/L)	N/A	280	N/A	700	700	N/A	280	N/A	N/A	280	N/A	280	N/A	N/A

* Diclofopmethyl exhibits rapid degradation (< 3 days) in non-preserved samples.

Abbreviations

MAC = Maximum Acceptable Concentrations

IMAC = Interim Maximal Acceptable Concentrations - The use of these 'interim' MACs was discontinued by the Federal-Provincial-Territorial Committee on Drinking Water in 2003. For more information on spesific guidelines, please refer to the guideline technical document for the perameter of concern.

AO = Aesthetic Objectives OG = Operational Guidance Values

MCLG = Maximum Contaminant Level Goal - The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.

MCL = Maximum Contaminant Level - The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using technology and taking cost into consideration. MCLs are enforceable standards.

Superscripts

a. Treatment system dependent.
b. USEPA national secondary drinking water standard.
c. Objective does not pertain to all rivers.

d. Objective is river dependent.
e. Where nitrate and nitrite are determined separately, levels of nitrite should not exceed 3.2 mg/L..
f. Nitrite = 1 mg/L - Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.
g. No more than 5% of samples should be present for coliforms.
h. Objective does not pertain to all rivers.

Fish Consumption Guidelines/Objectives

Parameter	Jurisdiction						
	Health Canada (CCME)	USEPA		Alberta	Saskatchewan	Manitoba	PPWB
Metals		Organism+ Water	Organism				
Antimony (total) (µg/L)	N/A	5.6	640	N/A	N/A	N/A	N/A
Arsenic (total) (µg/L)	N/A	0.18	0.14	N/A	N/A	N/A	N/A
Barium (total) (µg/L)	N/A	1000	N/A	N/A	N/A	N/A	N/A
Copper (total) (µg/L)	N/A	1300	N/A	N/A	N/A	N/A	N/A
Manganese (total) (µg/L)	N/A	50	100	N/A	N/A	N/A	N/A
Nickel (total) (µg/L)	N/A	610	4600	N/A	N/A	N/A	N/A
Selenium (total) (µg/L)	N/A	170	4200	N/A	N/A	N/A	N/A
Thallium (total) (µg/L)	N/A	0.24	0.47	N/A	N/A	N/A	N/A
Zinc (total) (µg/L)	N/A	7400	26000	N/A	N/A	N/A	N/A
Major Ions							
Fluoride (dissolved) (mg/kg)	N/A	N/A	N/A	N/A	N/A	150	N/A
Physicals							
pH (pH units)	N/A	5 - 9	N/A	N/A	N/A	N/A	N/A
Fish Tissue							
Mercury in fish (muscle) (µg/kg)	500-1000[a]	N/A	N/A	N/A	500-1000[a]	500	200-500[b]
Methylmercury (µg/kg)	N/A	N/A	300 [c]	N/A	N/A	N/A	N/A
PCB in fish (muscle) (µg/kg)	N/A	N/A	N/A	N/A	N/A	N/A	2000
Arsenic in fish (muscle) (µg/kg)	3500	N/A	N/A	N/A	3500	3500	N/A
Lead In fish (muscle) (µg/kg)	500	N/A	N/A	N/A	500	500	N/A
DDT total in fish (muscle) (µg/kg)	5000	N/A	N/A	N/A	5000	5000	N/A
Organochlorine Pesticides in Water							
Aldrin (µg/L)	N/A	0.000049	0.000050	N/A	N/A	N/A	N/A
Chlordane (µg/L)	N/A	0.00080	0.00081	N/A	N/A	N/A	N/A
Dieldrin (µg/L)	N/A	0.000052	0.000054	N/A	N/A	N/A	N/A
Endosulfan (µg/L)	N/A	62	89	N/A	N/A	N/A	N/A
Alpha-Endosulfan (µg/L)	N/A	62	89	N/A	N/A	N/A	N/A
Beta-Endosulfan (µg/L)	N/A	62	89	N/A	N/A	N/A	N/A
Endrin (µg/L)	N/A	0.059	0.06	N/A	N/A	N/A	N/A
Heptachlor (µg/L)	N/A	0.000079	0.000079	N/A	N/A	N/A	N/A
Heptachlor Epoxide (µg/L)	N/A	0.000039	0.000039	N/A	N/A	N/A	N/A
Hexachlorocyclohexane (µg/L)	N/A	0.00028	0.00029	N/A	N/A	N/A	N/A
Alpha-HCH (µg/L)	N/A	0.0026	0.0049	N/A	N/A	N/A	N/A
Beta-HCH (µg/L)	N/A	0.0091	0.017	N/A	N/A	N/A	N/A
Gamma-HCH (Lindane) (µg/L)	N/A	0.98	1.8	N/A	N/A	N/A	N/A

Superscripts

a. Objective is fish species specific.
b. Objective is river dependent.
c. This fish tissue residue criterion for methylmercury is based on a total fish consumption rate of 0.0175 kg/day.

Tissue Residue Guideline for the Protection of Wildlife Consumers of Aquatic Biota						
Parameter	**Jurisdiction**					
Metals	**CCME**	**USEPA**	**Alberta**	**Saskatchewan**	**Manitoba**	**PPWB**
Fish Tissue						
Mercury in fish (muscle)	N/A	N/A	N/A	N/A	N/A	N/A
Methylmercury (µg/kg diet)	33	N/A	N/A	33	33	N/A
PCB in fish (muscle)	0.79-2.4 [a]	N/A	N/A	0.79-2.4 [a]	0.79-2.4 [a]	N/A
Arsenic in fish (muscle) (µg/kg diet)	N/A	N/A	N/A	N/A	N/A	N/A
Lead In fish (muscle) (µg/kg diet)	N/A	N/A	N/A	N/A	N/A	N/A
DDT total in fish (muscle) (µg/kg diet)	14	N/A	N/A	14	14	N/A
Toxaphene in fish (muscle) (µg/kg diet)	6.3	N/A	N/A	6.3	6.3	N/A

Superscripts

a. Mammalian Objective = 0.79 µg/kg diet
Avian Objective = 2.4 µg/kg diet

Appendix 4: Lowest Value Objectives Tables

Lowest-Value Water Quality Guidelines/Objectives (Fish Consumption Excluded)						
Parameter	Lowest Value			Lowest Canadian Value		
Metals	Value	Use	Jurisdiction	Value	Use	Jurisdiction
Aluminum (total) (µg/L)	5–100[a]	PAL	CCME	5–100[a]	PAL	CCME
Aluminum (dissolved) (µg/L)	N/A			N/A		
Antimony (total) (µg/L)	6	DW	HealthCan+USEPA	6	DW	HealthCan+USEPA
Antimony (dissolved) (µg/L)	N/A			N/A		
Arsenic (total) (µg/L)	5	PAL	CCME	5	PAL	CCME
Arsenic (dissolved) (µg/L)	50	PAL	PPWB	50	PAL	PPWB
Barium (total) (µg/L)	1000	DW	Health Canada	1000	DW	Health Canada
Barium (dissolved) (µg/L)	N/A			N/A		
Beryllium (total) (µg/L)	4	DW	USEPA	100	Ag-I+Ag-L	CCME
Beryllium (dissolved) (µg/L)	N/A			N/A		
Boron (total) (µg/L)	500-6000[b]	Ag-I	CCME	500-6000 [b]	Ag-I	CCME
Boron (dissolved) (µg/L)	500-5000[c,d]	Ag-I+Ag-L	PPWB	500-5000 [c,d]	Ag-I+Ag-L	PPWB
Cadmium (total) (µg/L) (µg/L)	calculated[e,f]	PAL	CCME	calculated[e,f]	PAL	CCME
Cadmium (dissolved) (µg/L)	calculated[e,g]	PAL	USEPA	calculated[e,g]	PAL	Alberta+Manitoba
Chromium (total) (µg/L)	11	PAL	PPWB	11	PAL	PPWB
Chromium (dissolved) (µg/L)	N/A			N/A		
Chromium III (µg/L)	4.9	Ag-I	CCME	4.9	Ag-I	CCME
Chromium III (dissolved) (µg/L)	calculated[e,h]	PAL	USEPA	calculated[e,h]	PAL	Alberta+Manitoba
Chromium VI (µg/L)	1	PAL	CCME	1	PAL	CCME
Chromium VI (dissolved) (µg/L)	11 [i]	PAL	USEPA	11 [i]	PAL	Alberta+Manitoba
Cobalt (total) (µg/L)	50	Ag-I	CCME	50	Ag-I	CCME
Cobalt (dissolved) (µg/L)	N/A			N/A		
Copper (total) (µg/L)	calculated[e]	PAL	CCME	calculated[e]	PAL	CCME
Copper (dissolved) (µg/L)	calculated[e]	PAL	USEPA	calculated[e]	PAL	Alberta+Manitoba
Iron (total) (µg/L)	300 [j]	PAL+DW	CCME+USEPA	300	PAL	CCME
Iron (dissolved) (µg/L)	300-1000 [c,d]	DW	PPWB	300-1000 [c,d]	DW	PPWB
Lead (total) (µg/L)	calculated[e]	PAL	CCME	calculated[e]	PAL	CCME
Lead (dissolved) (µg/L)	calculated[e,k]	PAL	USEPA	calculated[e,k]	PAL	Alberta+Manitoba
Lithium (total) (µg/L)	2500	Ag-I	CCME	2500	Ag-I	CCME
Lithium (dissolved) (µg/L)	N/A			N/A		
Manganese (total) (µg/L)	50 [j]	DW	USEPA	≤50	DW	CCME
Manganese (dissolved) (µg/L)	50 [c]	DW	PPWB	50 [c]	DW	PPWB
Mercury (total) (µg/L)	0.005-0.013	PAL	Alberta	0.005-0.013	PAL	Alberta
Mercury (dissolved) (µg/L)	0.77 [l]	PAL	USEPA	0.77 [l]	PAL	Alberta
Inorganic Mercury[m] (µg/L)	0.026	PAL	CCME	0.026	PAL	CCME
Methylmercury[m] (µg/L)	0.001-0.002	PAL	Alberta	0.001-0.002	PAL	Alberta
Molybdenum (total) (µg/L)	10-50 [n]	Ag-I	CCME	10-50 [n]	Ag-I	CCME
Molybdenum (dissolved) (µg/L)	N/A			N/A		
Nickel (total) (µg/L)	calculated[e]	PAL	CCME	calculated[e]	PAL	CCME
Nickel (dissolved) (µg/L)	calculated[e,o]	PAL	USEPA	calculated[e,o]	PAL	Alberta+Manitoba
Selenium (total) (µg/L)	1	PAL	CCME	1	PAL	CCME
Selenium (dissolved) (µg/L)	1-10 [d]	PAL	PPWB	1-10 [d]	PAL	PPWB
	5	PAL	USEPA			
Silver (total) (µg/L)	0.1 [c]	PAL	CCME+PPWB	0.1 [c]	PAL	CCME+PPWB
Silver (dissolved) (µg/L)	calculated[e,p]	PAL	USEPA	calculated[e,p]	PAL	Alberta
Thallium (total) (µg/L)	0.5	DW	USEPA	0.8	PAL	CCME
Thallium (dissolved) (µg/L)	N/A			N/A		
Uranium (total) (µg/L)	10	Ag-I	CCME	10	Ag-I	CCME
Uranium (dissolved) (µg/L)	N/A			N/A		
Vanadium (total) (µg/L)	100 [c]	Ag-I+Ag-L	CCME+PPWB	100 [c]	Ag-I+Ag-L	CCME+PPWB
Vanadium (dissolved) (µg/L)	N/A			N/A		
Zinc (total) (µg/L)	30	PAL	CCME	30	PAL	CCME
Zinc (dissolved) (µg/L)	calculated[e,q]	PAL	USEPA	calculated[e,q]	PAL	Alberta+Manitoba

Lowest-Value Water Quality Guidelines/Objectives (Fish Consumption Excluded)

Parameter	Lowest Value			Lowest Canadian Value		
Nutrients	**Value**	**Use**	**Jurisdiction**	**Value**	**Use**	**Jurisdiction**
Ammonia (total) (as N) (mg N/L)	See Table[r]	PAL	CCME	See Table[r]	PAL	CCME
Ammonia (un-ionized) (µg/L)	19 [s]	PAL	CCME	19 [s]	PAL	CCME
Nitrate/Nitrite (as N) (mg N/L)	10	DW	HealthCan+PPWB	10	DW	HealthCan+PPWB
Nitrate (as N) (mg N/L)	3 [t]	PAL	CCME	3 [t]	PAL	CCME
Nitrite (as N) (mg N/L)	0.06 [u]	PAL	CCME	0.06 [u]	PAL	CCME
Phosphorus (total) (mg/L)	Guidance Framework[v]	PAL	CCME	Guidance Framework[v]	PAL	CCME
Phosphorus (dissolved) (mg/L)	N/A			N/A		
Major Ions						
Chloride (mg/L)	68-100[c,d]	Ag-I+Ag-L	PPWB	68-100[c,d]	Ag-I+Ag-L	PPWB
Fluoride (dissolved) (mg/L)	0.12	PAL	CCME	0.12	PAL	CCME
Sodium (dissolved) (mg/L)	100 [c]	Ag-I+Ag-L	PPWB	100 [c]	Ag-I+Ag-L	PPWB
Sulphate (dissolved) (mg/L)	250 [c]	Ag-I+Ag-L	PPWB	250 [c]	Ag-I+Ag-L	PPWB
Total Dissolved Solids (mg/L)	500 [c,j]	DW	PPWB+USEPA	500 [c]	DW	PPWB
Physicals						
pH (pH units)	6.5-8.5	PAL+Rec	Alberta+CCME	6.5-8.5	PAL+Rec	Alberta+CCME
Oxygen (dissolved) (mg/L)	6 - 6.5[c,d,w]	PAL	PPWB	6 - 6.5[c,d,w]	PAL	PPWB
	5.5 -9.5[x]	PAL	CCME	5.5 -9.5[x]	PAL	CCME
SAR	3 [c]	Ag-I+Ag-L	PPWB	3 [c]	Ag-I+Ag-L	PPWB
Total Suspended Solids (mg/L)	Increase of 5mg/L over background value	PAL	CCME	Increase of 5mg/L over background value	PAL	CCME
Biota						
Fecal Coliforms (No./100 mL)	100 [c]	Ag-I+Ag-L	CCME+PPWB	100 [c]	Ag-I+Ag-L	CCME+PPWB
Escherichia Coli (No./100 mL)	200	Rec	CCME	200	Rec	CCME
Fish Tissue						
Mercury in fish (muscle) (µg/kg)	200-500[d]	FC	PPWB	200-500[d]	FC	PPWB
Methylmercury	33 µg/kg diet	AqB	CCME	33 µg/kg diet	AqB	CCME
	300[y] µg/kg	FC	USEPA			
PCB in fish (muscle)	0.79-2.4[z] µg/kg diet	AqB	CCME	0.79-2.4[z] µg/kg diet	AqB	CCME
	2000 µg/kg	FC	PPWB	2000 µg/kg	FC	PPWB
Arsenic in fish (muscle) (µg/kg)	3500	FC	Health Canada	3500	FC	Health Canada
Lead In fish (muscle) (µg/kg)	500	FC	Health Canada	500	FC	Health Canada
DDT total in fish (muscle)	14 µg/kg diet	AqB	CCME	14 µg/kg diet	AqB	CCME
	5000 µg/kg	FC	Health Canada	5000 µg/kg	FC	Health Canada
Toxaphene in fish (muscle) (µg/kg diet)	6.3	AqB	CCME	6.3	AqB	CCME

Abbreviations

PAL = Protection of Aquatic Life
Ag-L = Agricultural uses – Livestock Watering
DW = Drinking Water (Treatability)
Ag-I = Agricultural uses – Irrigation
Rec = Recreation
FC = Fish Consumption (Human)
AqB = Tissue Residue Guideline for the Protection of Wildlife Consumers of Aquatic Biota
CMC = Criteria Maximum Concentration - an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect
CCC = Criterion Continuous Concentration - an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect

Superscripts

a. Aluminium guideline = 5 μg·L^{-1} at pH <6.5
= 100 μg·L^{-1} at pH ≥6.5

b. Guideline is crop-specific.

c. PPWB Objective does not pertain to all rivers.

d. PPWB Objective is river dependent.

e. Value is a function of hardness (mg/L) in the water column. See Appendix B - Table 1 for conversion factors in calculating total recoverable metal from dissolved metal criteria. See Appendix B - Table 2 for calculating freshwater dissolved metals criteria that are hardness-dependent.

f. Cadmium guideline = 10{0.86[log(hardness)] - 3.2}

g. CMC (acute) = 2 μg/L
CCC (chronic) = 0.25 μg/L

h. CMC (acute) = 570 μg/L
CCC (chronic) = 74 μg/L

i. CMC (acute) = 16 μg/L
CCC (chronic) = 11 μg/L

j. USEPA national secondary drinking water standard.

k. CMC (acute) = 65 μg/L
CCC (chronic) = 2.5 μg/L

l. CMC (acute) = 1.4
CCC (chronic) = 0.77

m. May not prevent accumulation of methylmercury in aquatic life, therefore, may not protect wildlife that consume aquatic life.

n. Molybdenum guideline = 50 μg·L^{-1} for short-term use on acidic soils.

o. CMC (acute) = 470 μg/L
CCC (chronic) = 52 μg/L

p. CMC (acute) = 3.2 μg/L

q. CMC (acute) = 120 μg/L
CCC (chronic) = 120 μg/L

r. Value is temperature and pH dependent. Water quality guidelines for total ammonia for the protection of aquatic life (mg/L NH_3).

		pH							
		6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0
Temp (°C)	0	231	73.0	23.1	7.32	2.33	0.749	0.25	0.042
	5	153	48.3	15.3	4.84	1.54	0.502	0.172	0.034
	10	102	32.4	10.3	3.26	1.04	0.343	0.121	0.029
	15	69.7	22.0	6.98	2.22	0.715	0.239	0.089	0.026
	20	48.0	15.2	4.82	1.54	0.499	0.171	0.067	0.024
	25	33.5	10.6	3.37	1.08	0.354	0.125	0.053	0.022
	30	23.7	7.50	2.39	0.767	0.256	0.094	0.043	0.021

Note: Measurements of total ammonia in the aquatic environment are often expressed as mg/L total ammonia-N. The present guideline values (mg/L NH3) can be converted to mg/L total ammonia-N by multiplying the corresponding guideline value by 0.8224. Values falling outside of shaded area should be used with caution.

s. Ammonia guideline: Expressed as μg unionized ammonia·L^{-1}. This would be equivalent to 15.2 μg ammonia-nitrogen·L^{-1}. Guideline for total ammonia is temperature and pH dependent, please consult factsheet for more information.

t. For protection from direct toxic effects; the guidelines do not consider indirect effects due to eutrophication. Guideline is expressed as mg nitrate-nitrogen·L^{-1}. This value is equivalent to 13 mg nitrate ·L^{-1}.

u. Guideline is expressed as mg nitrite-nitrogen·L^{-1}. This value is equivalent to 0.197 mg nitrite·L^{-1}

v. Canadian Guidance Framework for Phosphorus is for developing phosphorus guidelines (does not provide guidance on other freshwater nutrients). It provides Trigger Ranges for Total Phosphorus (see Guidance Framework for Phosphorus factsheet):
ultra-oligotrophic <4 μg·.L^{-1}
oligotrophic 4-10 μg·.L^{-1}
mesotrophic 10-20 μg·.L^{-1}
meso-eutrophic 20-35 μg·.L^{-1}
eutrophic 35-100 μg·.L^{-1}
hyper-eutrophic >100 μg·.L^{-1}

w. Includes Open Water Objectives (OW).

x. Dissolved oxygen for warm-water biota: early life stages = 6 mg·L^{-1}
other life stages = 5.5 mg·L^{-1}
for cold-water biota : early life stages = 9.5 mg·L^{-1}
other life stages = 6.5 mg·L^{-1}

y. This fish tissue residue criterion for methylmercury is based on a total fish consumption rate of 0.0175 kg/day.

z. Mammalian Objective = 0.79 μg/kg diet
Avian Objective = 2.4 μg/kg diet

Lowest-Value Water Quality Guidelines/Objectives (Fish Consumption Excluded)						
Parameter	Lowest Value			Lowest Canadian Value		
Acid Herbicides	**Value**	**Use**	**Jurisdiction**	**Value**	**Use**	**Jurisdiction**
2,4-D (µg/L)	4 [a]	PAL+DW	CCME+PPWB	4 [a]	PAL+DW	CCME+PPWB
Bromoxynil (µg/L)	0.33	Ag-I	CCME	0.33	Ag-I	CCME
Dicamba (µg/L)	0.006	Ag-I	CCME	0.006	Ag-I	CCME
MCPA (µg/L)	0.025	Ag-I	CCME	0.025	Ag-I	CCME
Picloram (µg/L)	29	PAL	CCME	29	PAL	CCME
Silvex (µg/L)	10	DW	PPWB	10	DW	PPWB
Organochlorine Pesticides in Water						
Aldrin+Dieldrin (µg/L)	0.7	DW	Health Canada	0.7	DW	Health Canada
Aldrin (µg/L)	~~0.004~~ [b]	PAL	CCME	~~0.004~~ [b]	PAL	CCME
	3 [c]	PAL	USEPA	N/A		
Dieldrin (µg/L)	~~0.004~~ [b]	PAL	CCME	~~0.004~~ [b]	PAL	CCME
	0.056-0.24 [d]	PAL	USEPA	N/A		
Chlordane (µg/L)	0.0043-2.4 [d]	PAL	USEPA	N/A		
	~~0.006~~ [b]	PAL	CCME	~~0.006~~ [b]	PAL	CCME
Endosulfan (µg/L)	0.003	PAL	CCME	0.003	PAL	CCME
Alpha-Endosulfan (µg/L)	0.02	PAL	Alberta	0.02	PAL	Alberta
Beta-Endosulfan (µg/L)	0.02	PAL	Alberta	0.02	PAL	Alberta
Endrin (µg/L)	~~0.0023~~ [b]	PAL	CCME	~~0.0023~~ [b]	PAL	CCME
	0.036-0.086 [d]	PAL	USEPA	N/A		
Heptachlor (µg/L)	0.0038-0.52 [d]	PAL	USEPA	N/A		
	~~0.01~~ [b]	PAL	CCME	~~0.01~~ [b]	PAL	CCME
Heptachlor Epoxide (µg/L)	0.0038-0.52 [d]	PAL	USEPA	N/A		
	~~0.01~~ [b]	PAL	CCME	~~0.01~~ [b]	PAL	CCME
Hexachlorocyclohexane (µg/L)	0.52	Ag-L	CCME	0.52	Ag-L	CCME
Alpha-HCH (µg/L)	0.0026-0.0049 [e]	FC	USEPA	N/A		
Beta-HCH (µg/L)	0.0091-0.017 [e]	FC	USEPA	N/A		
Gamma-HCH (Lindane) (µg/L)	0.01	PAL	CCME	0.01	PAL	CCME
Mirex (µg/L)	0.001 [f]	PAL	USEPA	0.001	PAL	Alberta
Neutral Herbicides in Water						
Atrazine (µg/L)	1.8	PAL	CCME	1.8	PAL	CCME
Diclofopmethyl (Hoegrass)* (µg/L)	0.18	Ag-I	CCME	0.18	Ag-I	CCME
Metolachlor (µg/L)	7.8	PAL	CCME	7.8	PAL	CCME
Metribuzin (µg/L)	0.5	Ag-I	CCME	0.5	Ag-I	CCME
Simazine (µg/L)	0.5	Ag-I	CCME	0.5	Ag-I	CCME
Triallate (µg/L)	0.24	PAL	CCME	0.24	PAL	CCME
Trifluralin (µg/L)	0.2	PAL	CCME	0.2	PAL	CCME
Other						
Glyphosate (µg/L)	65	PAL	CCME	65	PAL	CCME

Alberta Water Quality Guidelines (WQGs) include and consider existing WQGs from both CCME and USEPA.

Legend

~~aabb~~= This guideline is no longer recommended and the value is withdrawn. A water quality guideline is not recommended.

* Diclofopmethyl exhibits rapid degradation (< 3 days) in non-preserved samples.

Abbreviations

CMC (acute) = Criteria Maximum Concentration

CCC (chronic) = Criterion Continuous Concentration

Superscripts

a. PPWB Objective does not pertain to all rivers.
b. This substance meets the criteria for Track 1 substances under the national CCME Policy for the Management of Toxic Substances (PMTS) (i.e., persistent, bioaccumulative, primarily the result of human activity, and CEPA-toxic or equivalent), and should be subject to virtual elimination strategies. Guidelines can serve as action levels or interim management objectives towards virtual elimination.
c. CMC objective
d. Expressed as CCC objective – CMC objective.
e. Expressed as Organism only objective – Organism + Water objective.
f. CCC Objective

Appendix 5: Exceedance Graphs

Appendix 5-a: Battle River

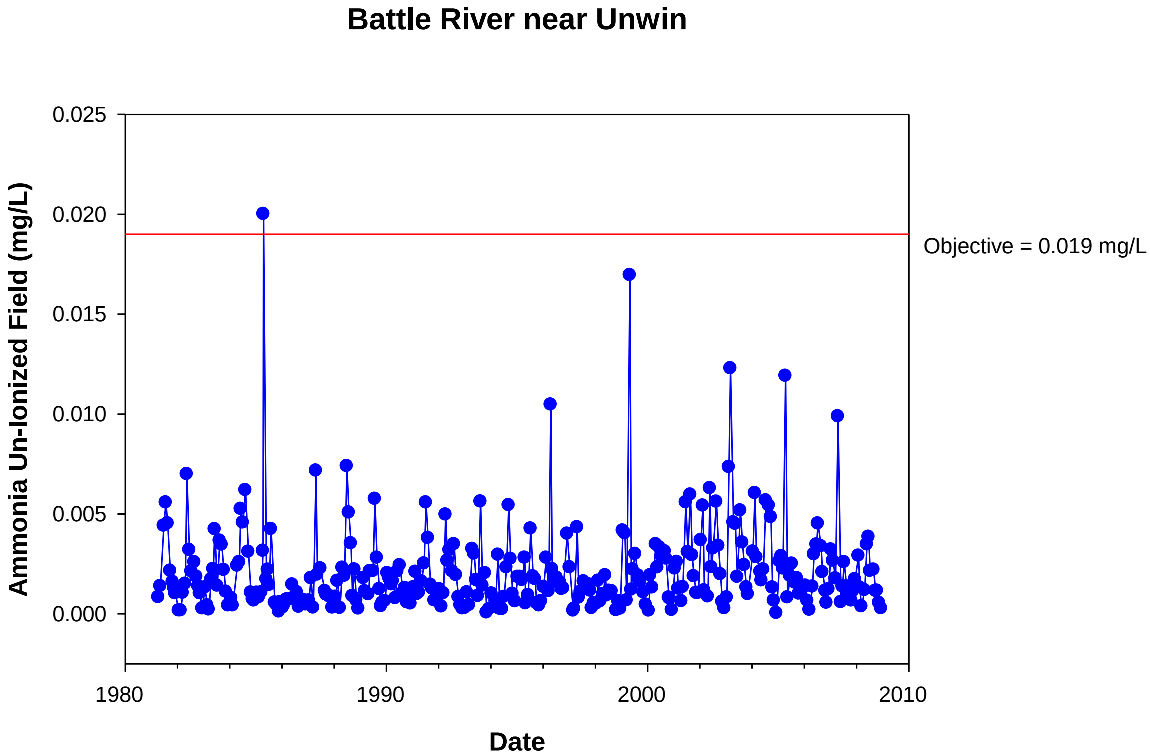

Figure 5-a1: Battle River Ammonia Un-Ionized Field

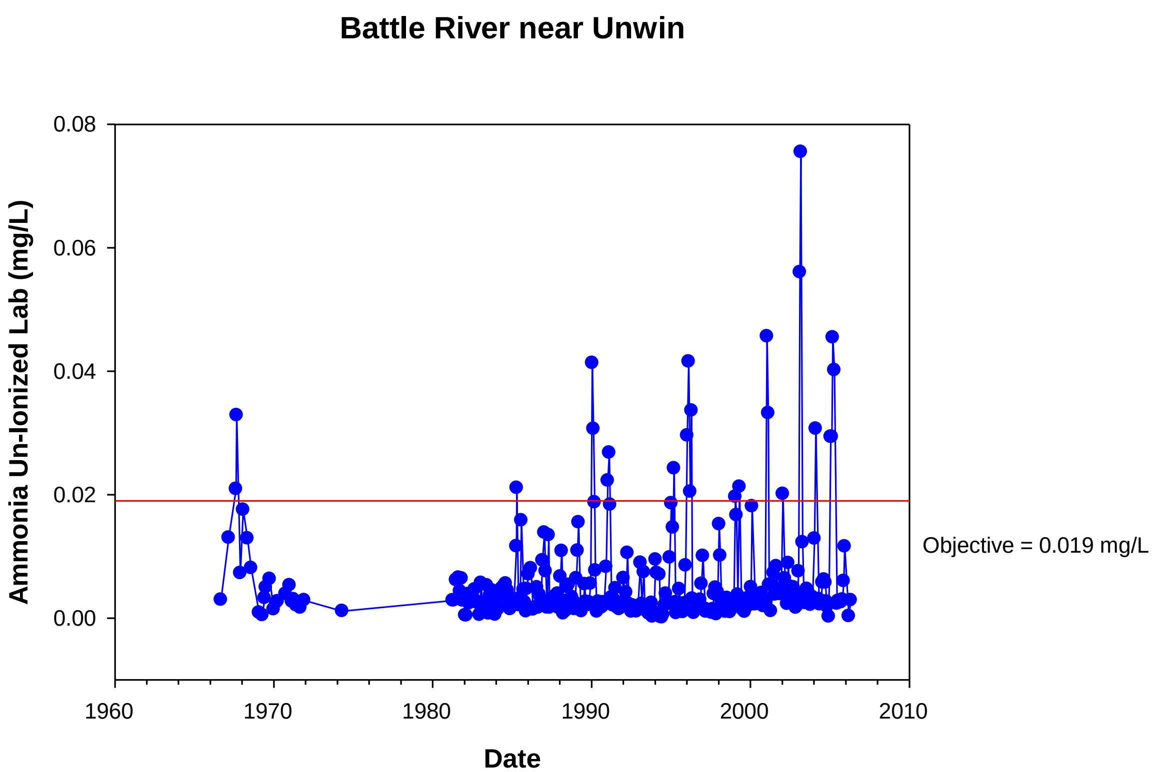

Figure 5-a2: Battle River Ammonia Un-Ionized Lab

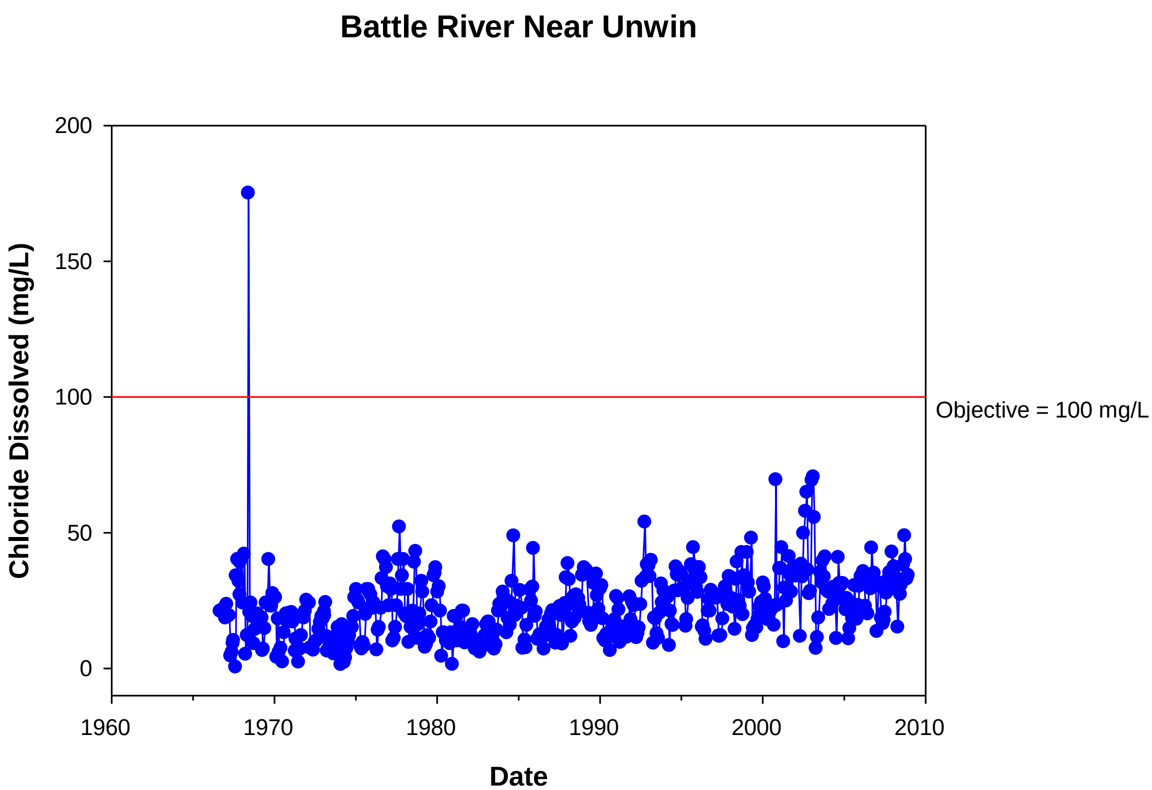

Figure 5-a3: Battle River Chloride Dissolved

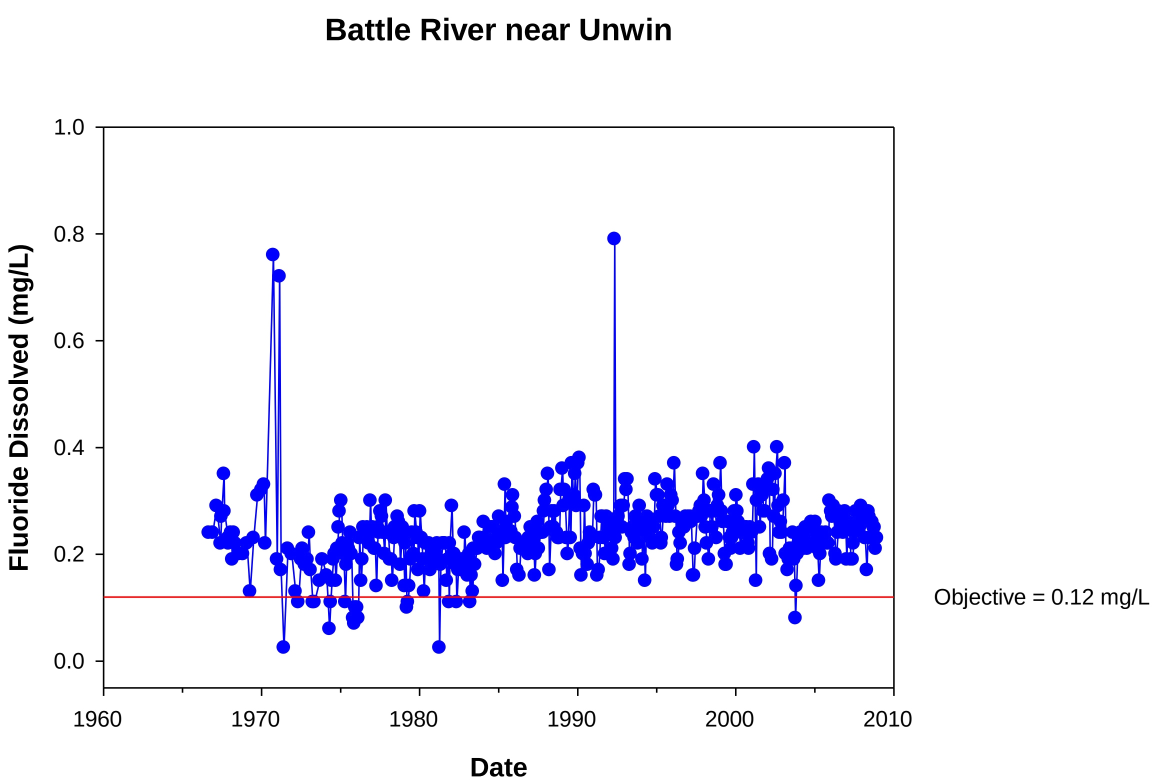

Figure 5-a4: Battle River Fluoride Dissolved

Battle River Near Unwin

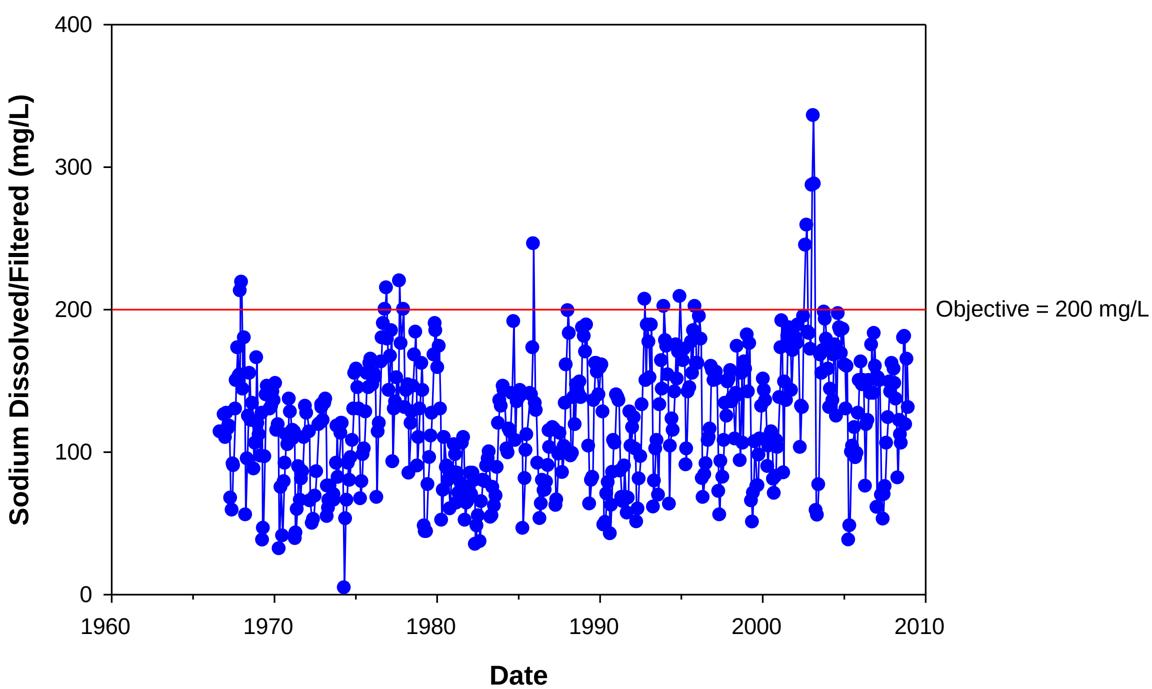

Figure 5-a5: Battle River Sodium Dissolved/Filtered

Battle River near Unwin

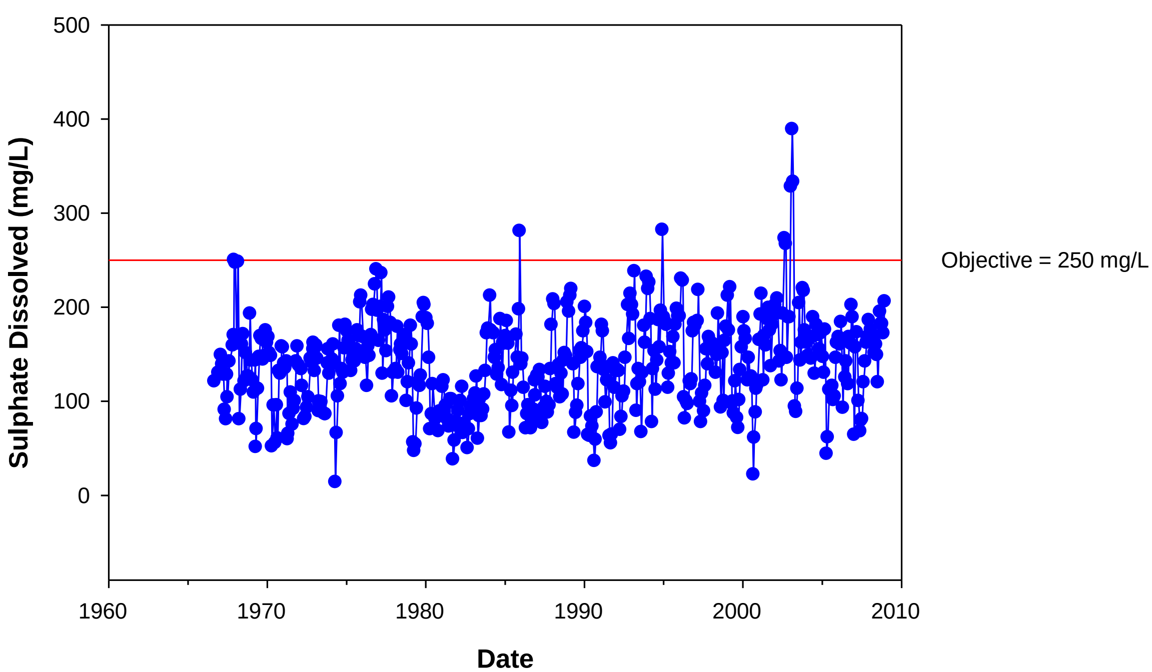

Figure 5-a6: Battle River Sulphate Dissolved

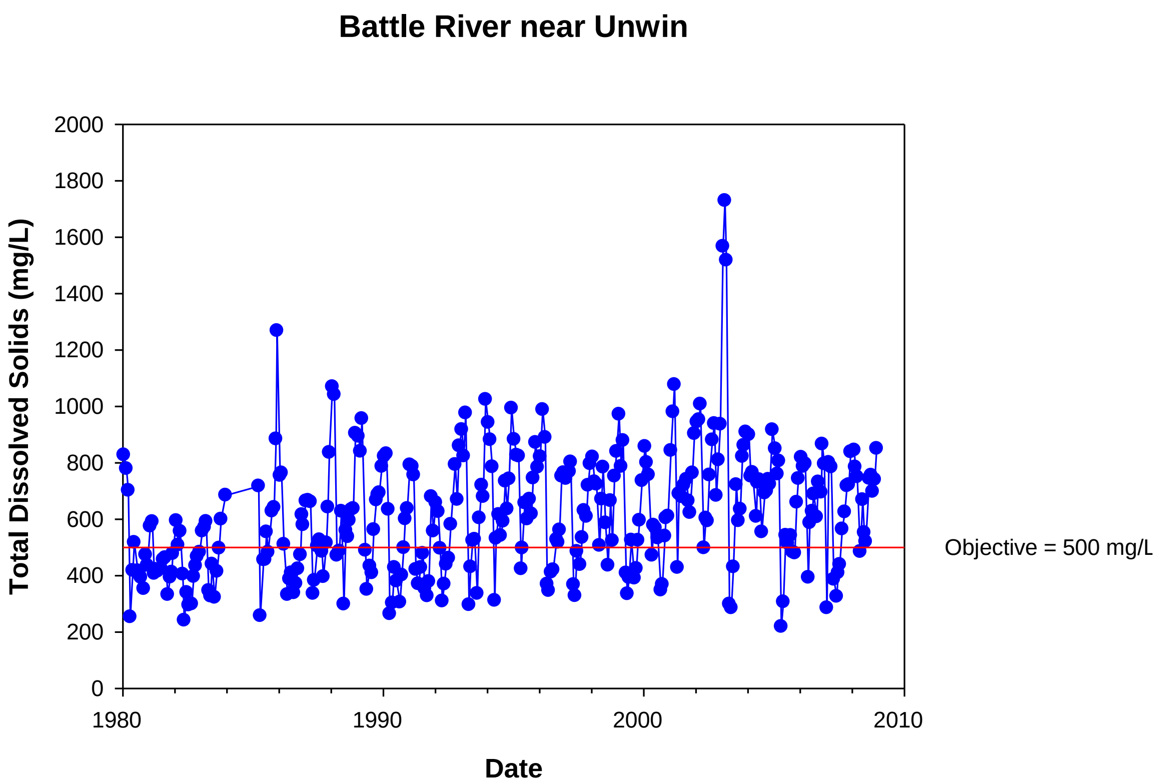

Figure 5-a7: Battle River Total Dissolved Solids

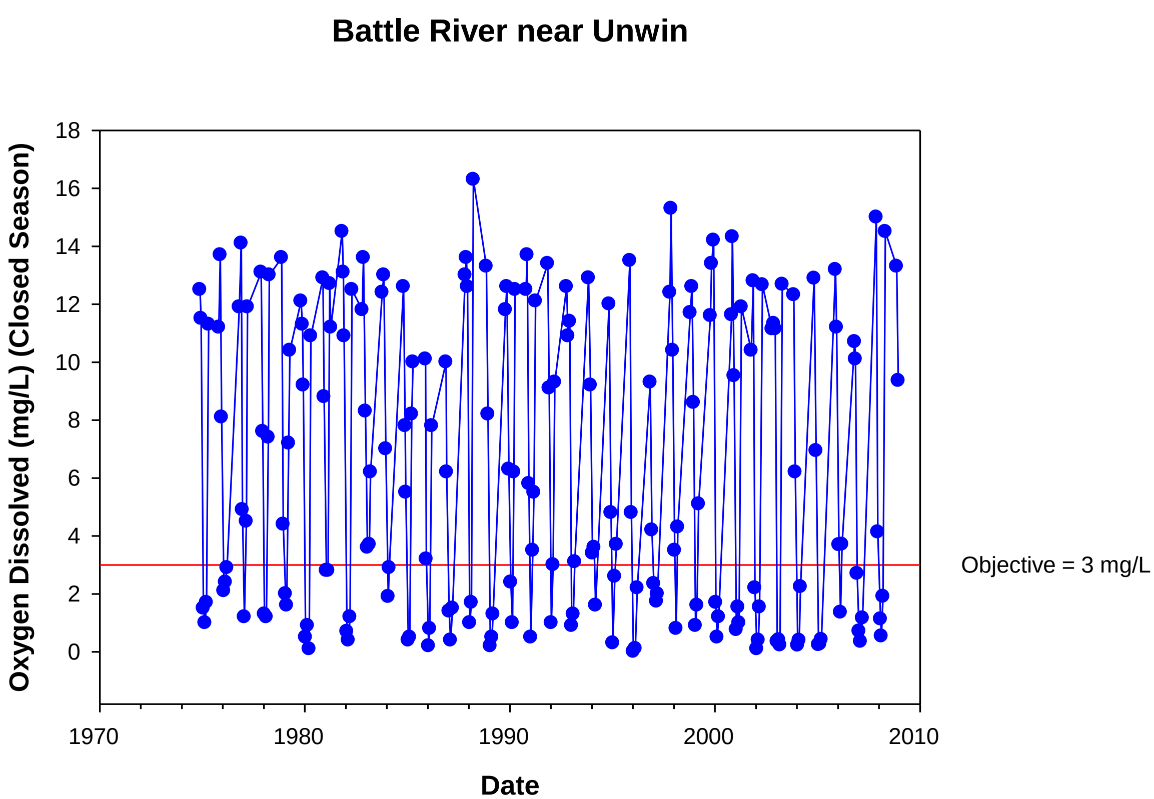

Figure 5-a8: Battle River Oxygen Dissolved (Closed Season)

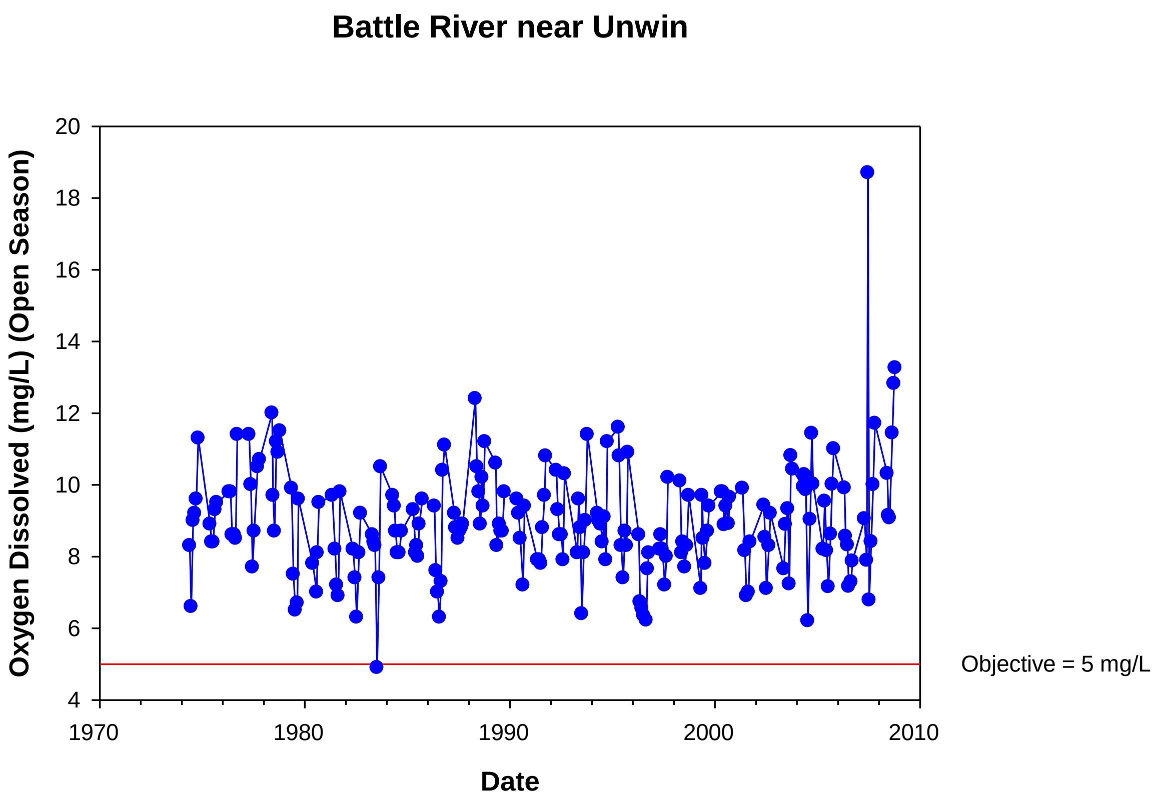

Figure 5-a9: Battle River Oxygen Dissolved (Open Season)

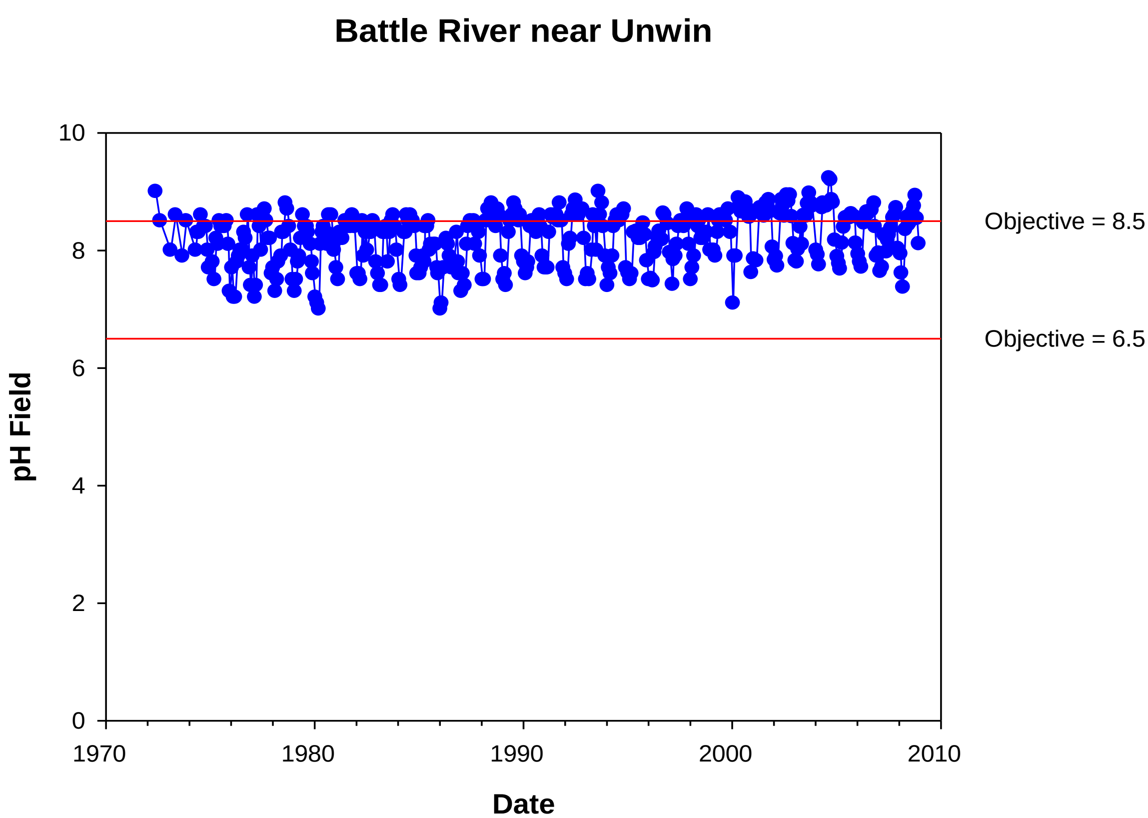

Figure 5-a10: Battle River pH Field

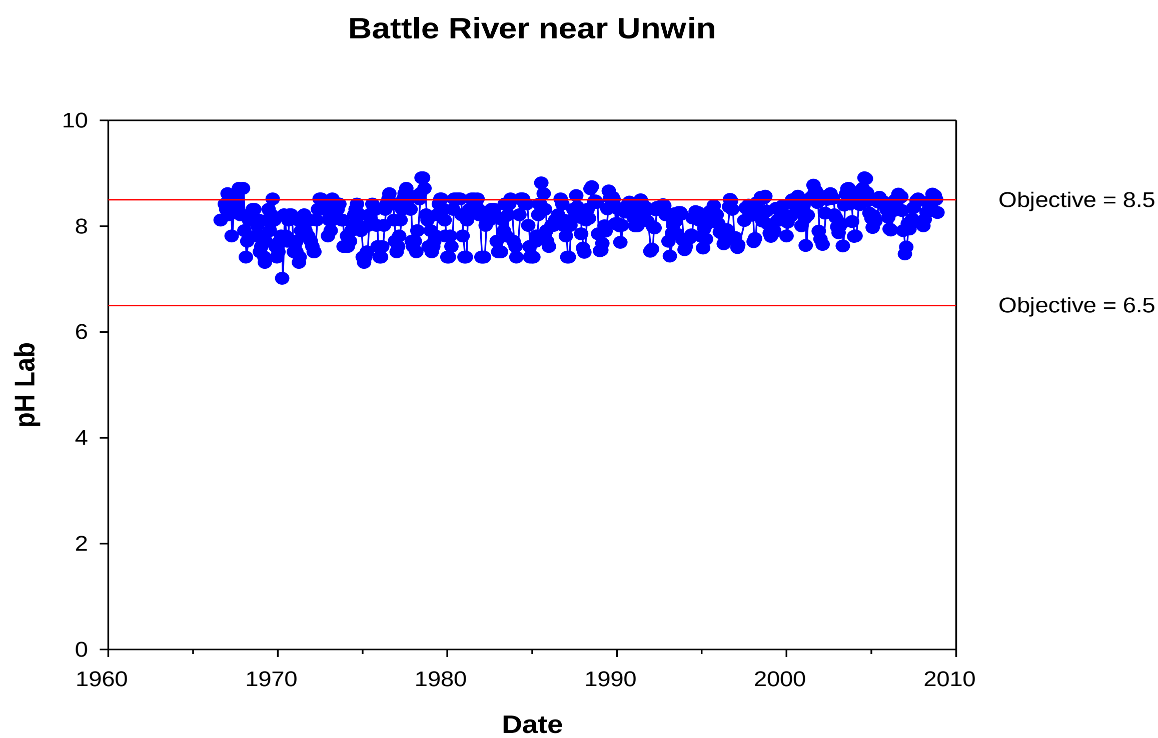

Figure 5-a11: Battle River pH Lab

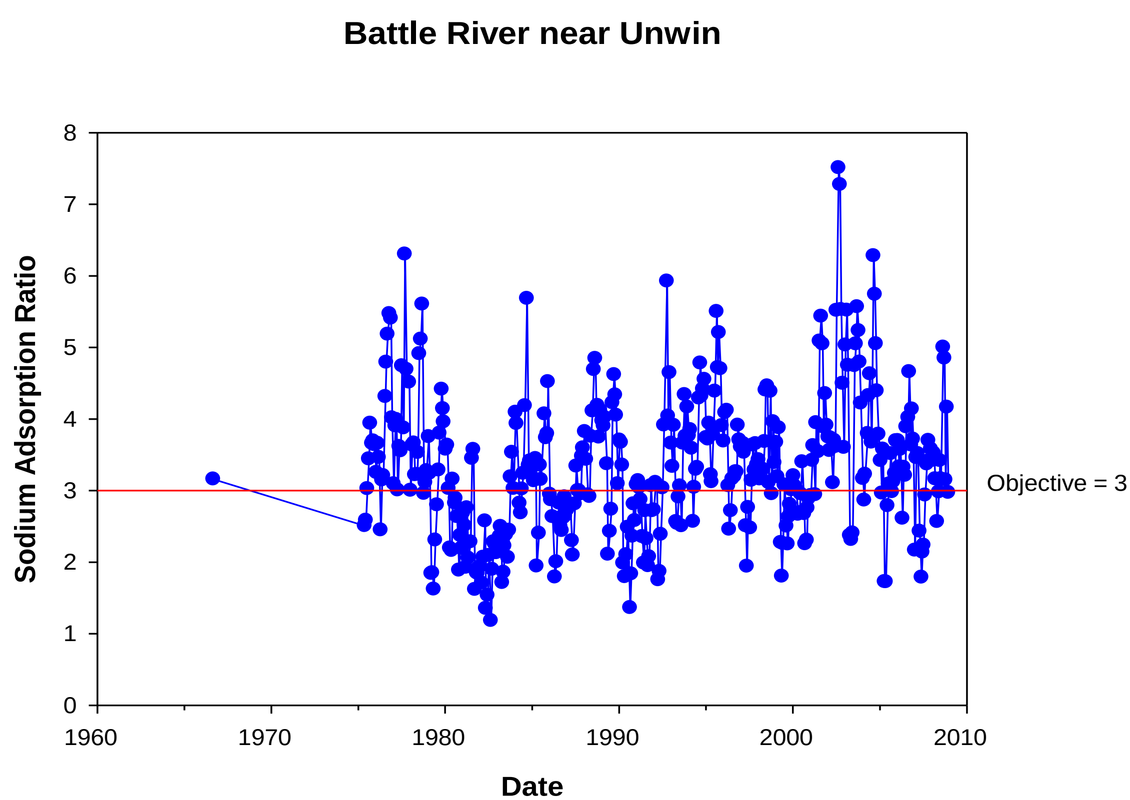

Figure 5-a12: Battle River Sodium Adsorption Ratio

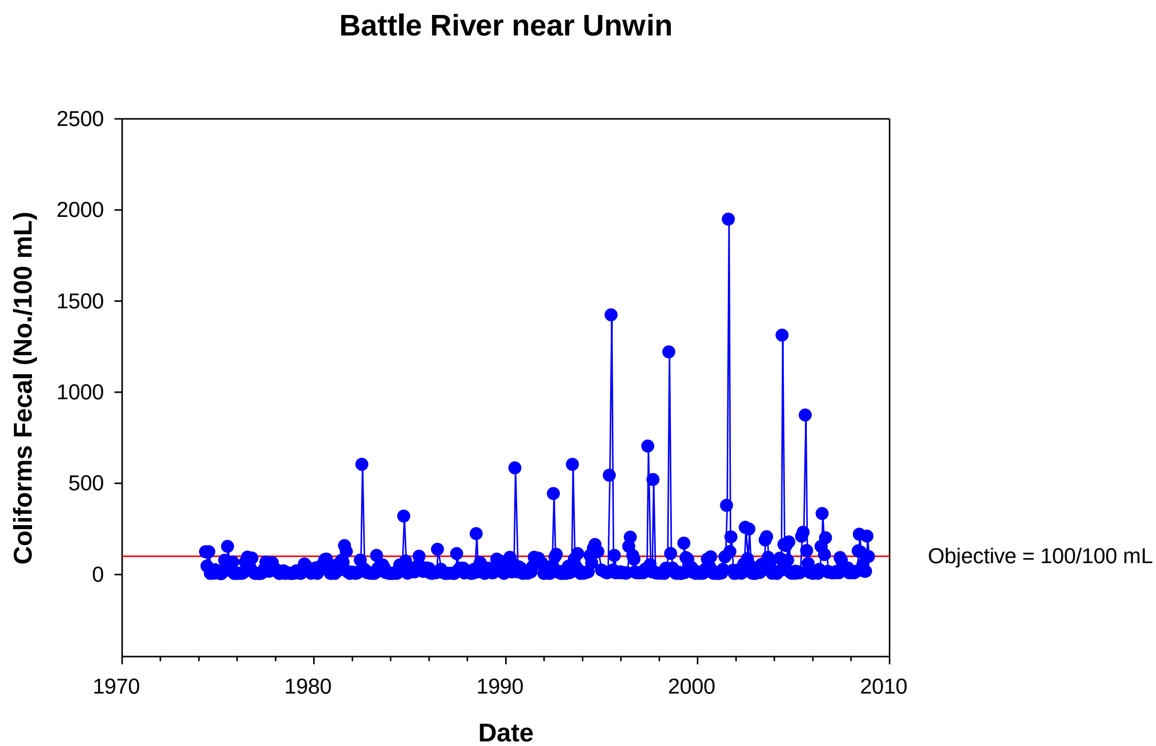

Figure 5-a13: Battle River Coliforms Fecal

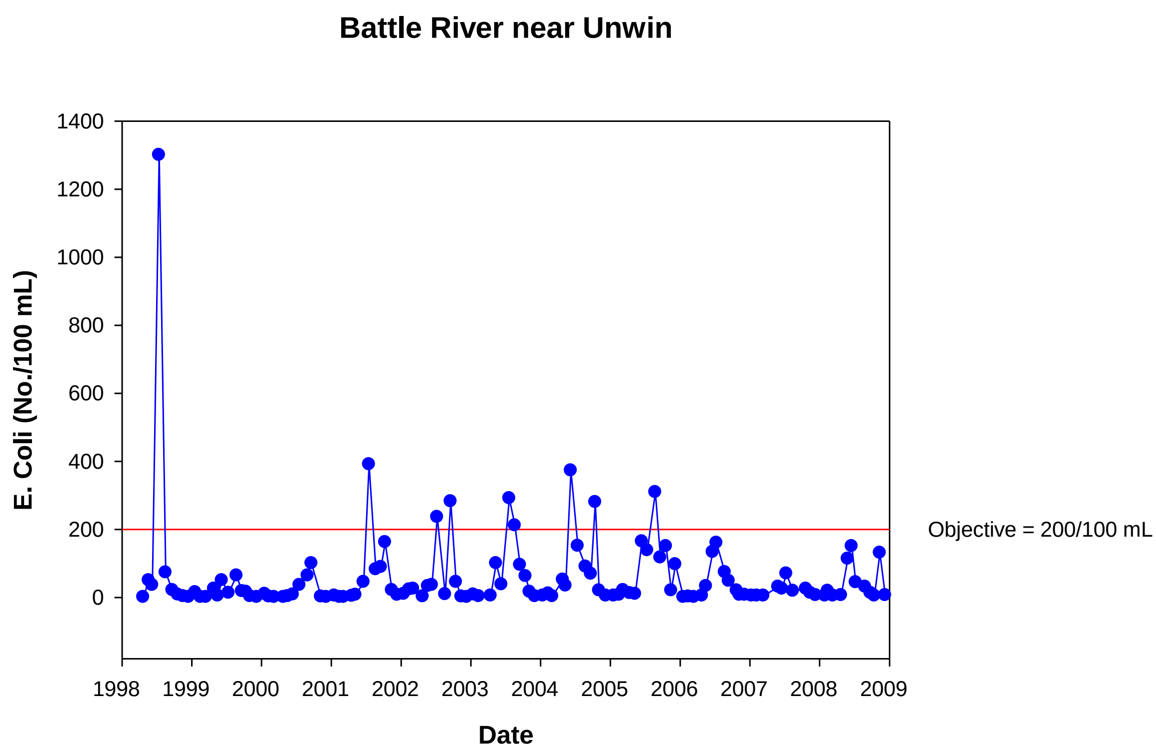

Figure 5-a14: Battle River E. Coli

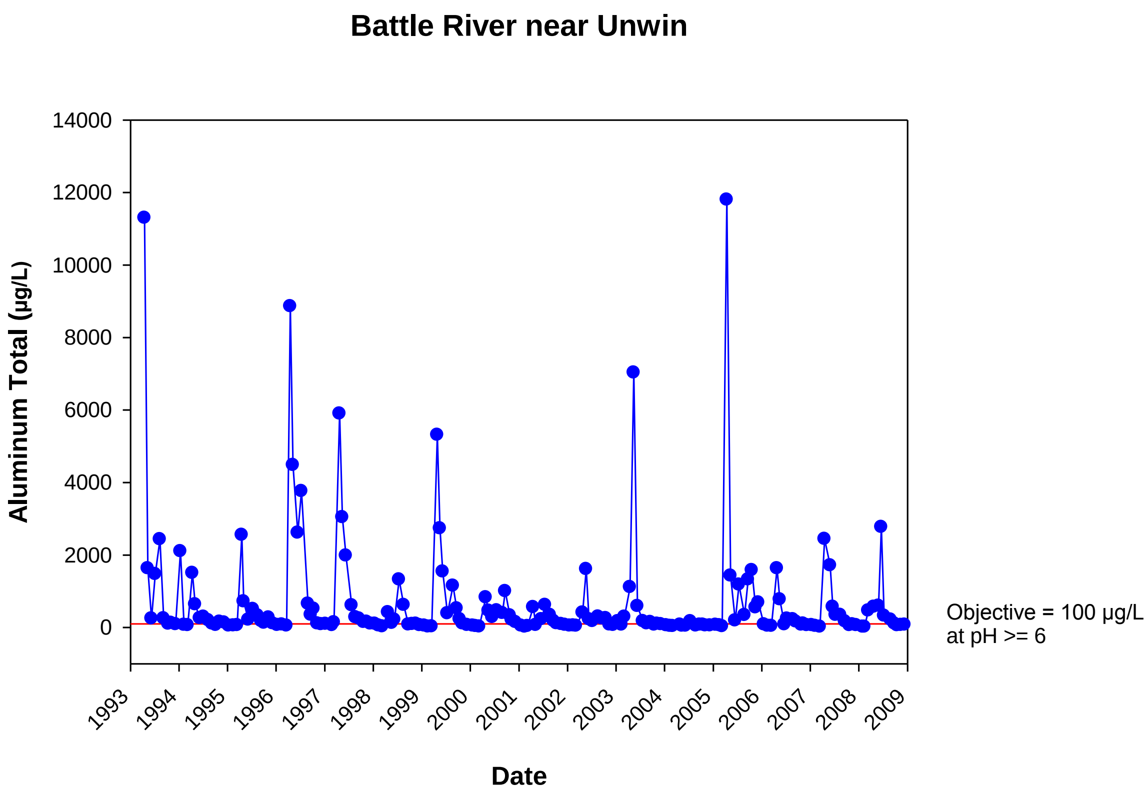

Figure 5-a15: Battle River Aluminum Total

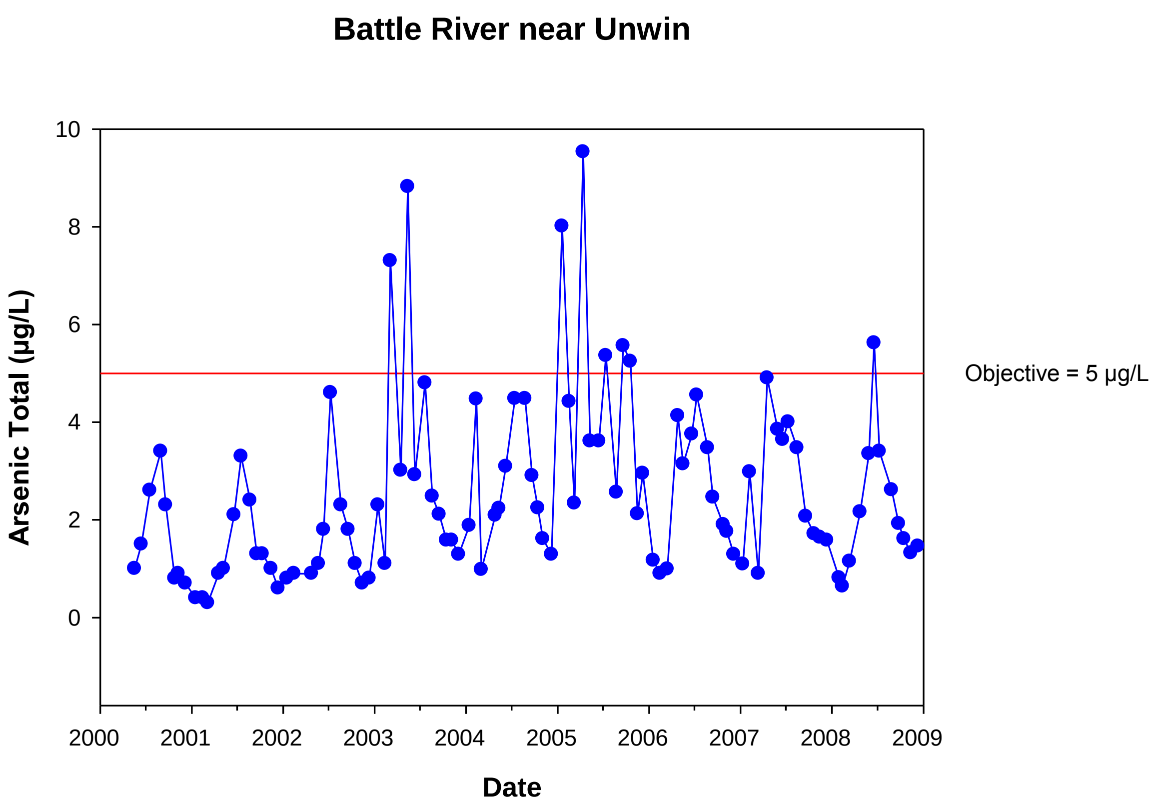

Figure 5-a16: Battle River Arsenic Total

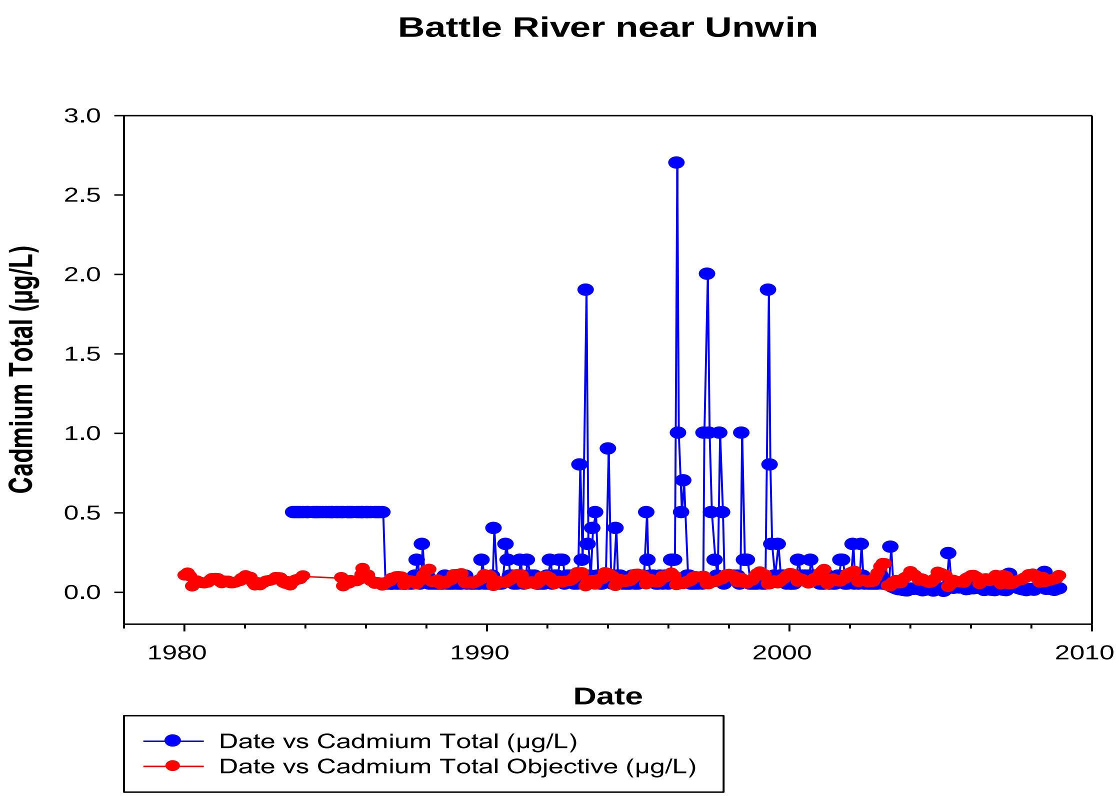

Figure 5-a17: Battle River Cadmium Total

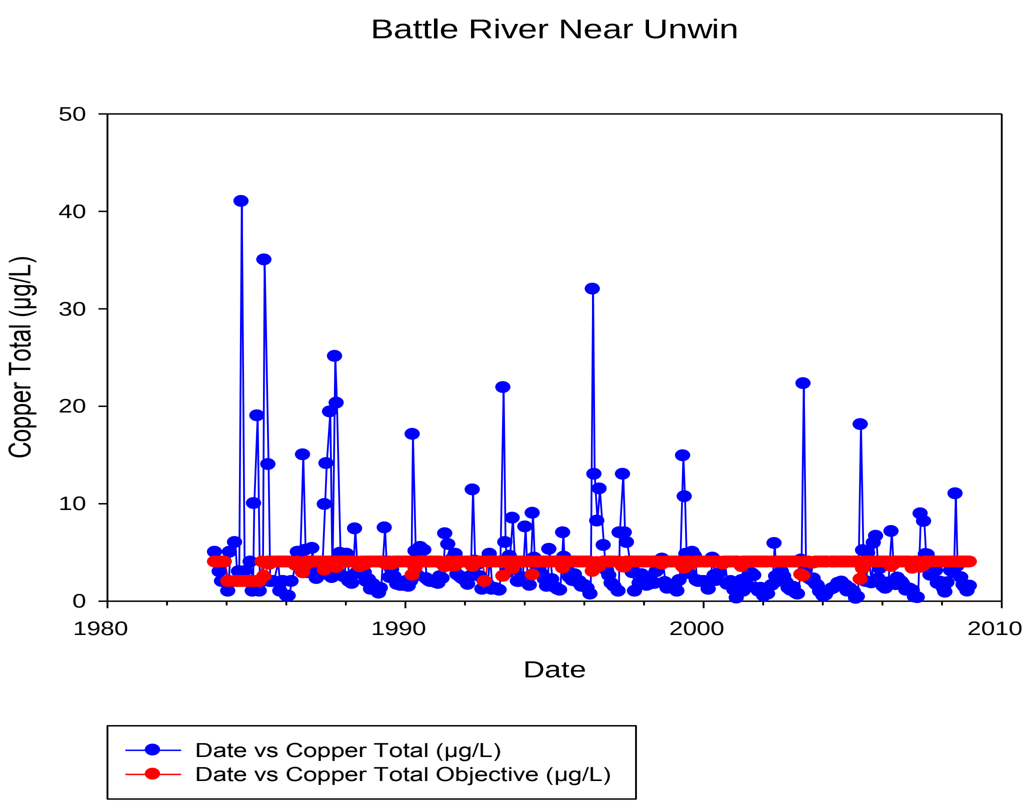

Figure 5-a18: Battle River Copper Total

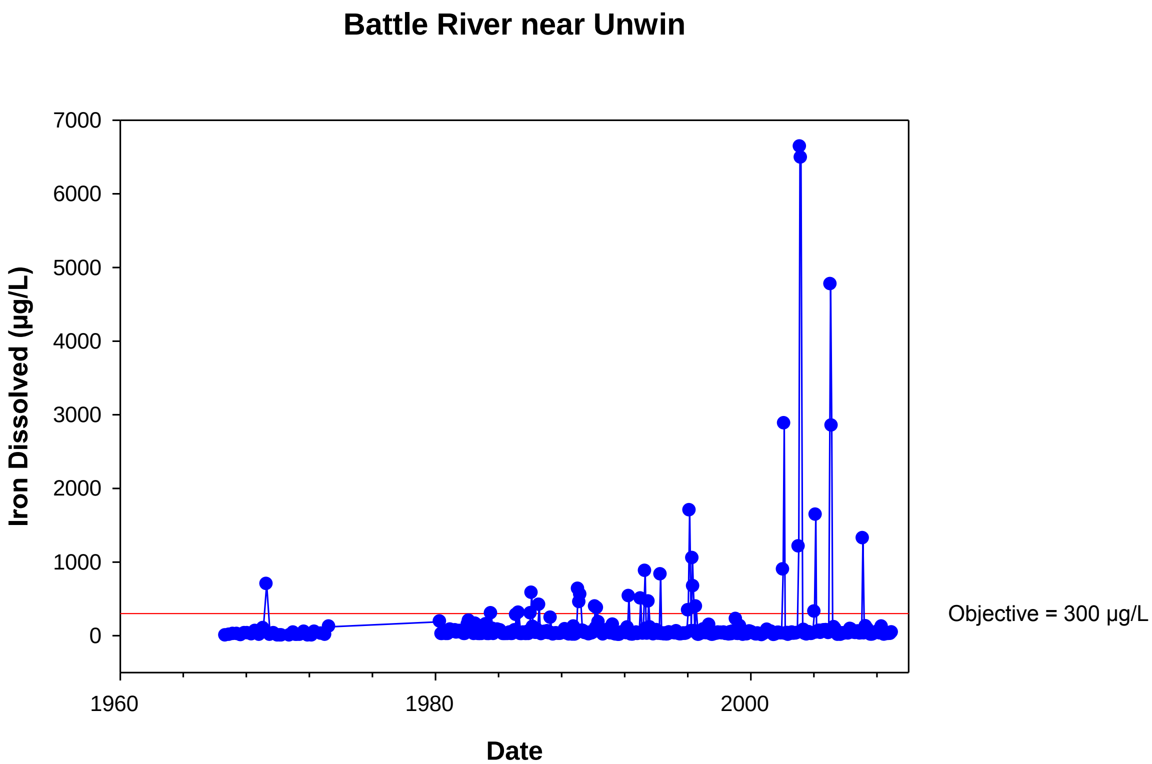

Figure 5-a19: Battle River Iron Dissolved

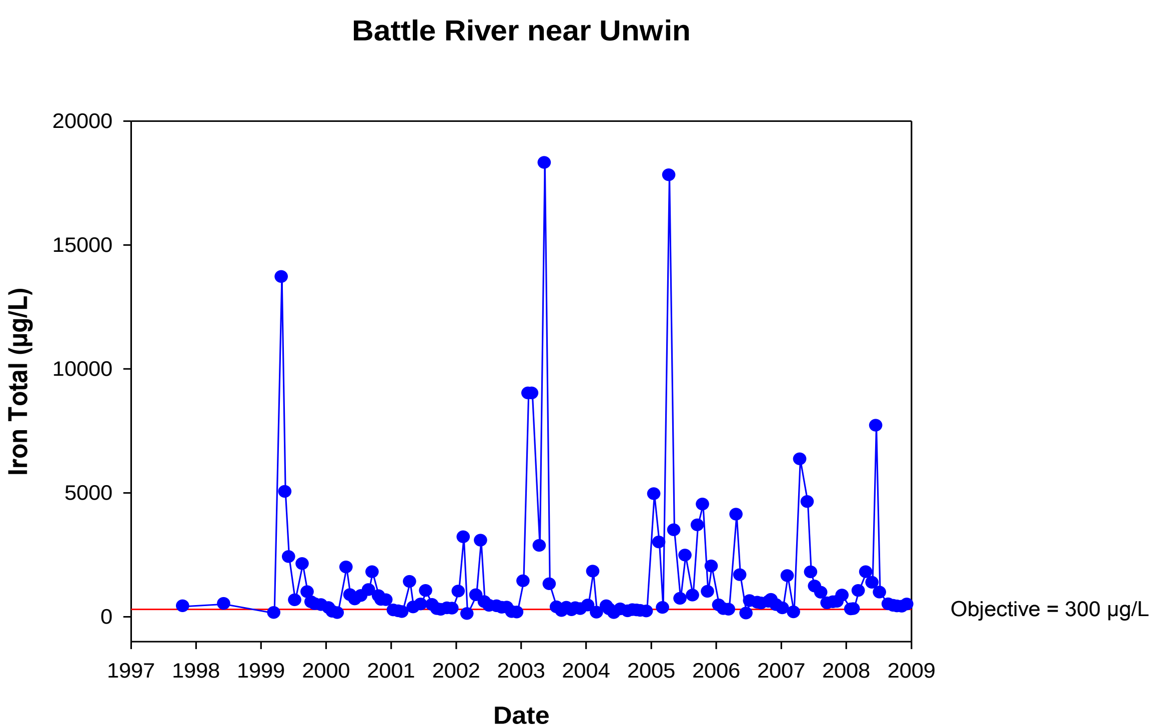

Figure 5-a20: Battle River Iron Total

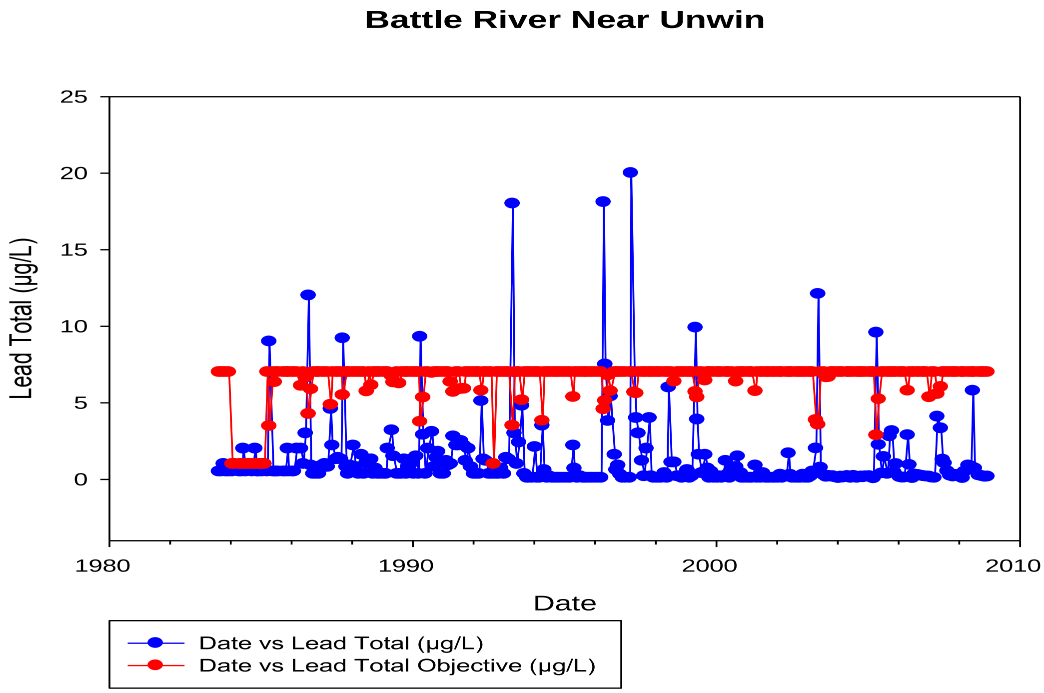

Figure 5-a21: Battle River Lead Total

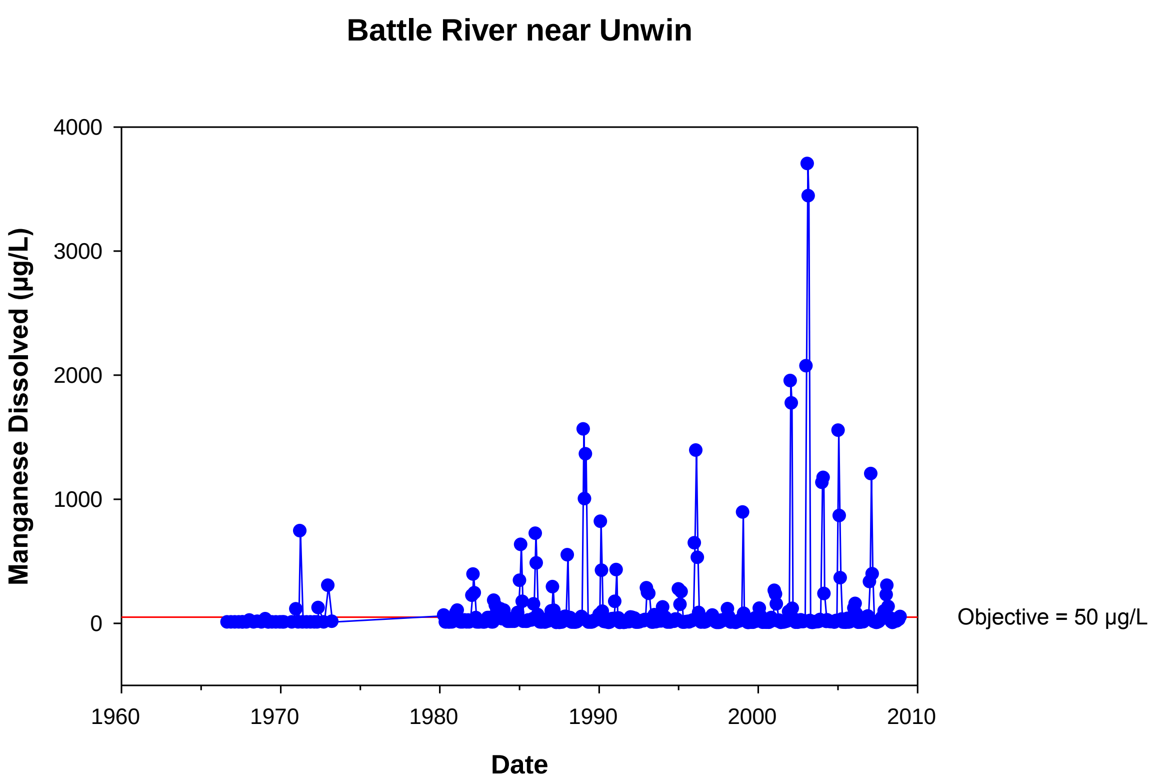

Figure 5-a22: Battle River Manganese Dissolved

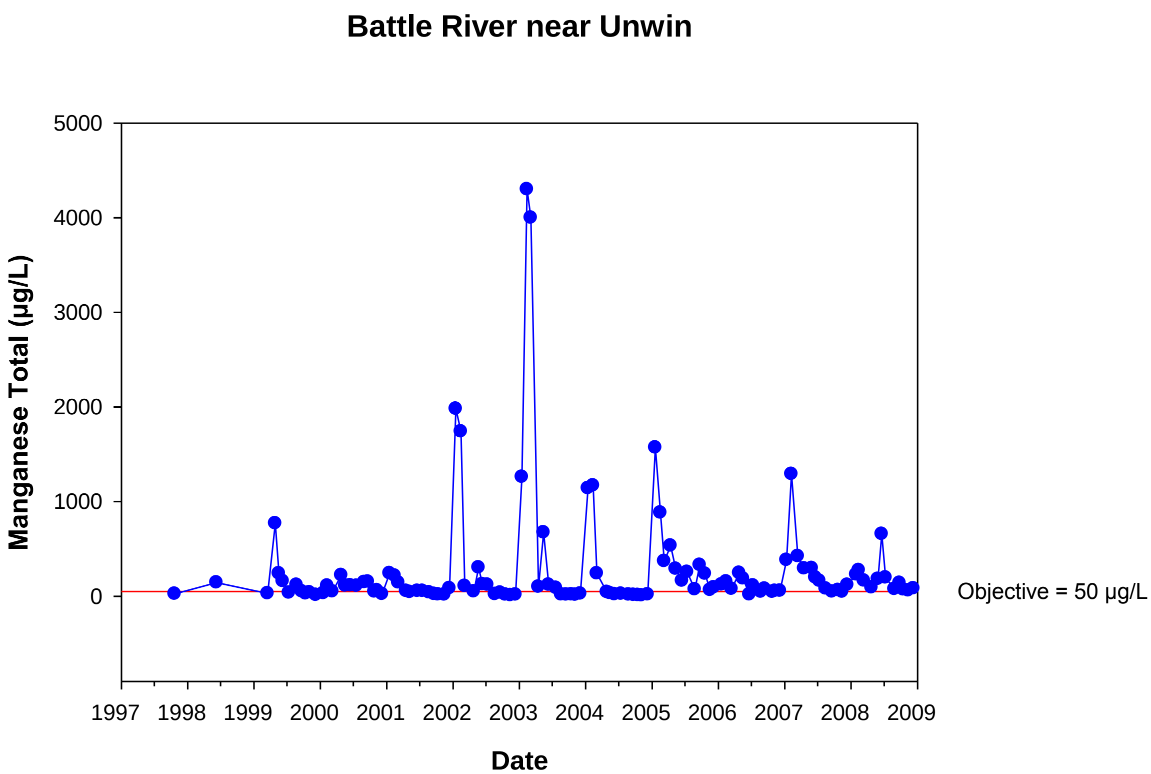

Figure 5-a23: Battle River Manganese Total

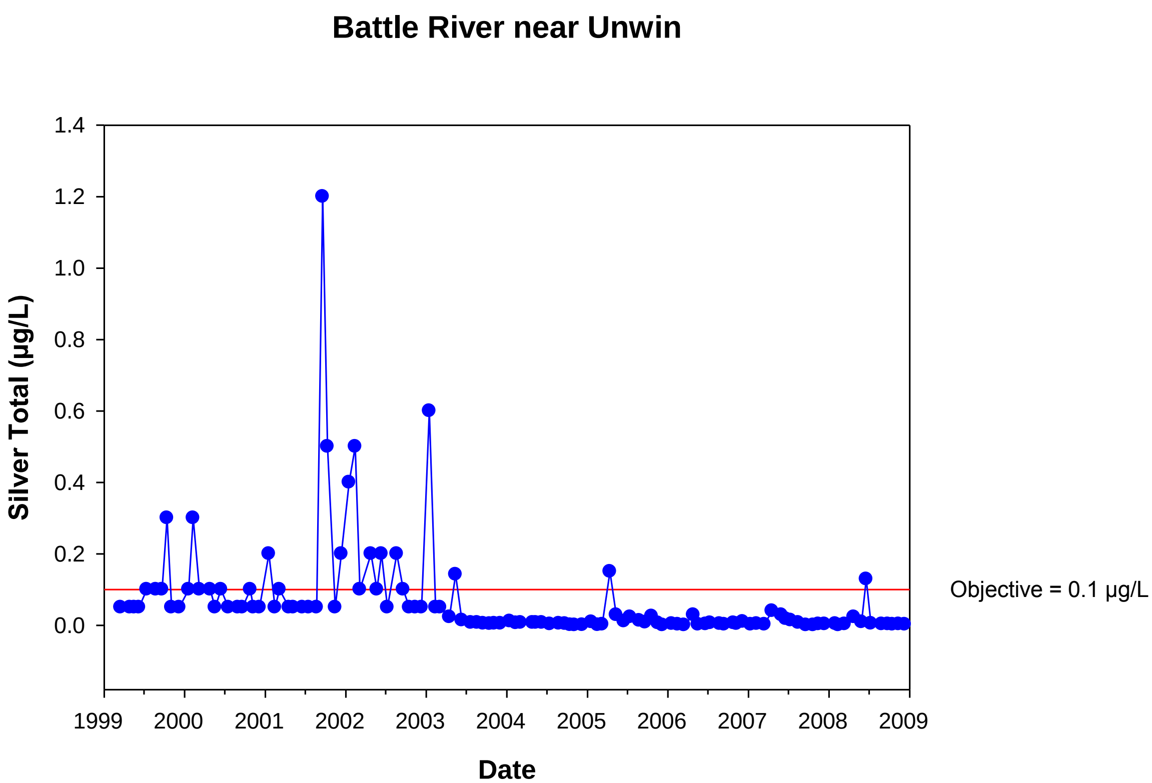

Figure 5-a24: Battle River Silver Total

Battle River near Unwin

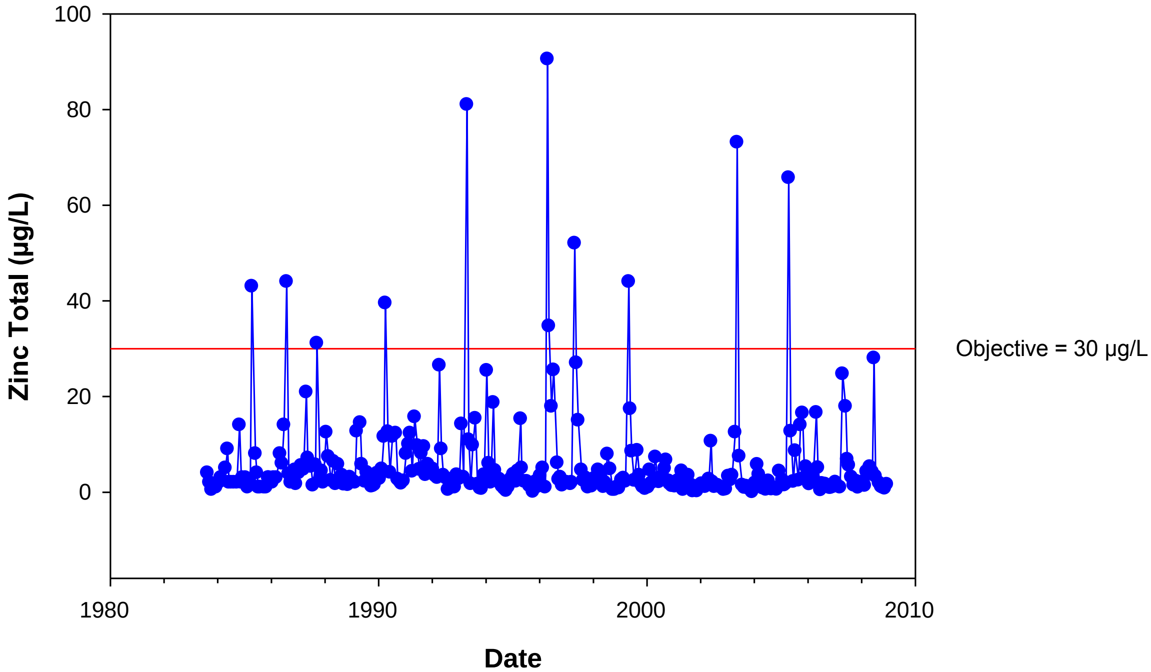

Figure 5-a25: Battle River Zinc Total

Battle River near Unwin

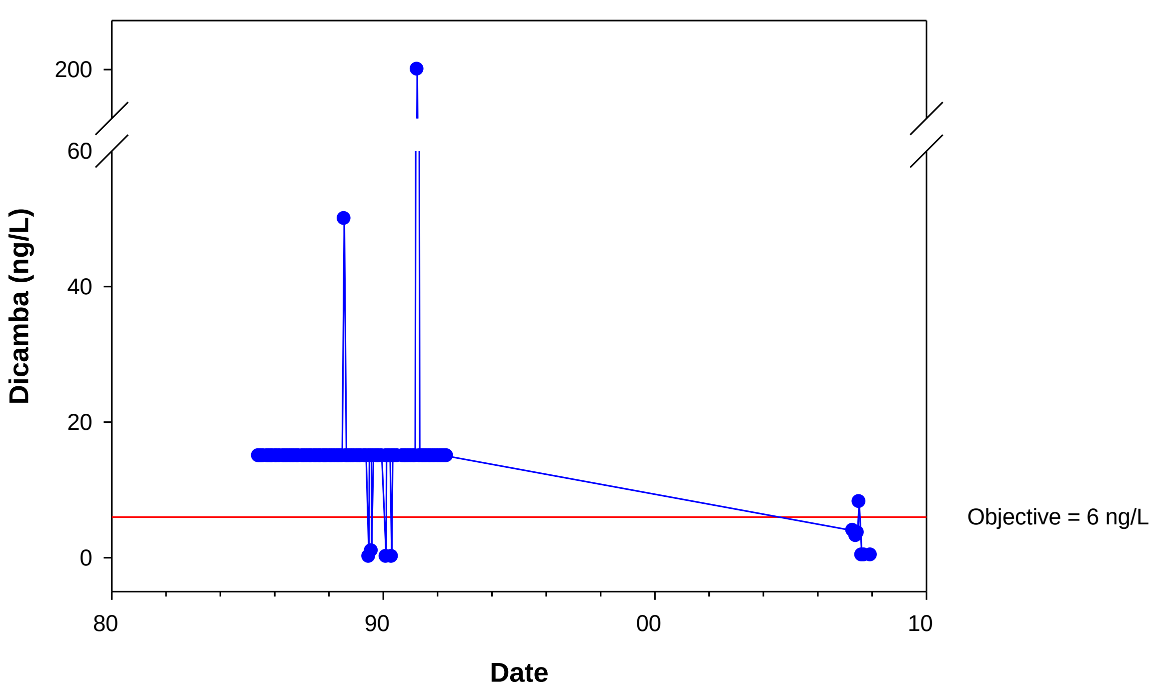

Figure 5-a26: Battle River Dicamba

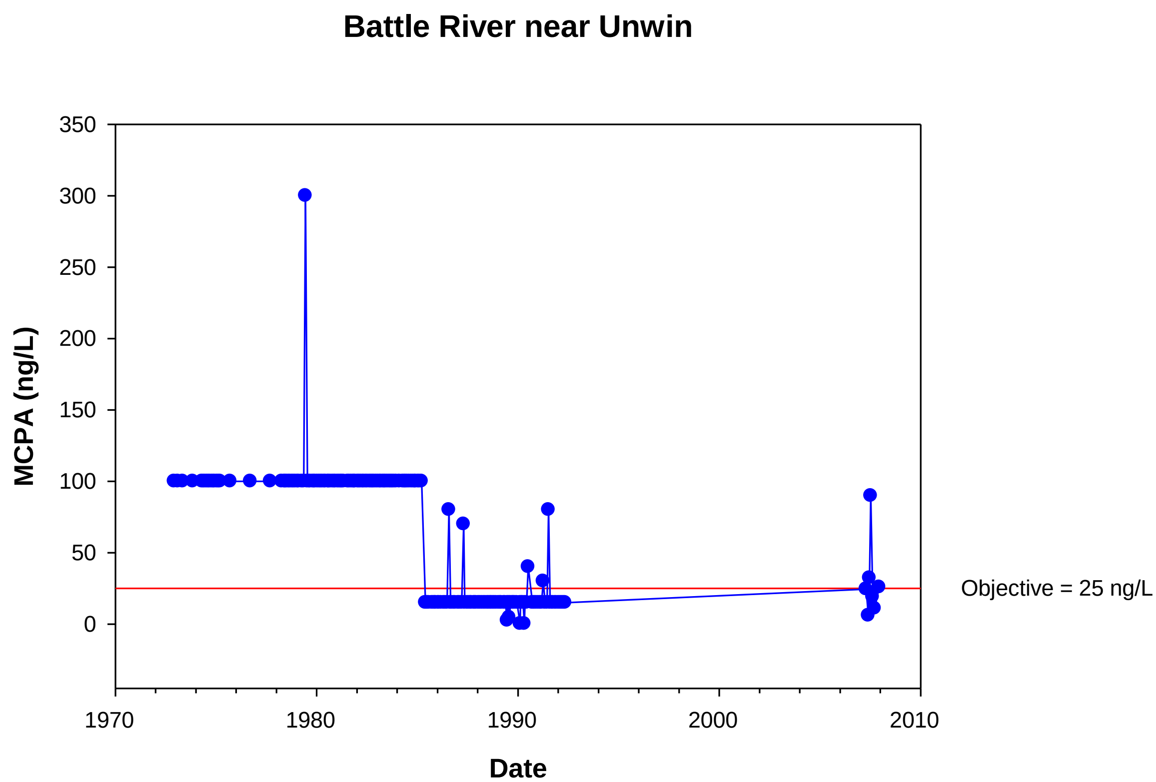

Figure 5-a27: Battle River MCPA

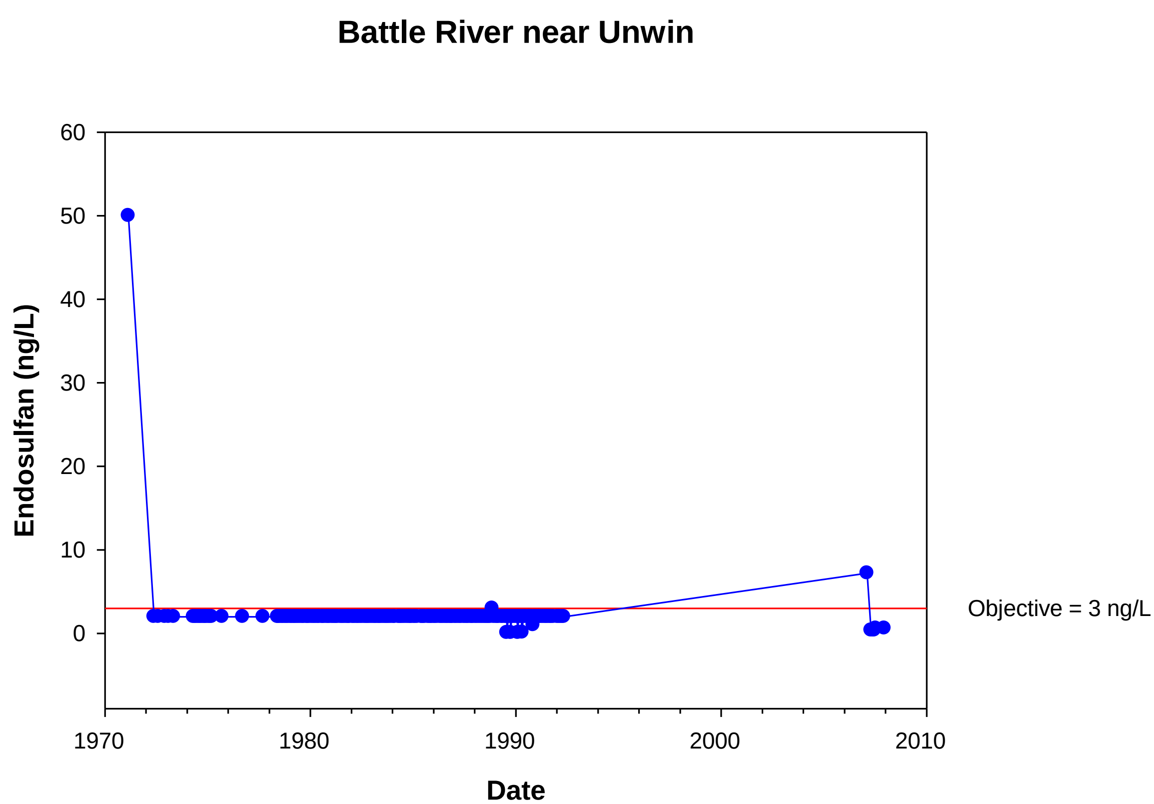

Figure 5-a28: Battle River Endosulfan

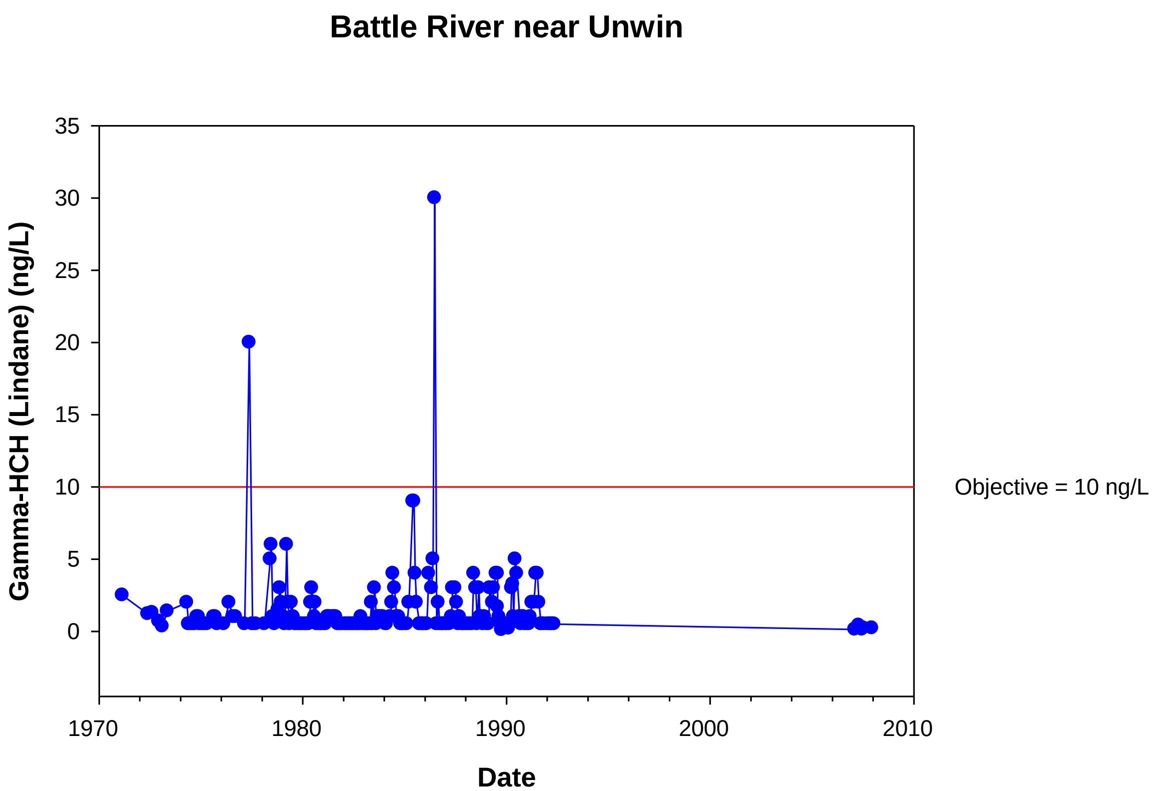

Figure 5-a29: Battle River Lindane

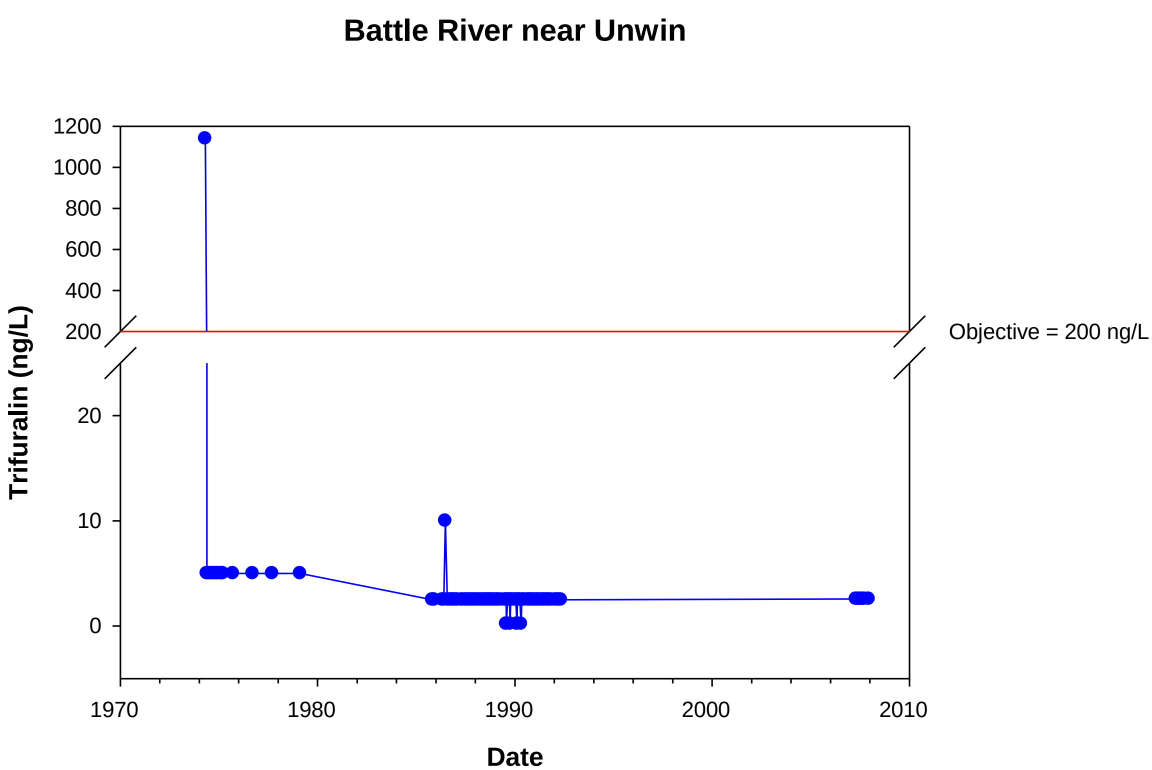

Figure 5-a30: Battle River Trifluralin

Appendix 5-b: Beaver River

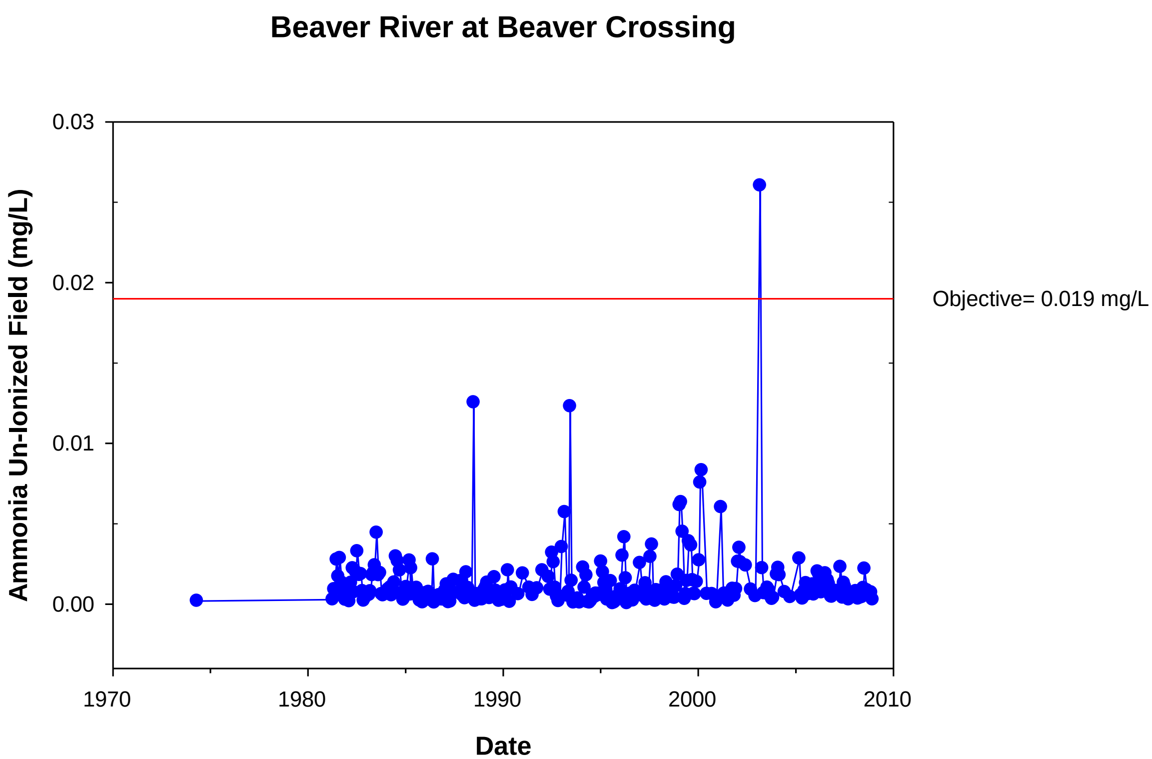

Figure 5-b1: Beaver River Ammonia Un-Ionized Field

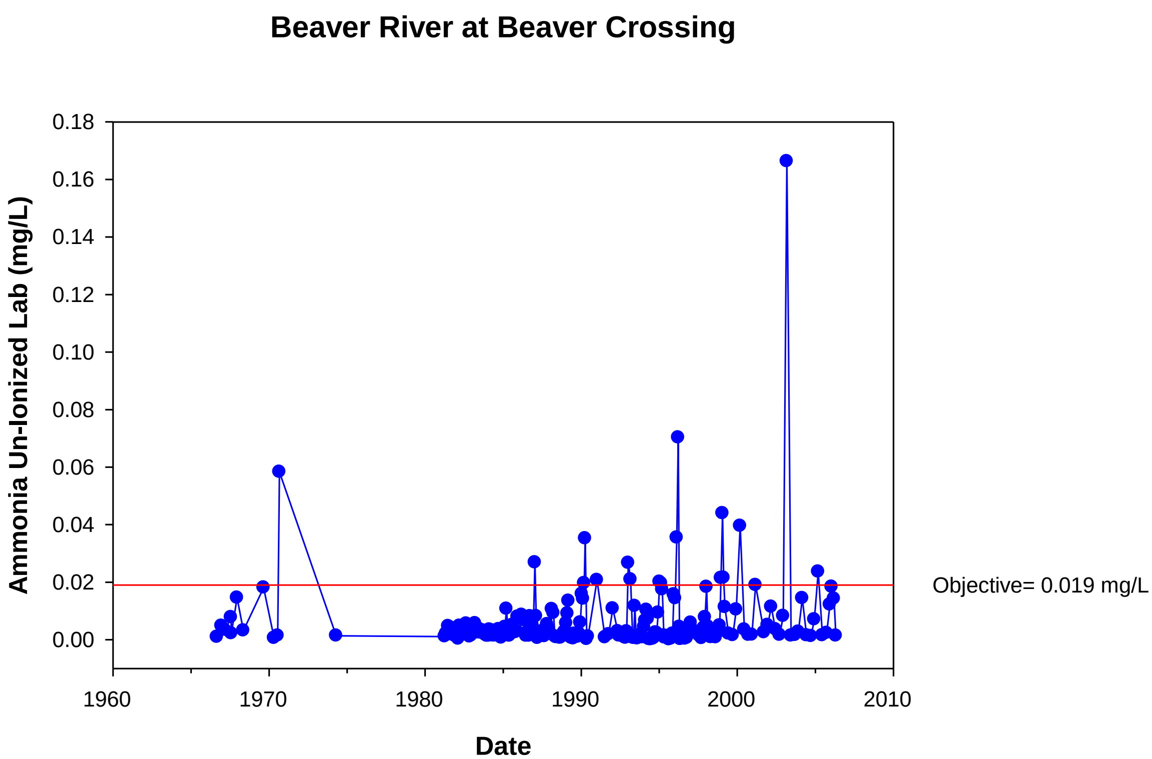

Figure 5-b2: Beaver River Ammonia Un-Ionized Lab

Beaver River at Beaver Crossing

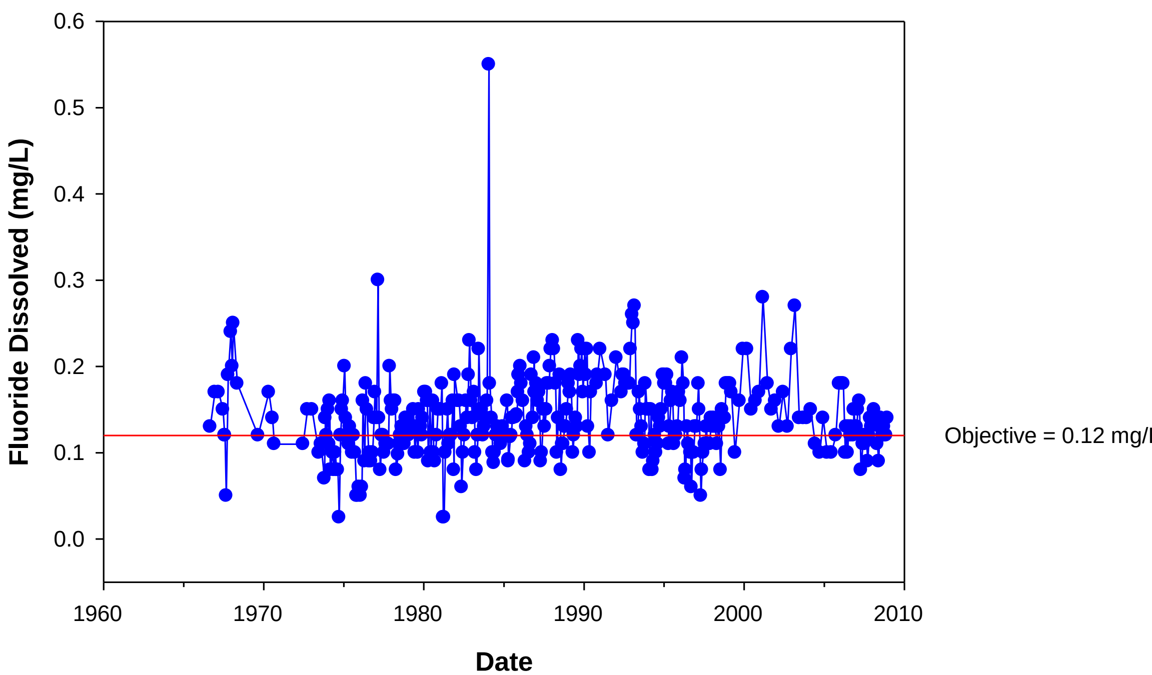

Figure 5-b3: Beaver River Fluoride Dissolved

Beaver River at Beaver Crossing

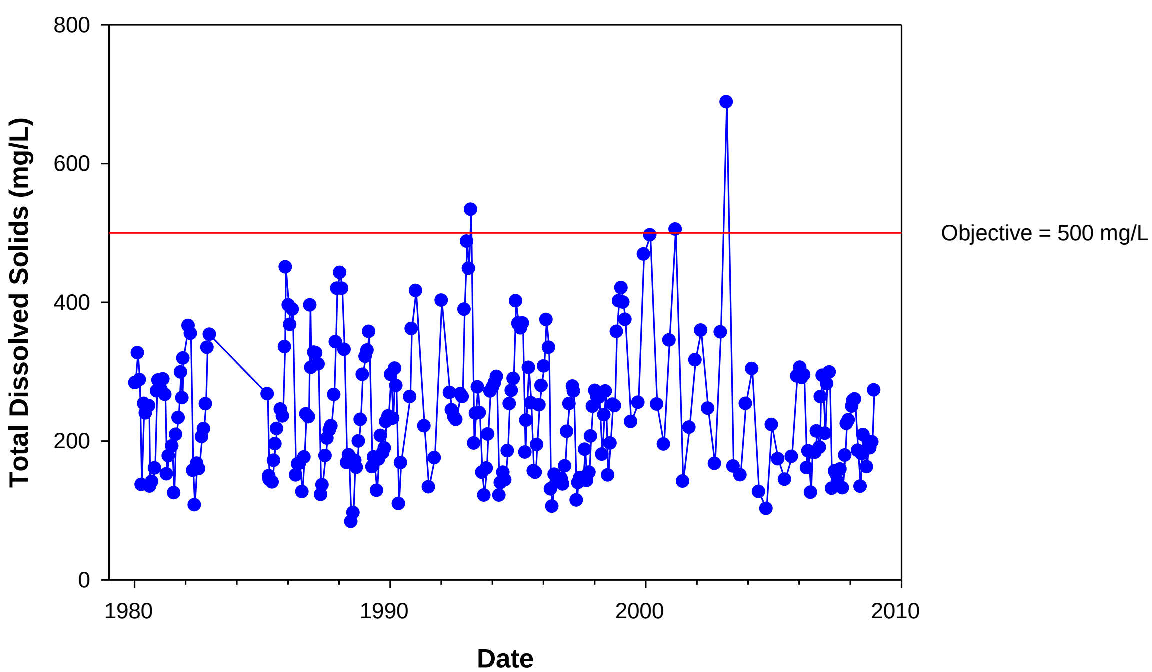

Figure 5-b4: Beaver River Total Dissolved Solids

Beaver River at Beaver Crossing

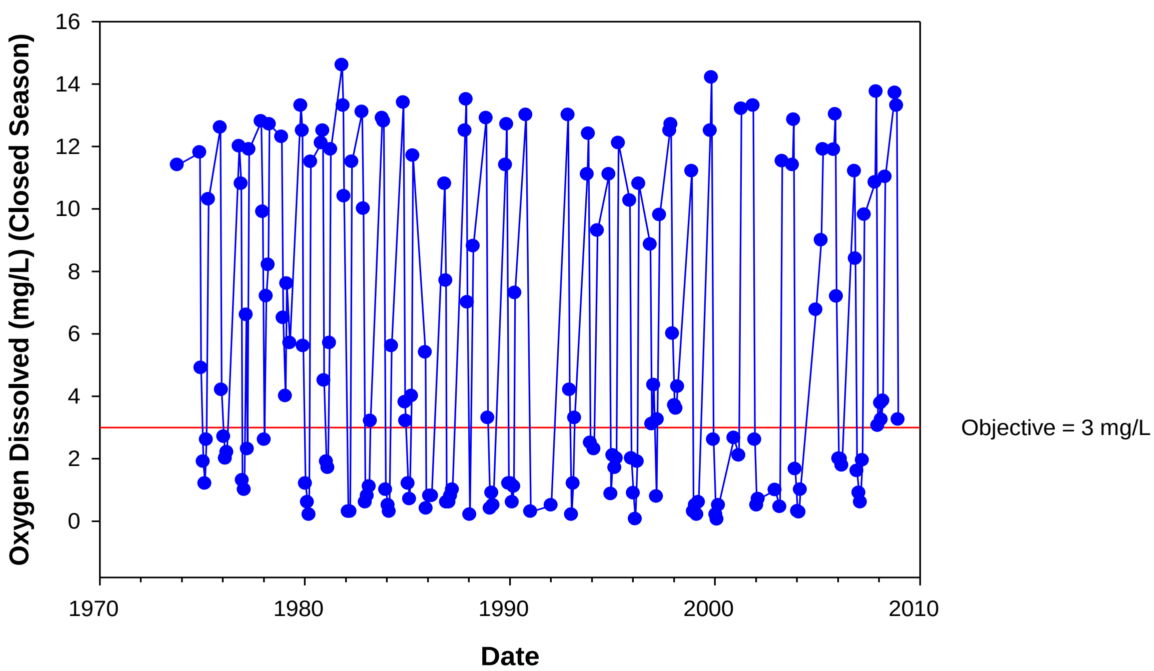

Figure 5-b5: Beaver River Oxygen Dissolved (Closed Season)

Beaver River at Beaver Crossing

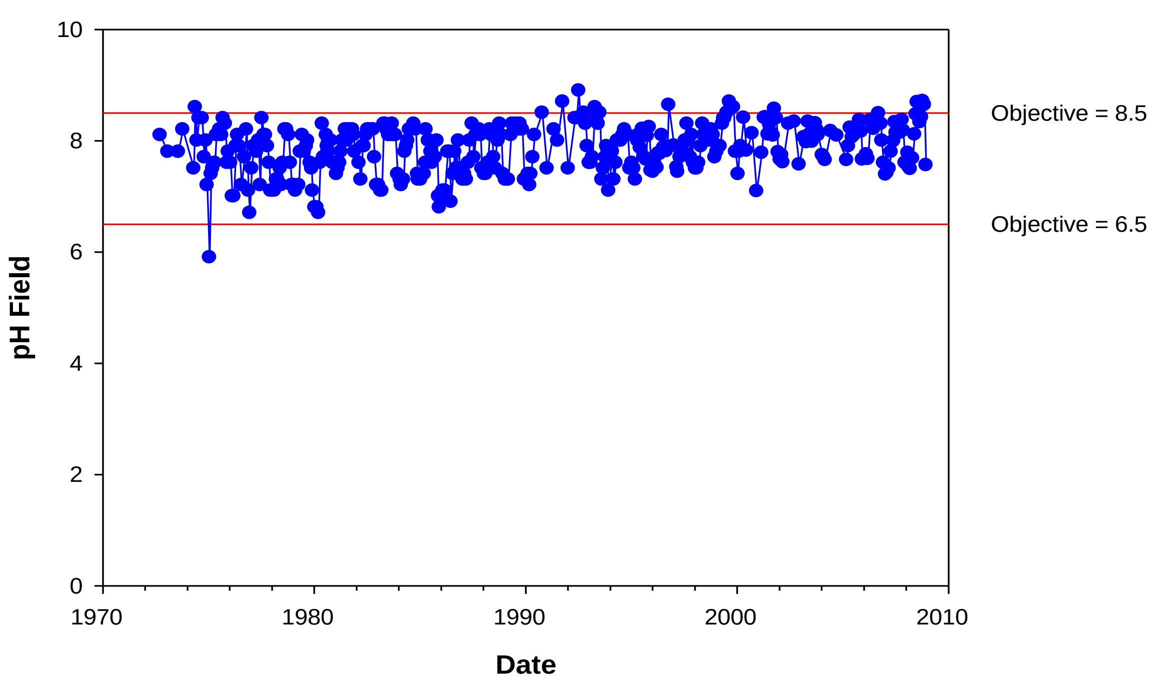

Figure 5-b6: Beaver River pH Field

Beaver River at Beaver Crossing

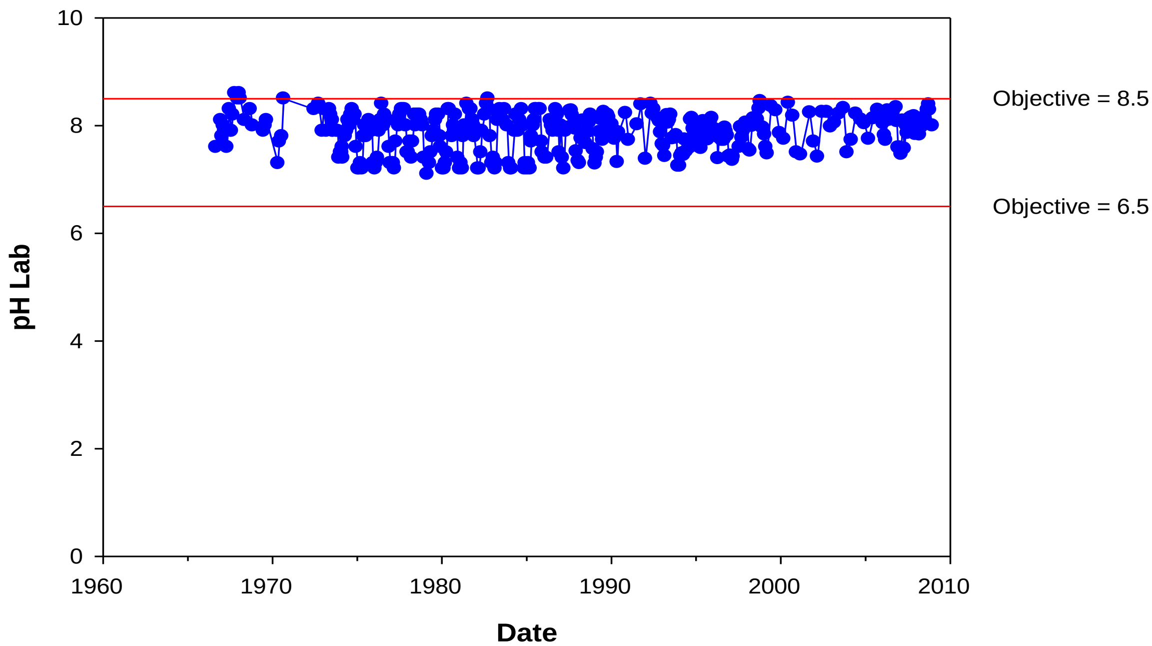

Figure 5-b7: Beaver River pH Lab

Beaver River at Beaver Crossing

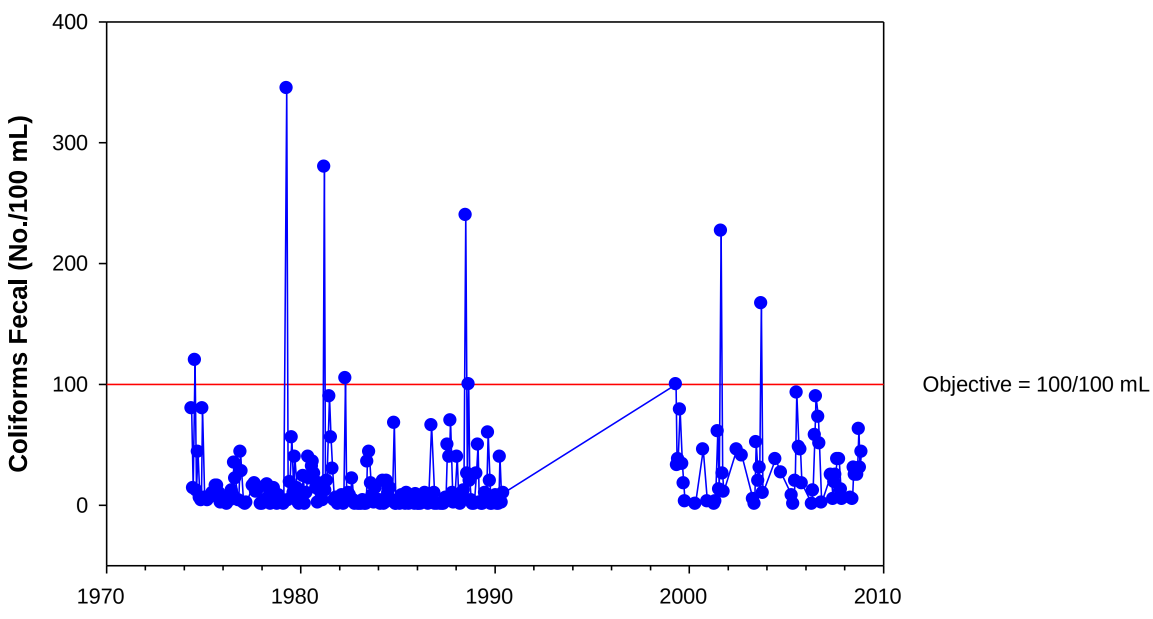

Figure 5-b8: Beaver River Coliforms Fecal

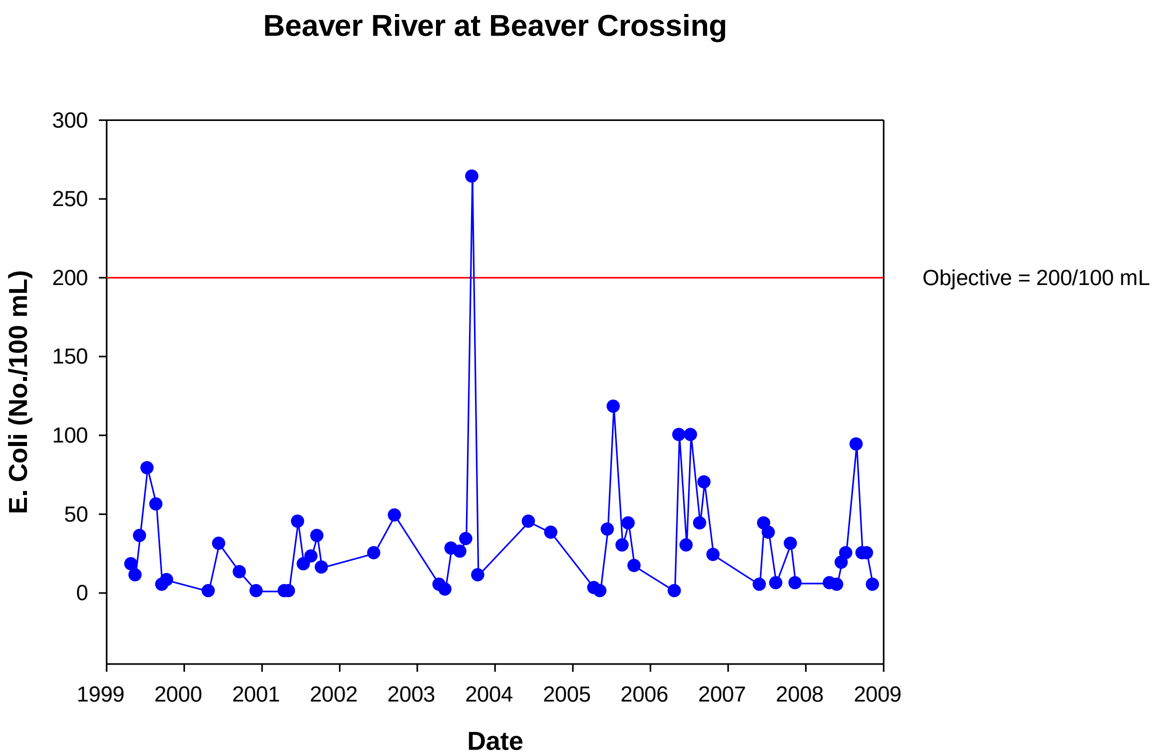

Figure 5-b9: Beaver River E. Coli

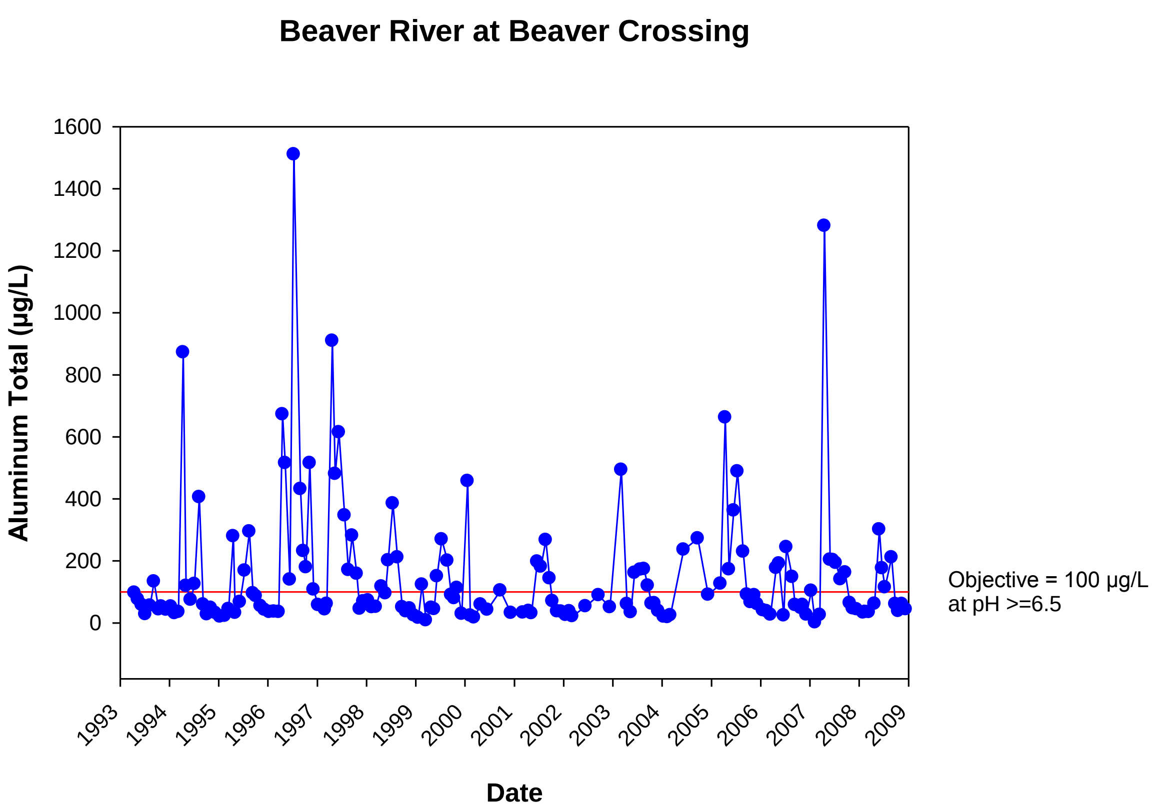

Figure 5-b10: Beaver River Aluminum Total

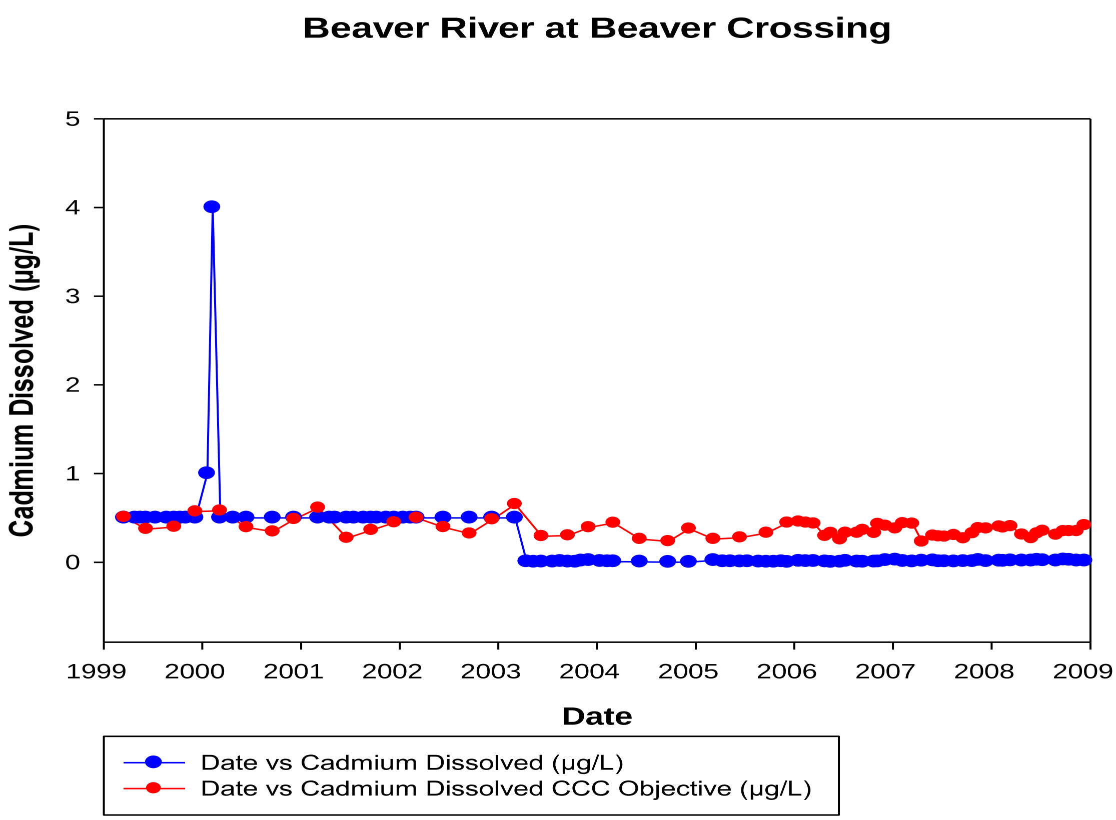

Figure 5-b11: Beaver River Cadmium Dissolved

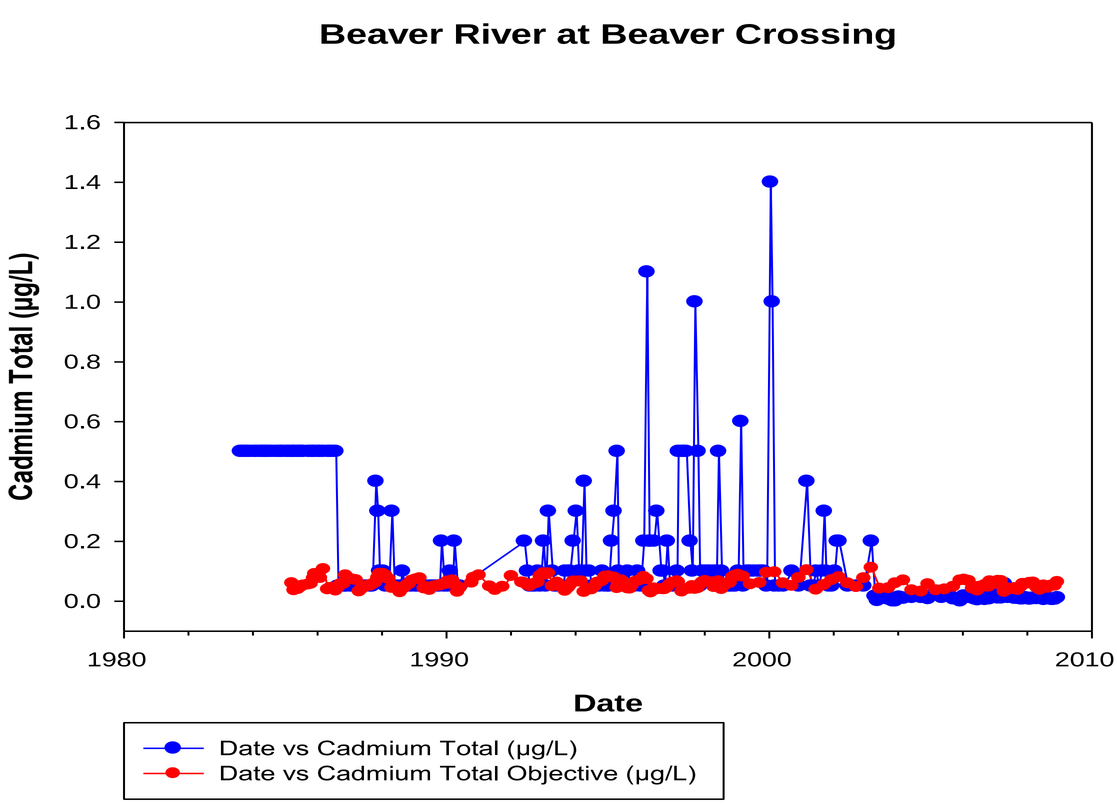

Figure 5-b12: Beaver River Cadmium Total

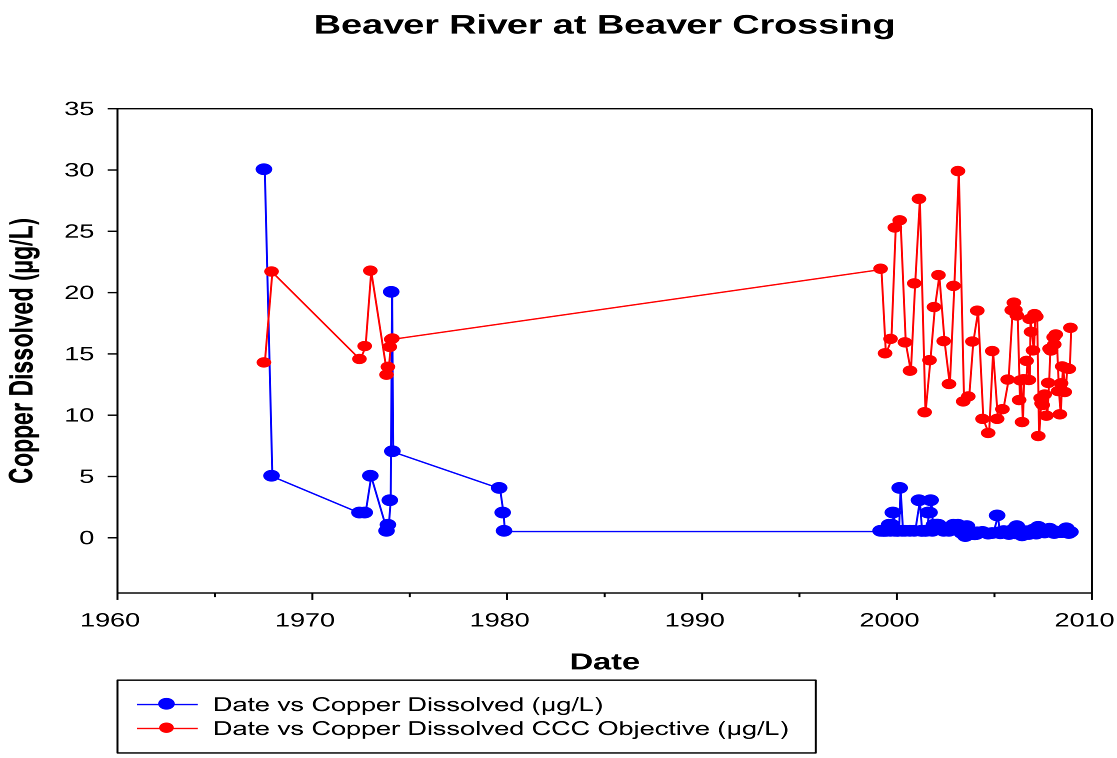

Figure 5-b13: Beaver River Copper Dissolved

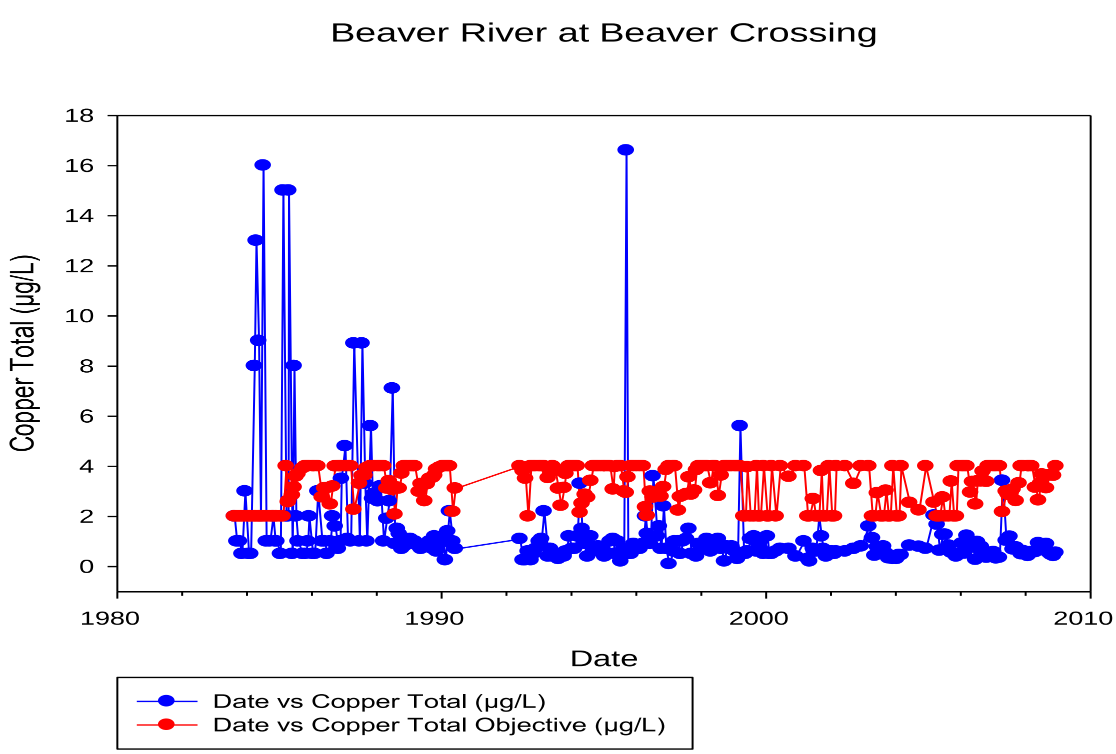

Figure 5-b14: Beaver River Copper Total

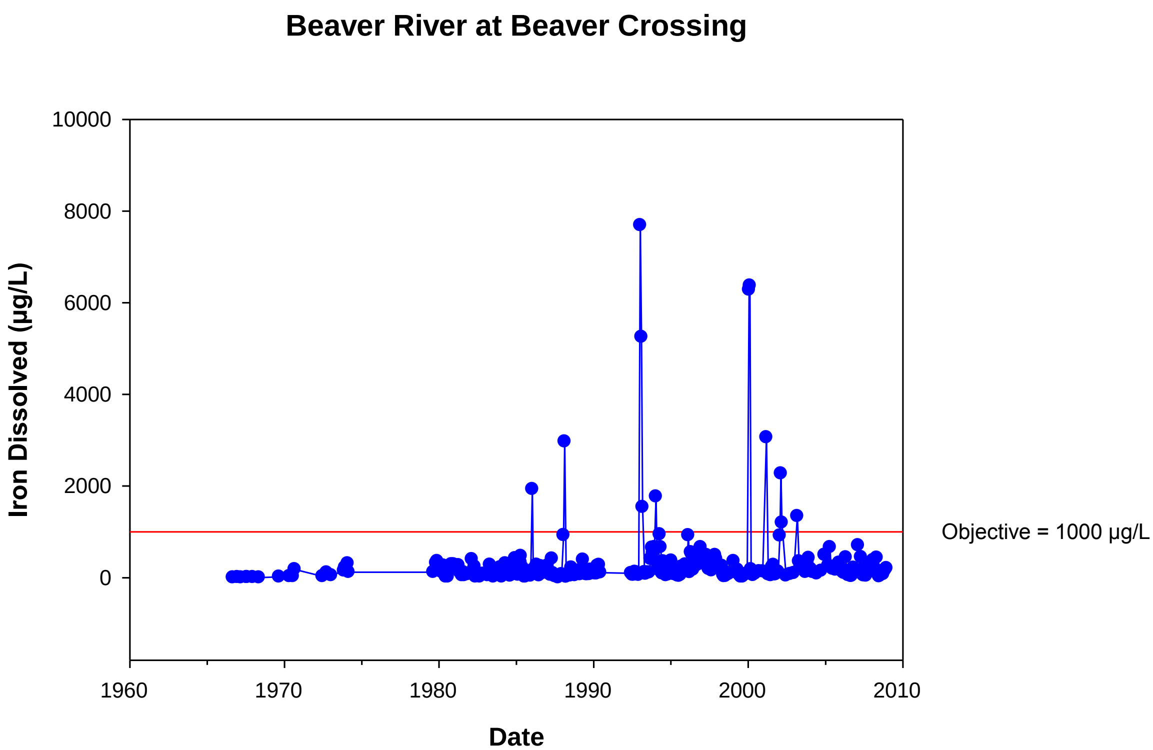

Figure 5-b15: Beaver River Iron Dissolved

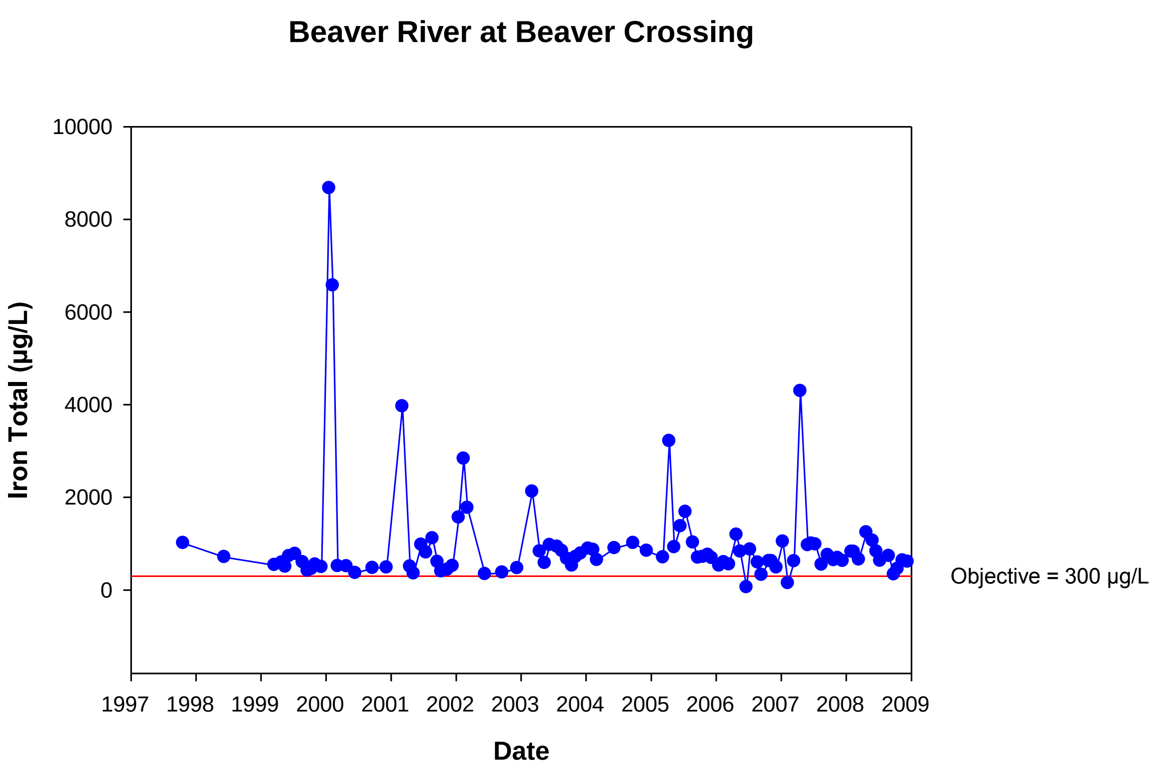

Figure 5-b16: Beaver River Iron Total

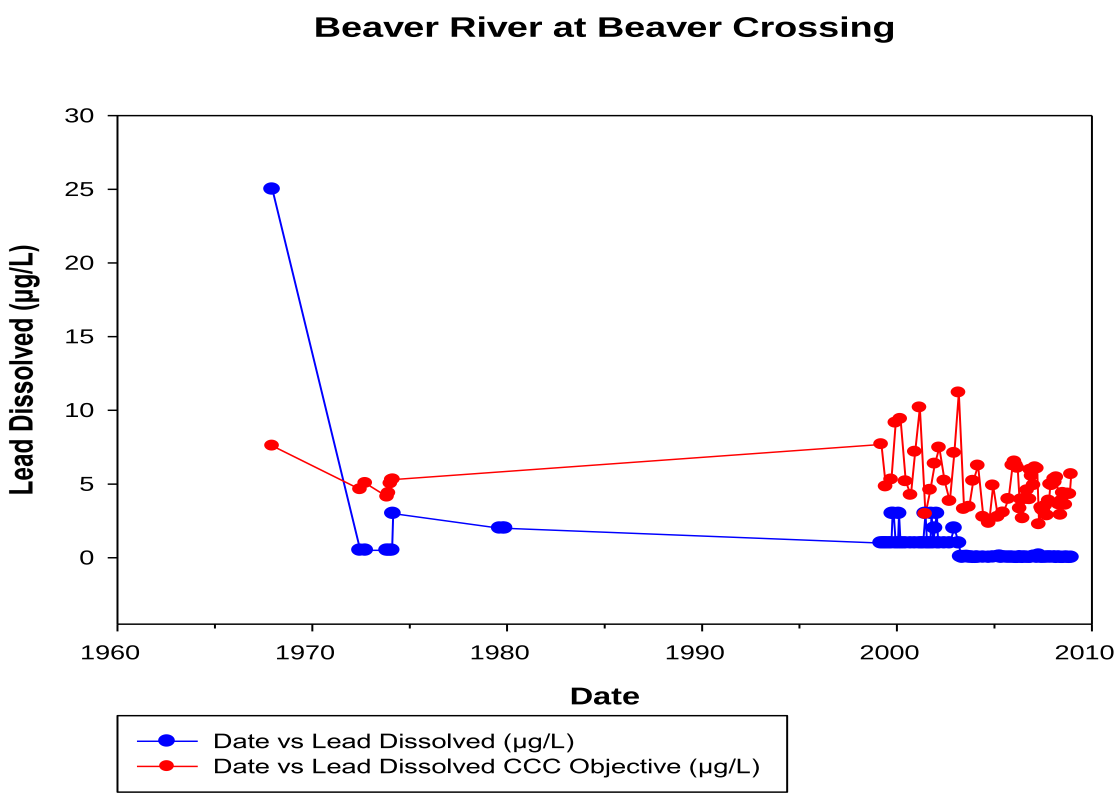

Figure 5-b17: Beaver River Lead Dissolved

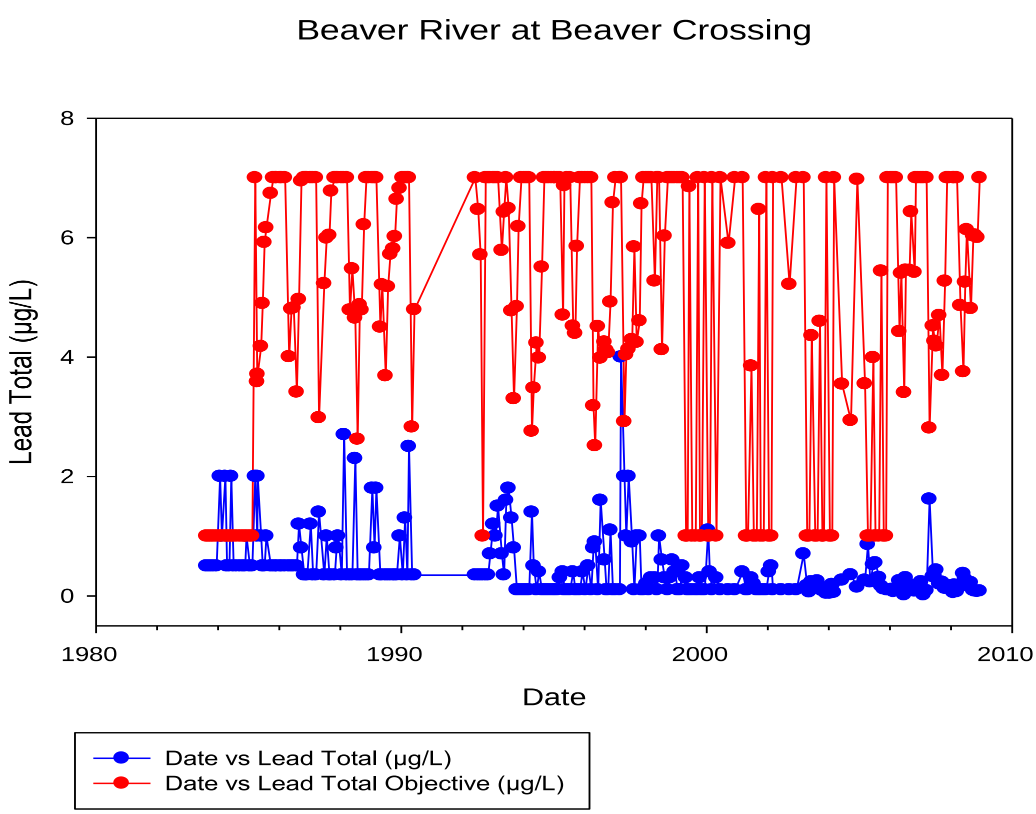

Figure 5-b18: Beaver River Lead Total

Beaver River at Beaver Crossing

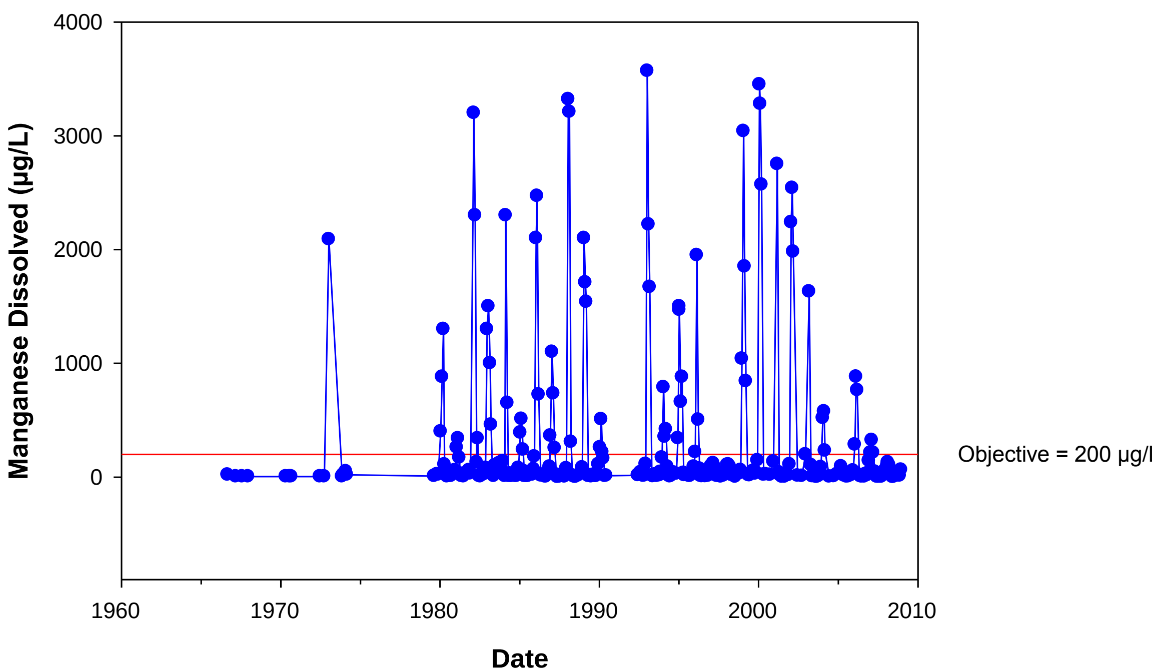

Figure 5-b19: Beaver River Manganese Dissolved

Beaver River at Beaver Crossing

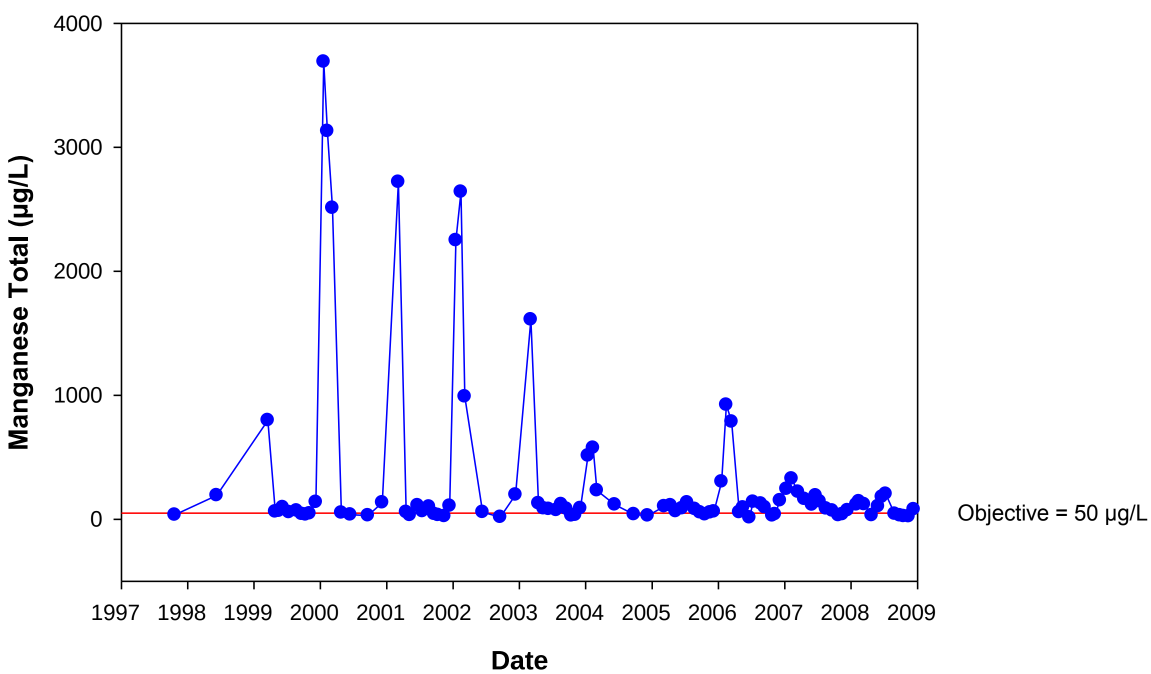

Figure 5-b20: Beaver River Manganese Total

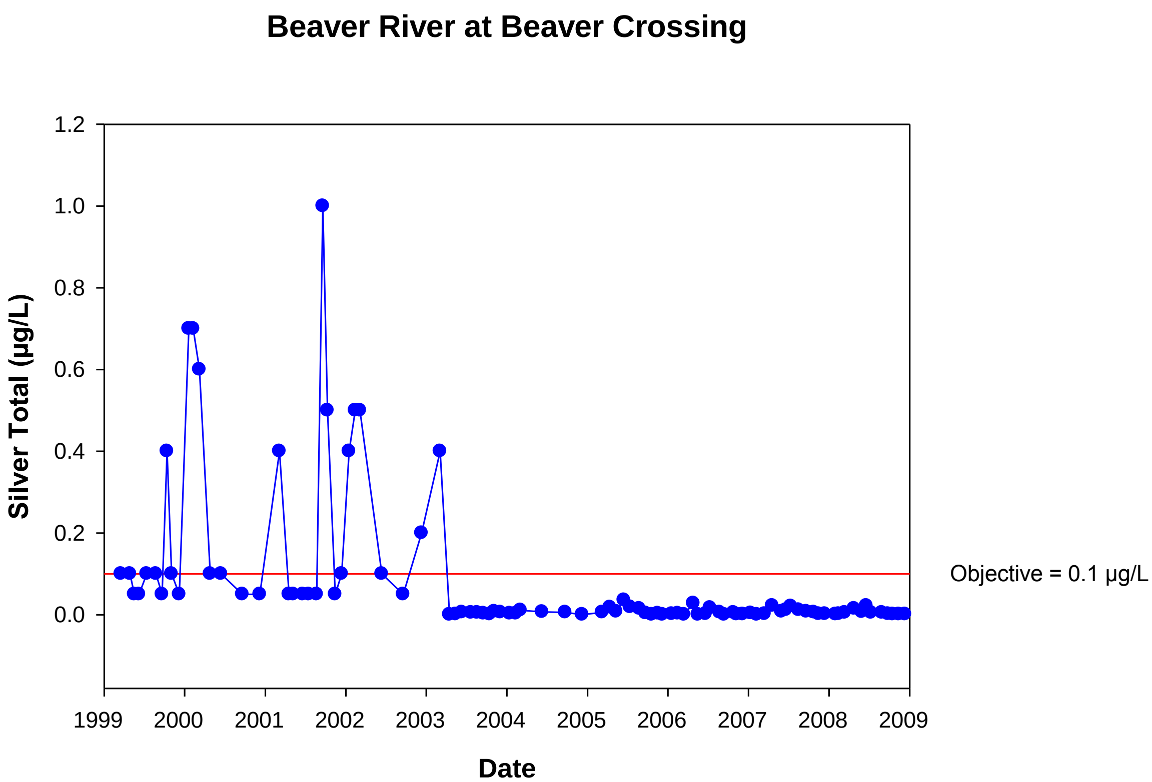

Figure 5-b21: Beaver River Silver Total

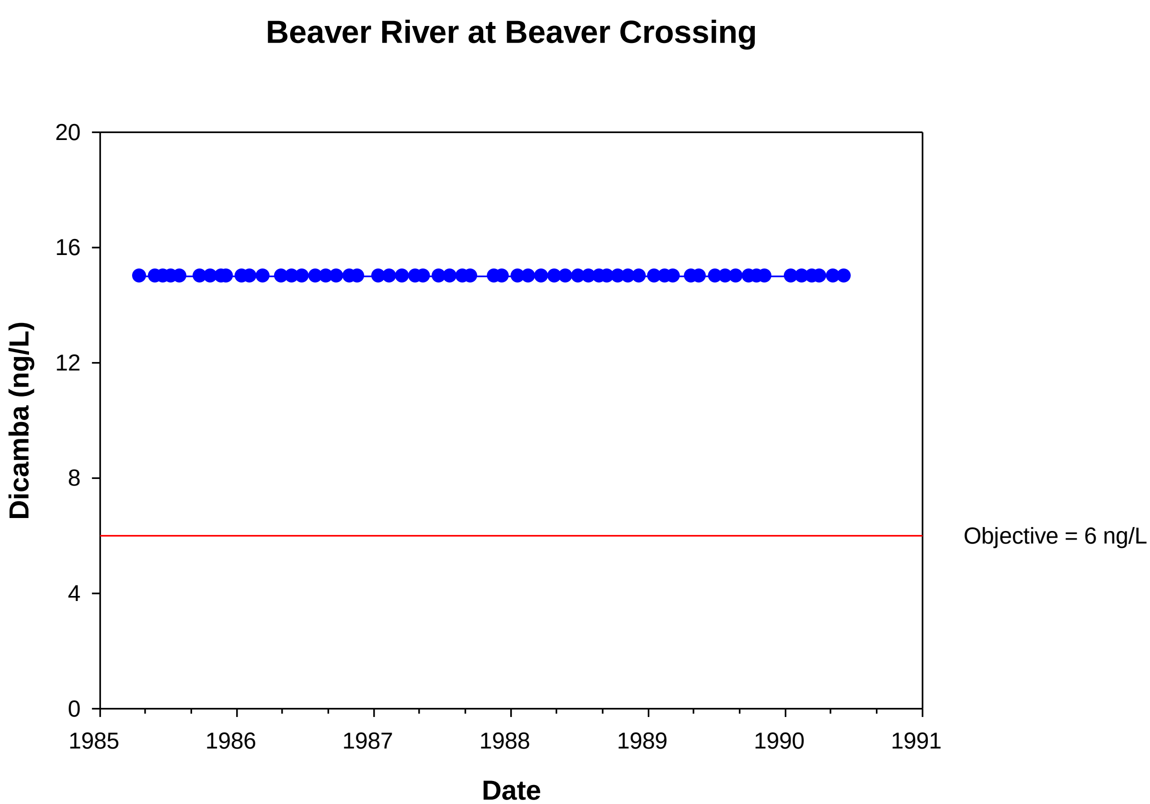

Figure 5-b22: Beaver River Dicamba

Beaver River at Beaver Crossing

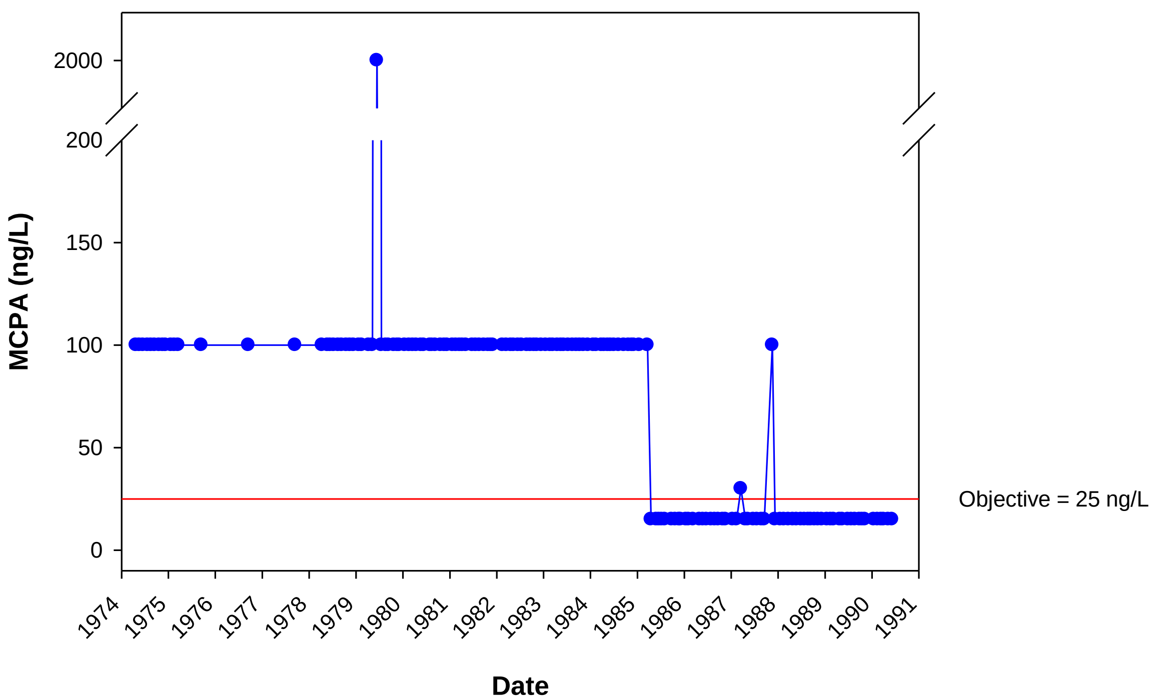

Figure 5-b23: Beaver River MCPA

Beaver River at Beaver Crossing

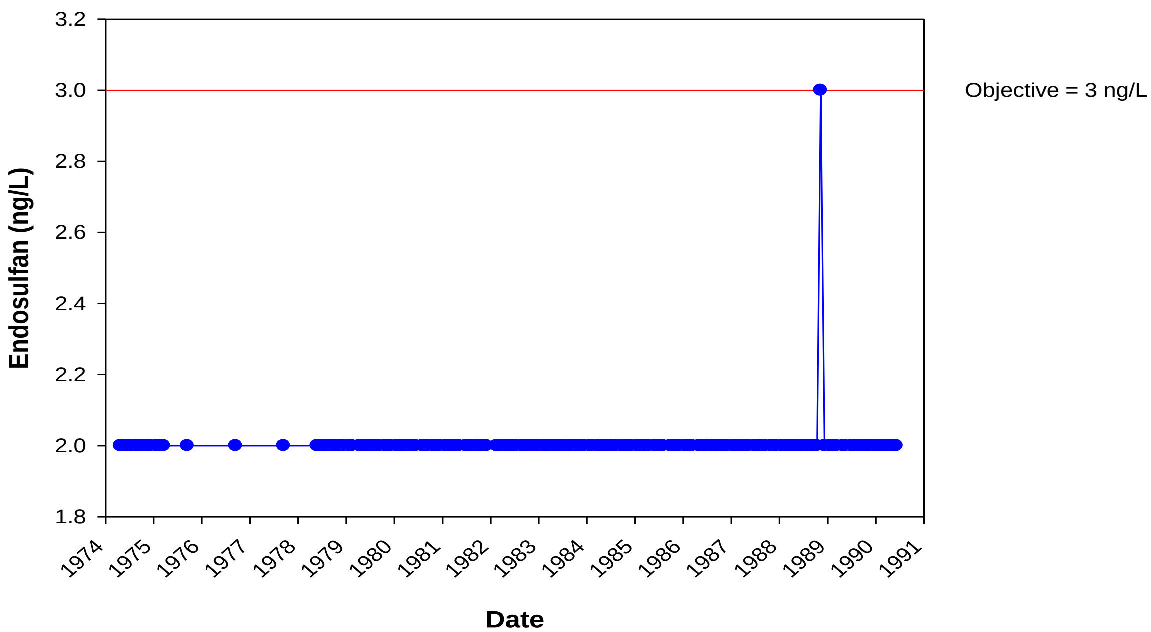

Figure 5-b24: Beaver River Endosulfan

Appendix 5-c: Cold River

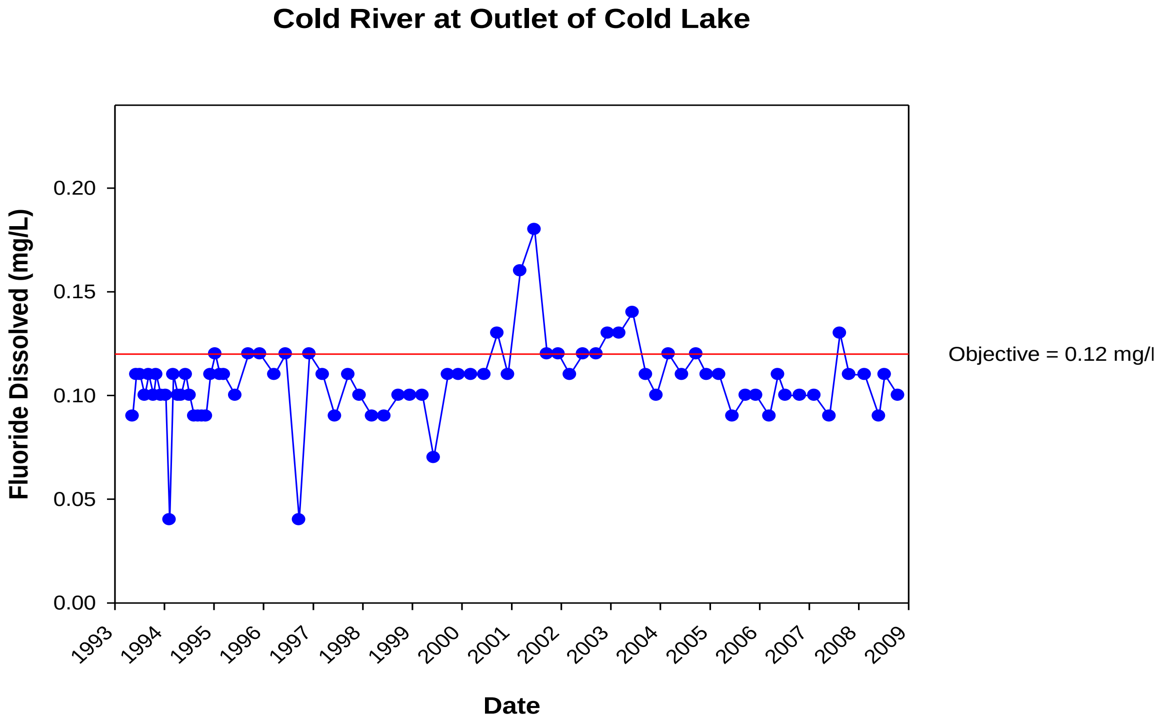

Figure 5-c1: Cold River Fluoride Dissolved

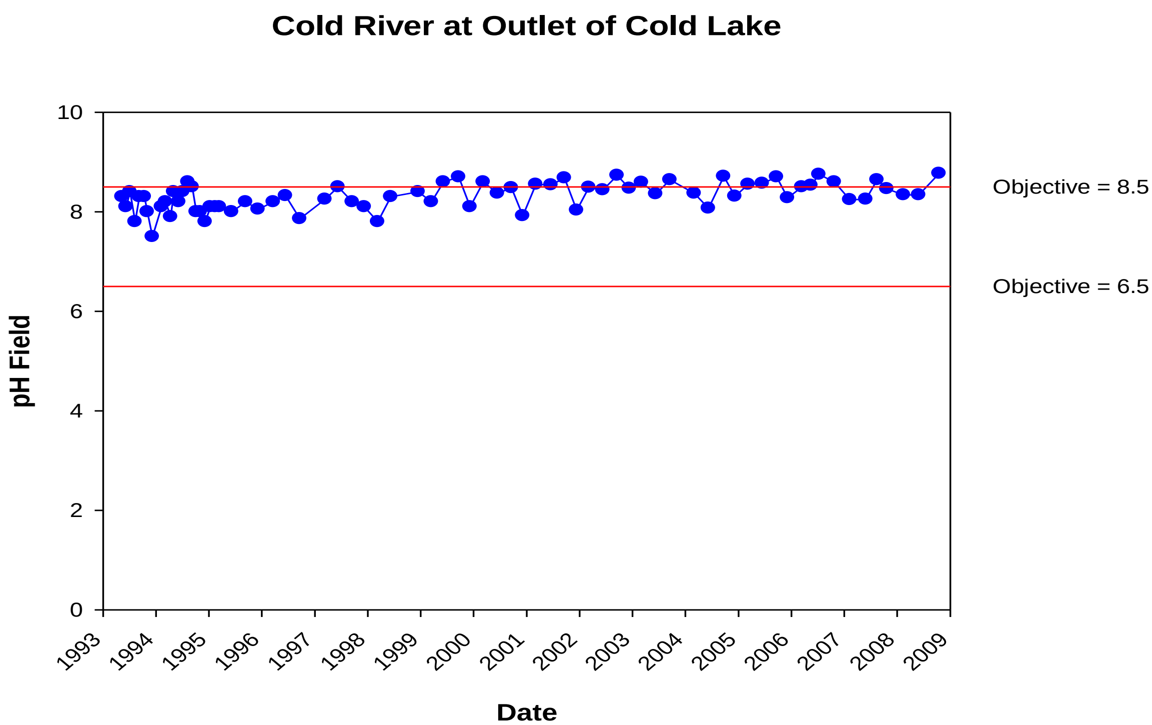

Figure 5-c2: Cold River pH Field

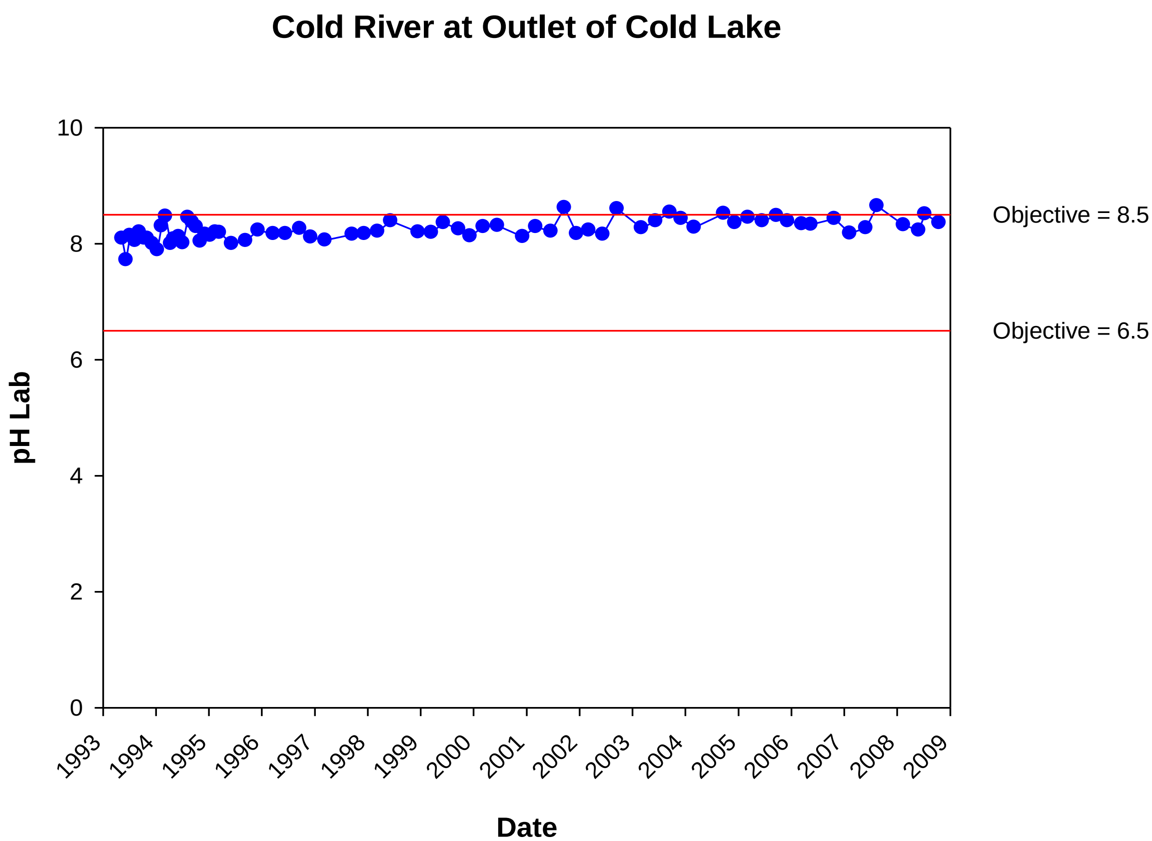

Figure 5-c3: Cold River pH Lab

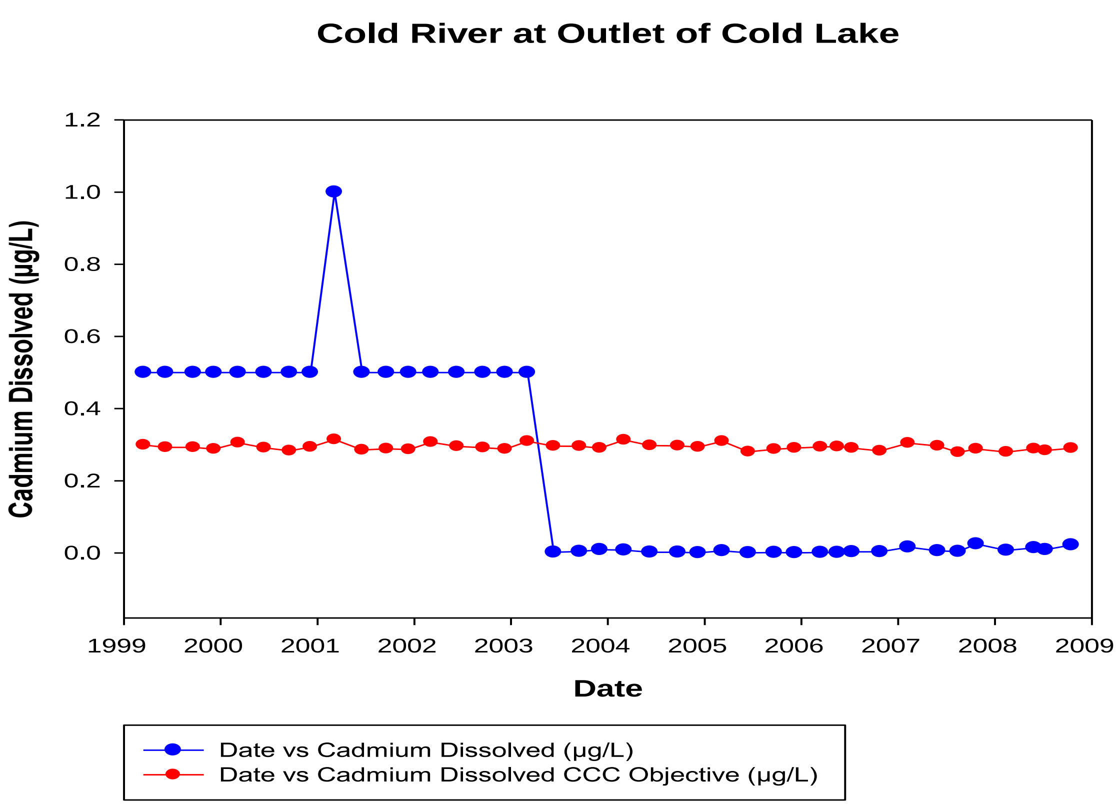

Figure 5-c4: Cold River Cadmium Dissolved

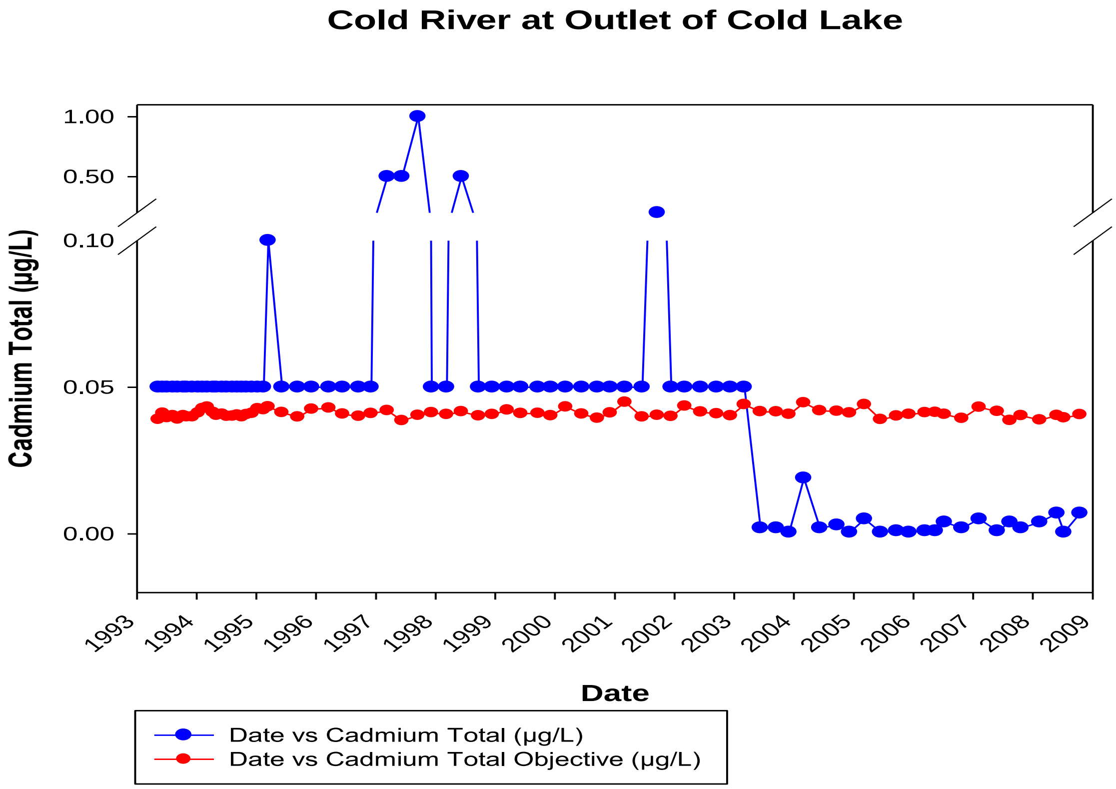

Figure 5-c5: Cold River Cadmium Total

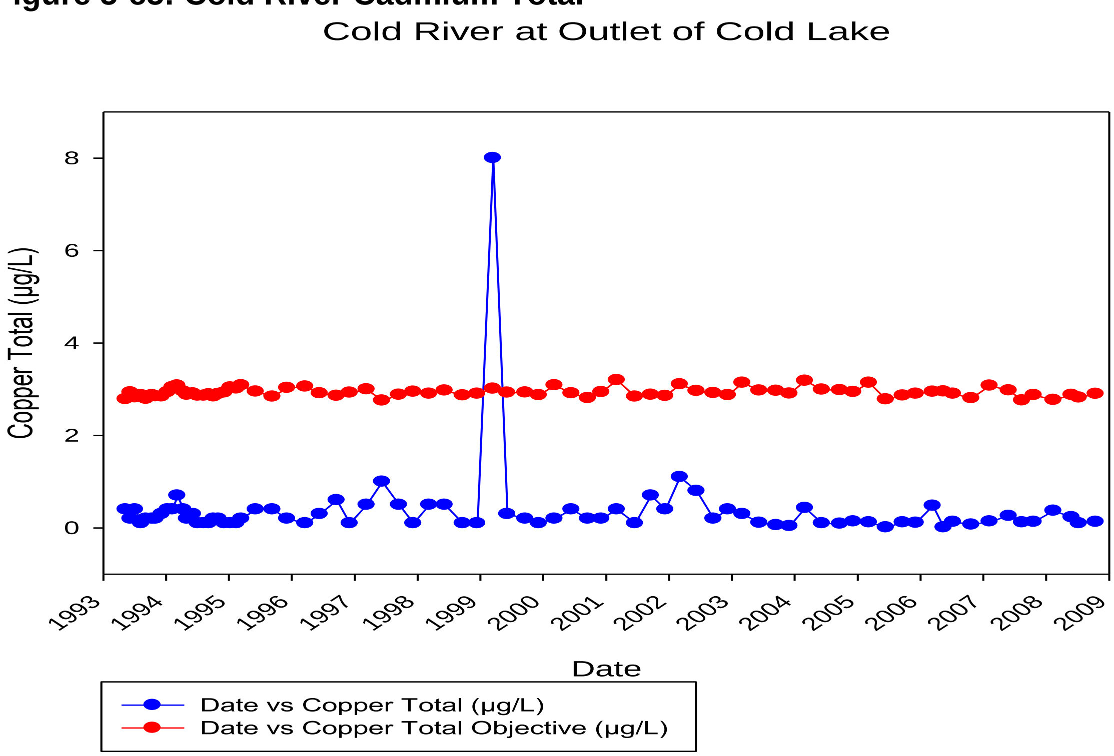

Figure 5-c6: Cold River Copper Total

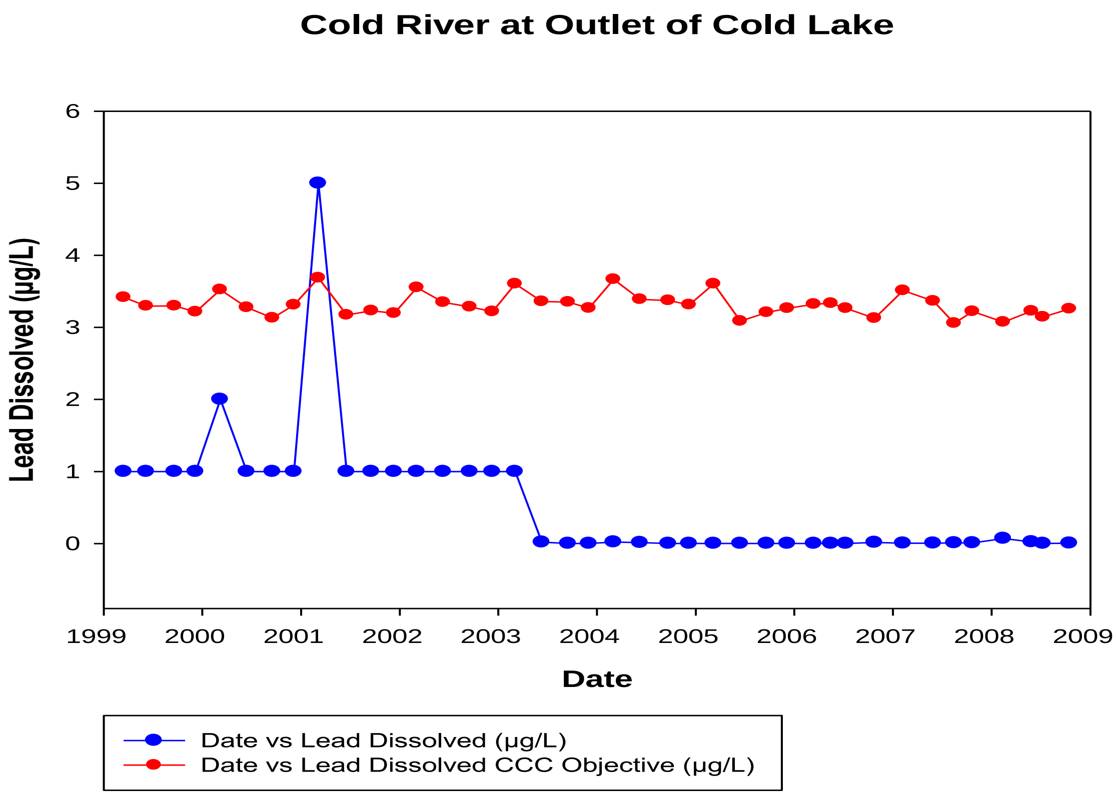

Figure 5-c7: Cold River Lead Dissolved

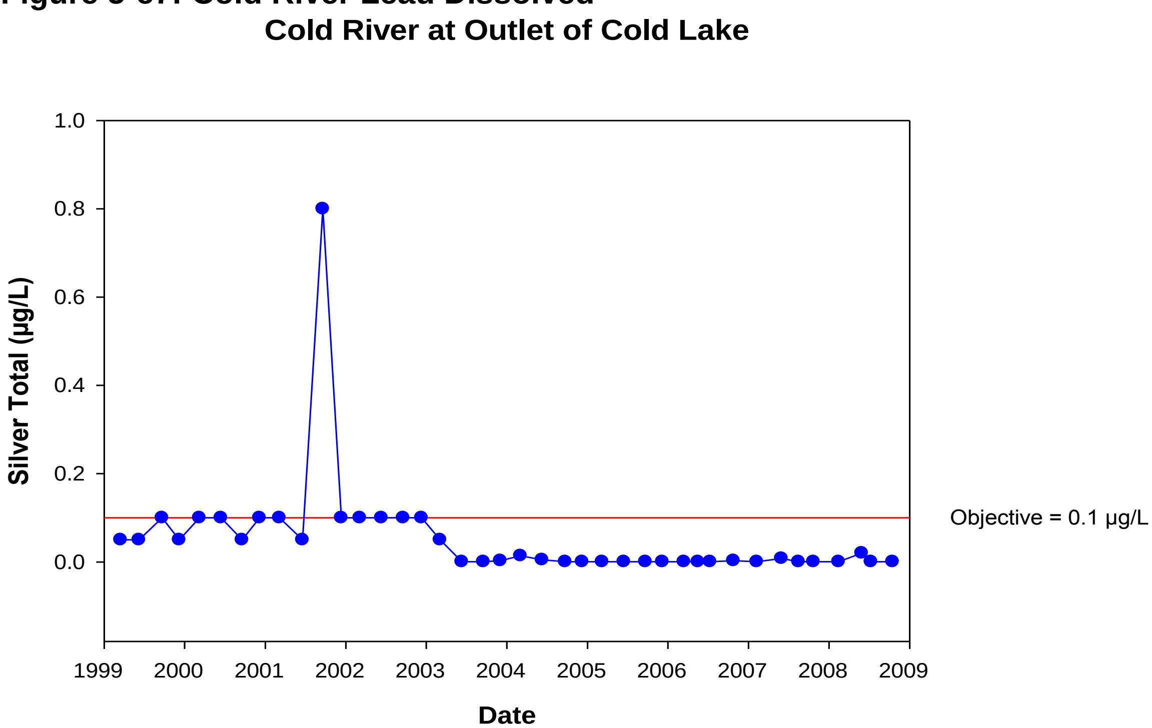

Figure 5-c8: Cold River Silver Total

Appendix 5-d: North Saskatchewan River

North Saskatchewan River at Hwy 17 Bridge

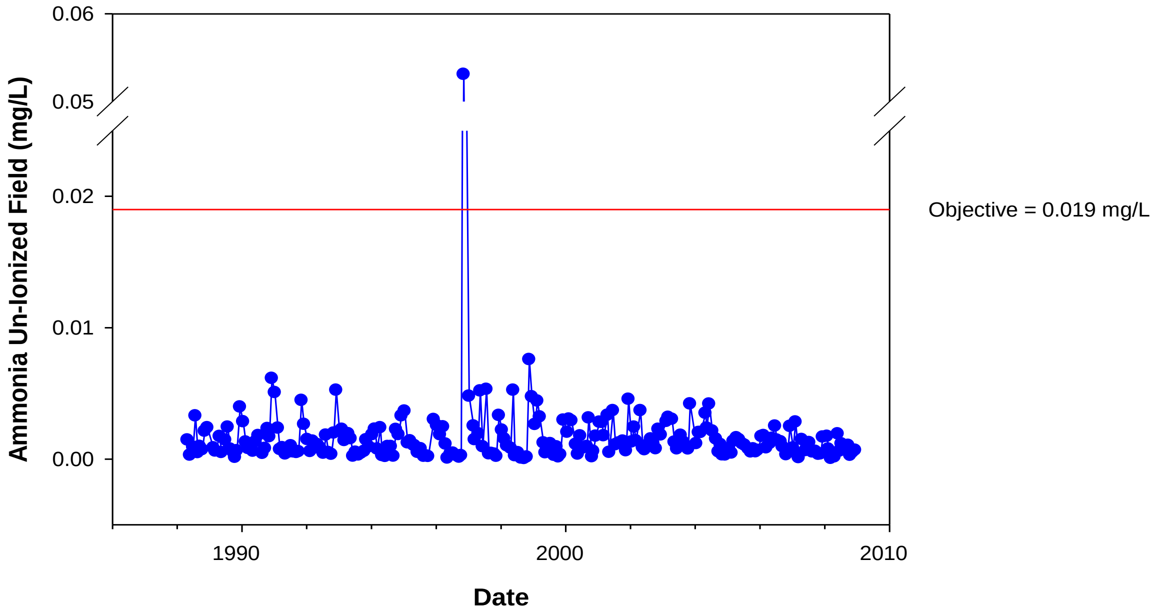

Figure 5-d1: North Saskatchewan River Ammonia Un-Ionized Field

North Saskatchewan River at Hwy 17 Bridge

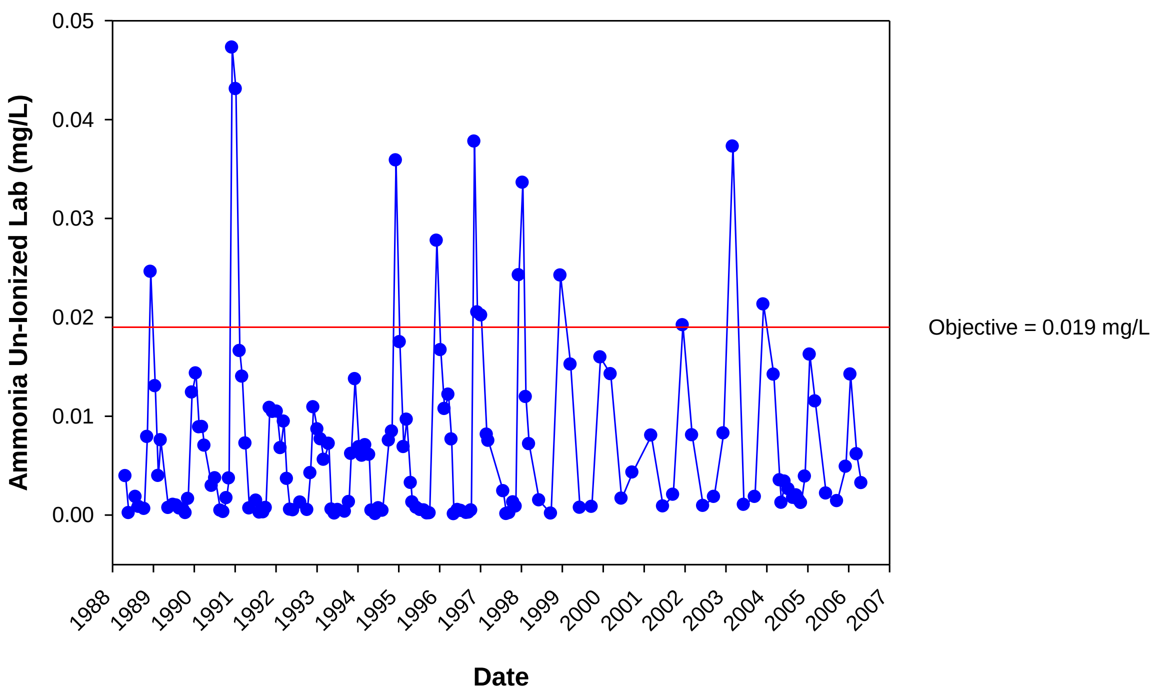

Figure 5-d2: North Saskatchewan River Ammonia Un-Ionized Lab

North Saskatchewan River at Hwy 17 Bridge

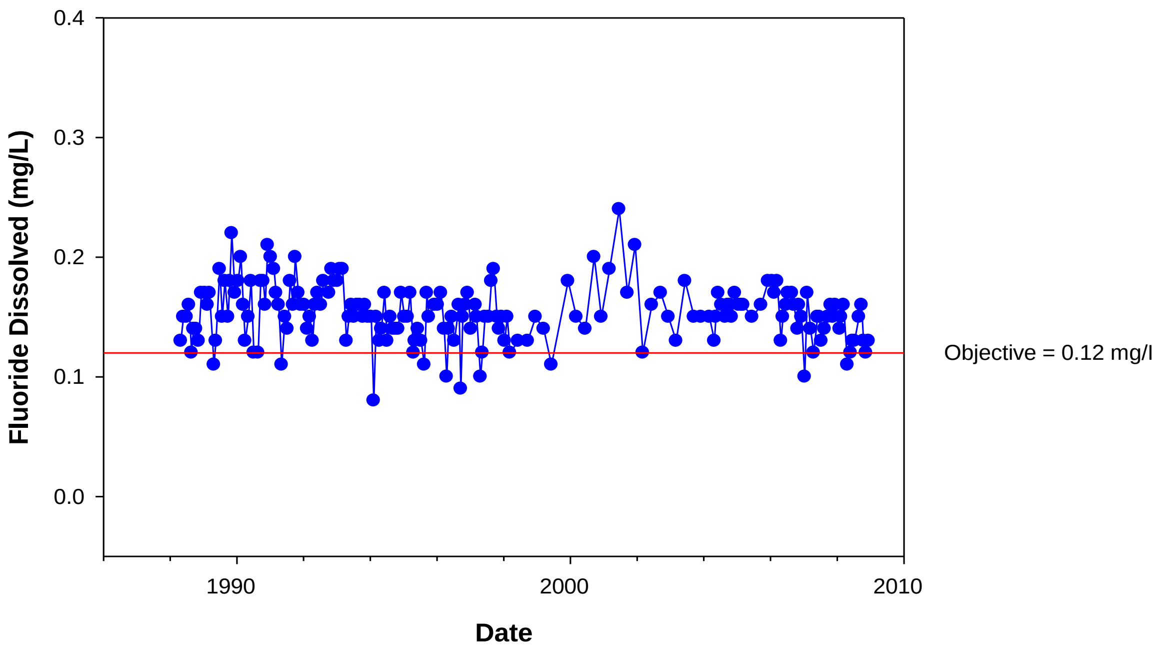

Figure 5-d3: North Saskatchewan River Fluoride Dissolved

North Saskatchewan River at Hwy 17 Bridge

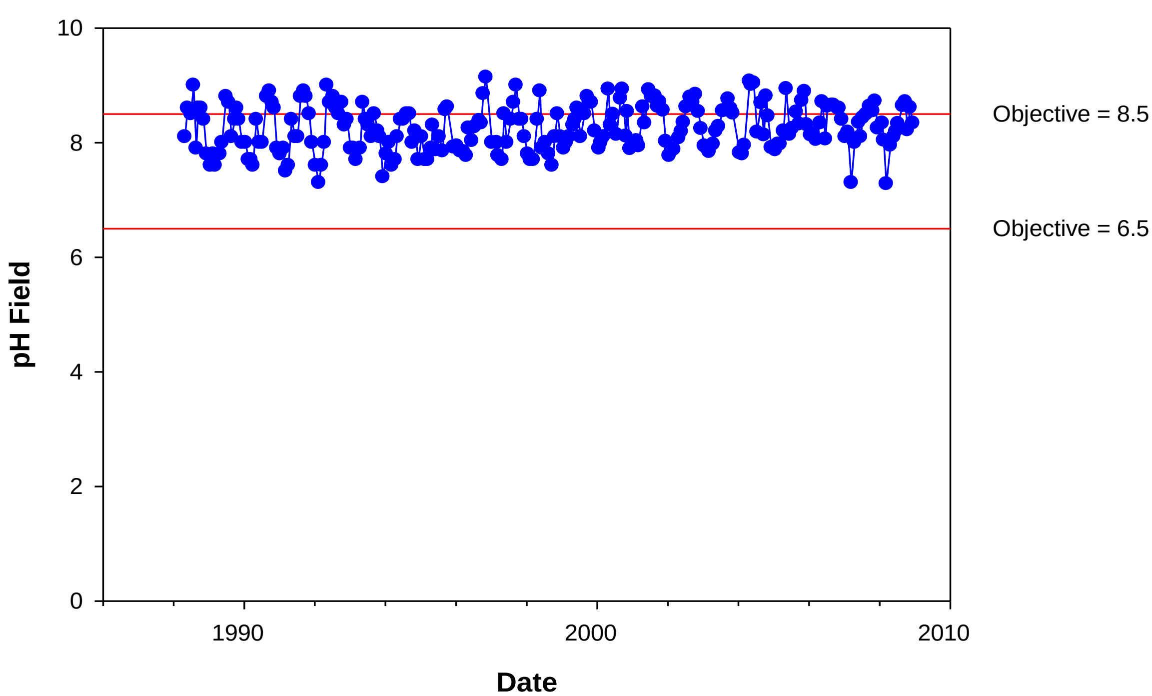

Figure 5-d4: North Saskatchewan River pH Field

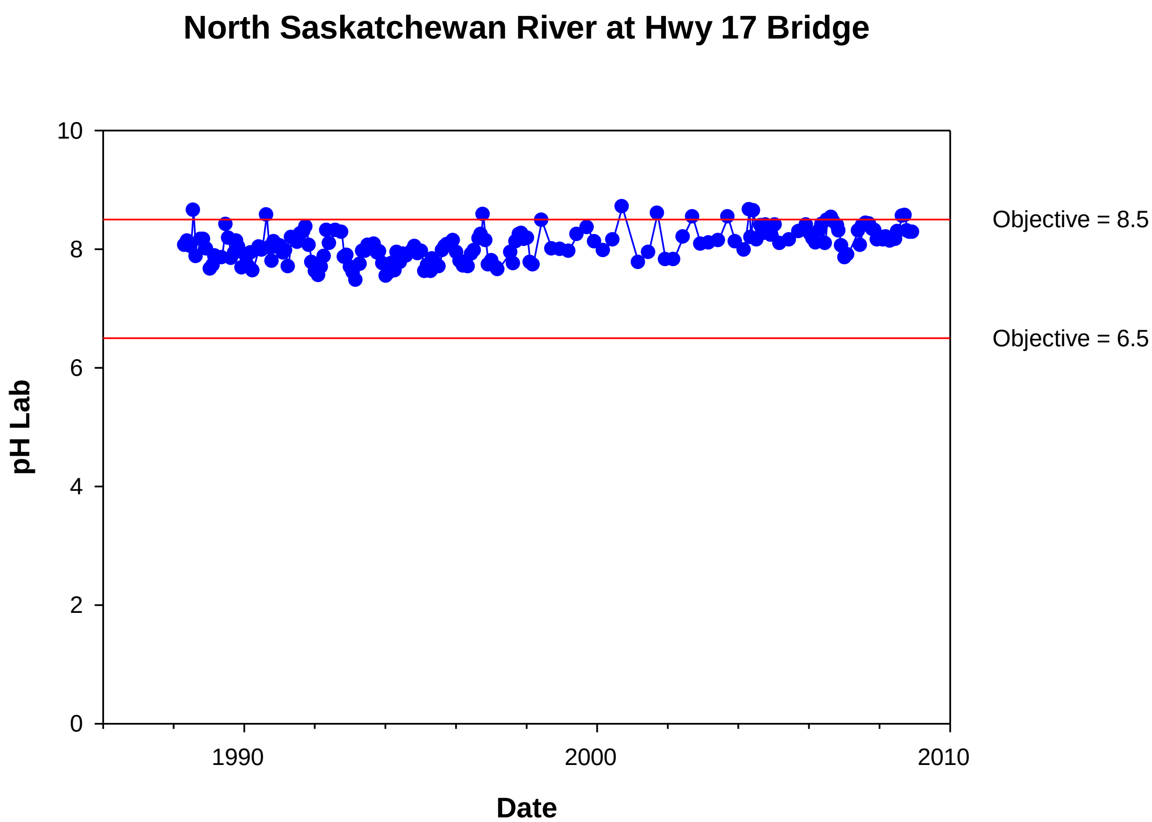

Figure 5-d5: North Saskatchewan River pH Lab

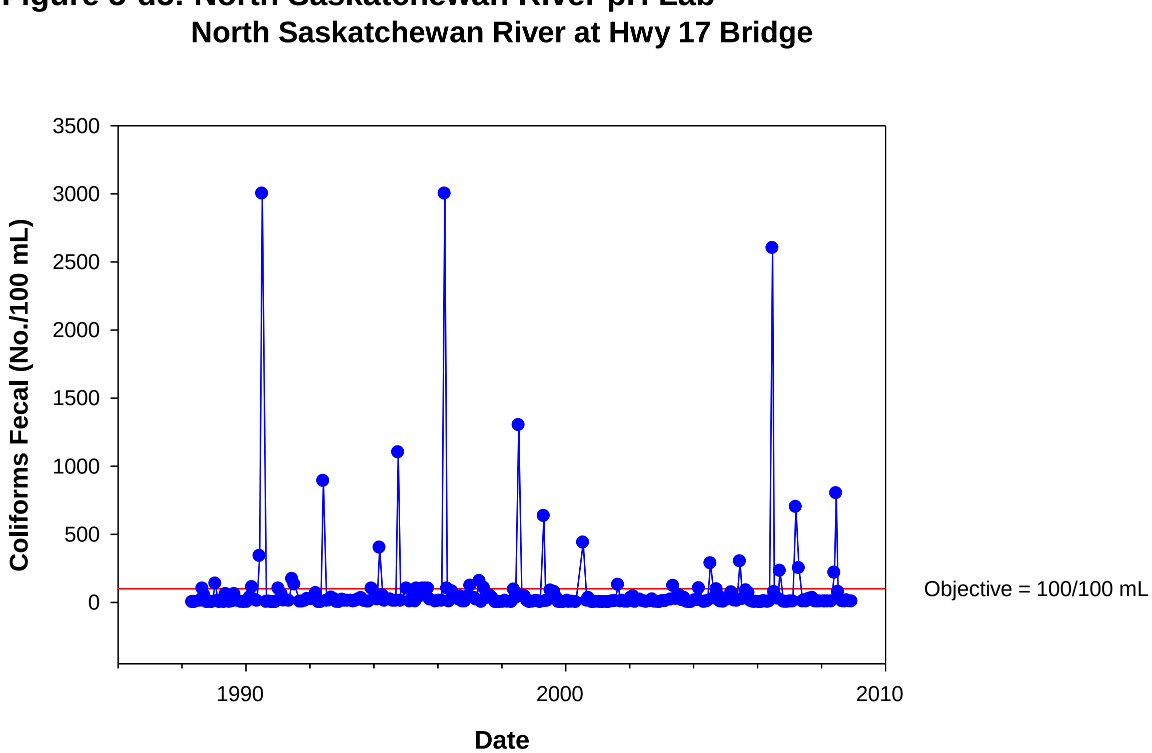

Figure 5-d6: North Saskatchewan River Coliforms Fecal

North Saskatchewan River at Hwy 17 Bridge

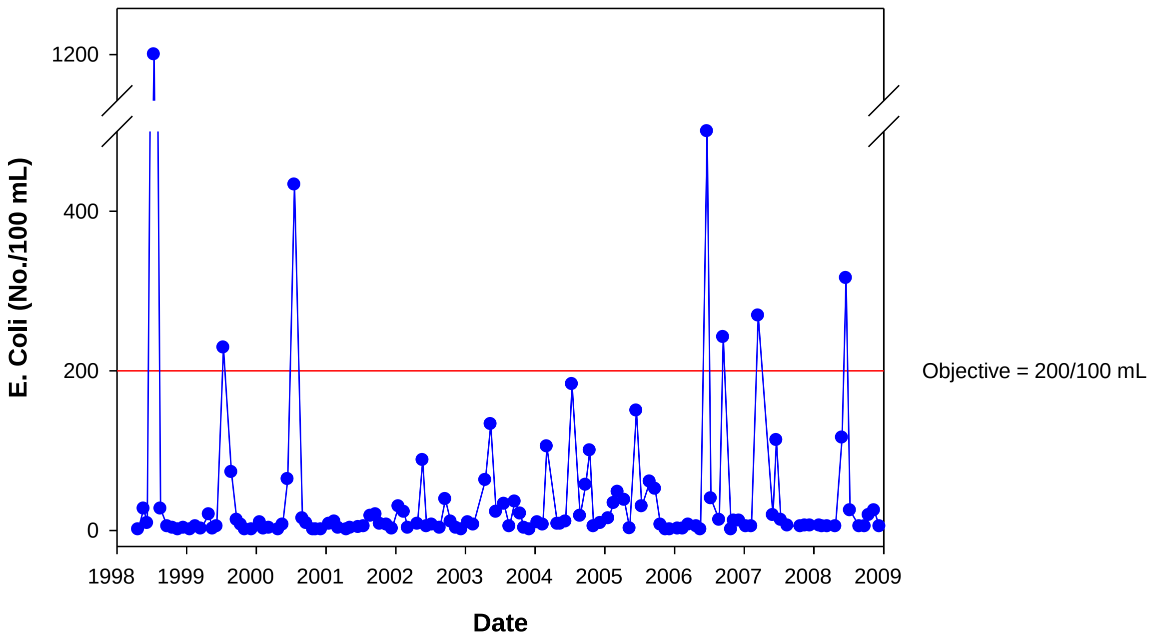

Figure 5-d7: North Saskatchewan River E. Coli

North Saskatchewan River at Hwy 17 Bridge

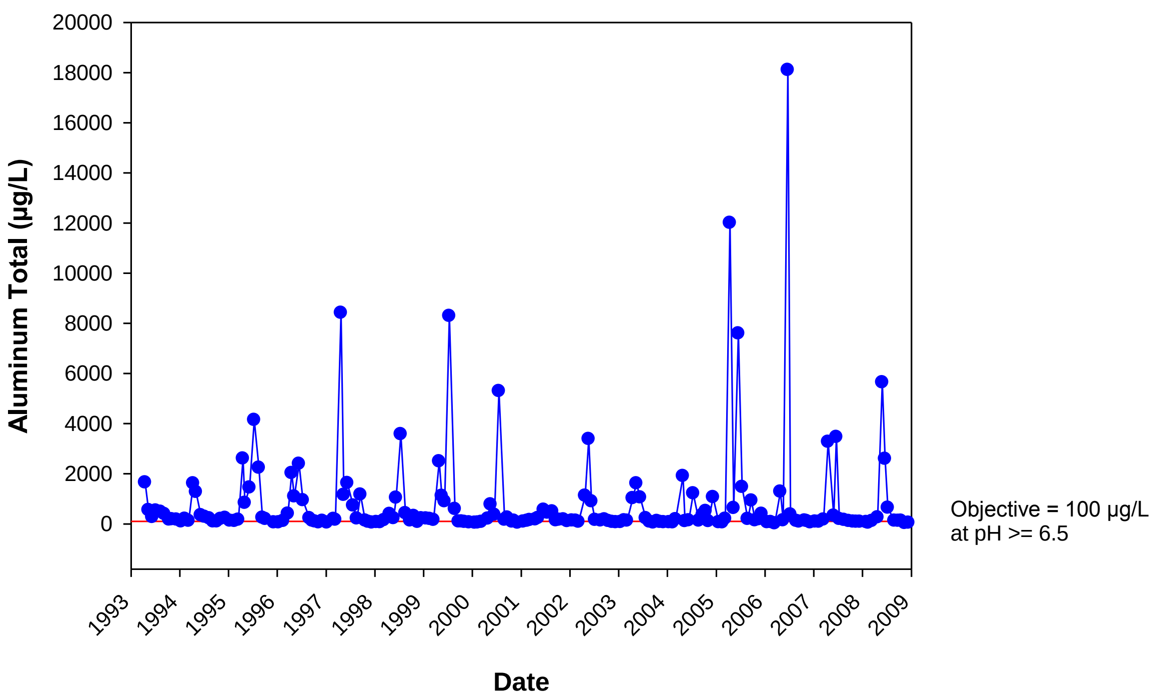

Figure 5-d8: North Saskatchewan River Aluminum Total

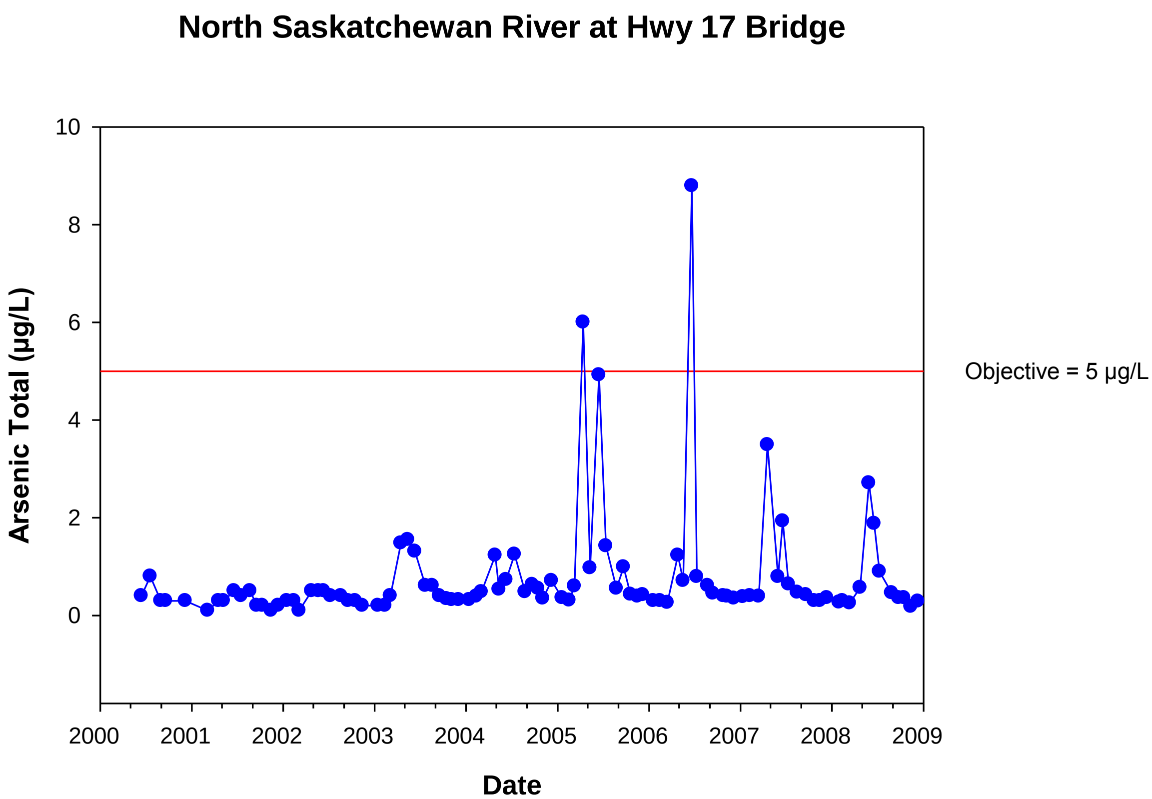

Figure 5-d9: North Saskatchewan River Arsenic Total

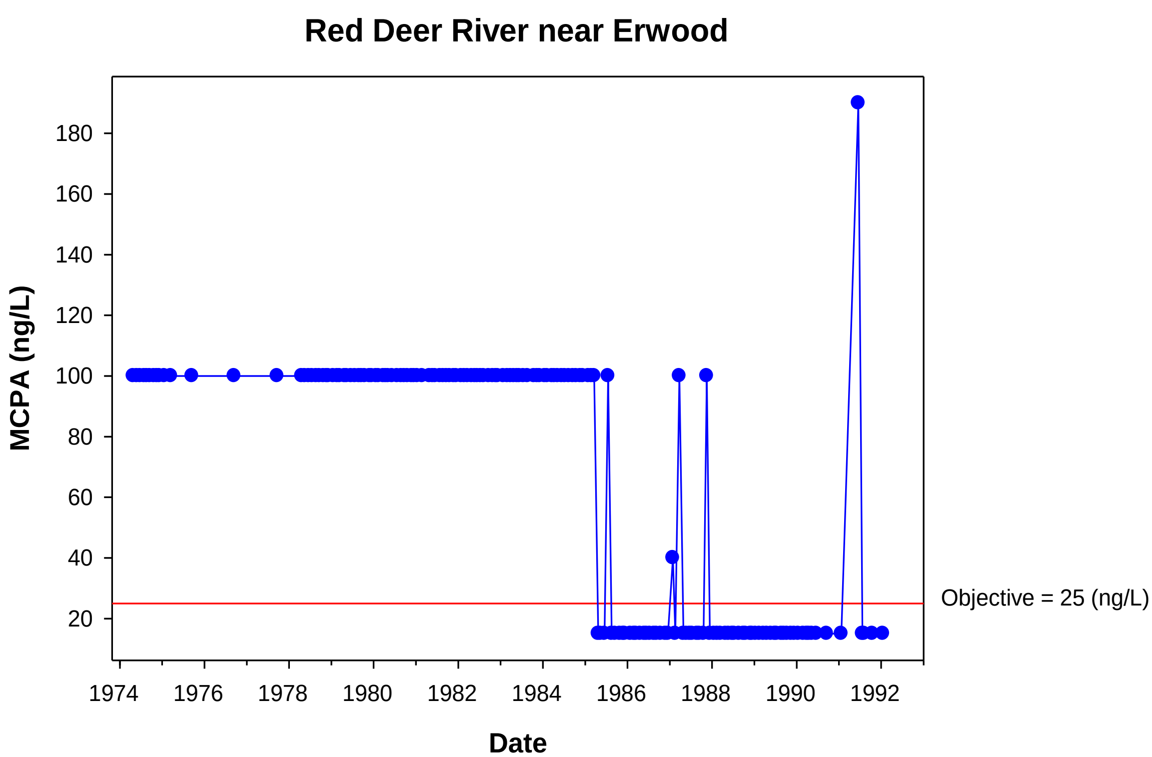

Figure 5-d10: North Saskatchewan River Cadmium Dissolved

North Saskatchewan River at Hwy 17 Bridge

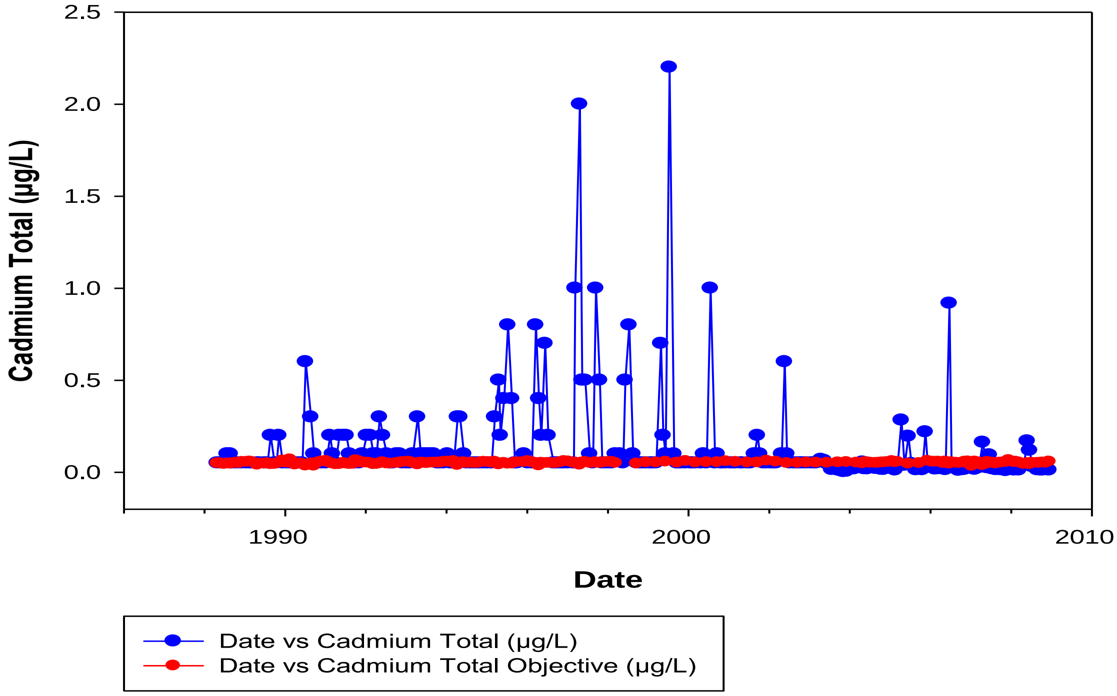

Figure 5-d11: North Saskatchewan River Cadmium Total

North Saskatchewan River at Hwy 17 Bridge

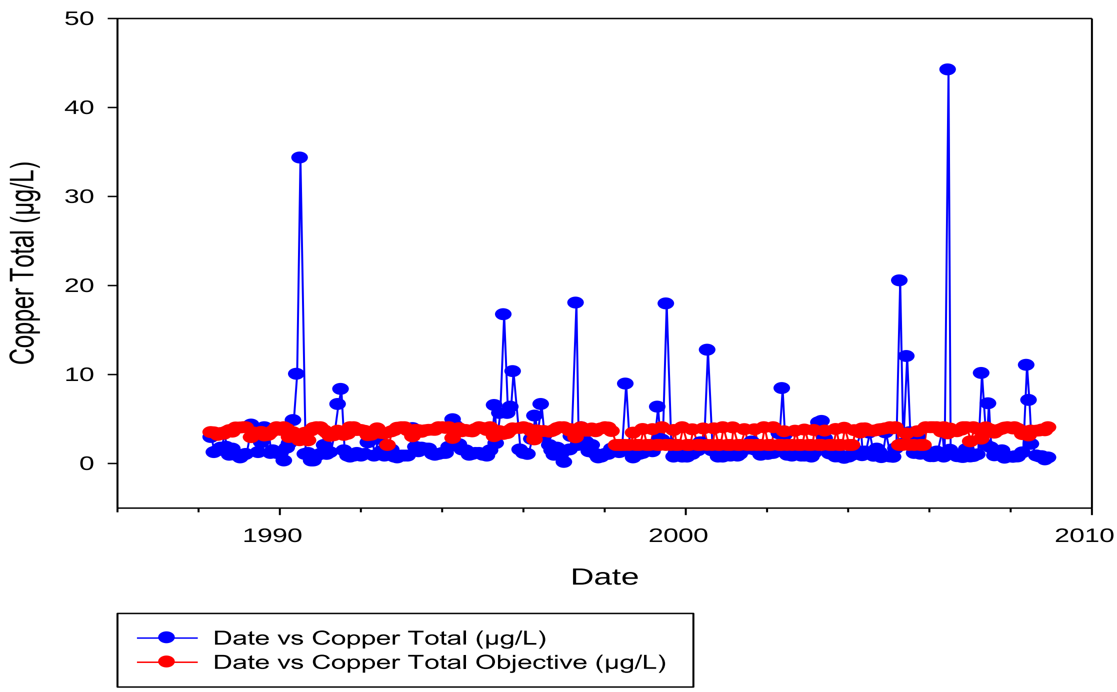

Figure 5-d12: North Saskatchewan River Copper Total

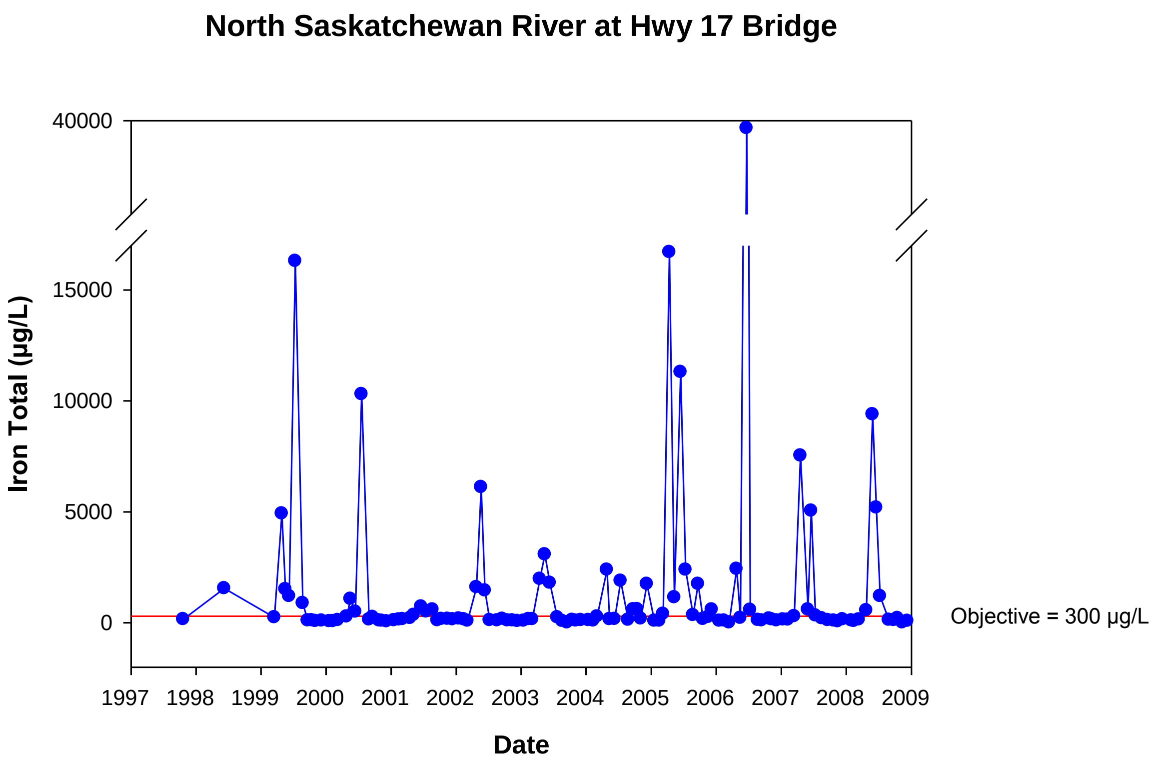

Figure 5-d13: North Saskatchewan River Iron Total

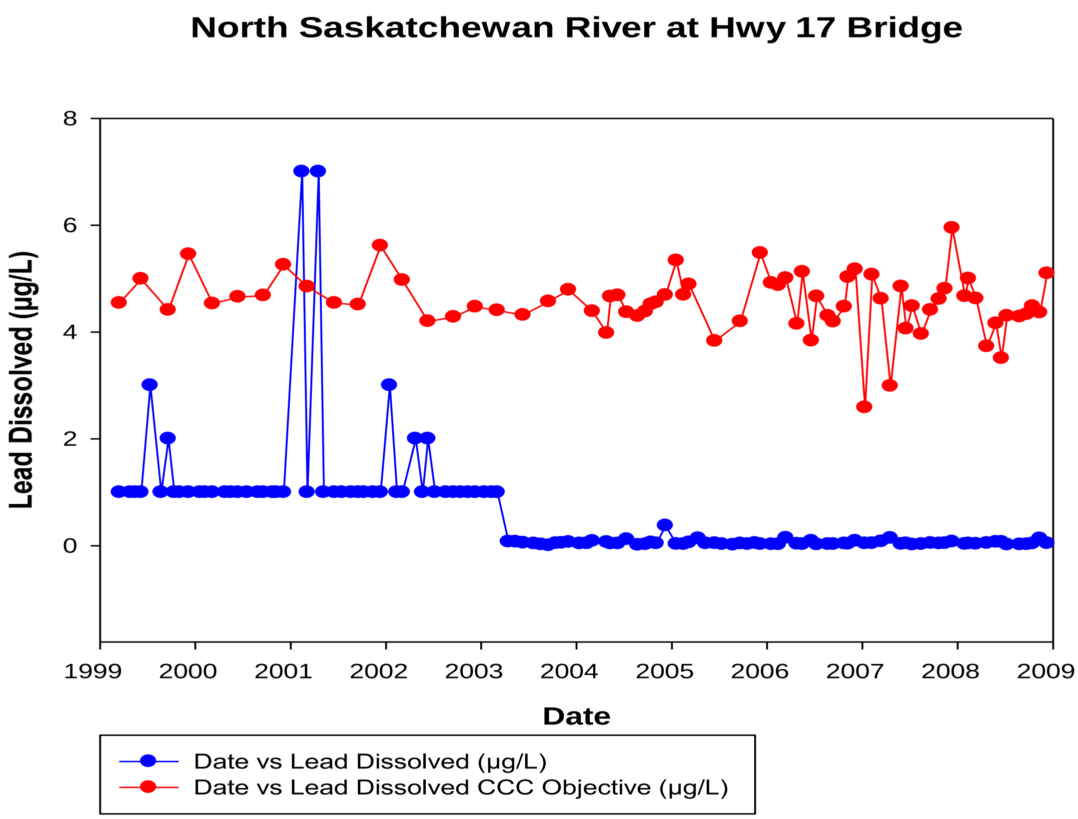

Figure 5-d14: North Saskatchewan River Lead Dissolved

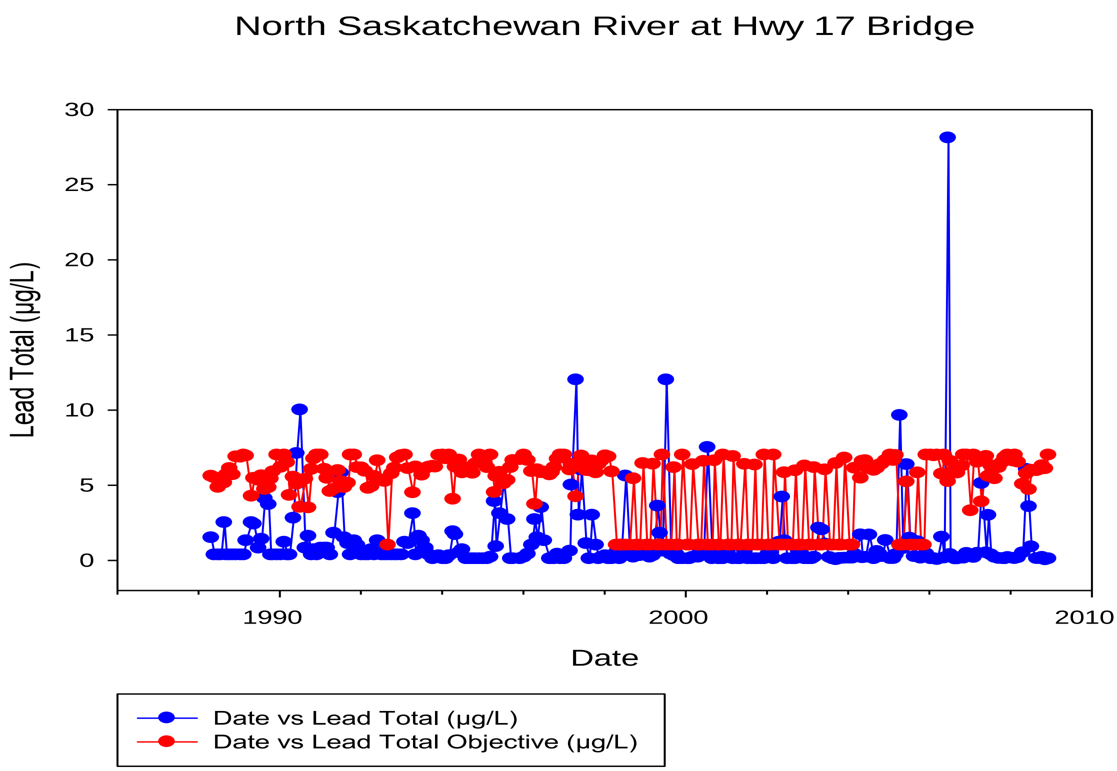

Figure 5-d15: North Saskatchewan River Lead Total

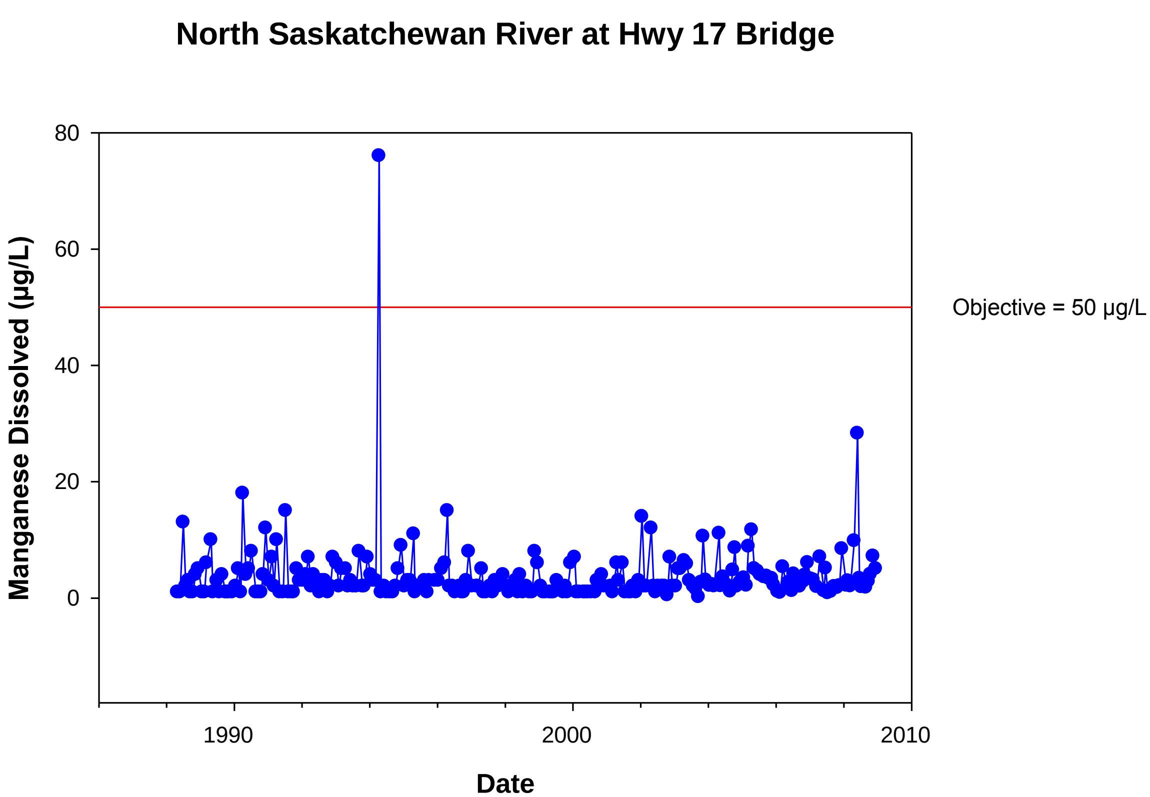

Figure 5-d16: North Saskatchewan River Manganese Dissolved

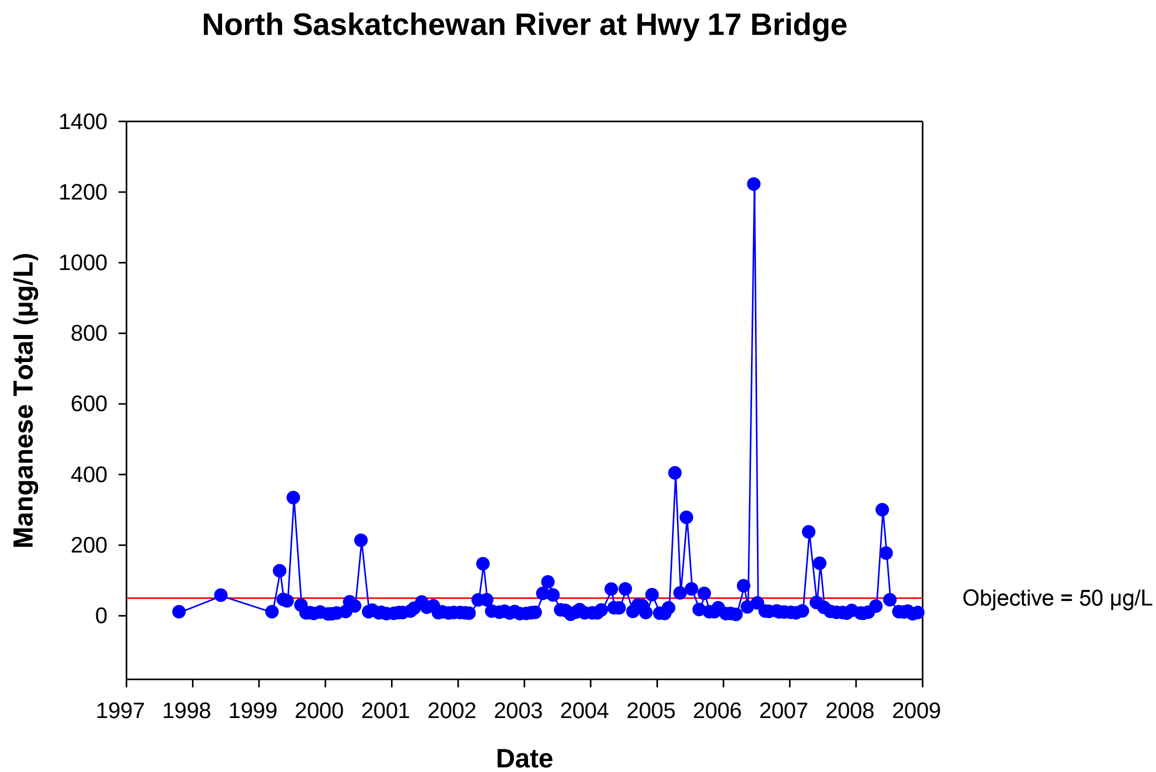

Figure 5-d17: North Saskatchewan River Manganese Total

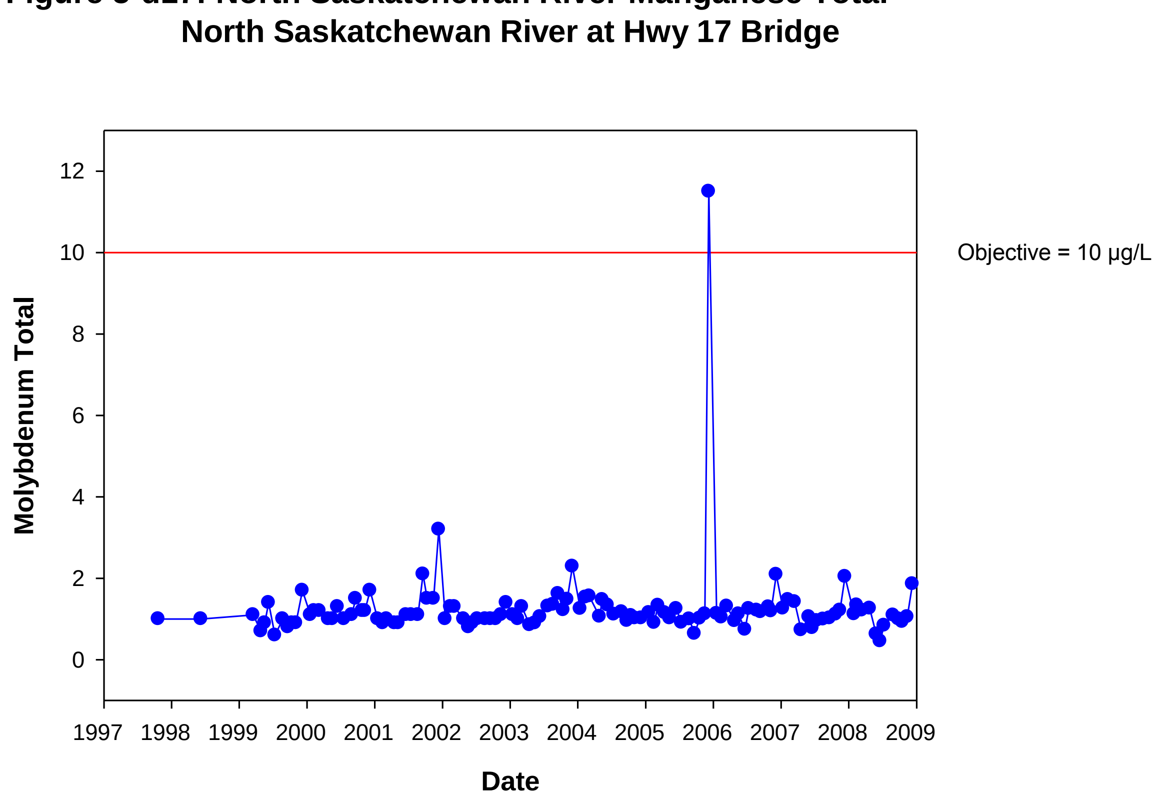

Figure 5-d18: North Saskatchewan River Molybdenum Total

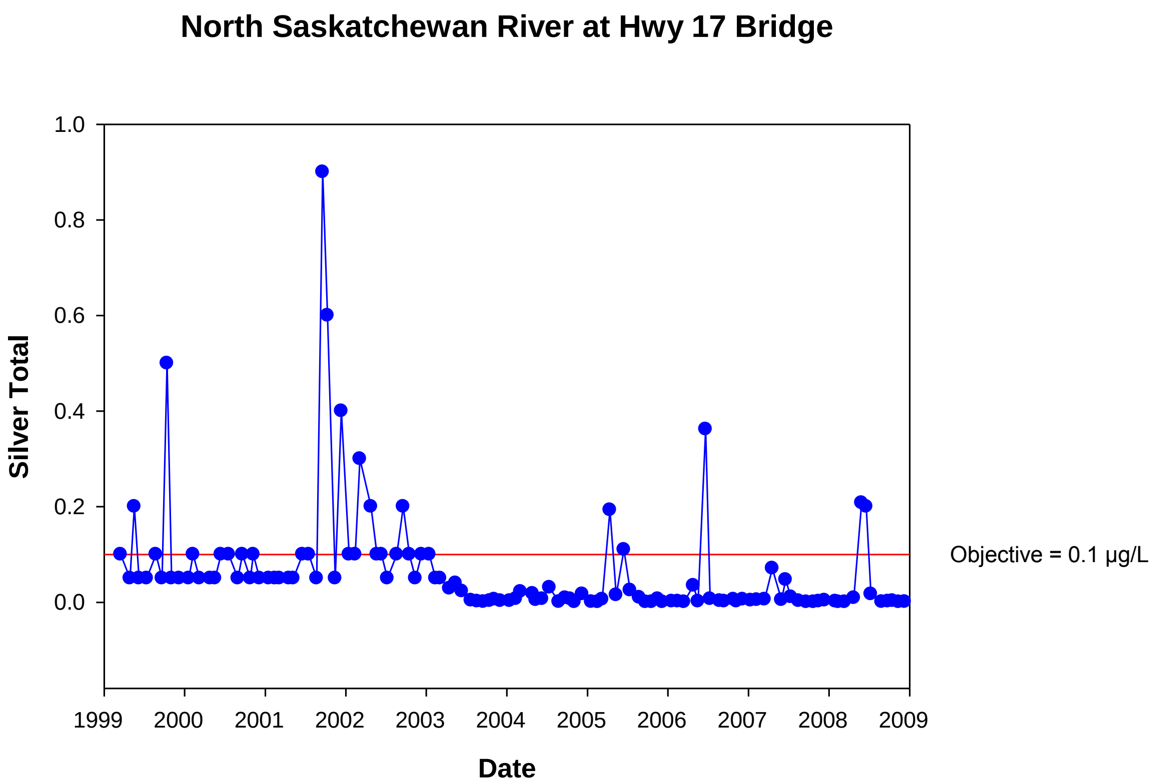

Figure 5-d19: North Saskatchewan River Silver Total

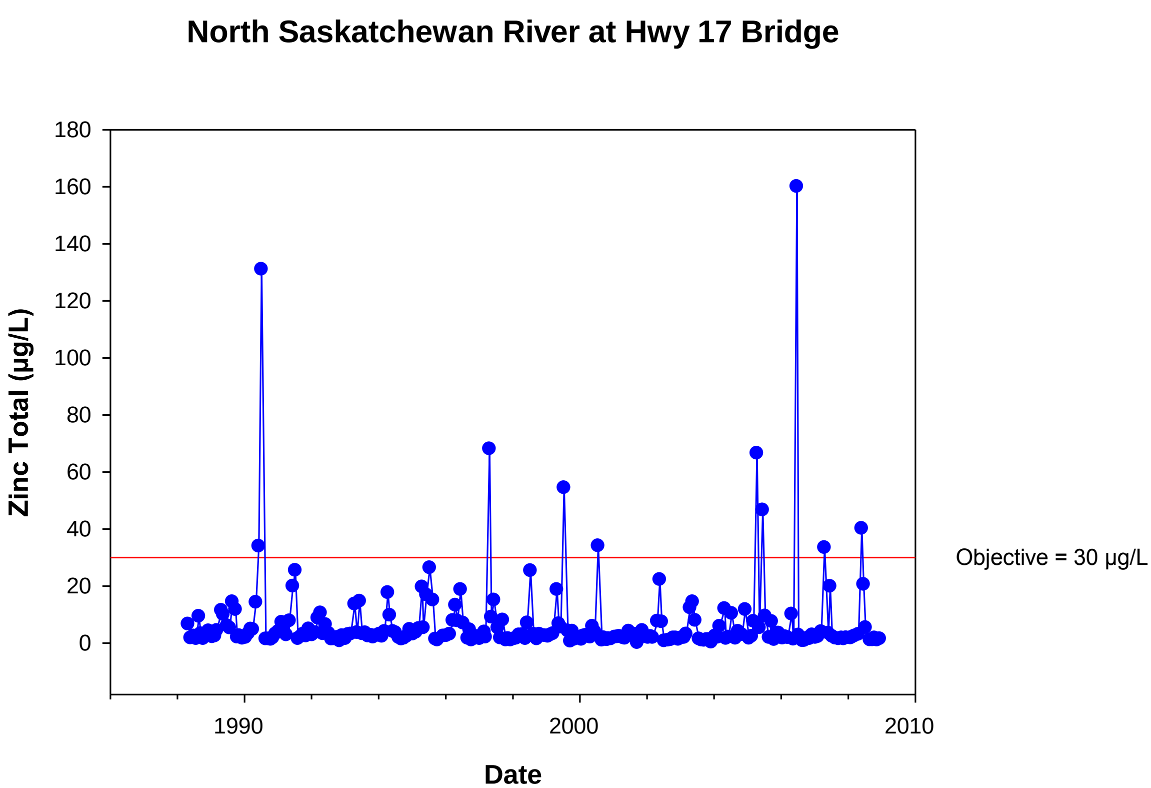

Figure 5-d20: North Saskatchewan River Zinc Total

North Saskatchewan River at Hwy 17 Bridge

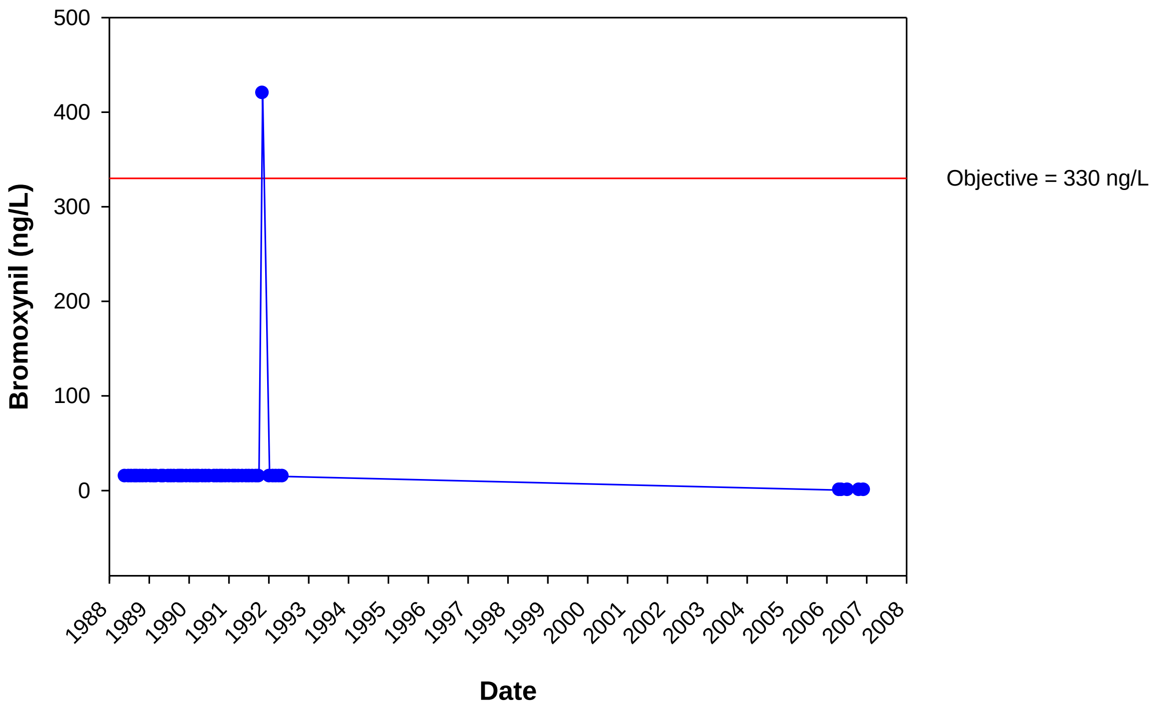

Figure 5-d21: North Saskatchewan River Bromoxynil

North Saskatchewan River at Hwy 17 Bridge

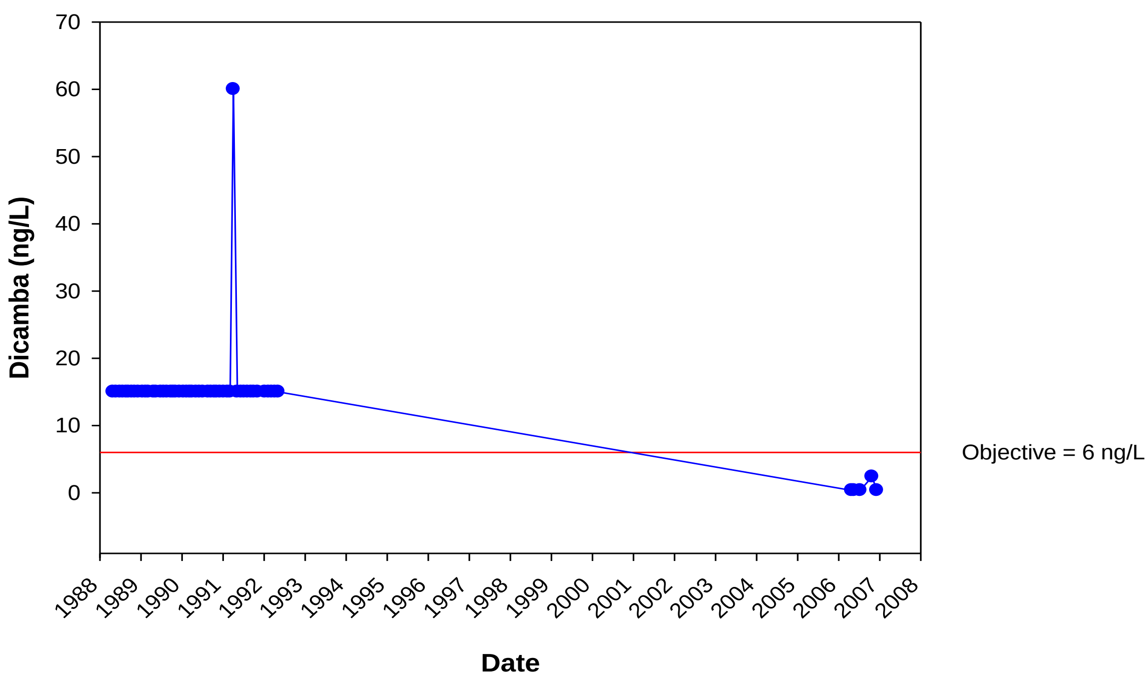

Figure 5-d22: North Saskatchewan River Dicamba

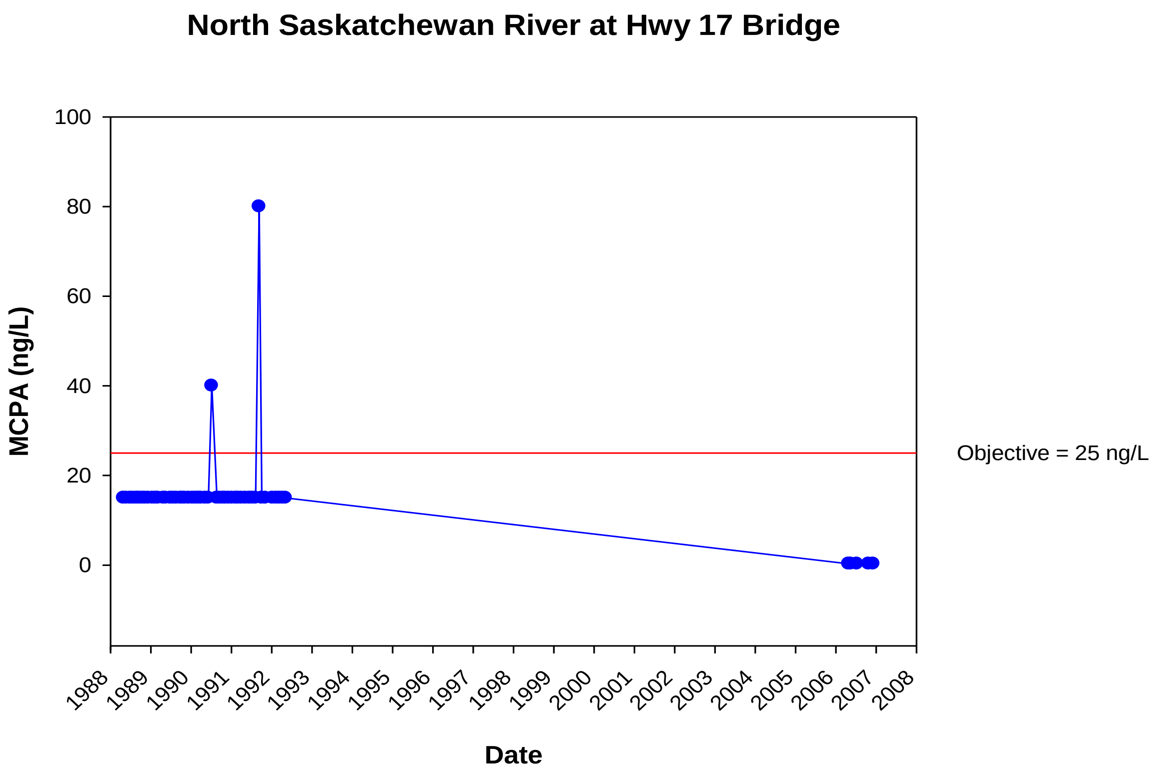

Figure 5-d23: North Saskatchewan River MCPA

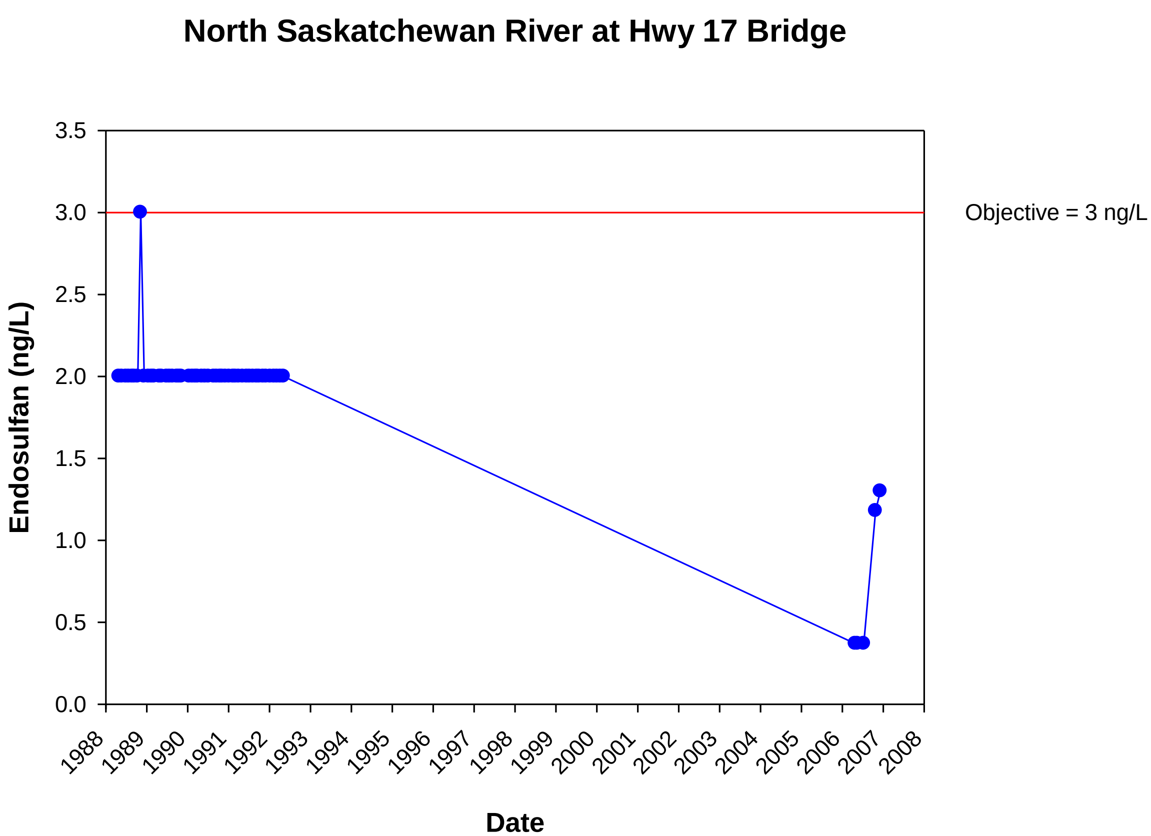

Figure 5-d24: North Saskatchewan River Endosulfan

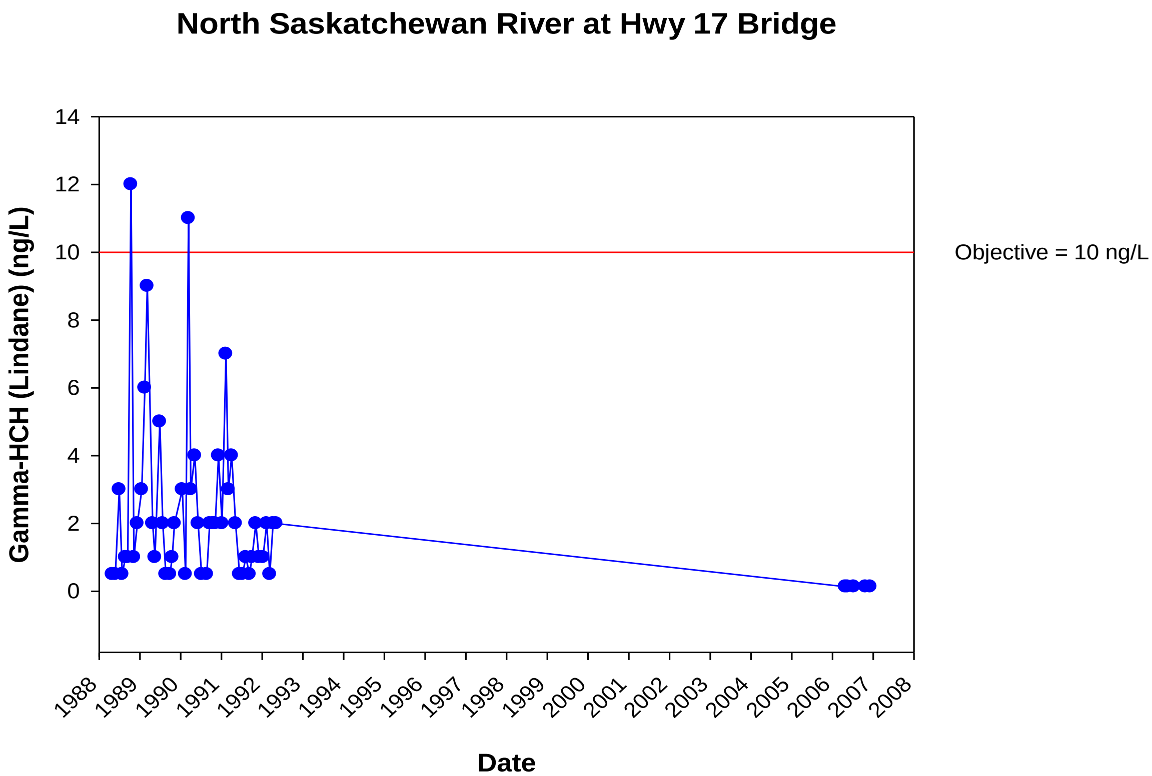

Figure 5-d25: North Saskatchewan River Lindane

Appendix 5-e: Red Deer River (AB-SK)

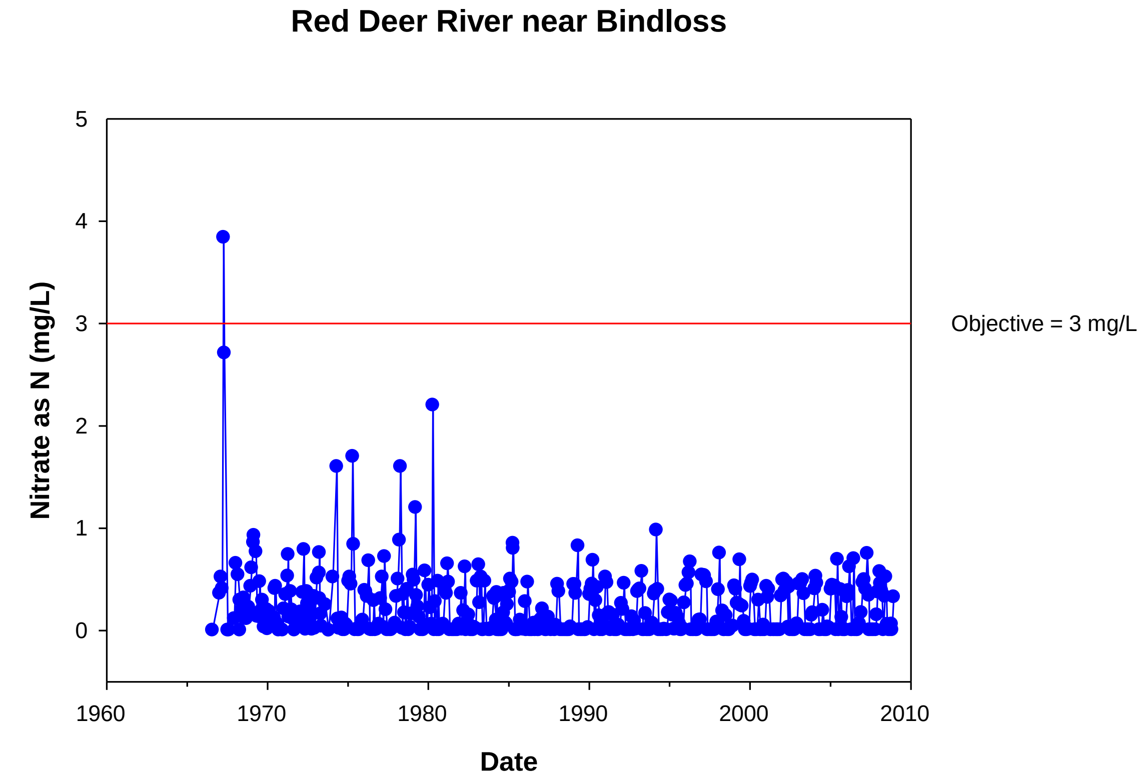

Figure 5-e1: Red Deer River (AB-SK) Nitrate as N

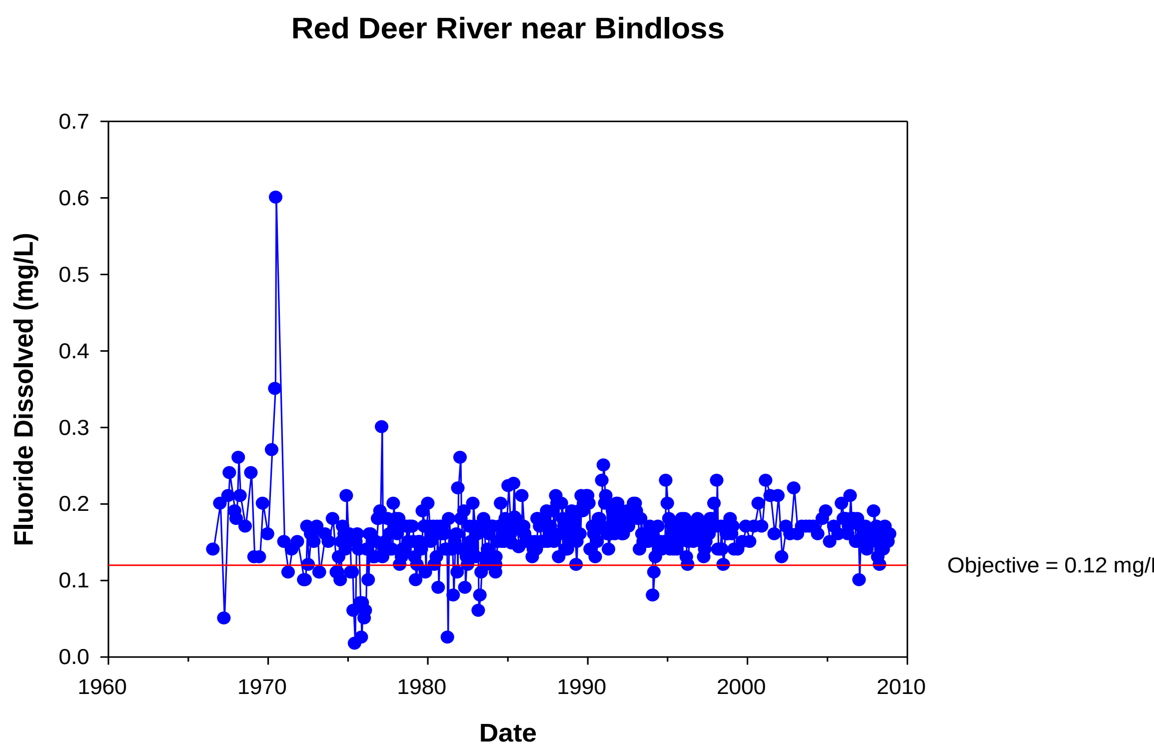

Figure 5-e2: Red Deer River (AB-SK) Fluoride Dissolved

Red Deer River near Bindloss

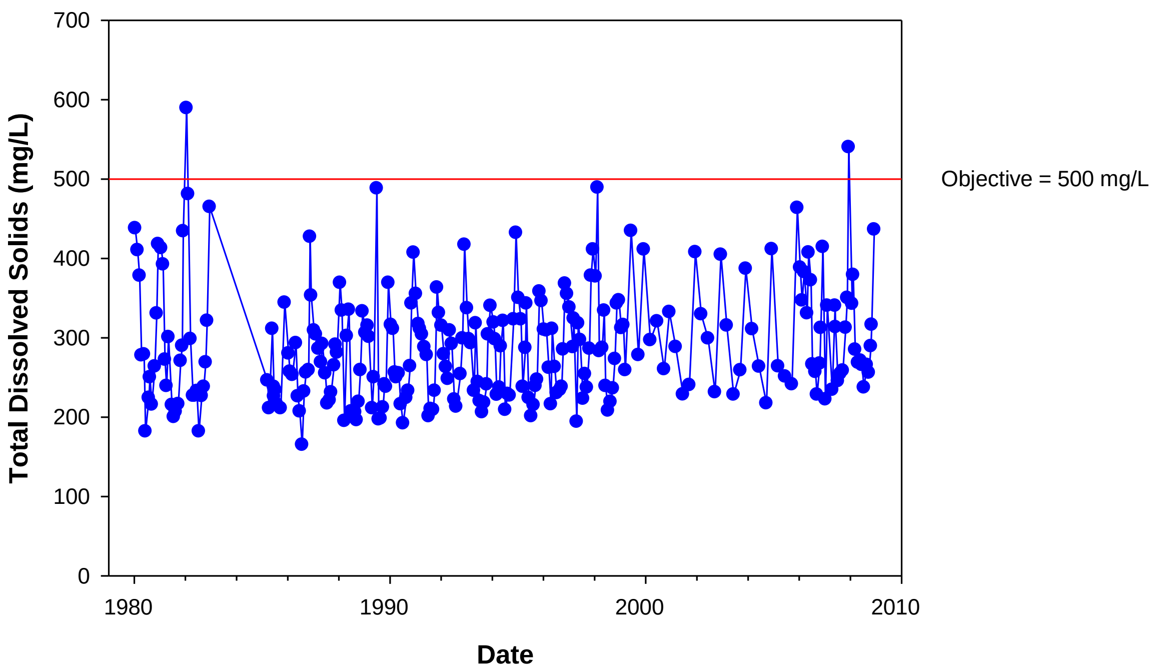

Figure 5-e3: Red Deer River (AB-SK) Total Dissolved Solids

Red Deer River near Bindloss

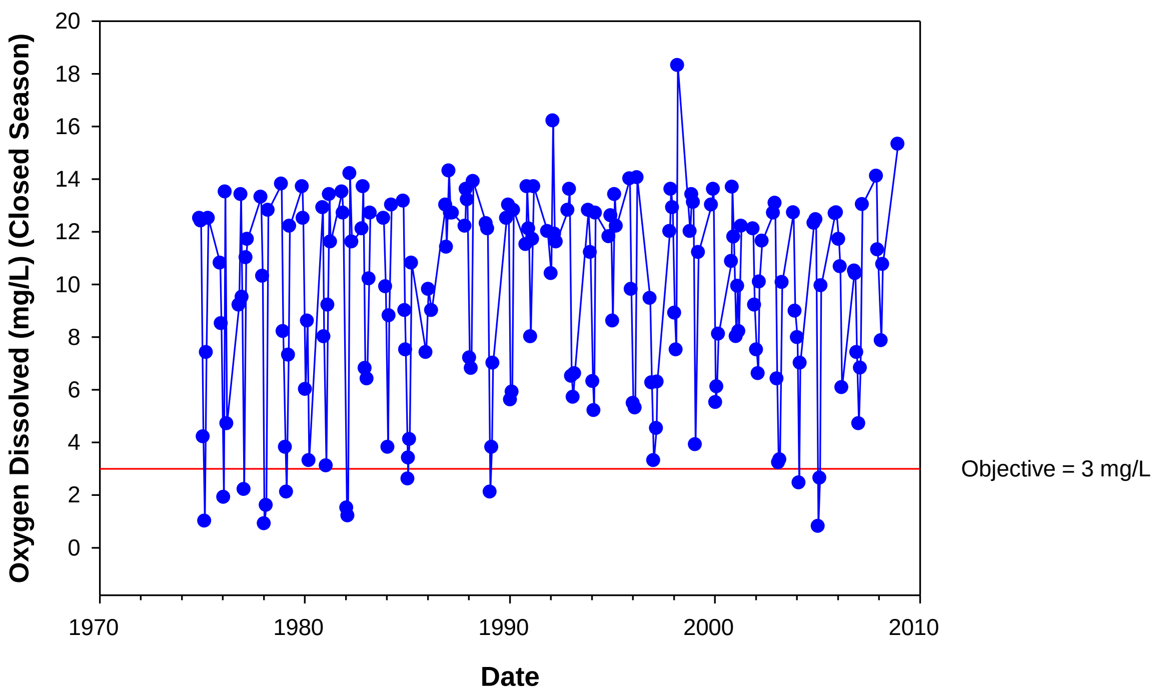

Figure 5-e4: Red Deer River (AB-SK) Oxygen Dissolved (Closed Season)

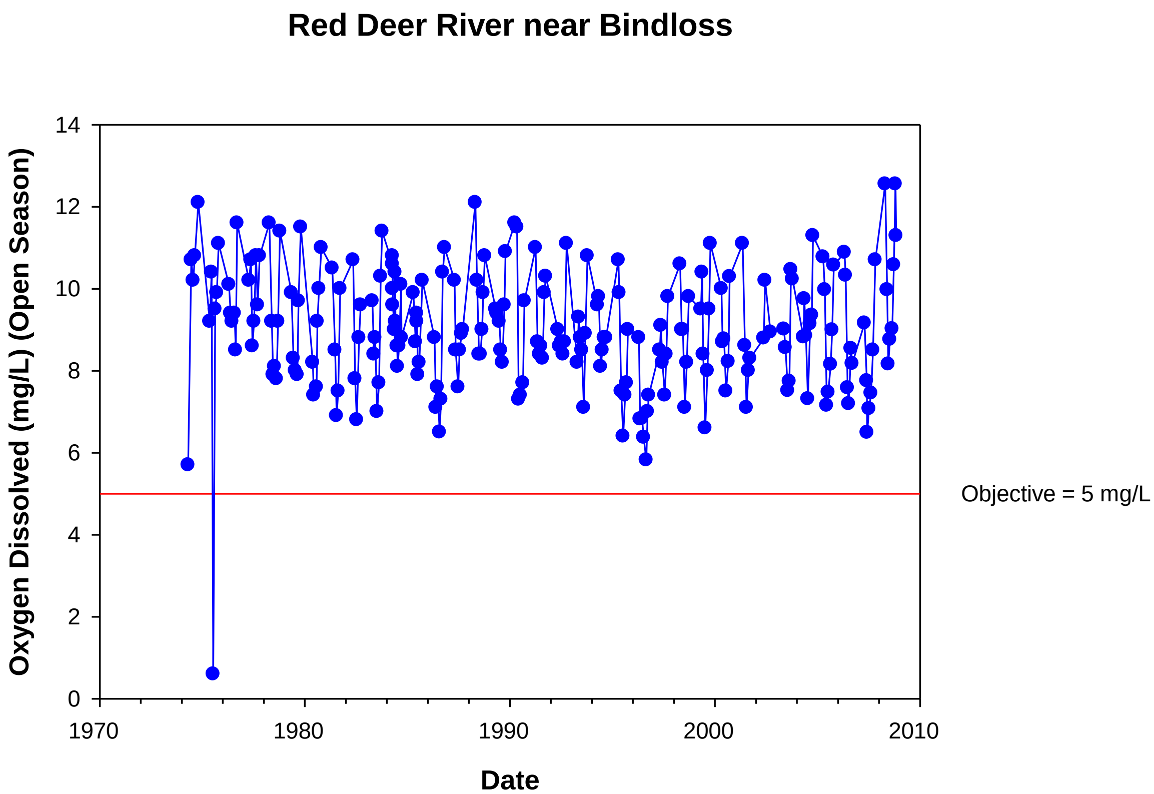

Figure 5-e5: Red Deer River (AB-SK) Oxygen Dissolved (Open Season)

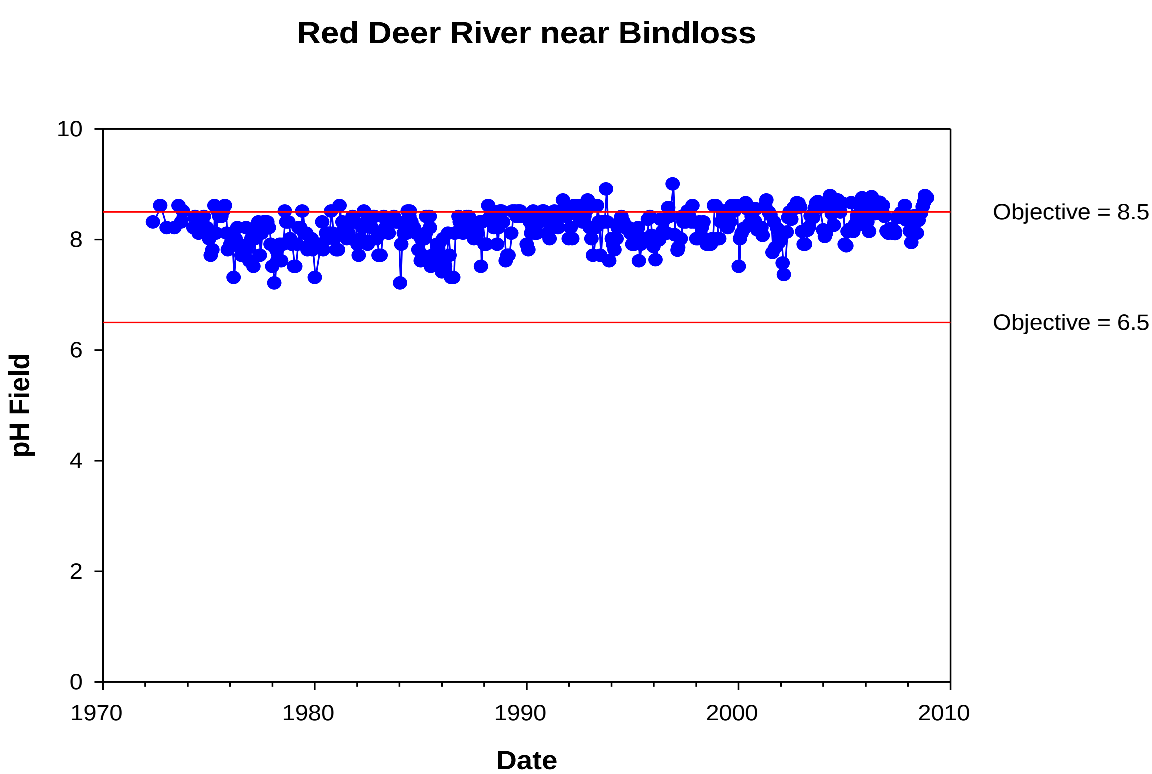

Figure 5-e6: Red Deer River (AB-SK) pH Field

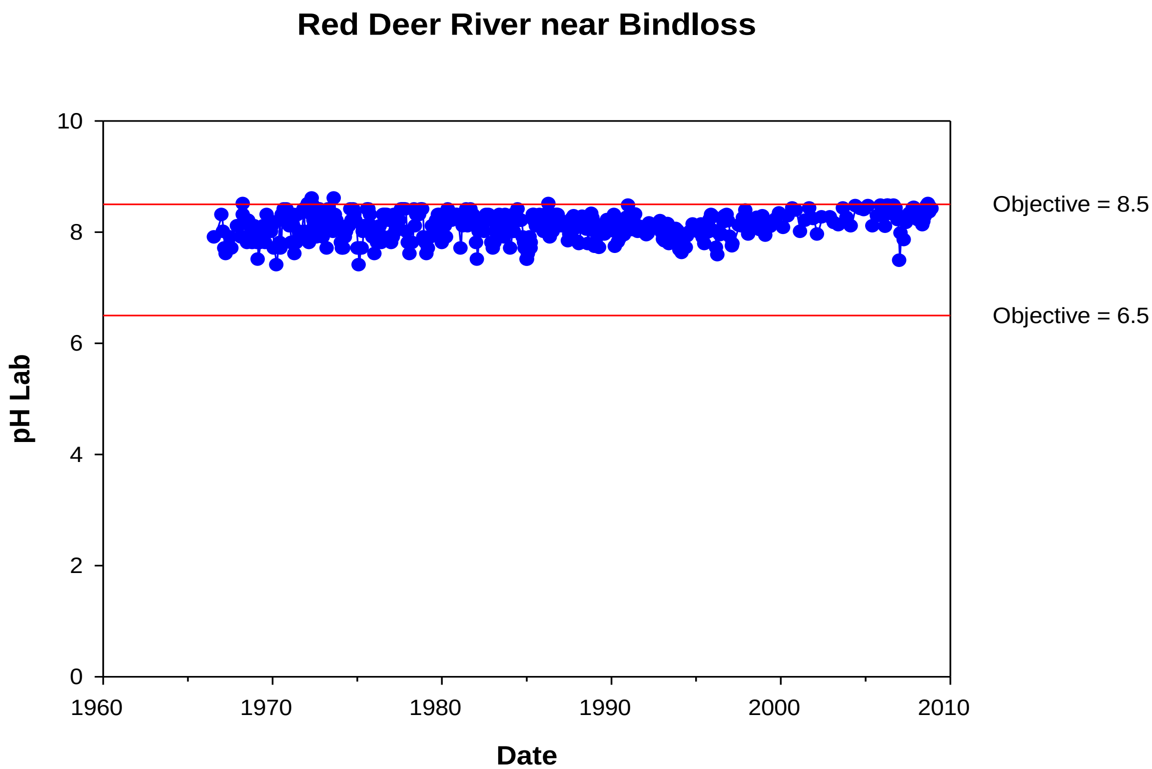

Figure 5-e7: Red Deer River (AB-SK) pH Lab

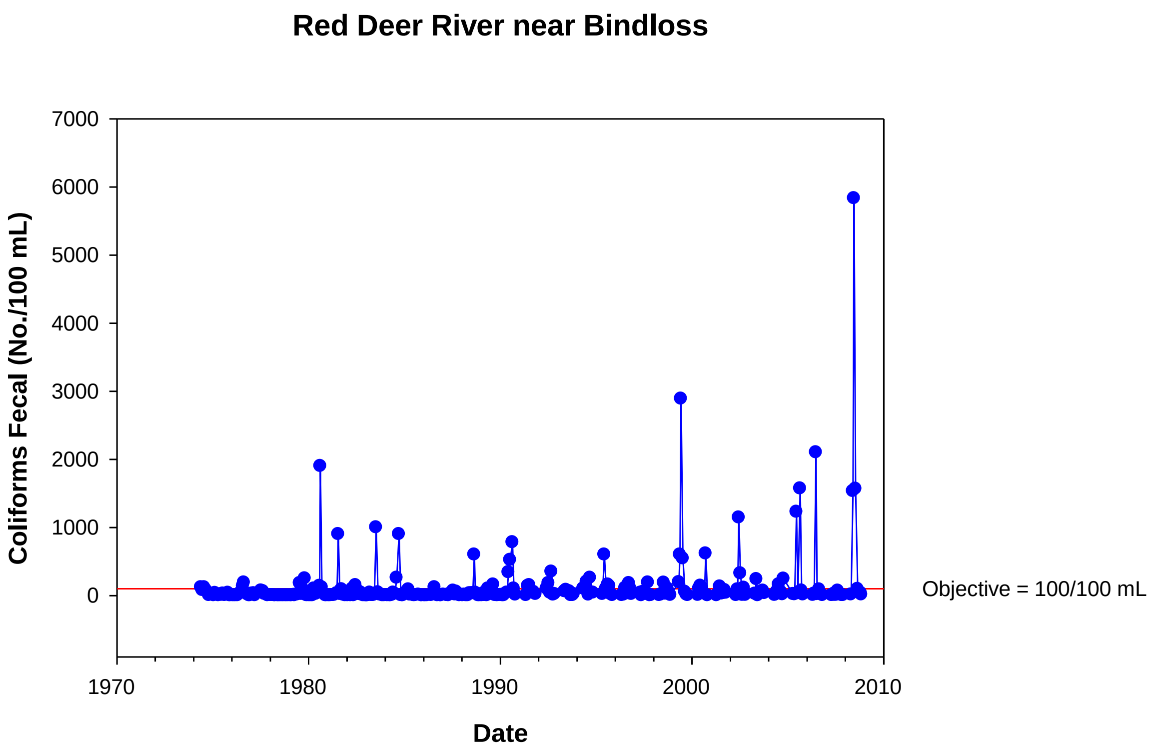

Figure 5-e8: Red Deer River (AB-SK) Coliforms Fecal

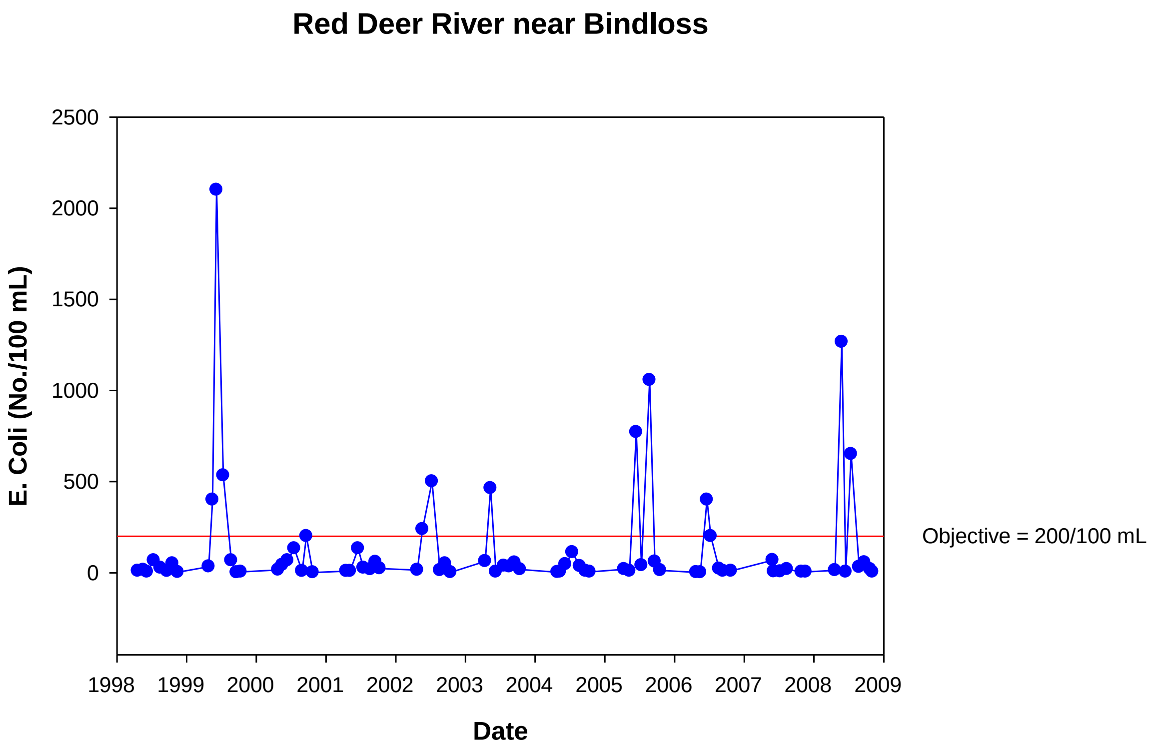

Figure 5-e9: Red Deer River (AB-SK) E. Coli

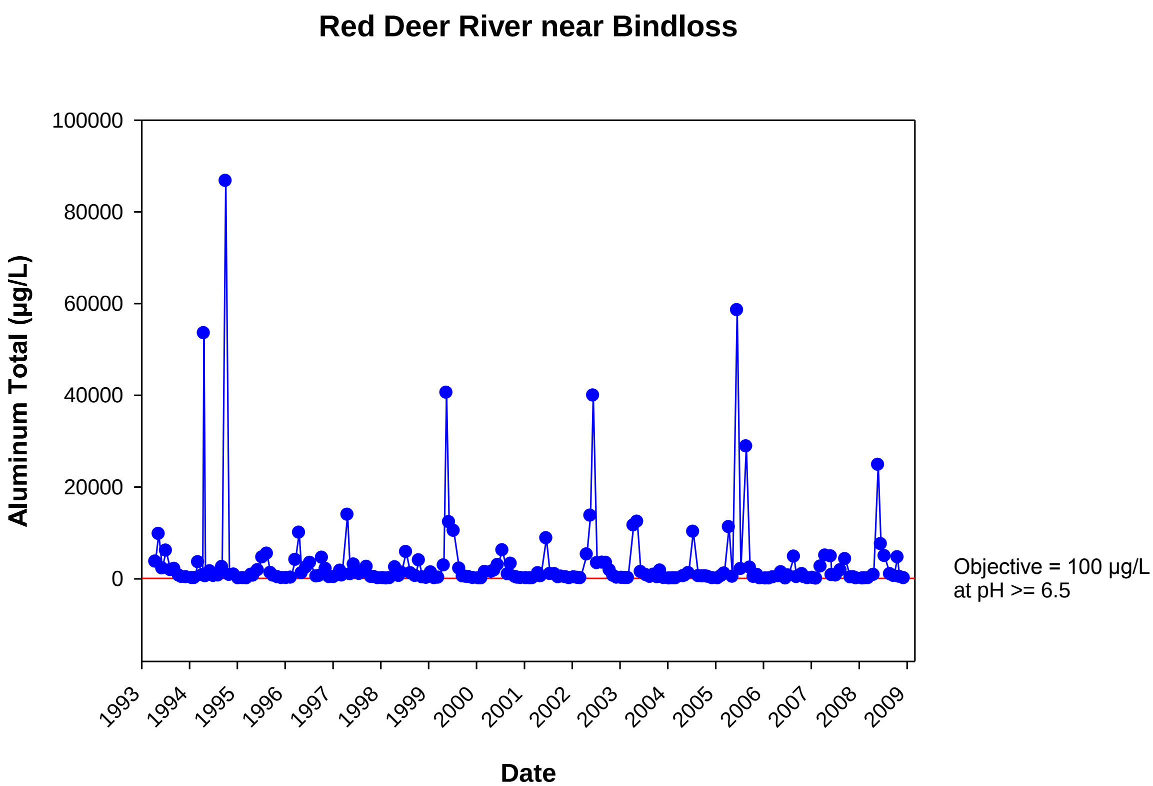

Figure 5-e10: Red Deer River (AB-SK) Aluminum Total

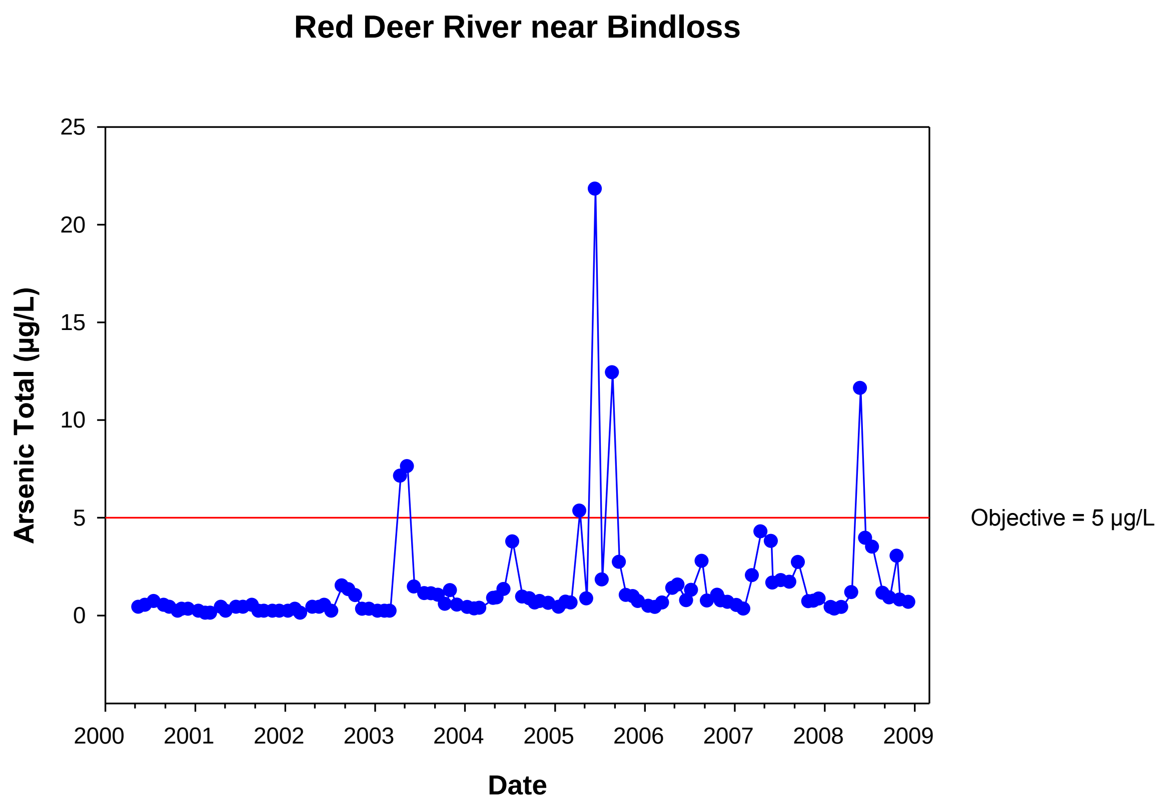

Figure 5-e11: Red Deer River (AB-SK) Arsenic Total

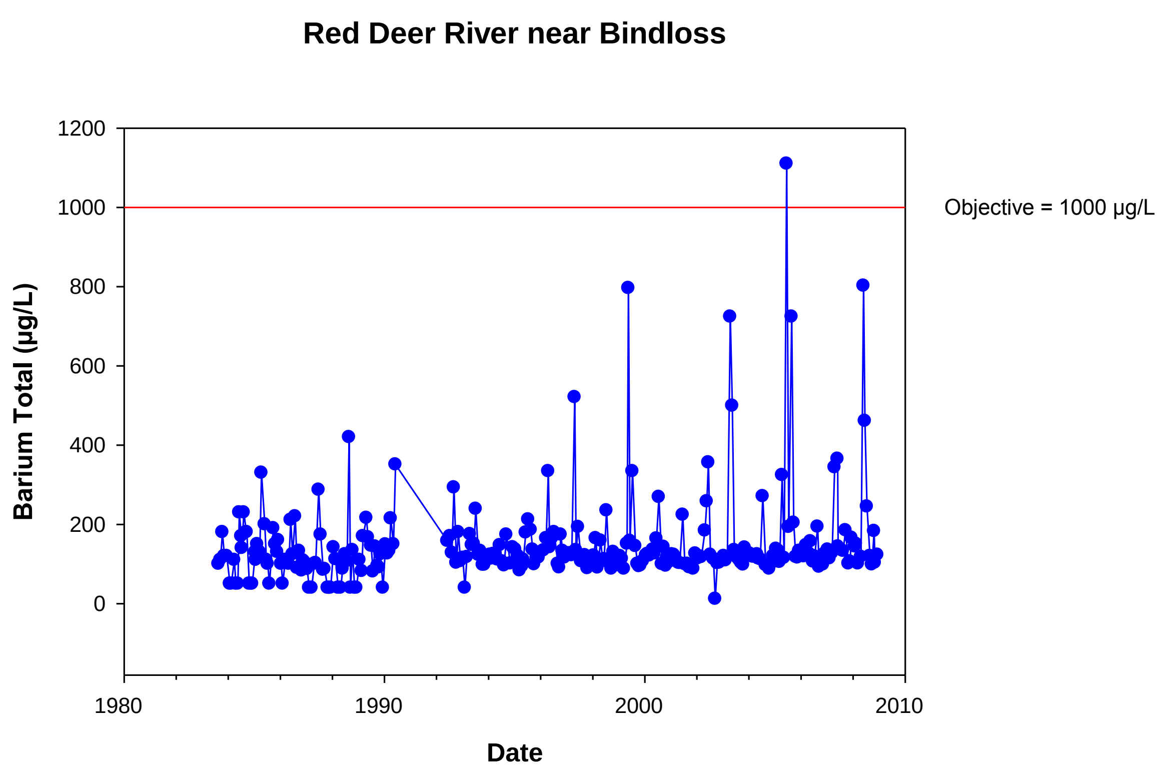

Figure 5-e12: Red Deer River (AB-SK) Barium Total

Red Deer River near Bindloss

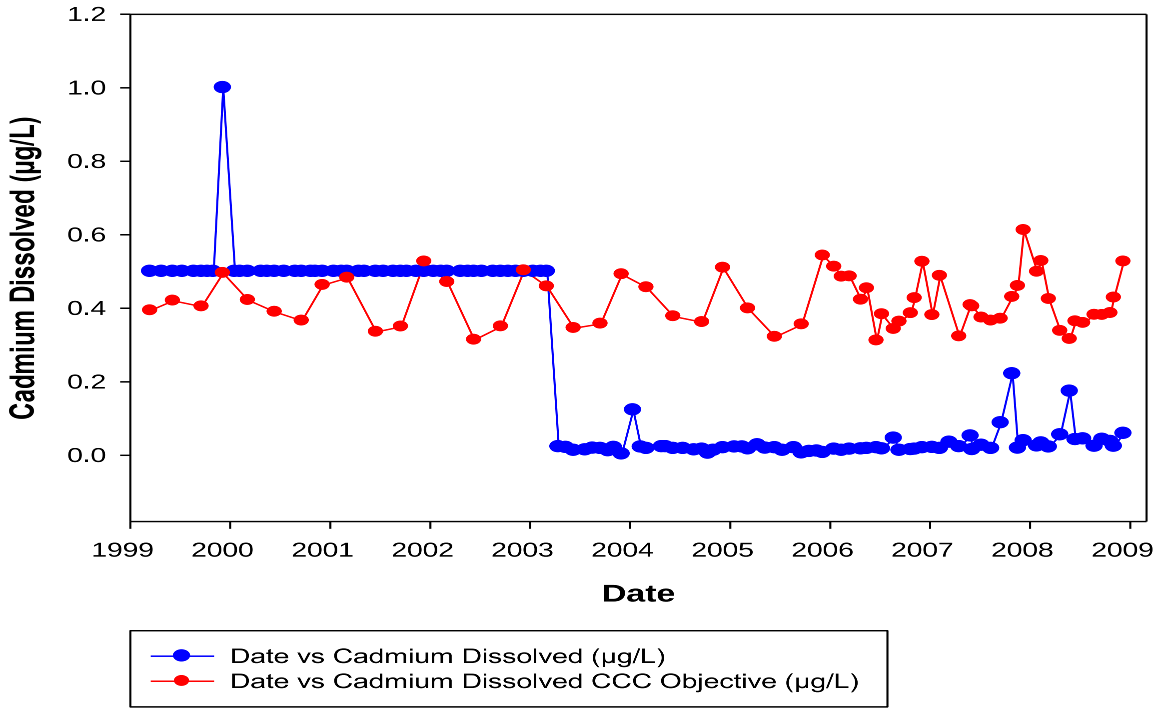

Figure 5-e13: Red Deer River (AB-SK) Cadmium Dissolved

Red Deer River near Bindloss

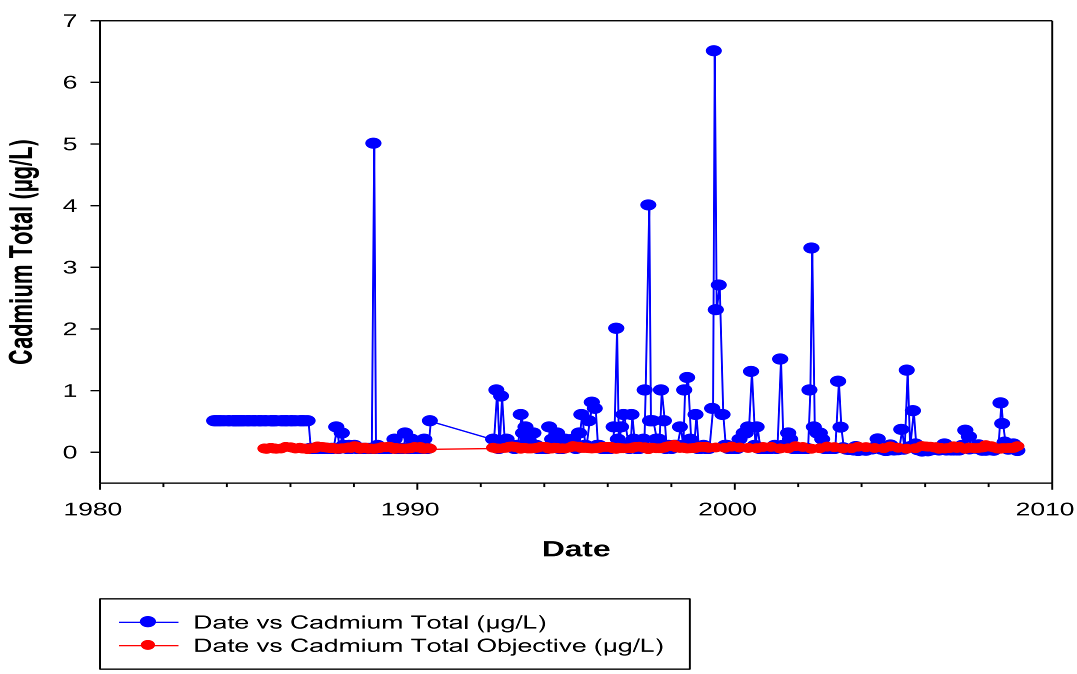

Figure 5-e14: Red Deer River (AB-SK) Cadmium Total

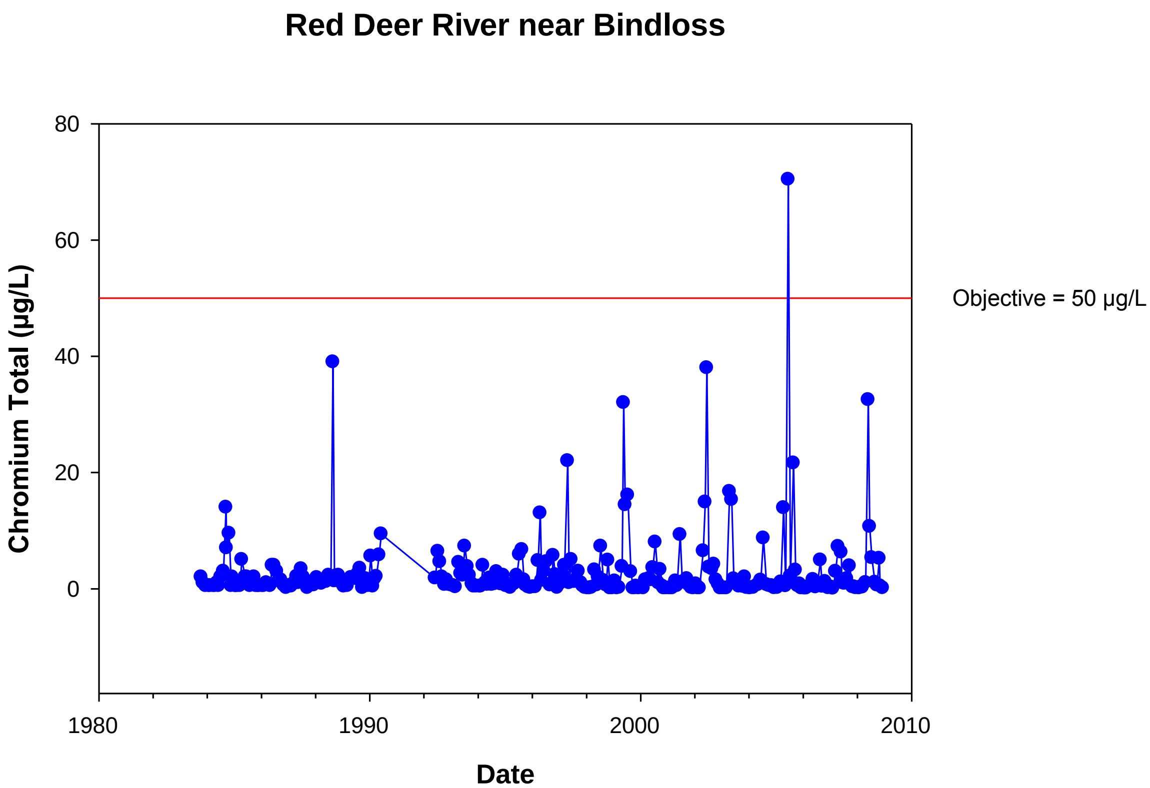

Figure 5-e15: Red Deer River (AB-SK) Chromium Total

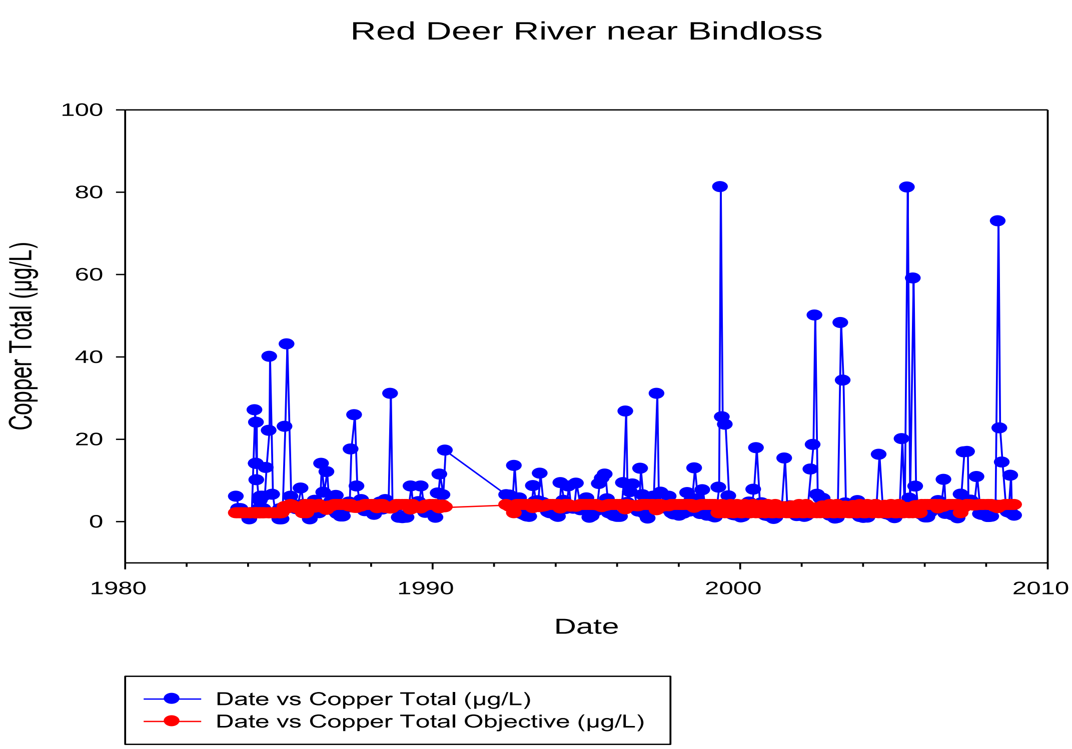

Figure 5-e16: Red Deer River (AB-SK) Copper Total

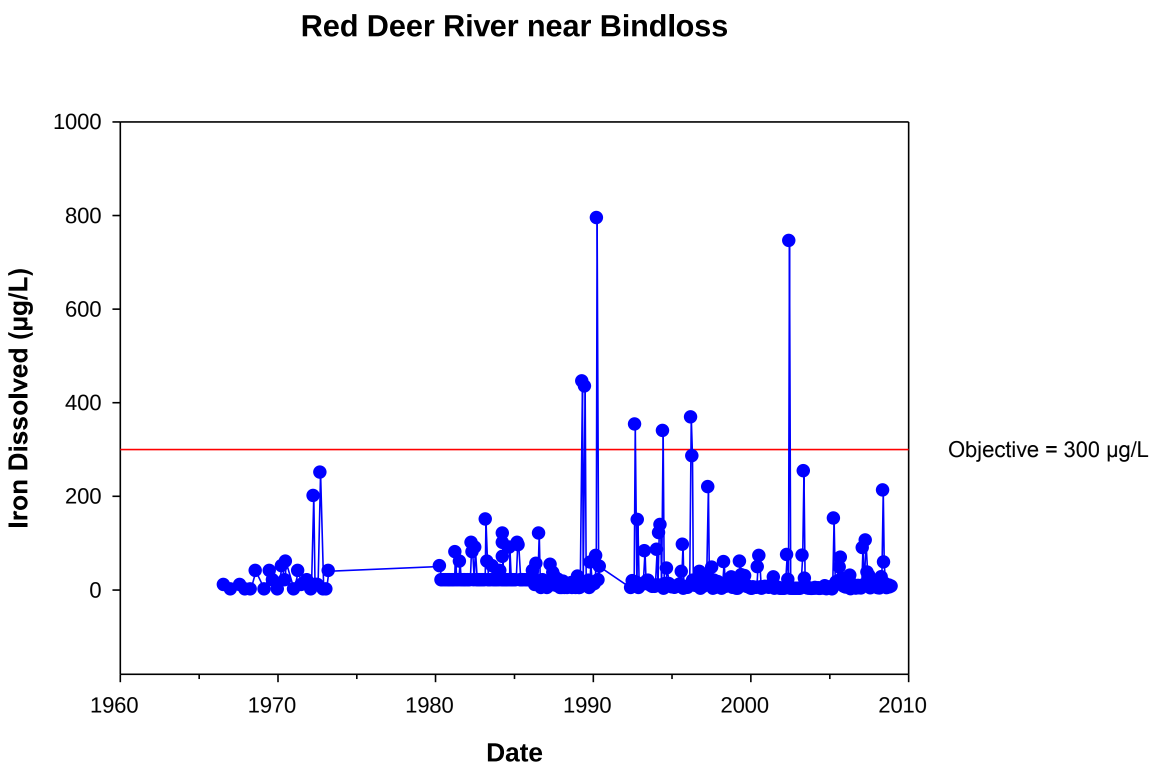

Figure 5-e17: Red Deer River (AB-SK) Iron Dissolved

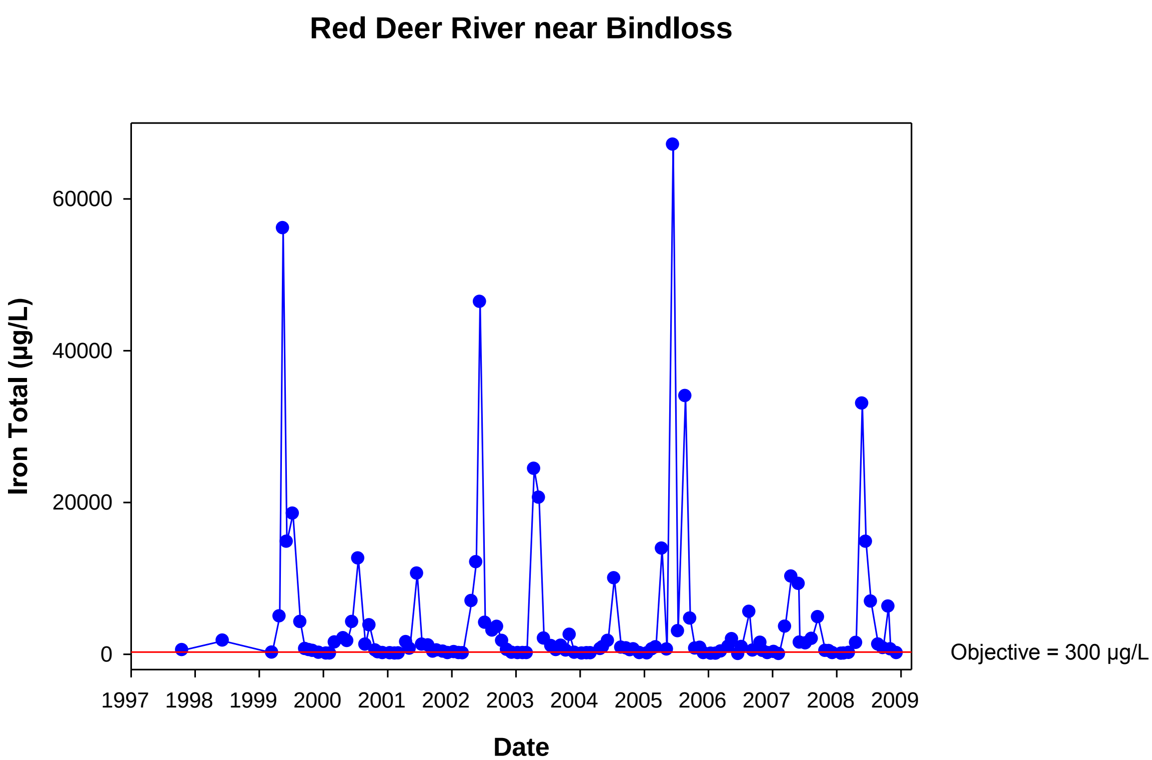

Figure 5-e18: Red Deer River (AB-SK) Iron Total

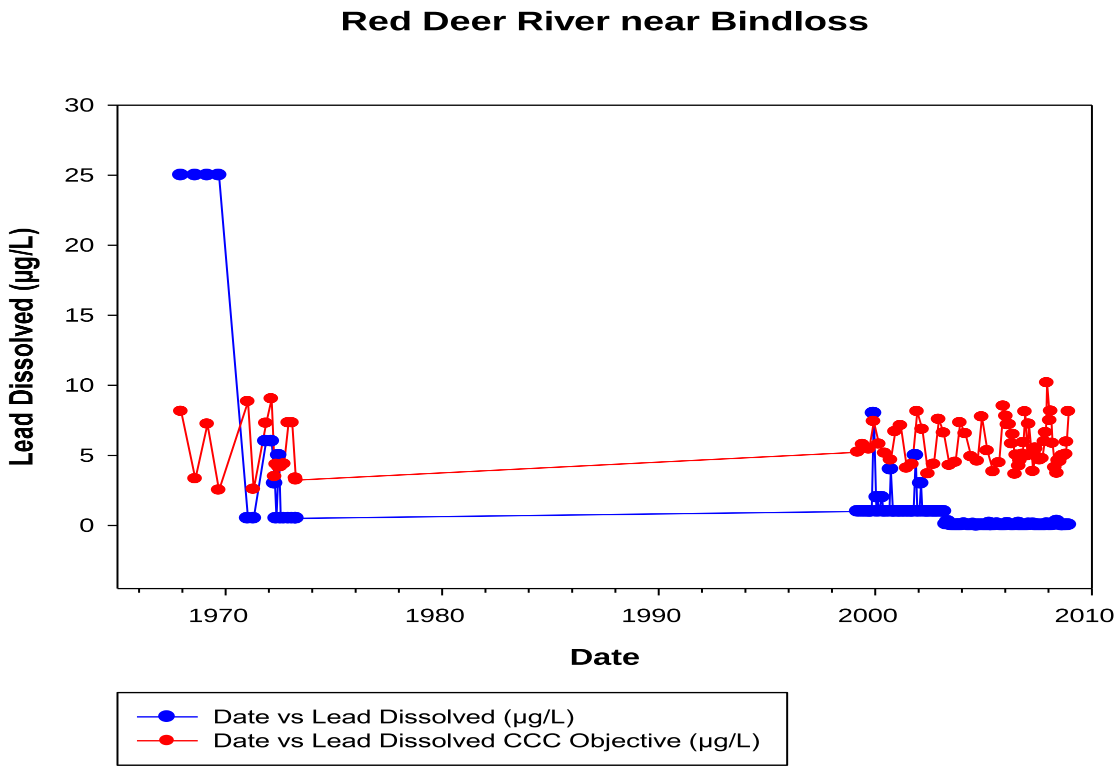

Figure 5-e19: Red Deer River (AB-SK) Lead Dissolved

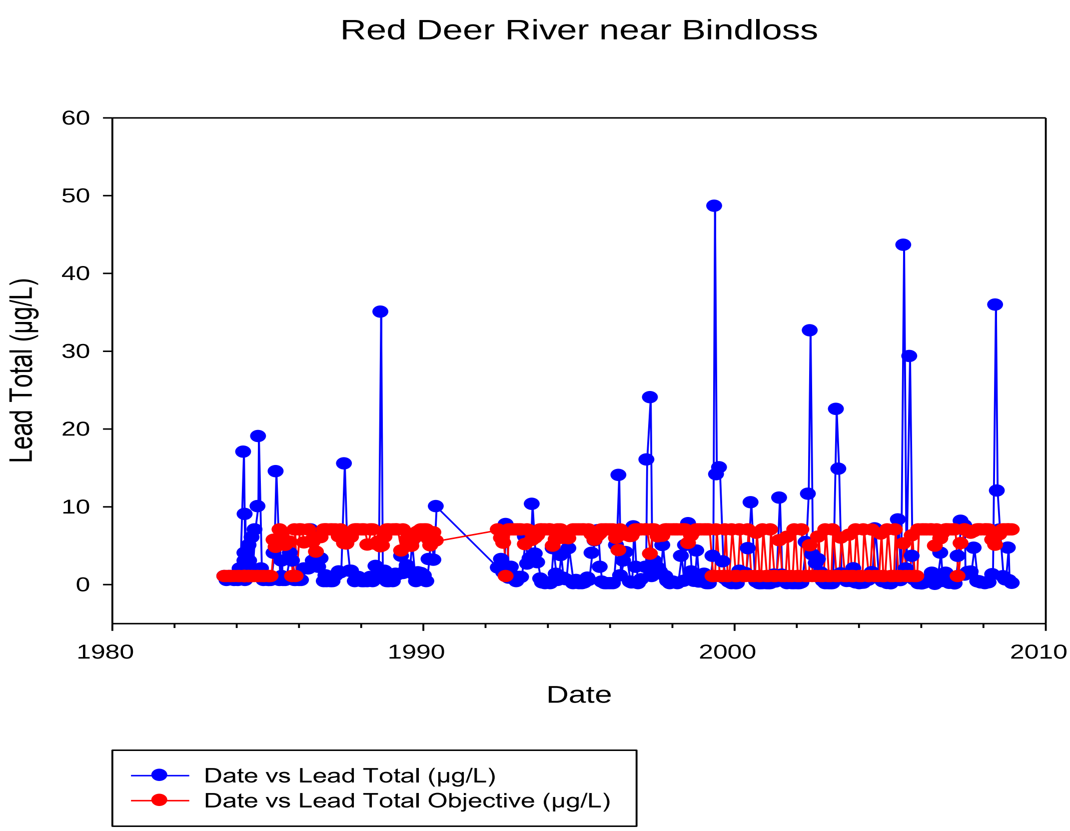

Figure 5-e20: Red Deer River (AB-SK) Lead Total

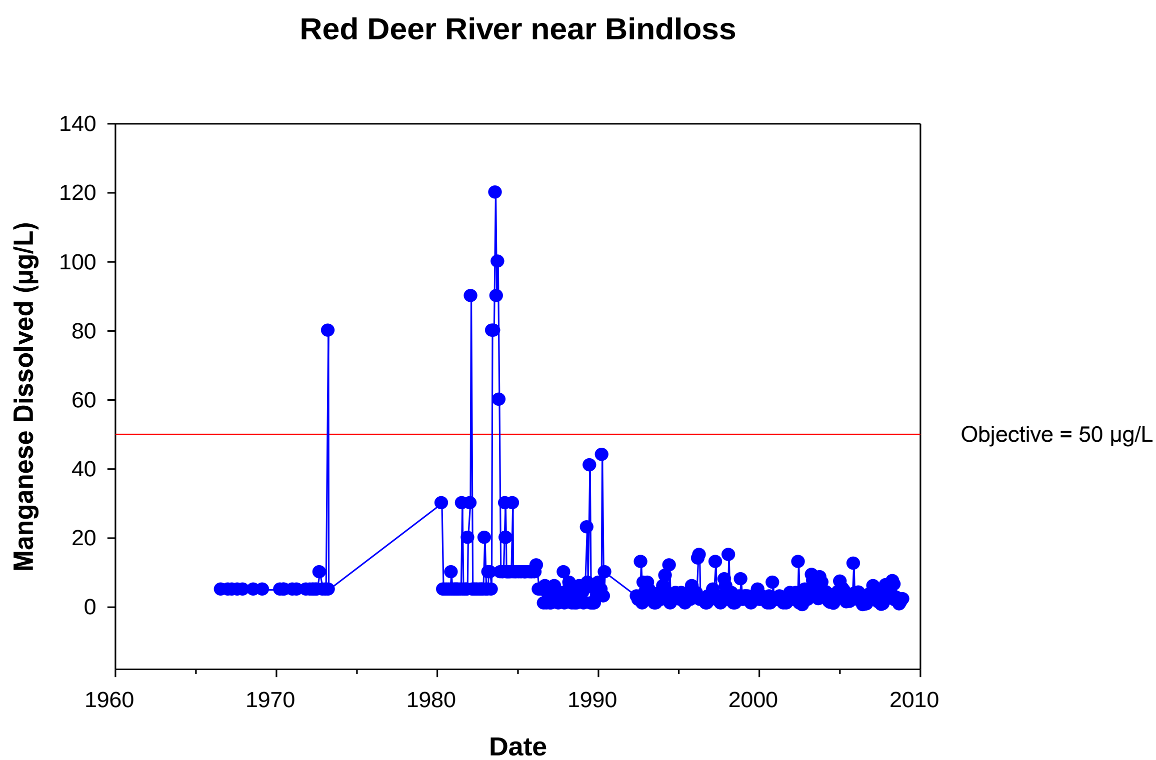

Figure 5-e21: Red Deer River (AB-SK) Manganese Dissolved

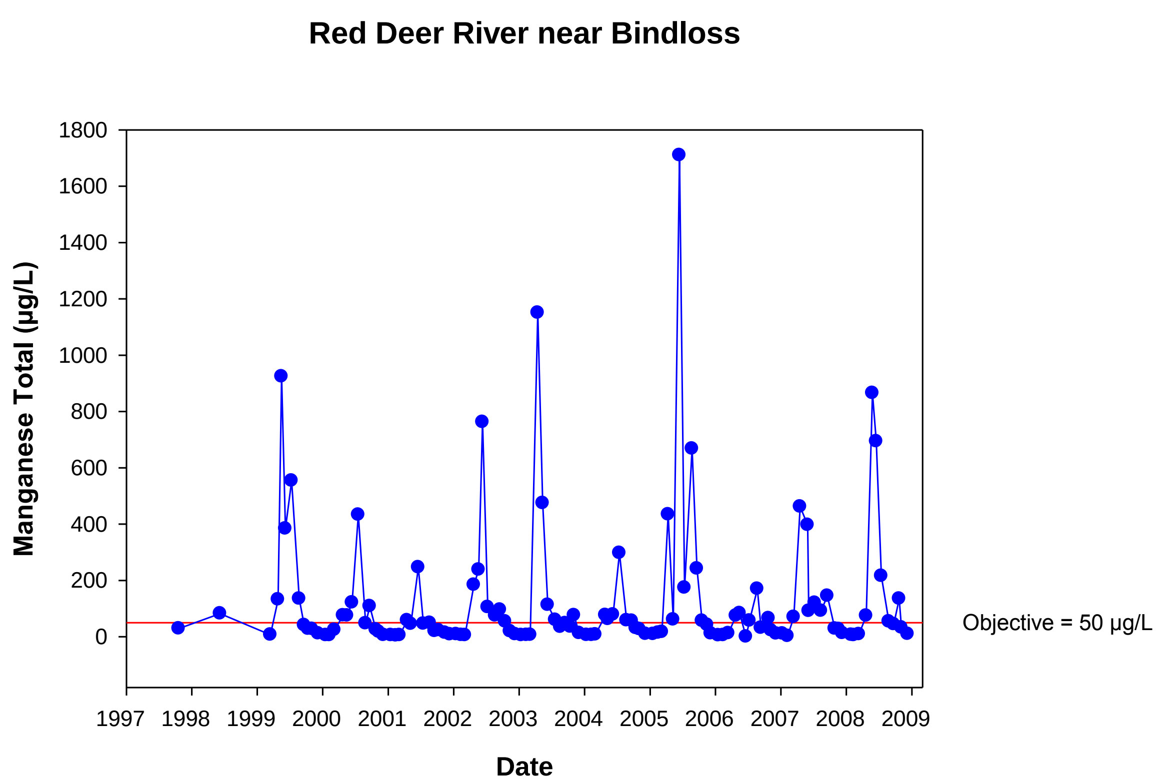

Figure 5-e22: Red Deer River (AB-SK) Manganese Total

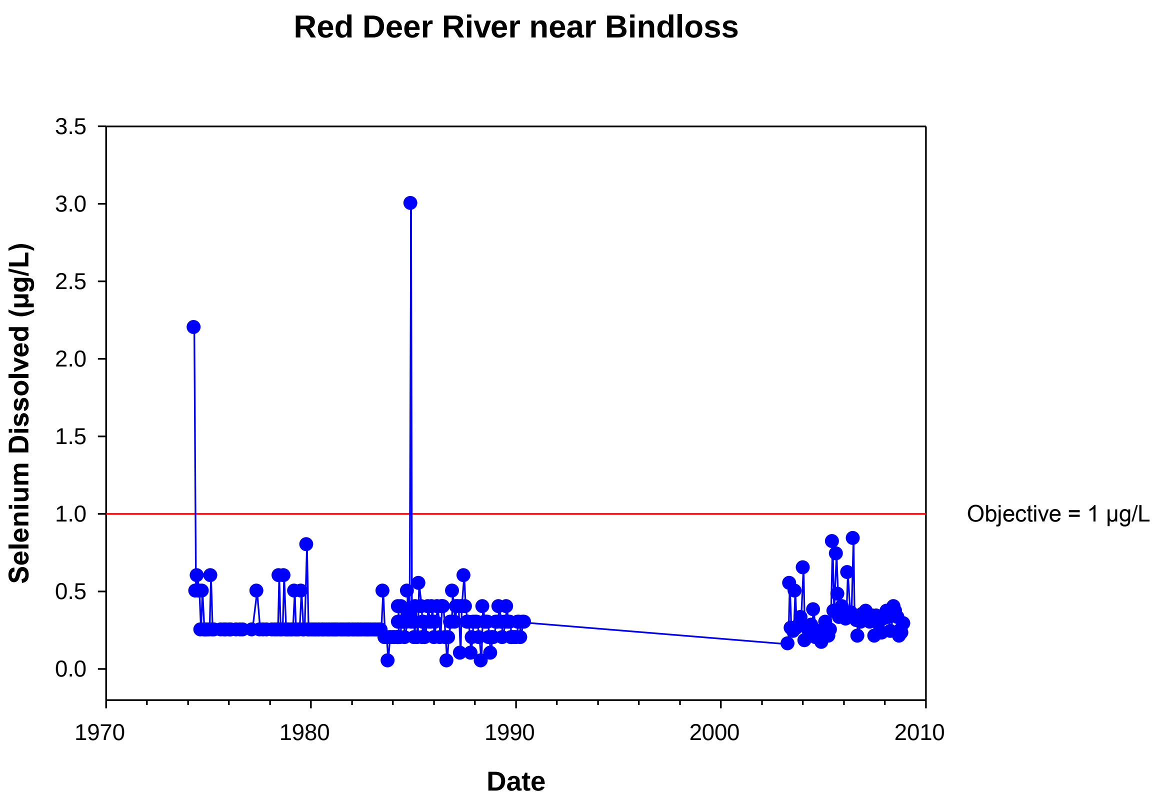

Figure 5-e23: Red Deer River (AB-SK) Selenium Dissolved

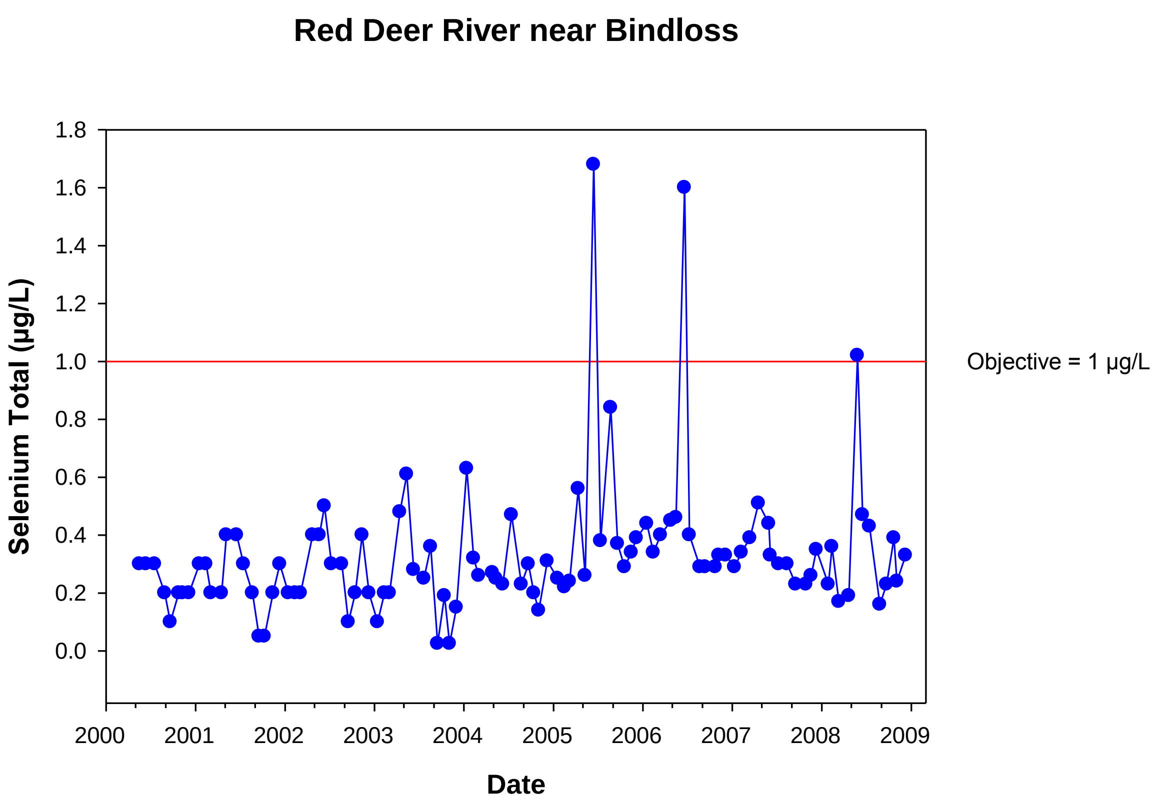

Figure 5-e24: Red Deer River (AB-SK) Selenium Total

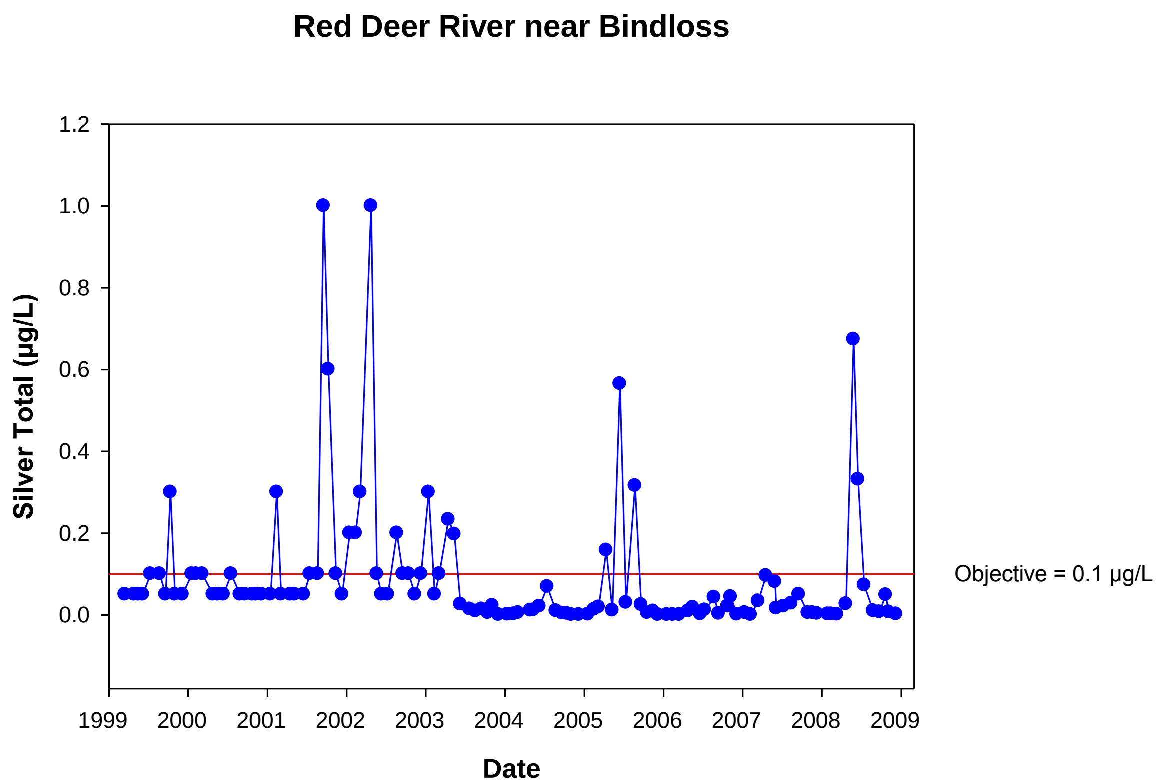

Figure 5-e25: Red Deer River (AB-SK) Silver Total

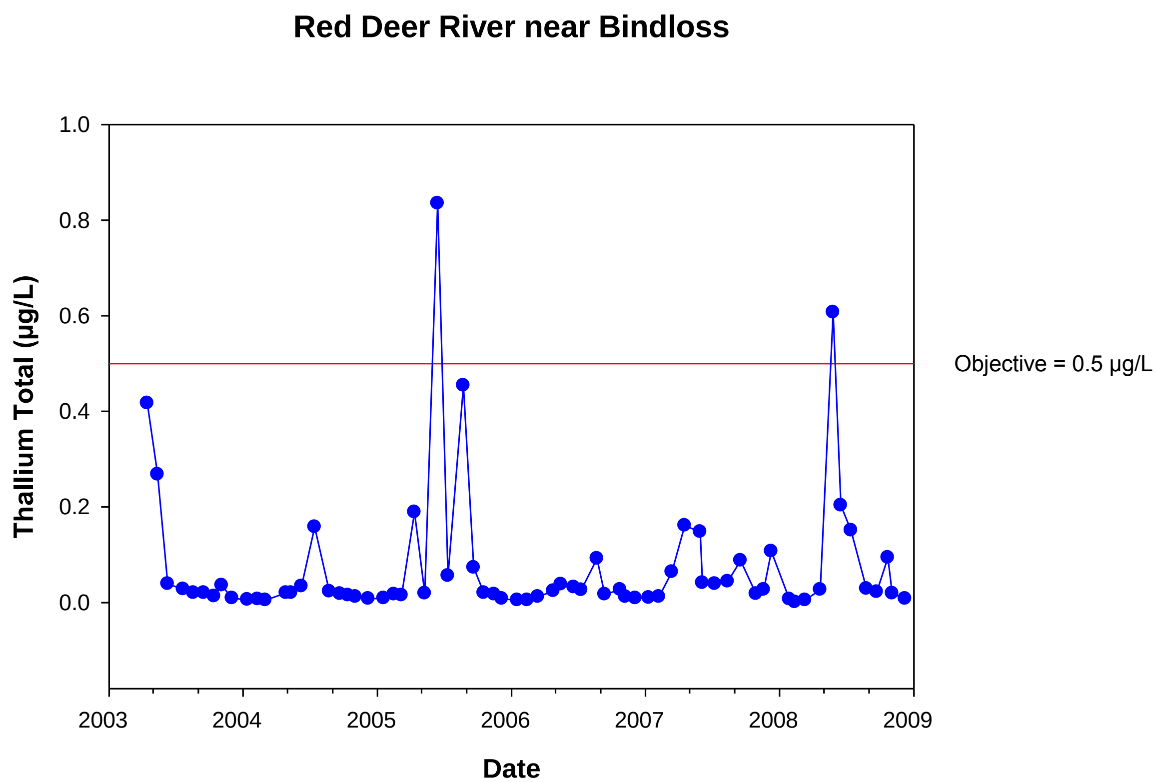

Figure 5-e26: Red Deer River (AB-SK) Thallium Total

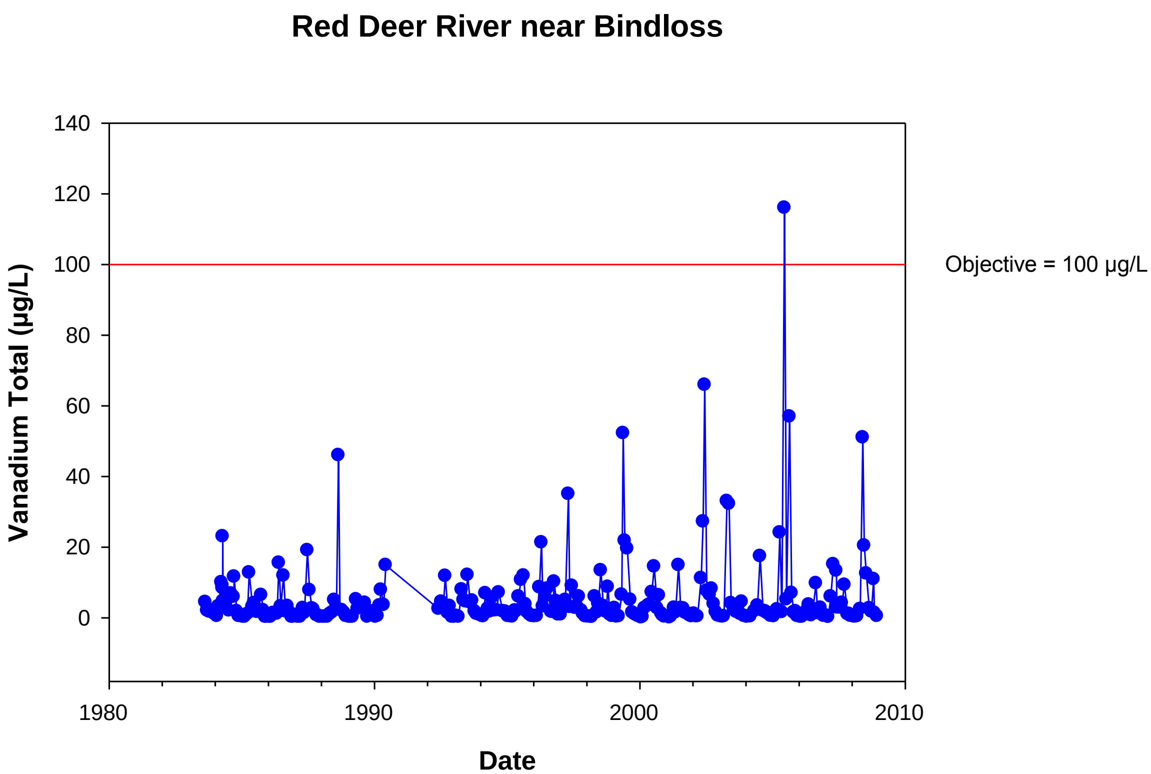

Figure 5-e27: Red Deer River (AB-SK) Vanadium Total

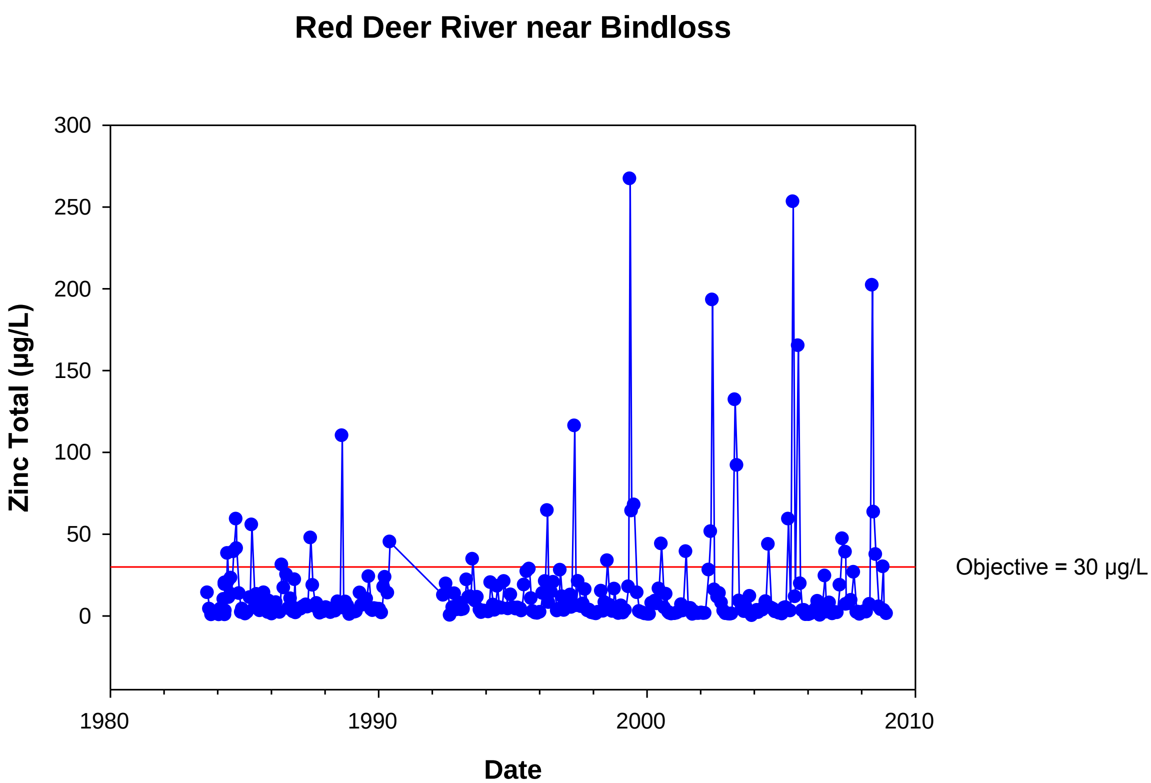

Figure 5-e28: Red Deer River (AB-SK) Zinc Total

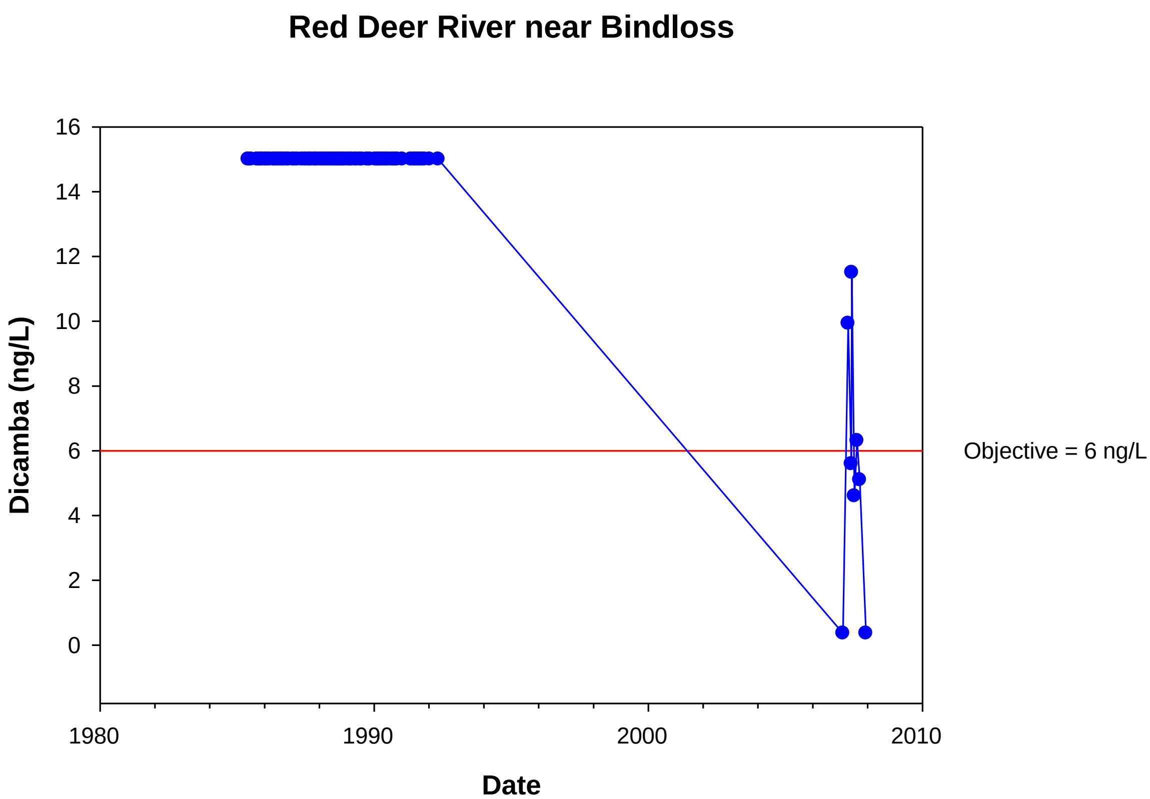

Figure 5-e29: Red Deer River (AB-SK) Dicamba

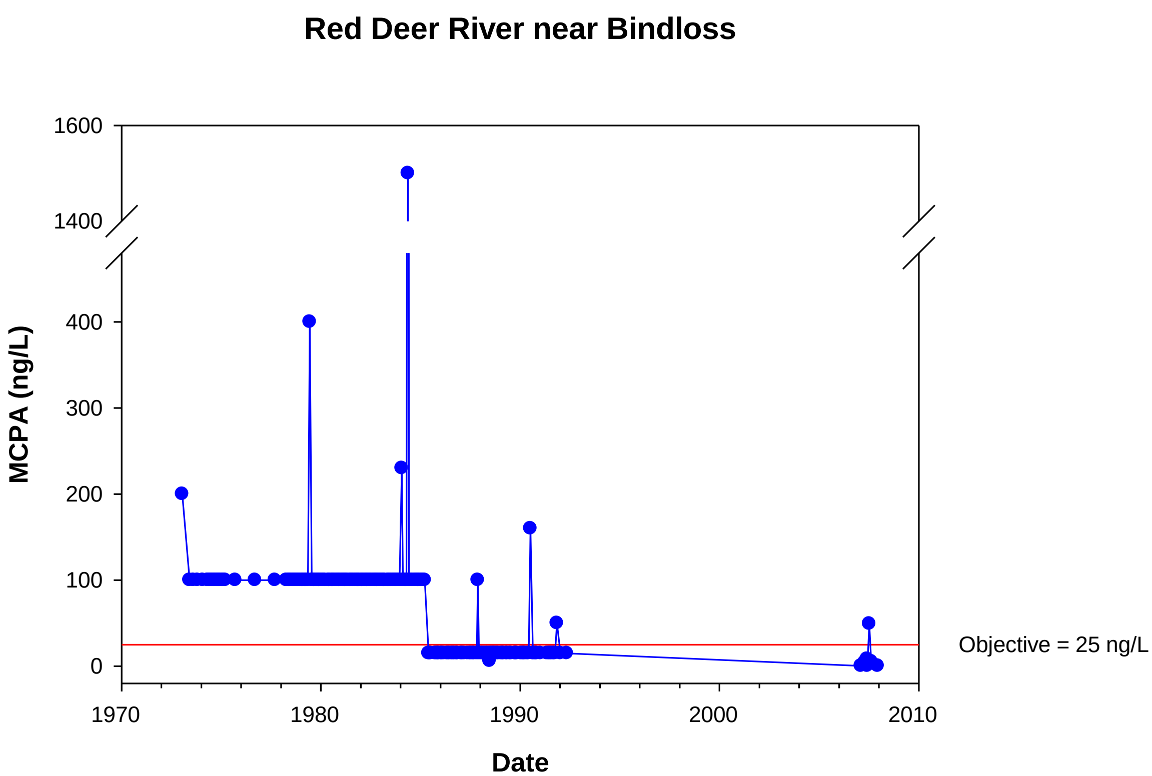

Figure 5-e30: Red Deer River (AB-SK) MCPA

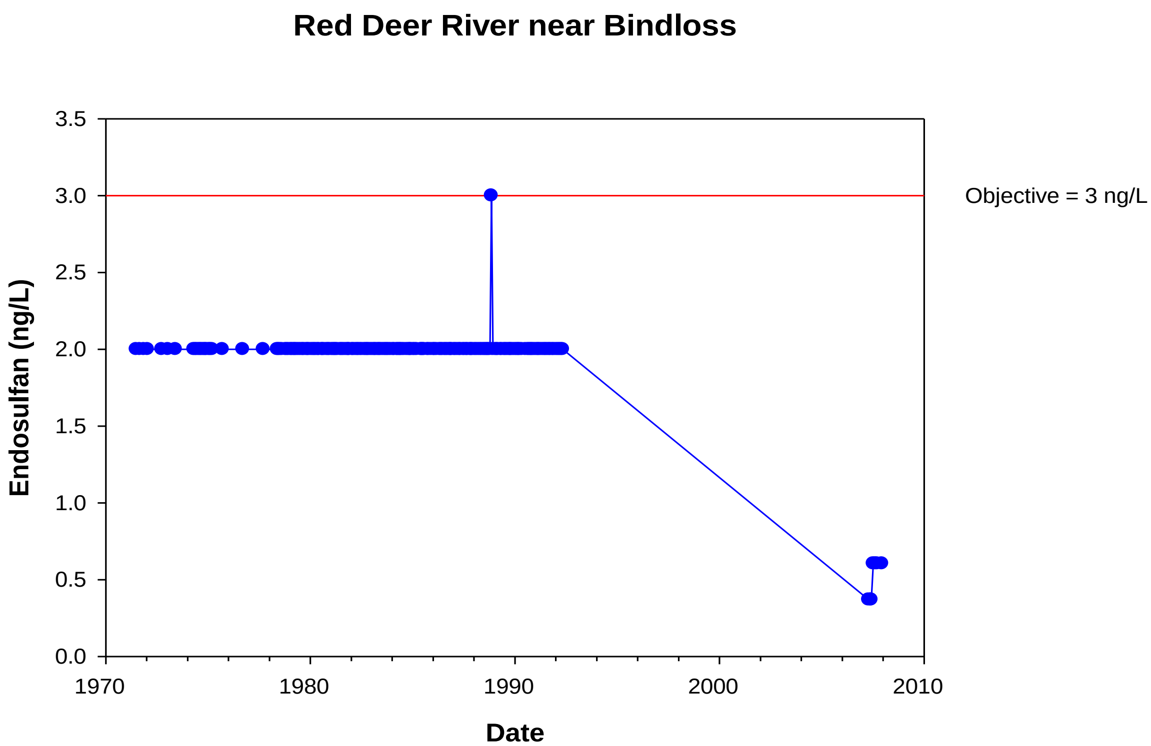

Figure 5-e31: Red Deer River (AB-SK) Endosulfan

Appendix 5-f: South Saskatchewan River

South Saskatchewan River at Hwy 41

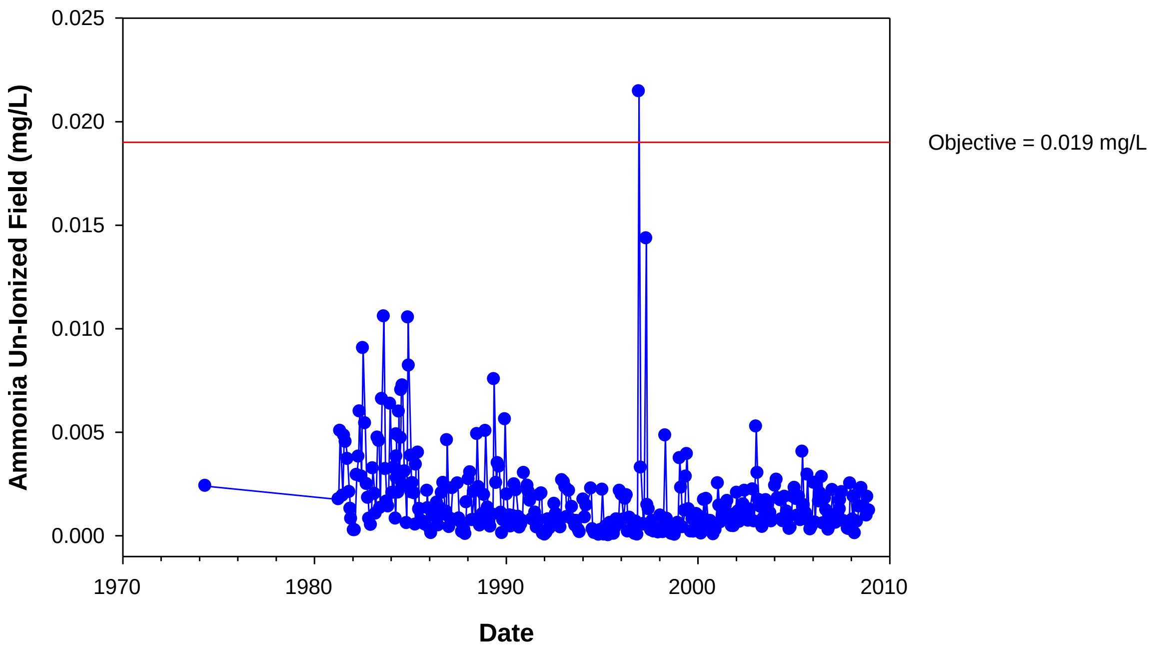

Figure 5-f1: South Saskatchewan River Ammonia Un-Ionized Field

South Saskatchewan River at Hwy 41

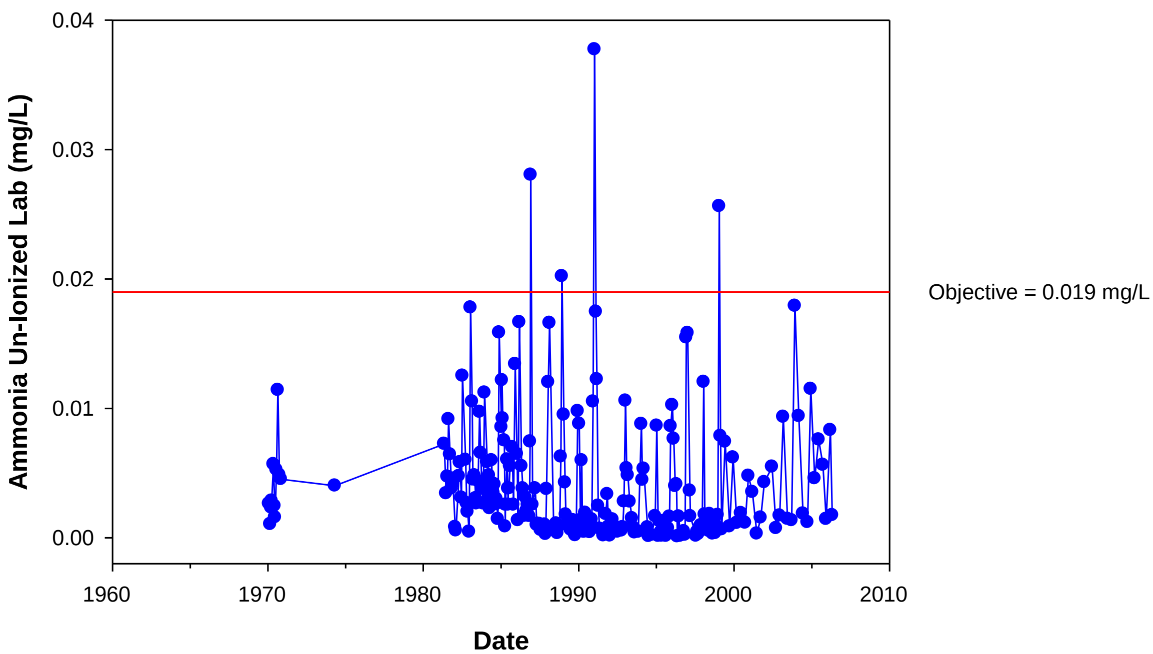

Figure 5-f2: South Saskatchewan River Ammonia Un-Ionized Lab

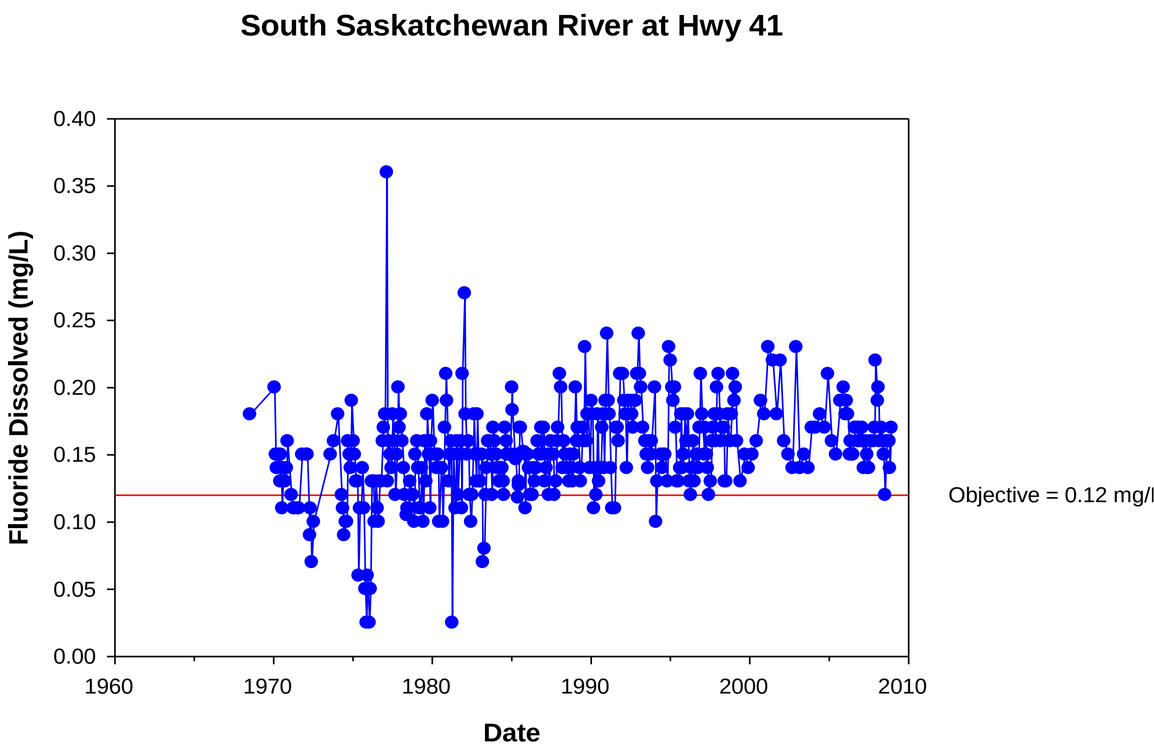

Figure 5-f3: South Saskatchewan River Fluoride Dissolved

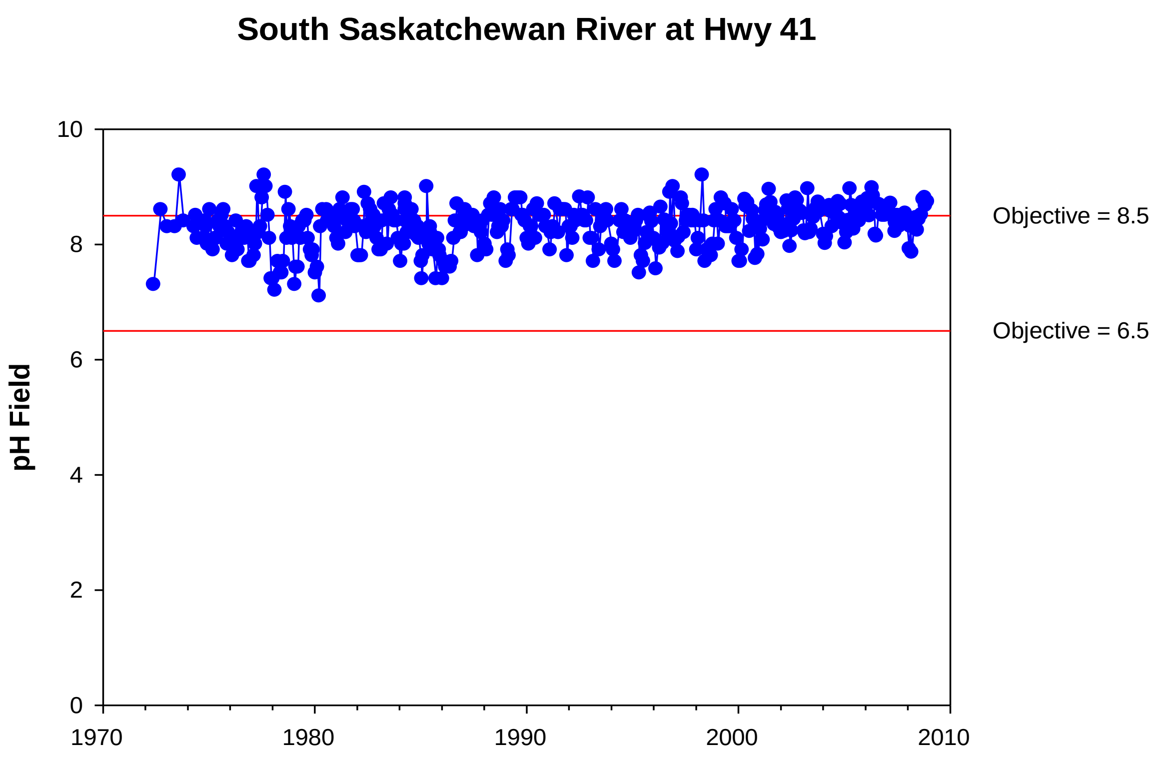

Figure 5-f4: South Saskatchewan River pH Field

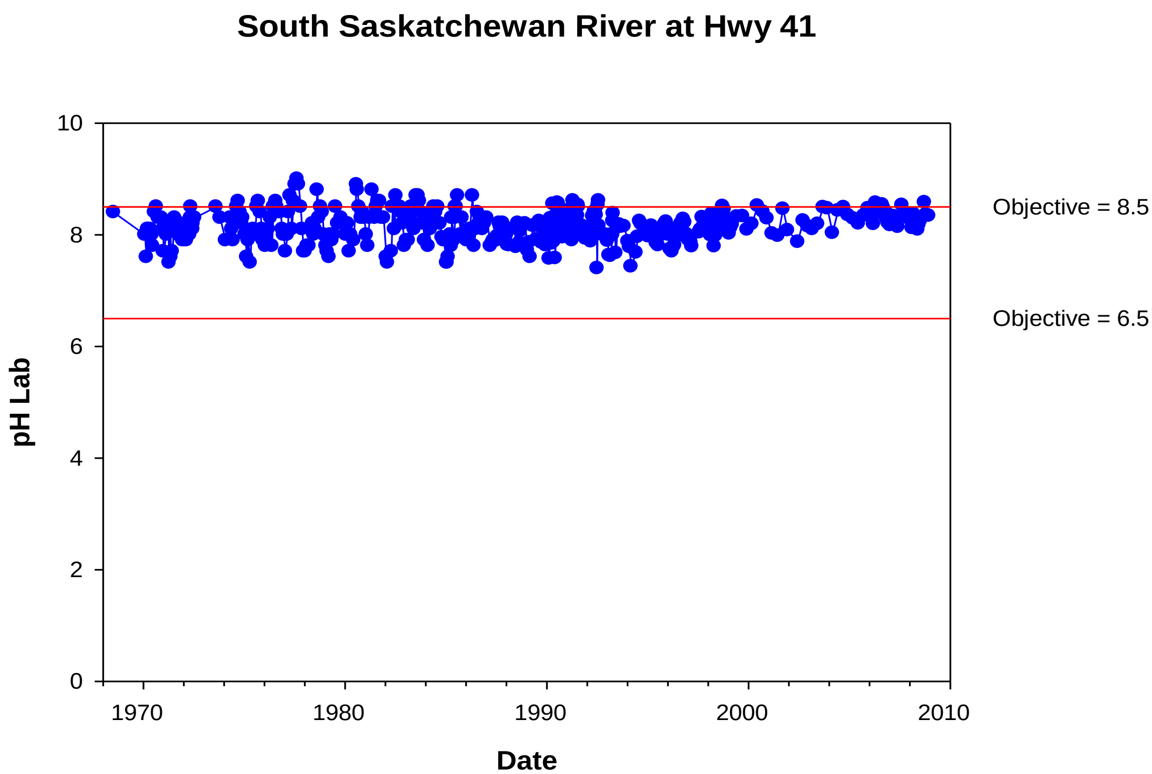

Figure 5-f5: South Saskatchewan River pH Lab

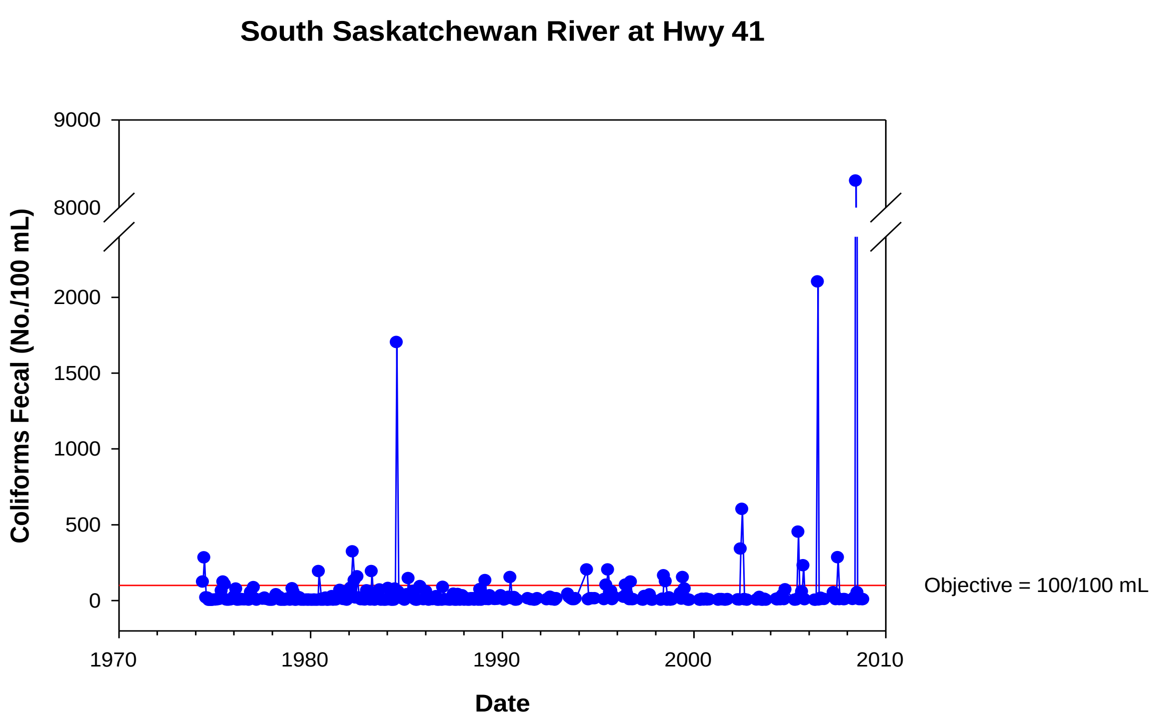

Figure 5-f6: South Saskatchewan River Coliforms Fecal

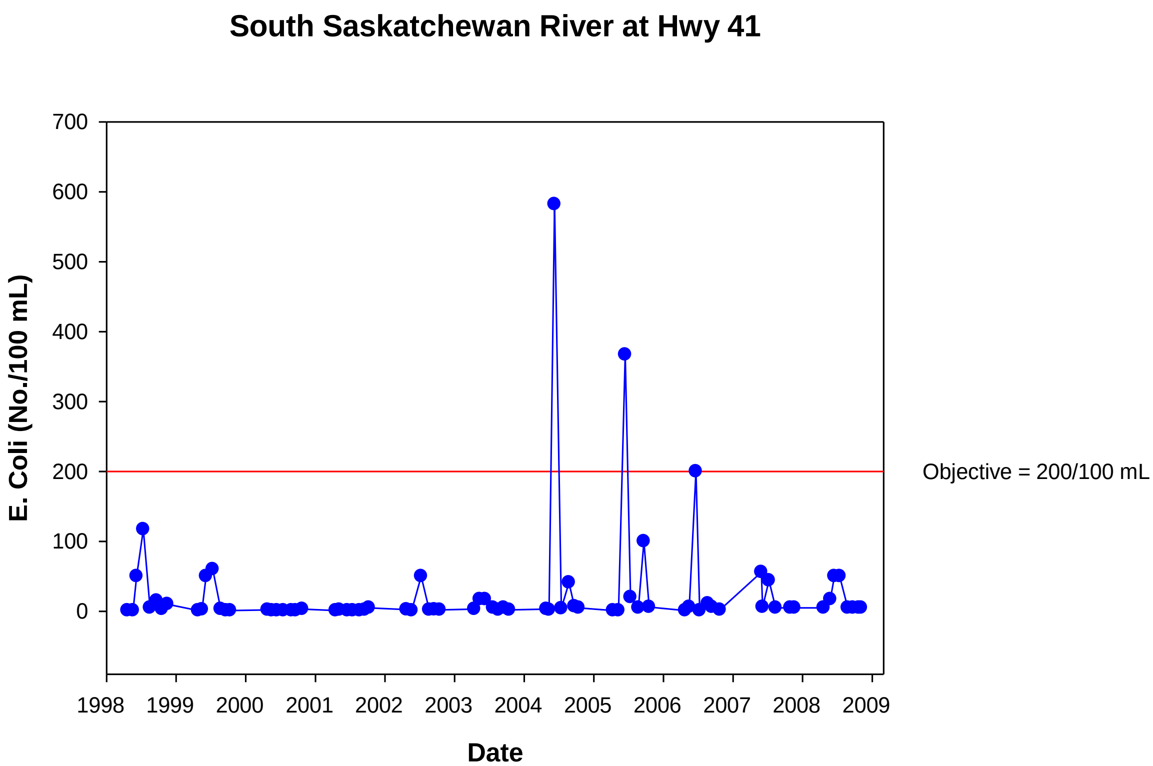

Figure 5-f7: South Saskatchewan River E. Coli

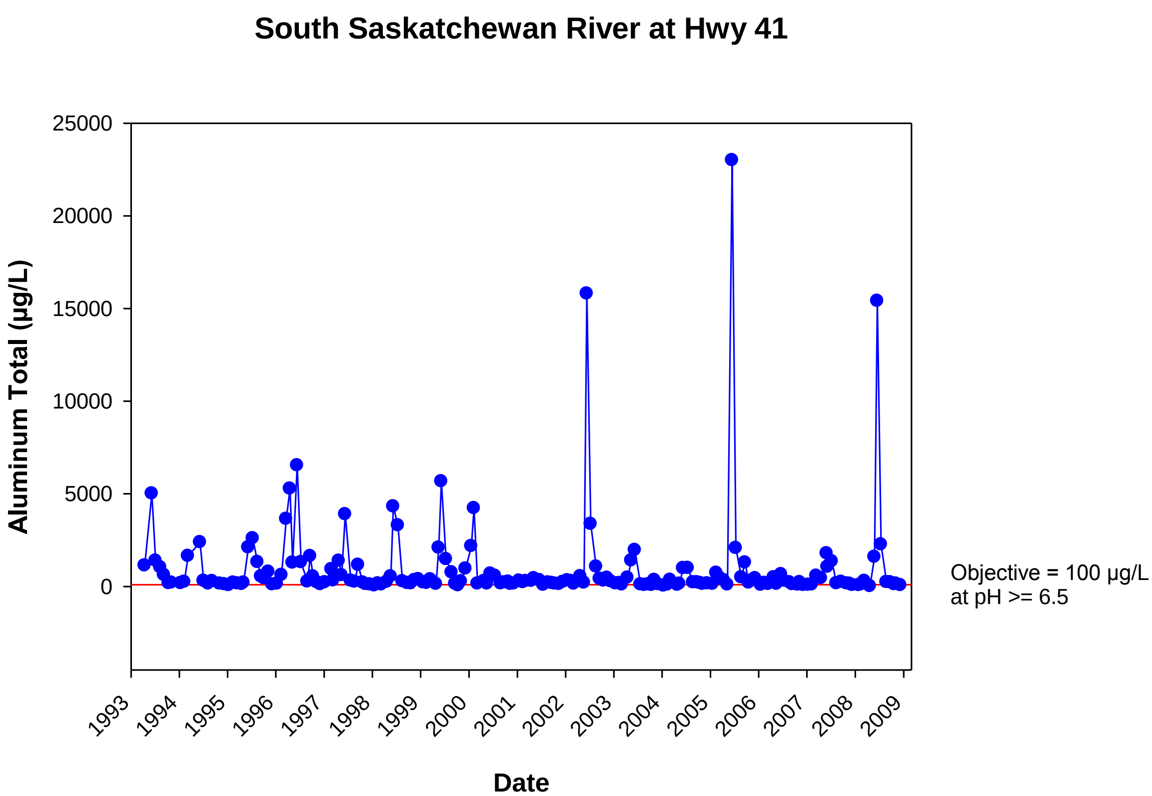

Figure 5-f8: South Saskatchewan River Aluminum Total

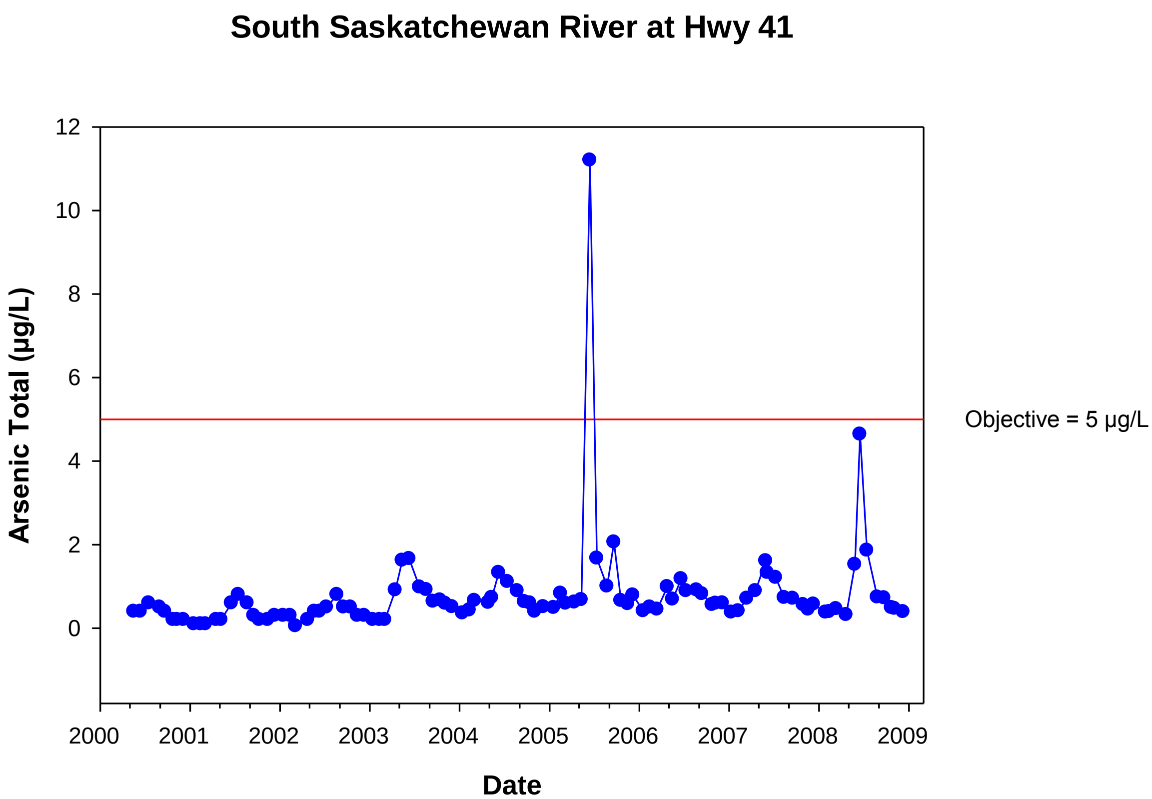

Figure 5-f9: South Saskatchewan River Arsenic Total

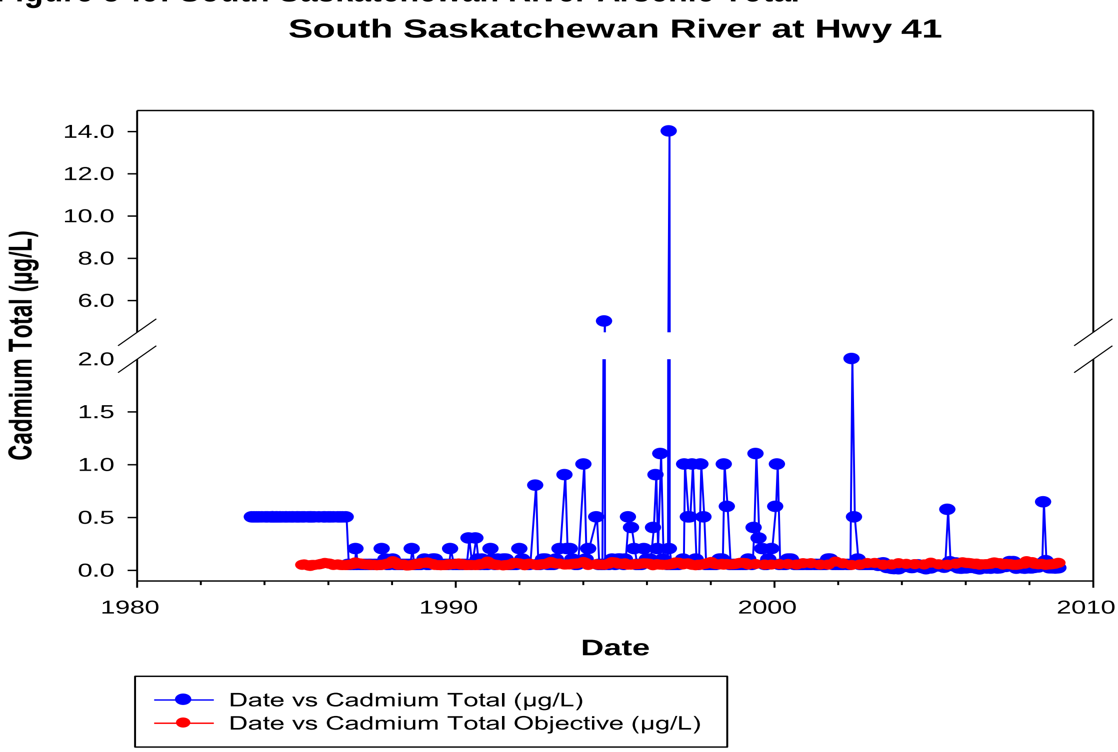

Figure 5-f10: South Saskatchewan River Cadmium Total

South Saskatchewan River at Hwy 41

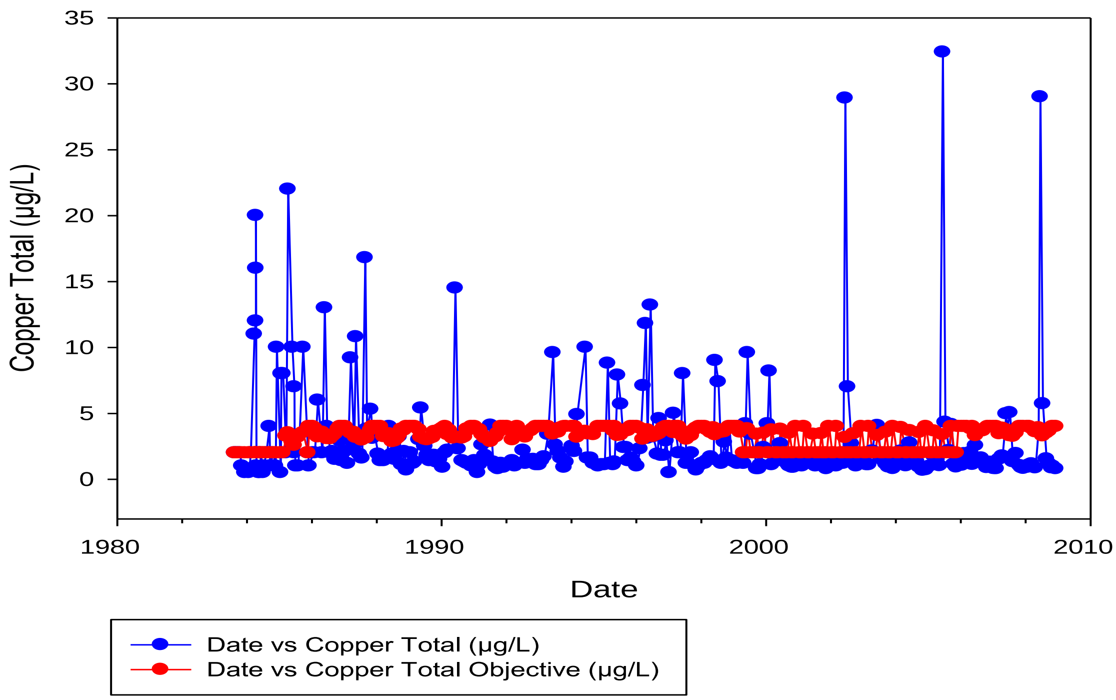

Figure 5-f11: South Saskatchewan River Copper Total

South Saskatchewan River at Hwy 41

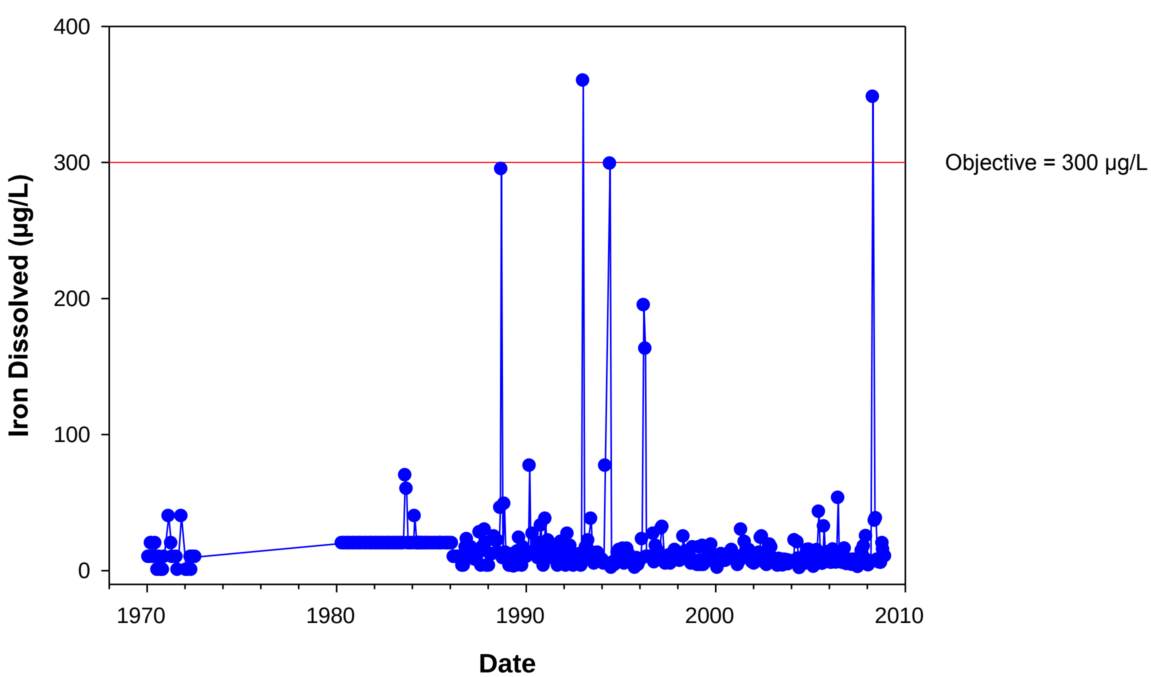

Figure 5-f12: South Saskatchewan River Iron Dissolved

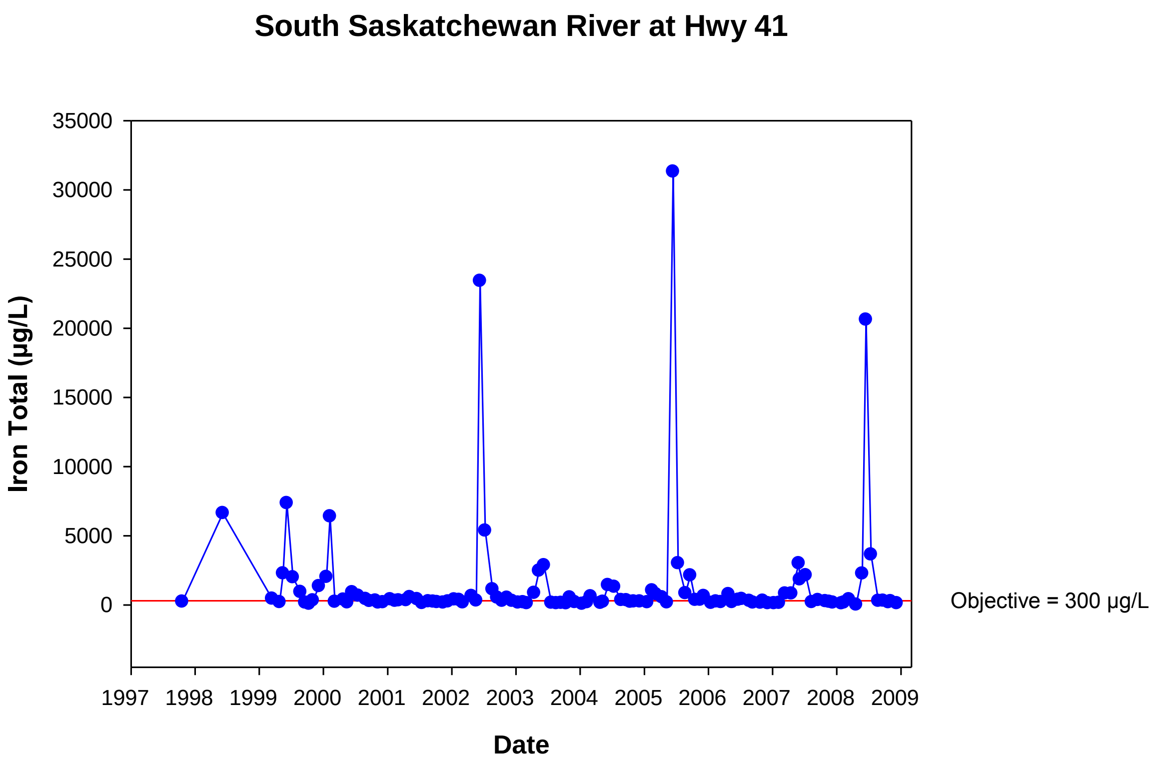

Figure 5-f13: South Saskatchewan River Iron Total

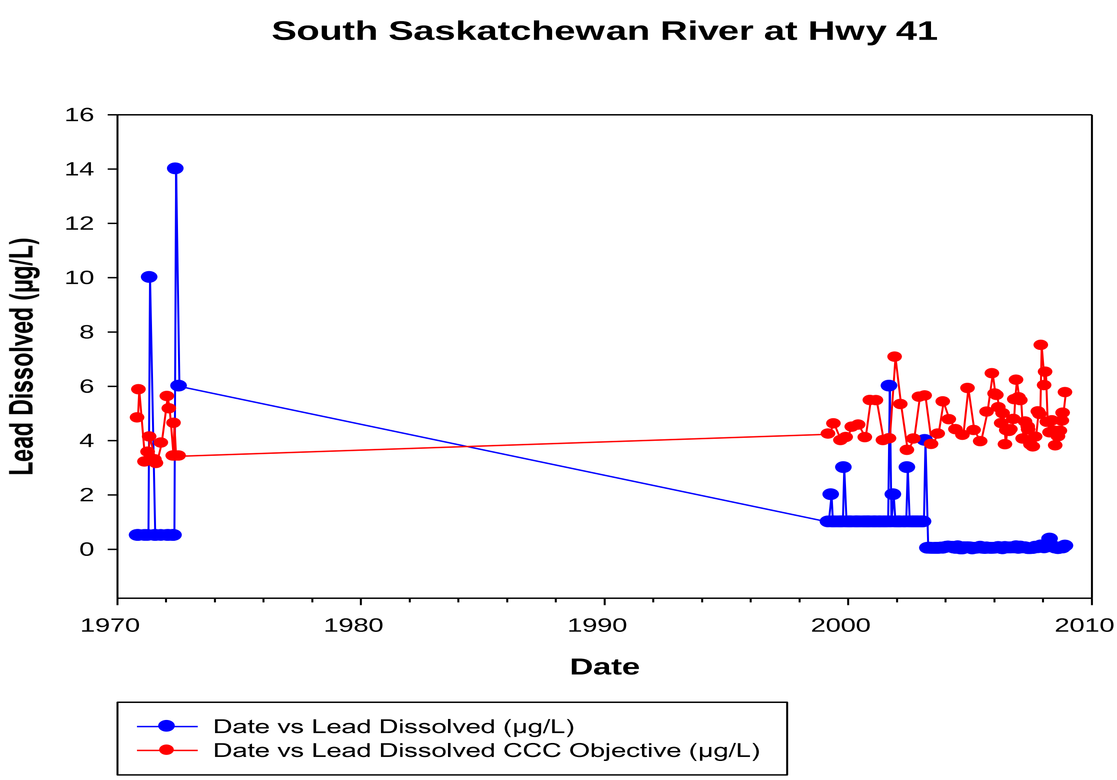

Figure 5-f14: South Saskatchewan River Lead Dissolved

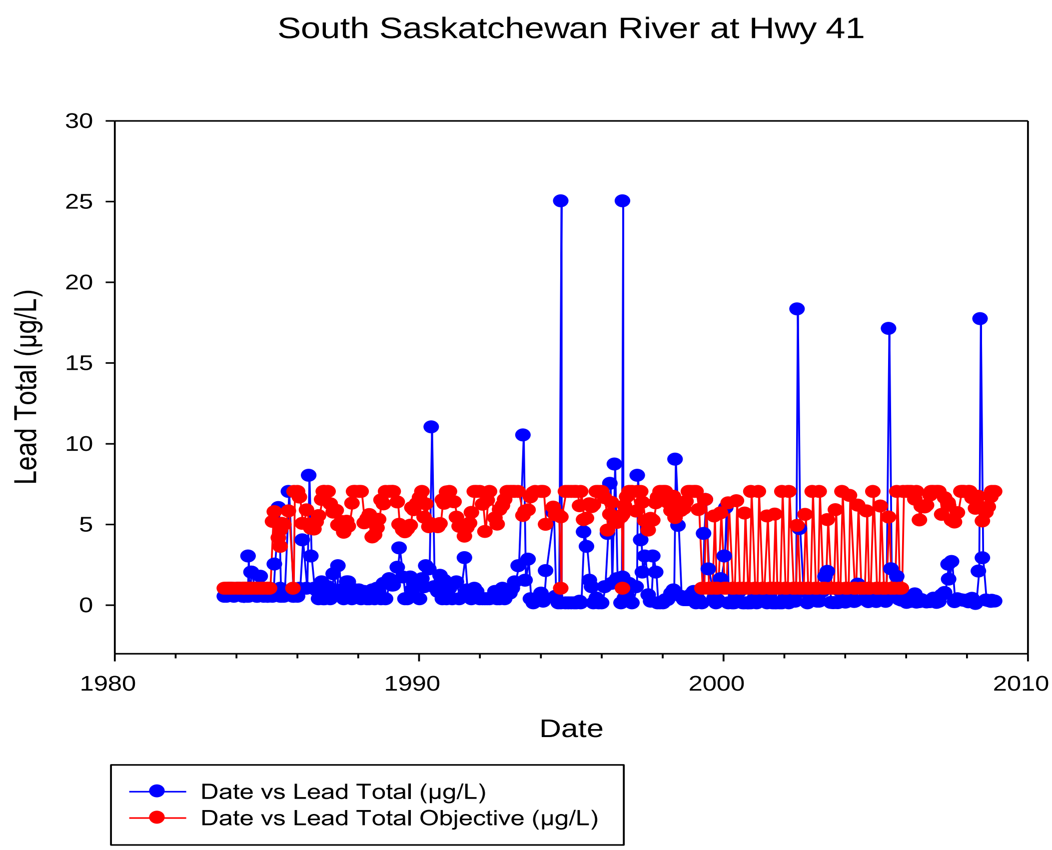

Figure 5-f15: South Saskatchewan River Lead Total

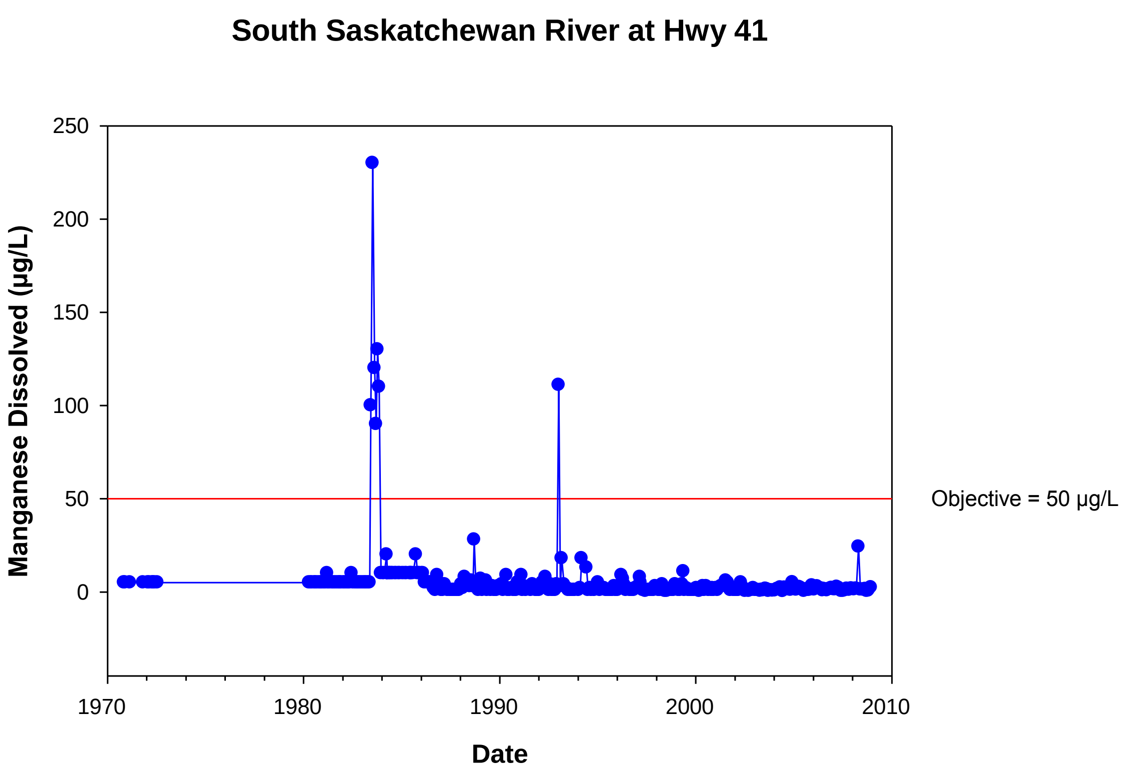

Figure 5-f16: South Saskatchewan River Manganese Dissolved

South Saskatchewan River at Hwy 41

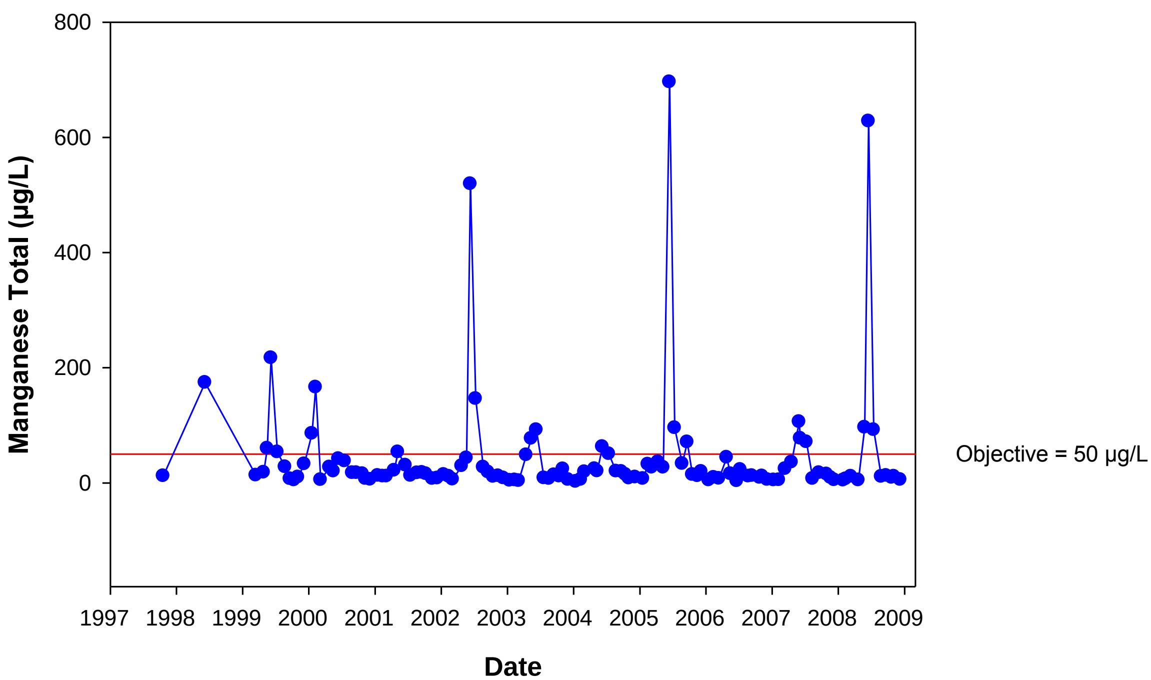

Figure 5-f17: South Saskatchewan River Manganese Total

South Saskatchewan River at Hwy 41

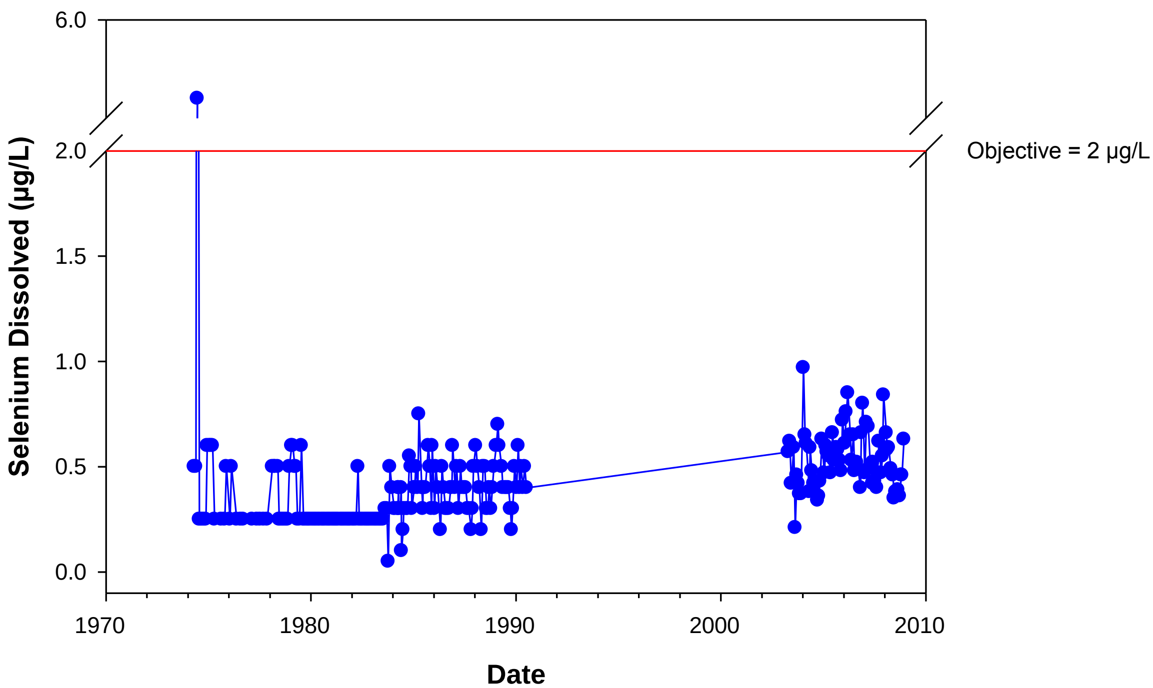

Figure 5-f18: South Saskatchewan River Selenium Dissolved

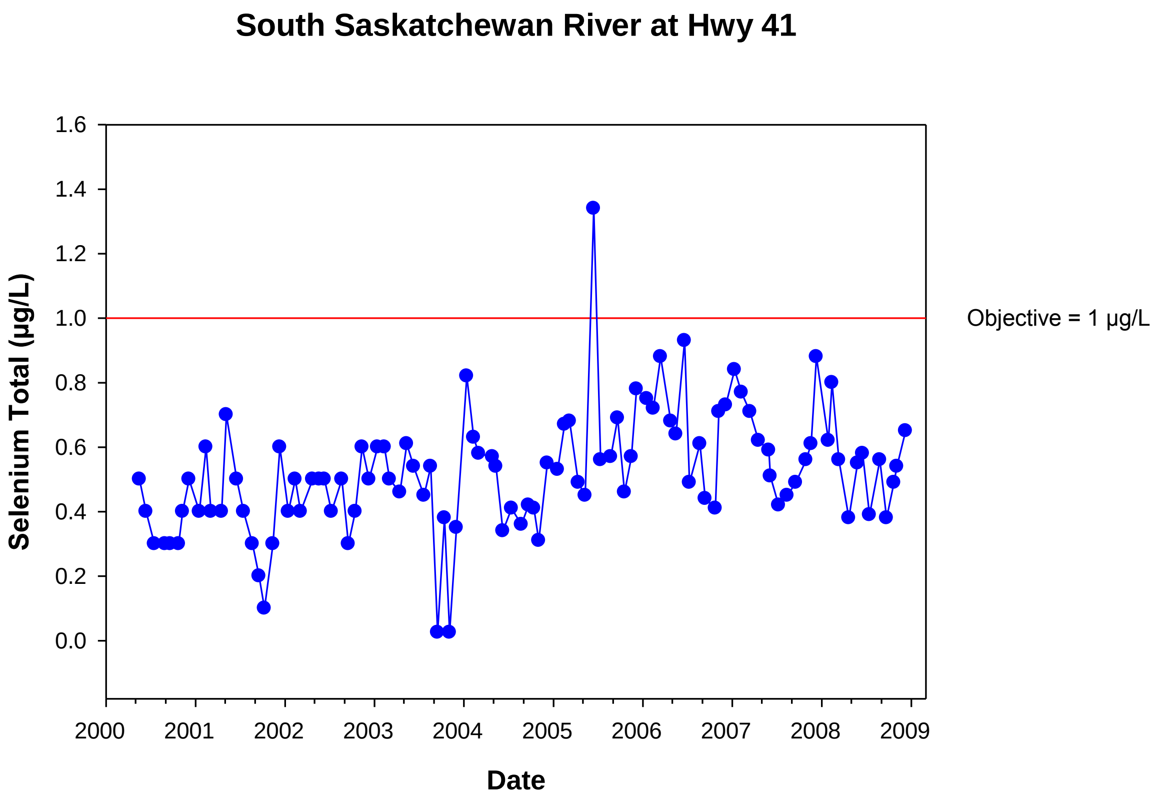

Figure 5-f19: South Saskatchewan River Selenium Total

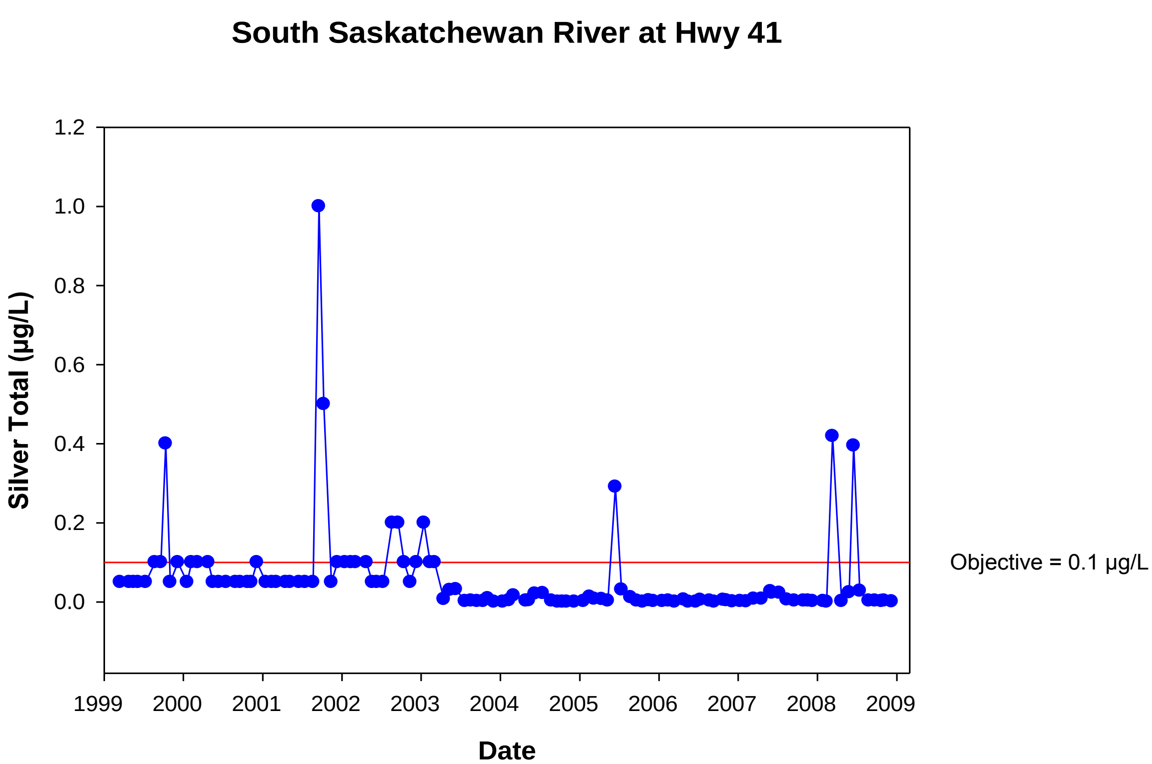

Figure 5-f20: South Saskatchewan River Silver Total

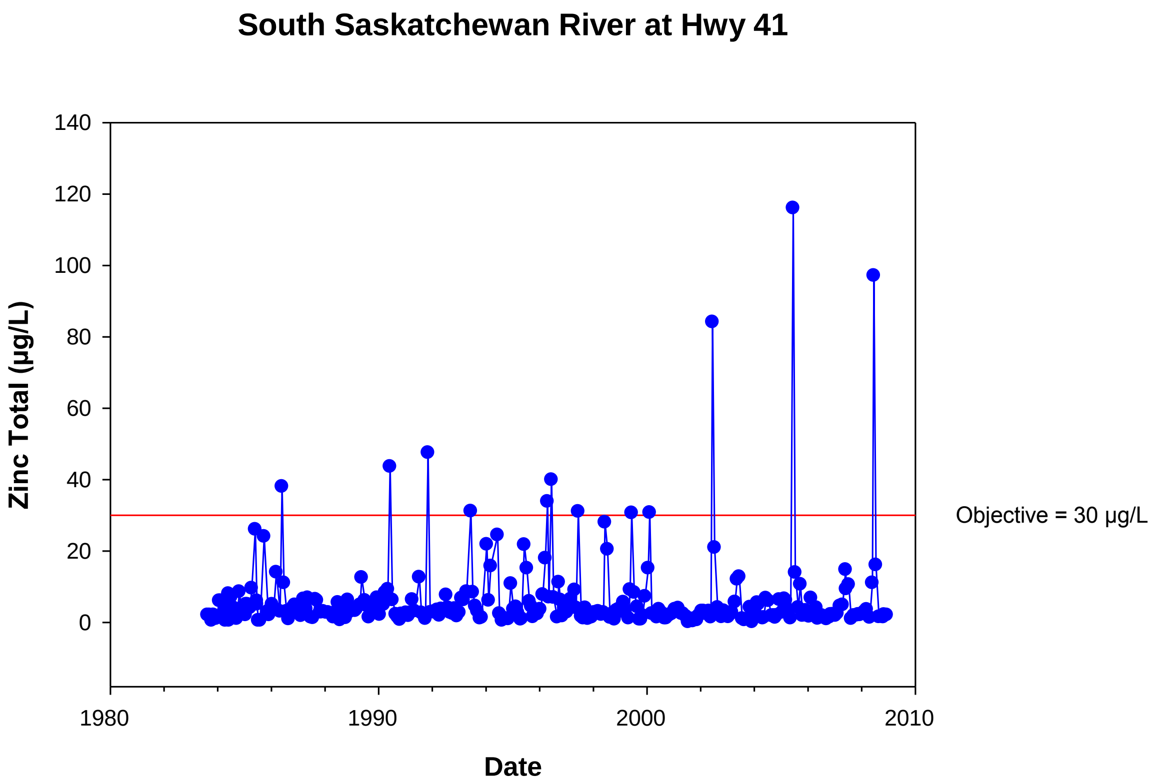

Figure 5-f21: South Saskatchewan River Zinc Total

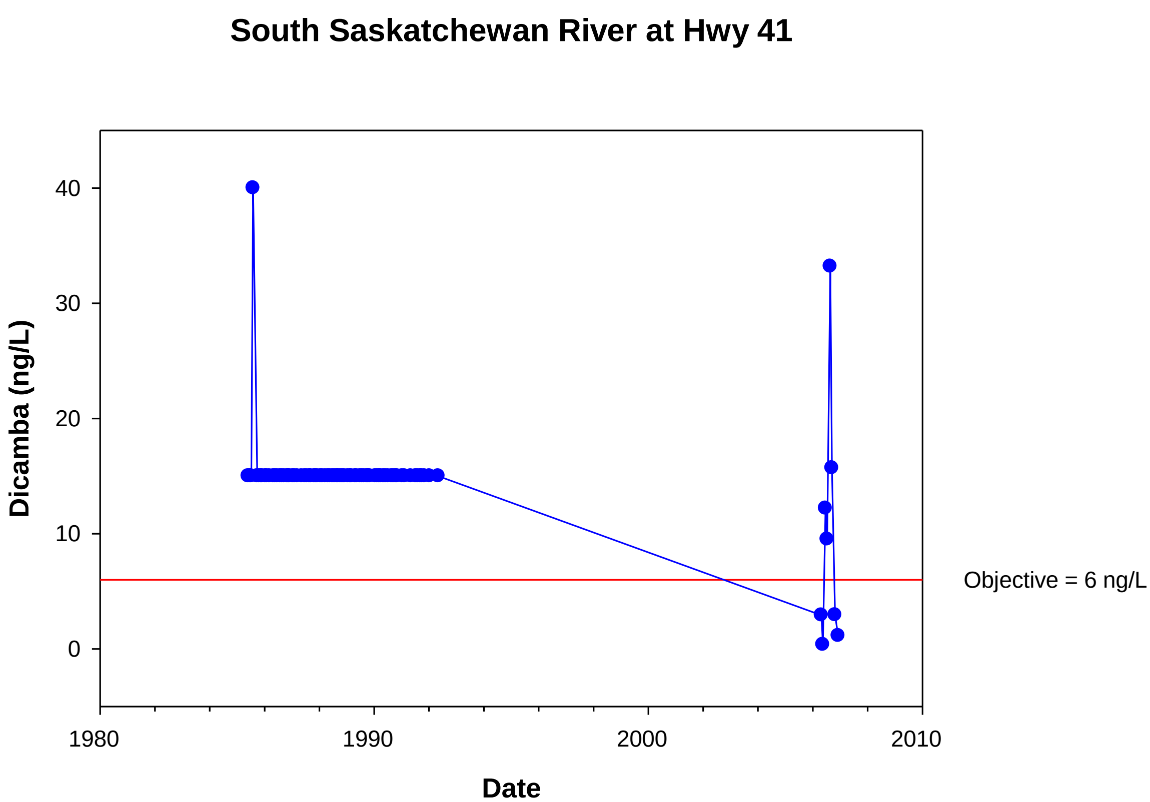

Figure 5-f22: South Saskatchewan River Dicamba

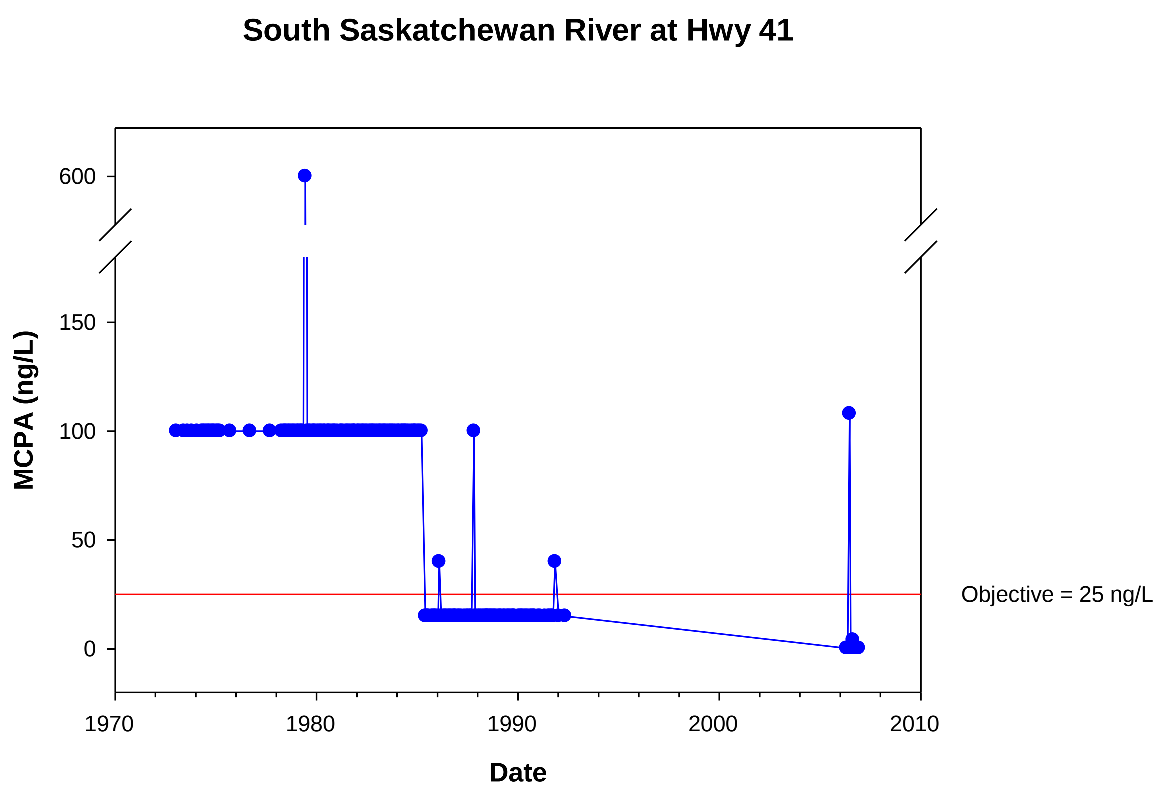

Figure 5-f23: South Saskatchewan River MCPA

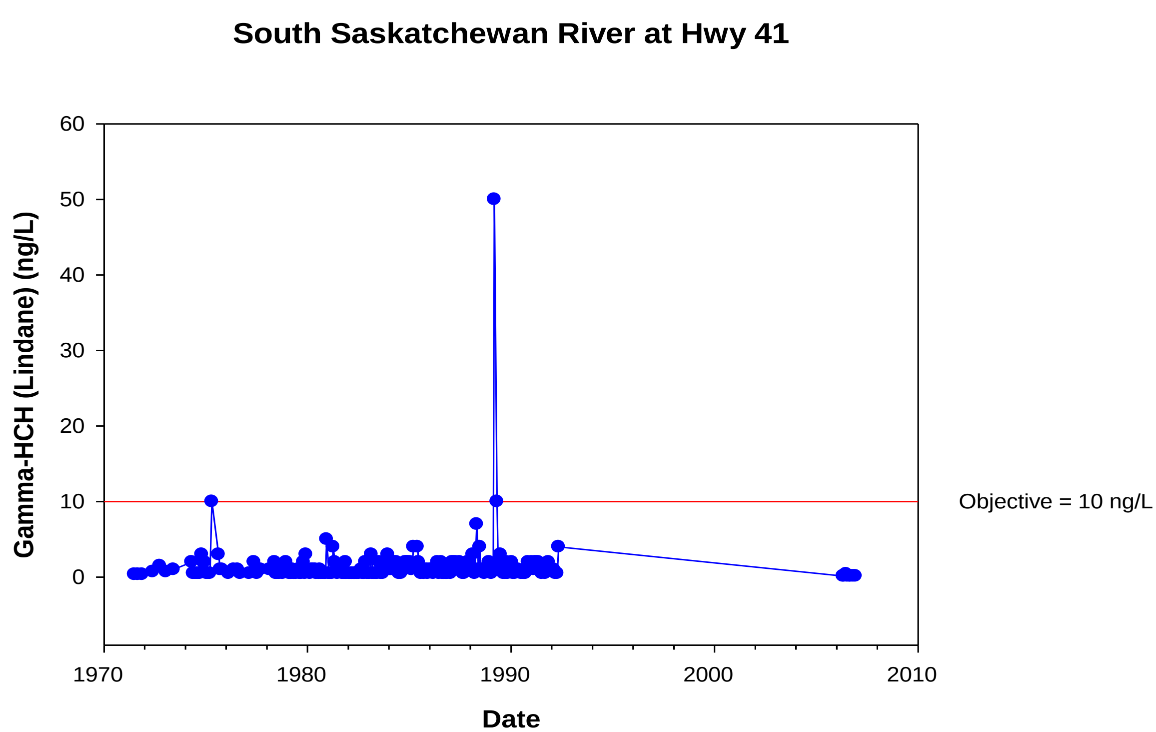

Figure 5-f24: South Saskatchewan River Lindane

Appendix 5-g: Assiniboine River

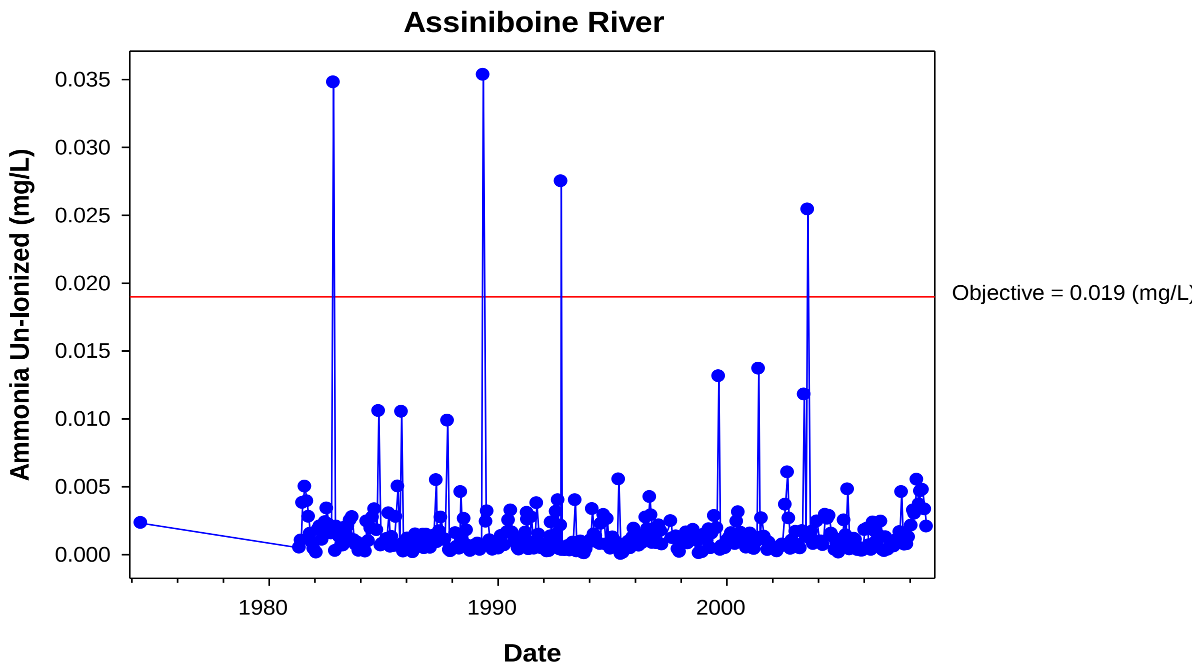

Figure 5-g1: Assiniboine River Ammonia Un-Ionized

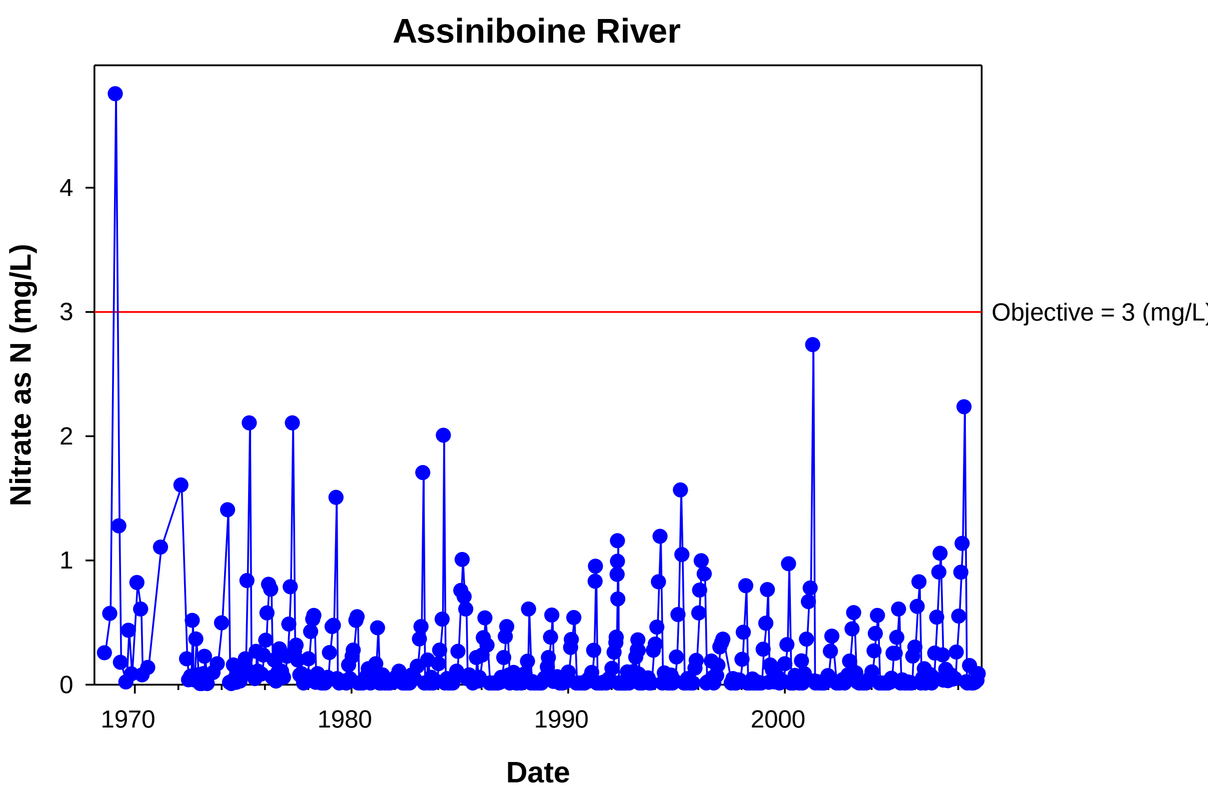

Figure 5-g2: Assiniboine River Nitrate as N

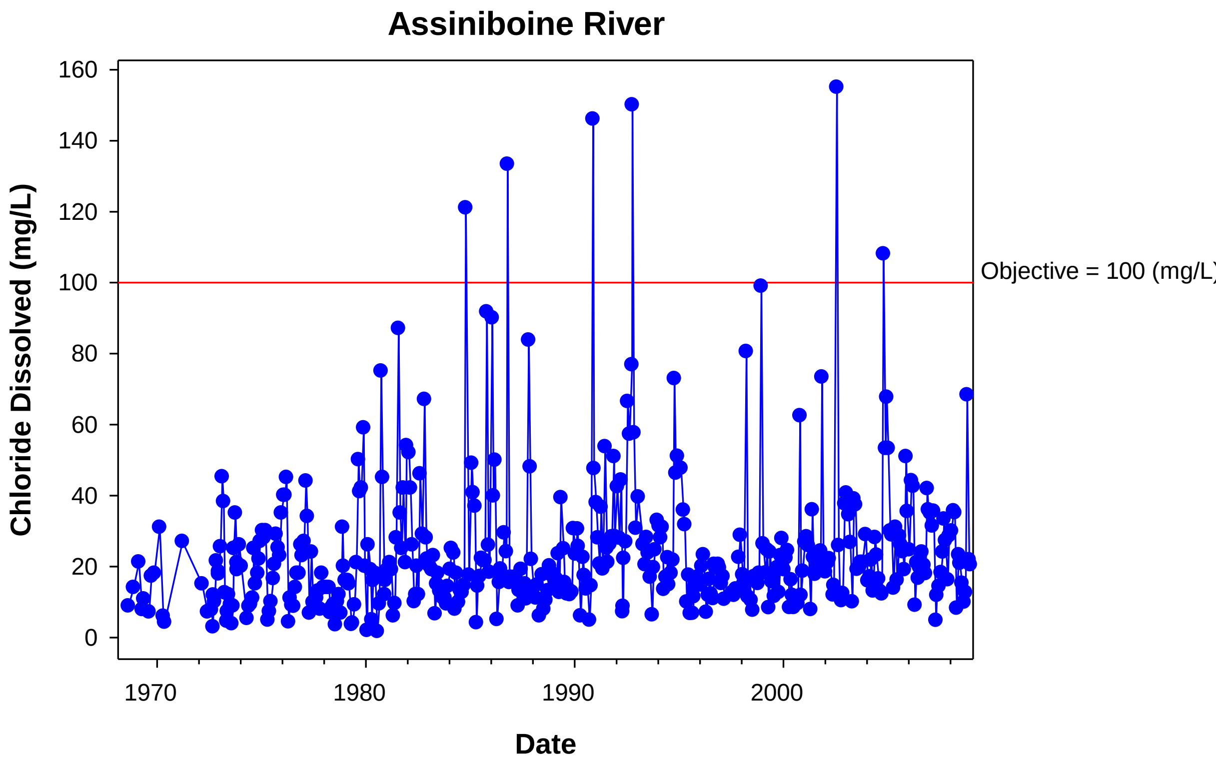

Figure 5-g3: Assiniboine River Chloride Dissolved

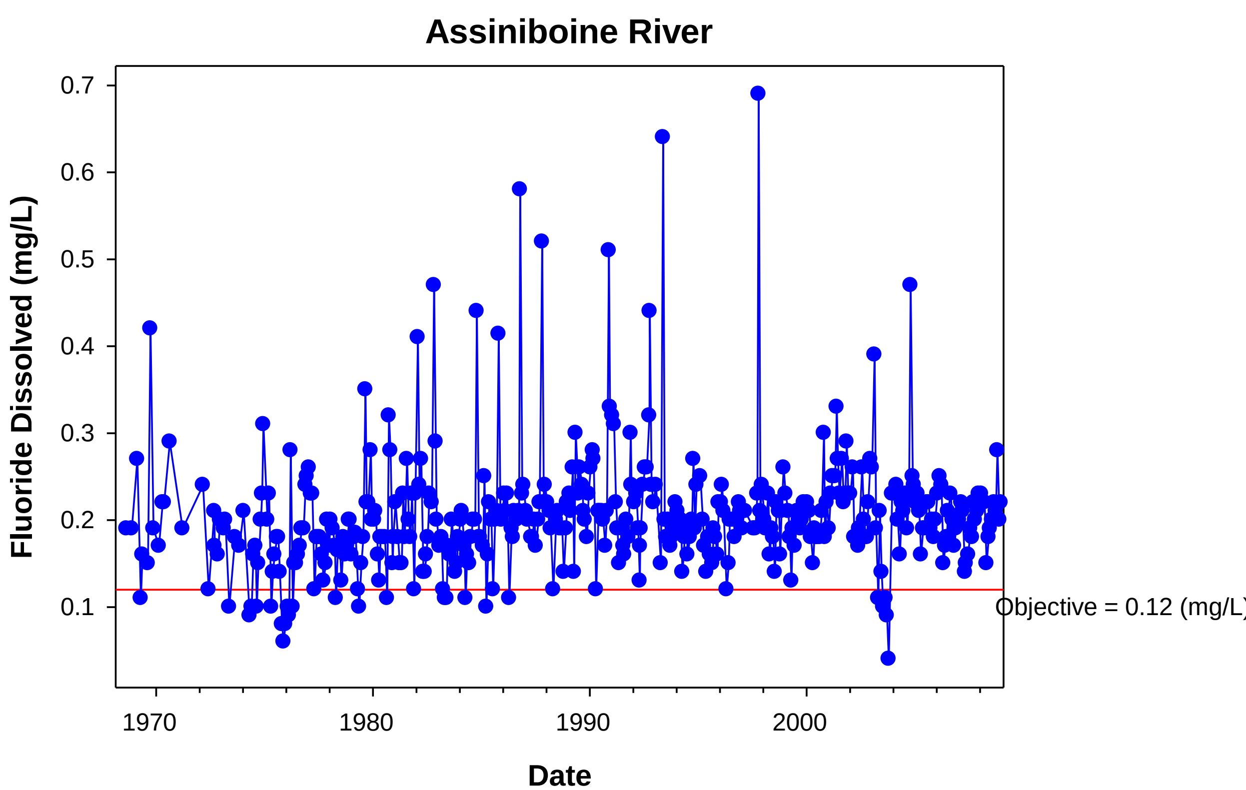

Figure 5-g4: Assiniboine River Fluoride Dissolved

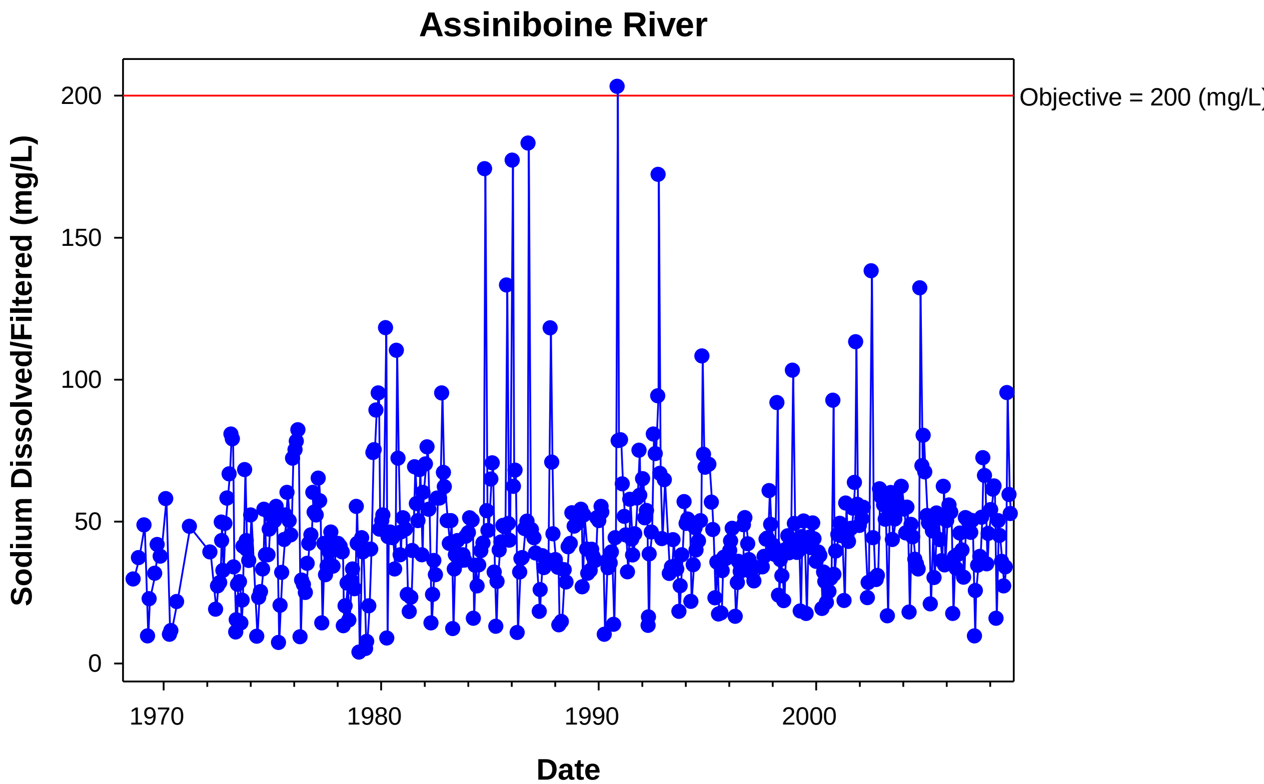

Figure 5-g5: Assiniboine River Sodium Dissolved/Filtered

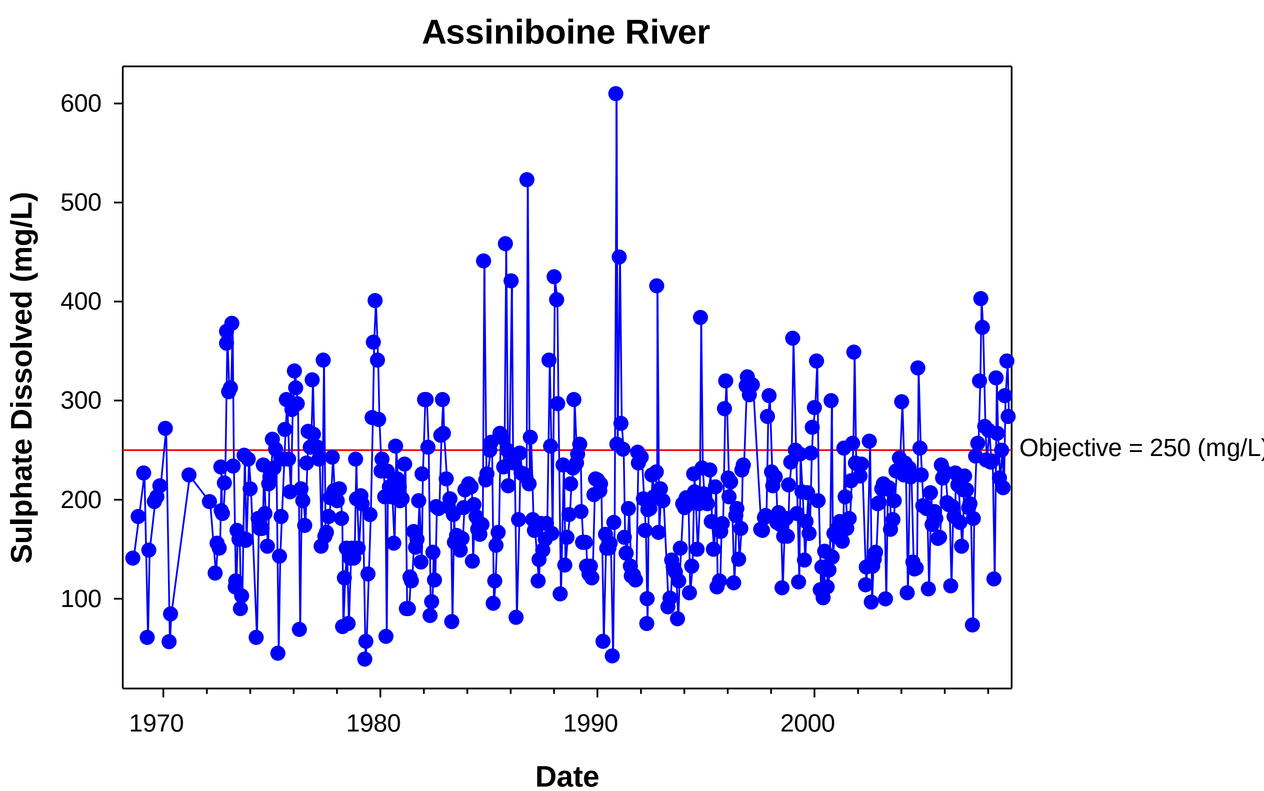

Figure 5-g6: Assiniboine River Sulphate Dissolved

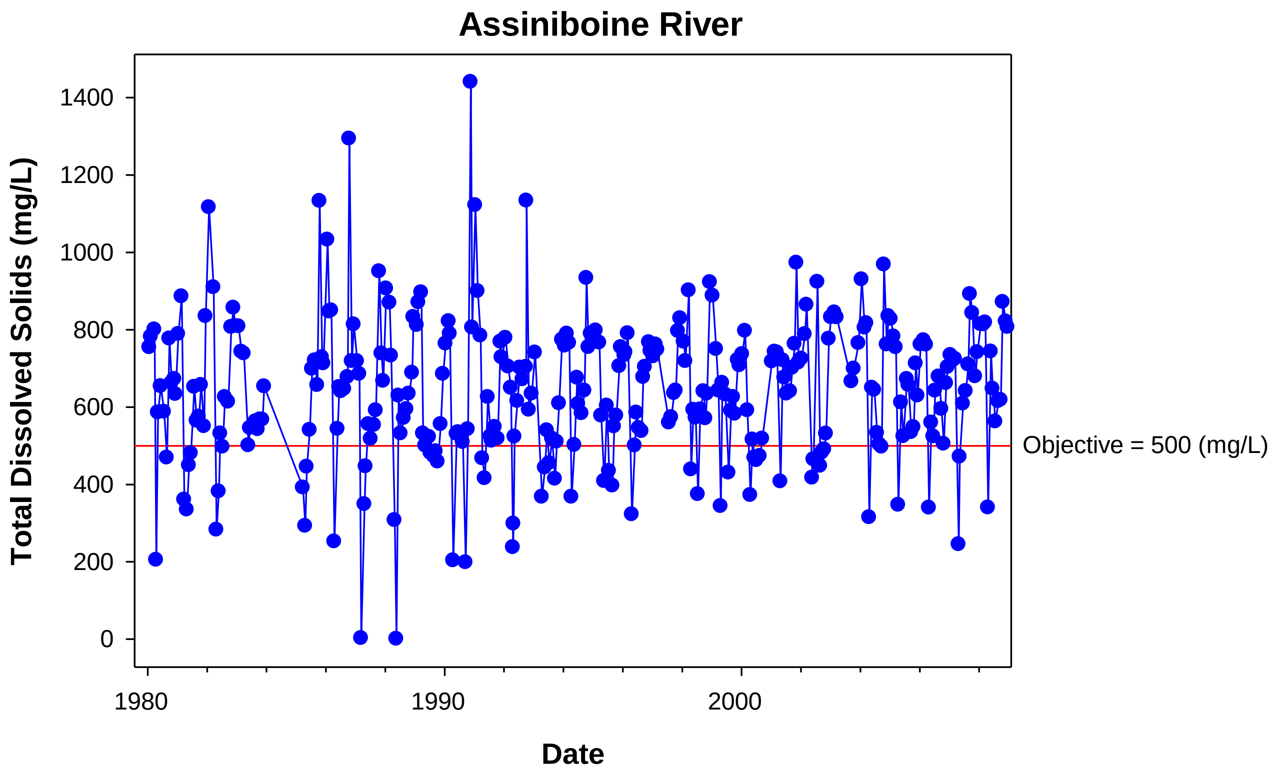

Figure 5-g7: Assiniboine River Total Dissolved Solids

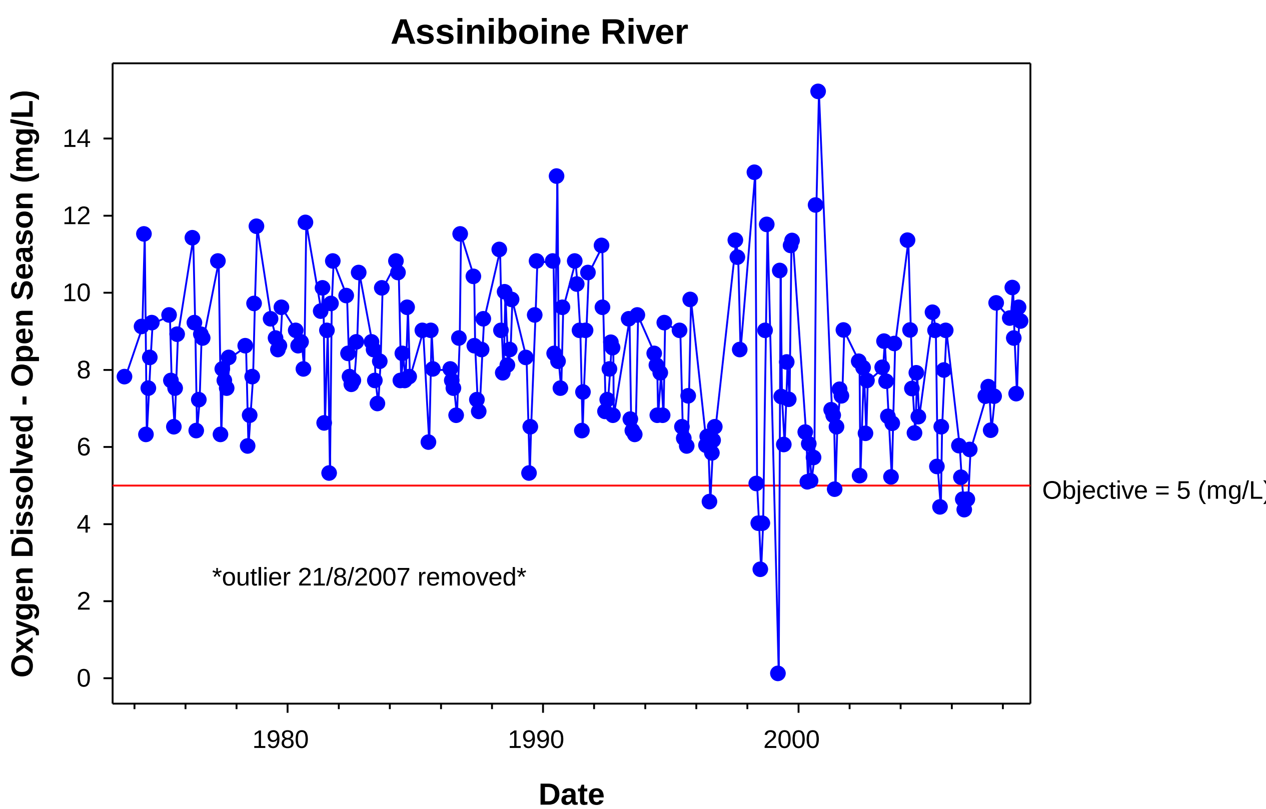

Figure 5-g8: Assiniboine River Oxygen Dissolved (Open Season)

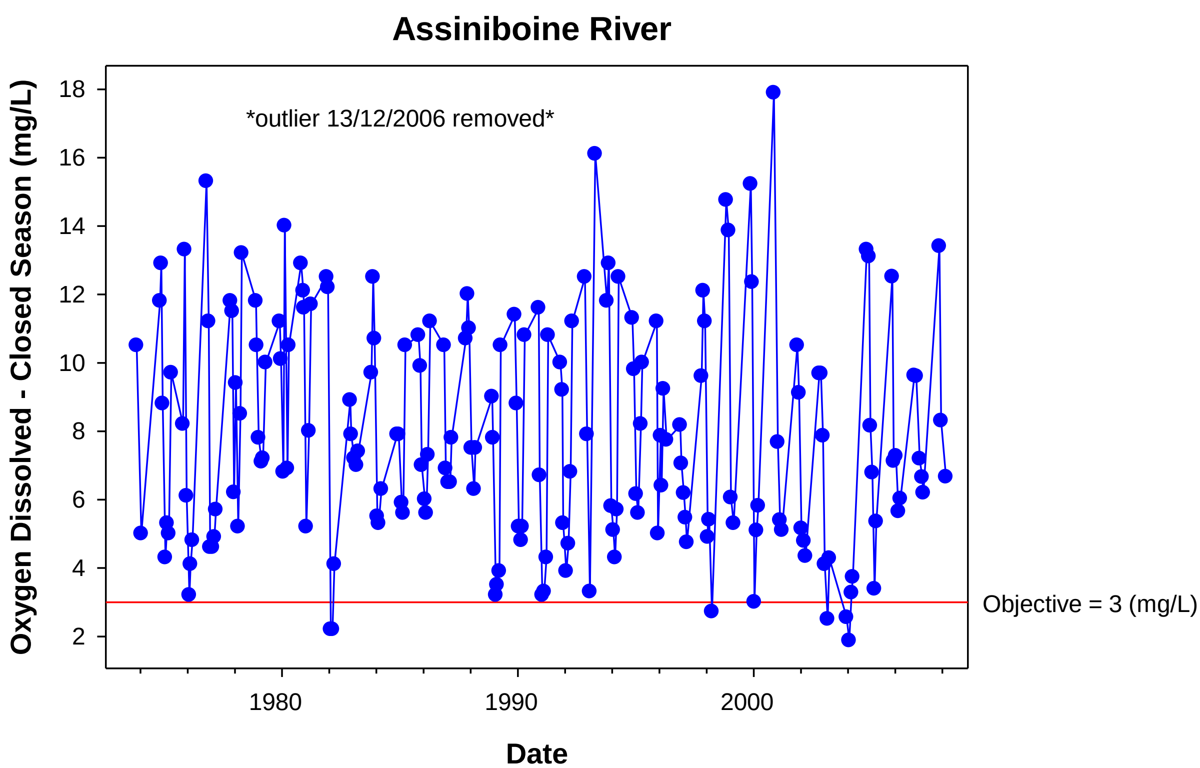

Figure 5-g9: Assiniboine River Oxygen Dissolved (Closed Season)

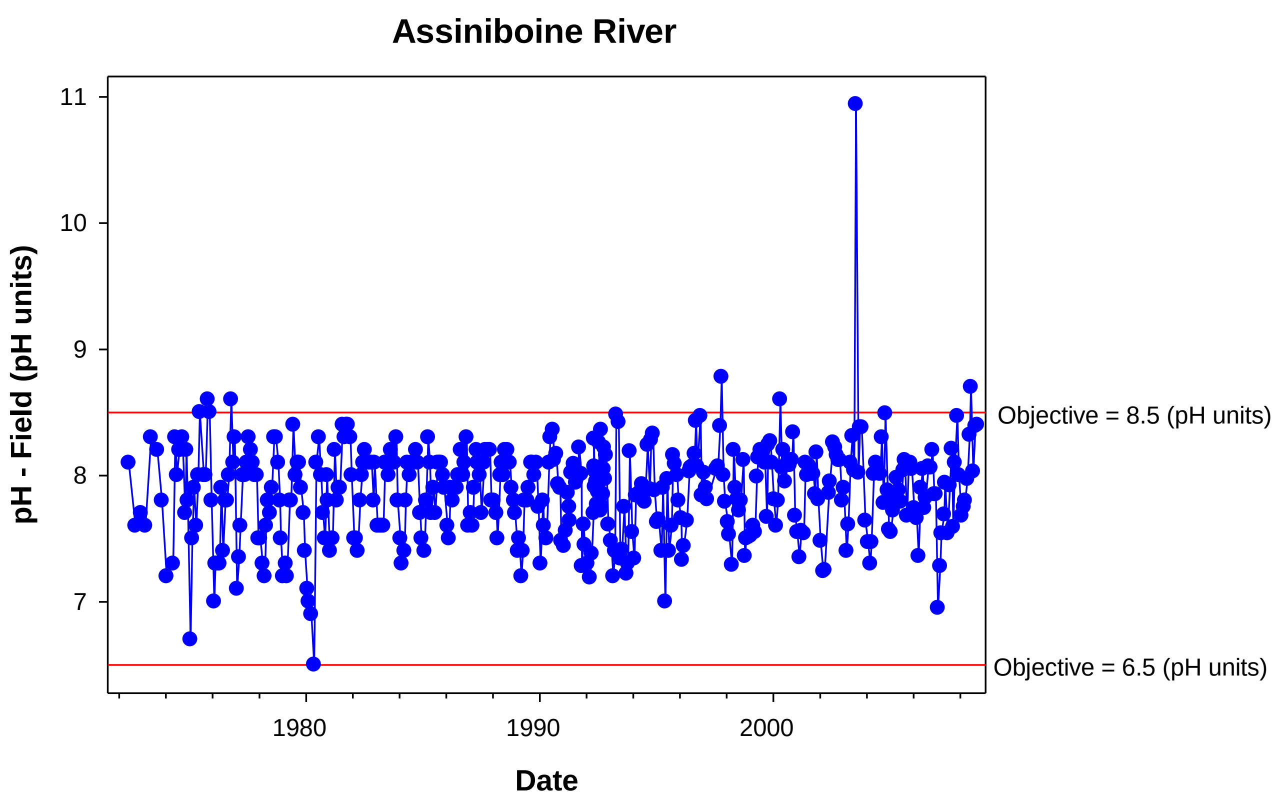

Figure 5-g10: Assiniboine River pH Field

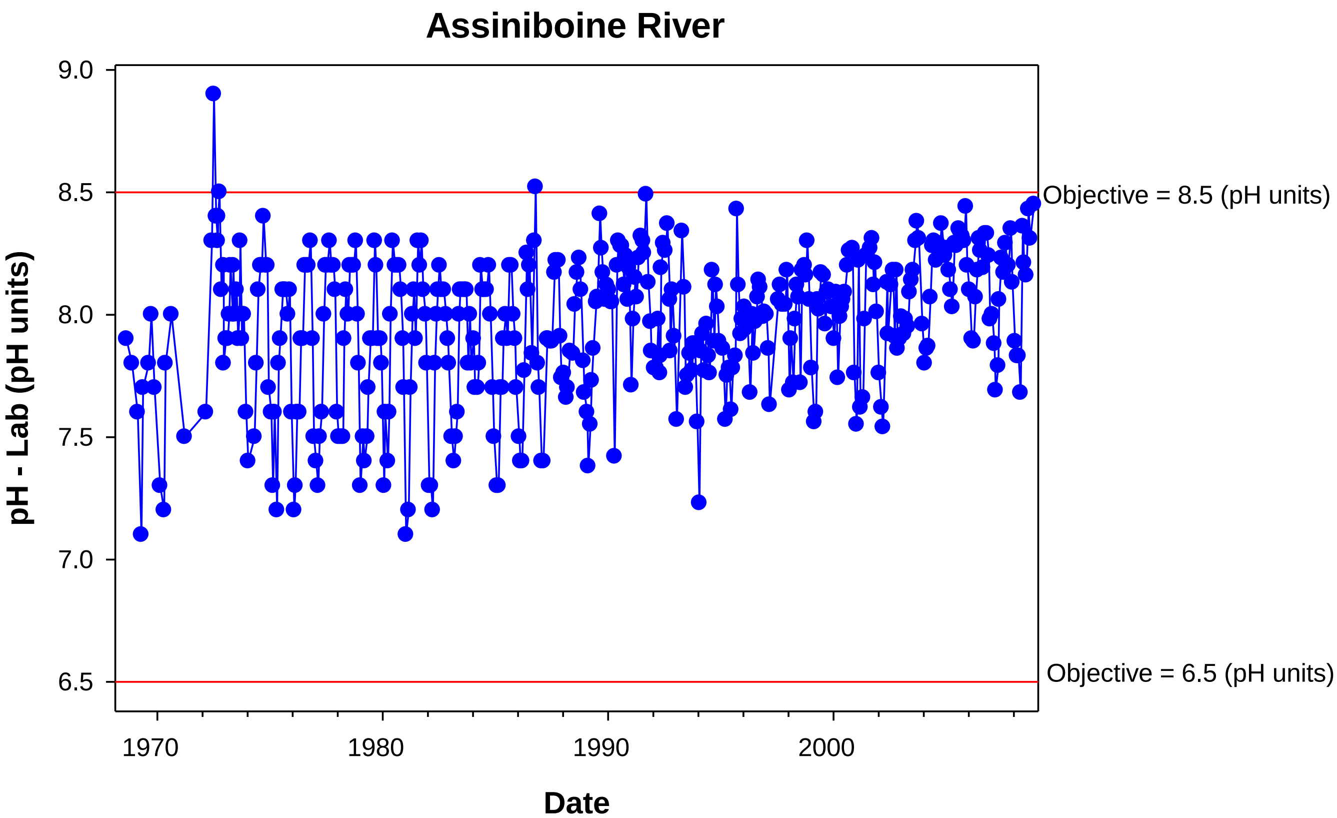

Figure 5-g11: Assiniboine River pH Lab

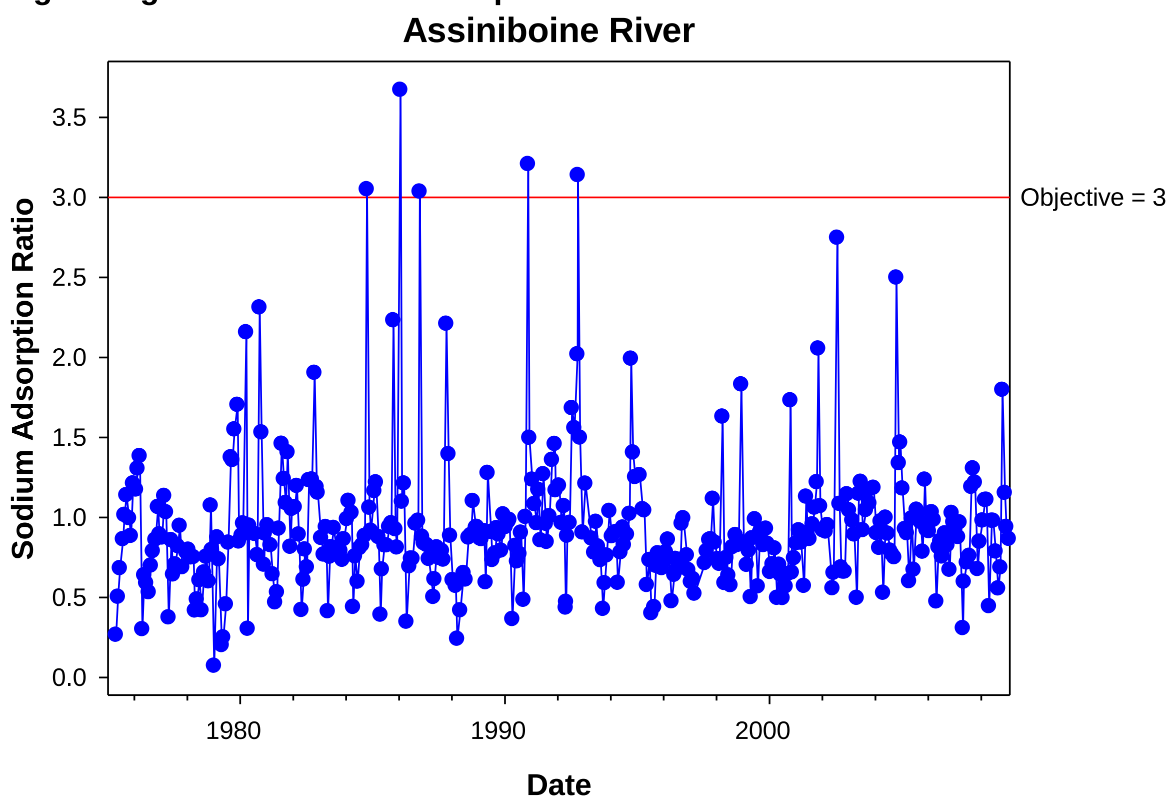

Figure 5-g12: Assiniboine River Sodium Adsorption Ratio

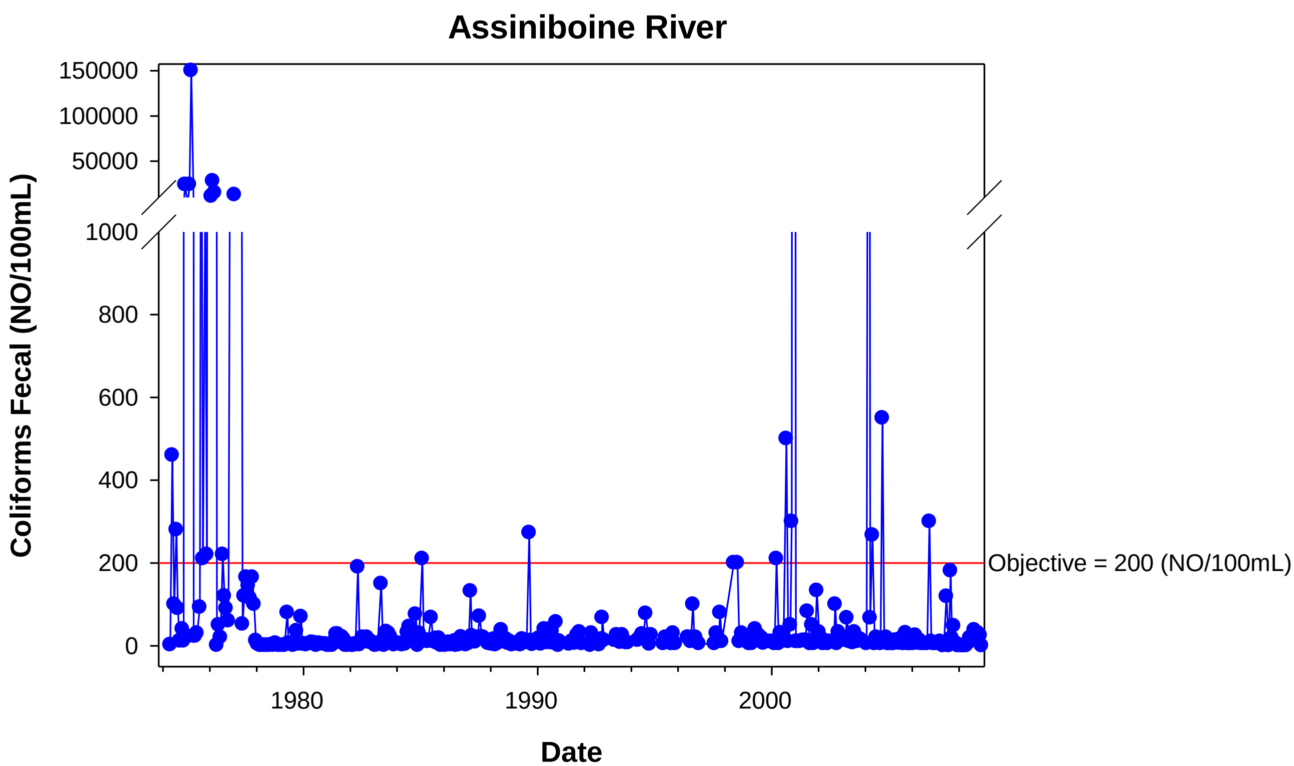

Figure 5-g13: Assiniboine River Coliforms Fecal

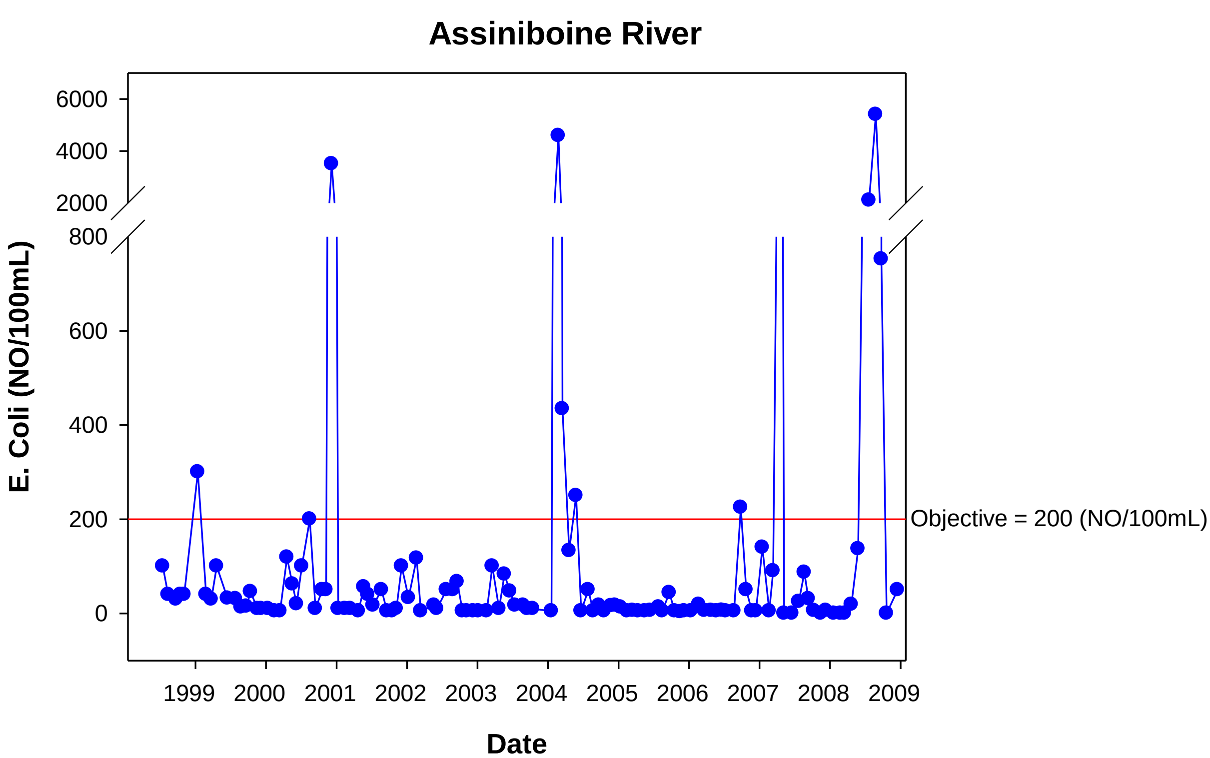

Figure 5-g14: Assiniboine River E. Coli

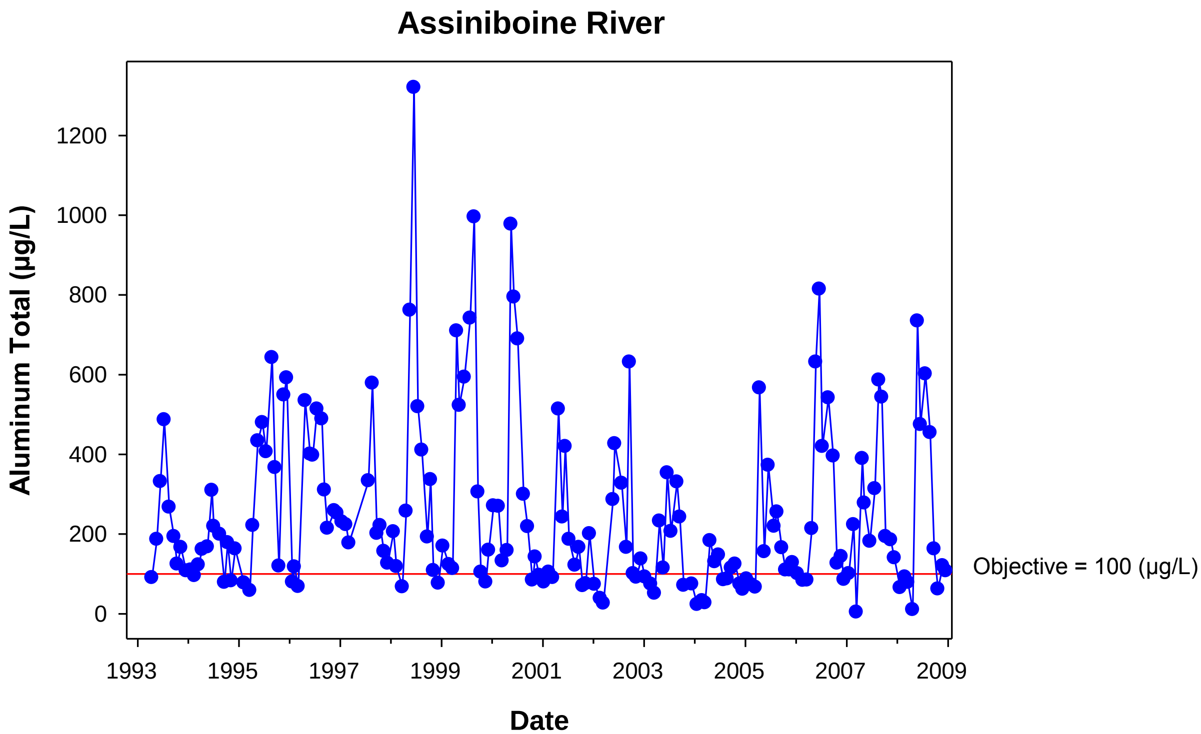

Figure 5-g15: Assiniboine River Aluminum Total

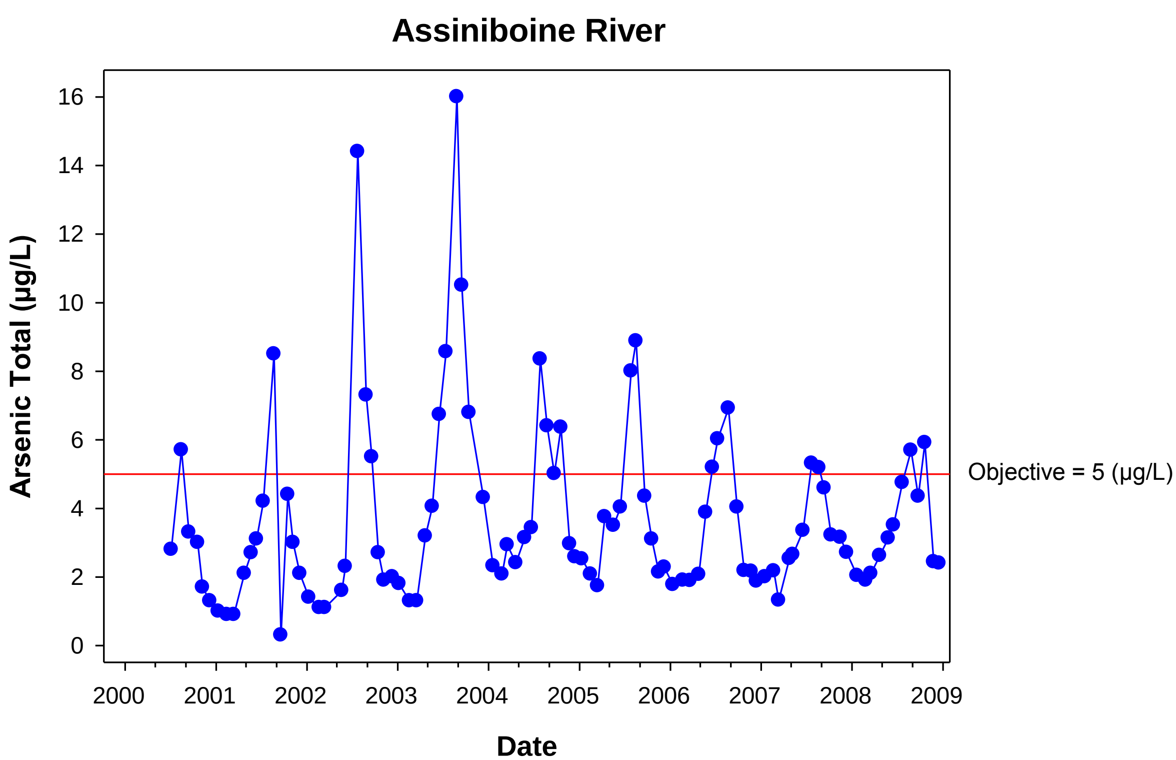

Figure 5-g16: Assiniboine River Arsenic Total

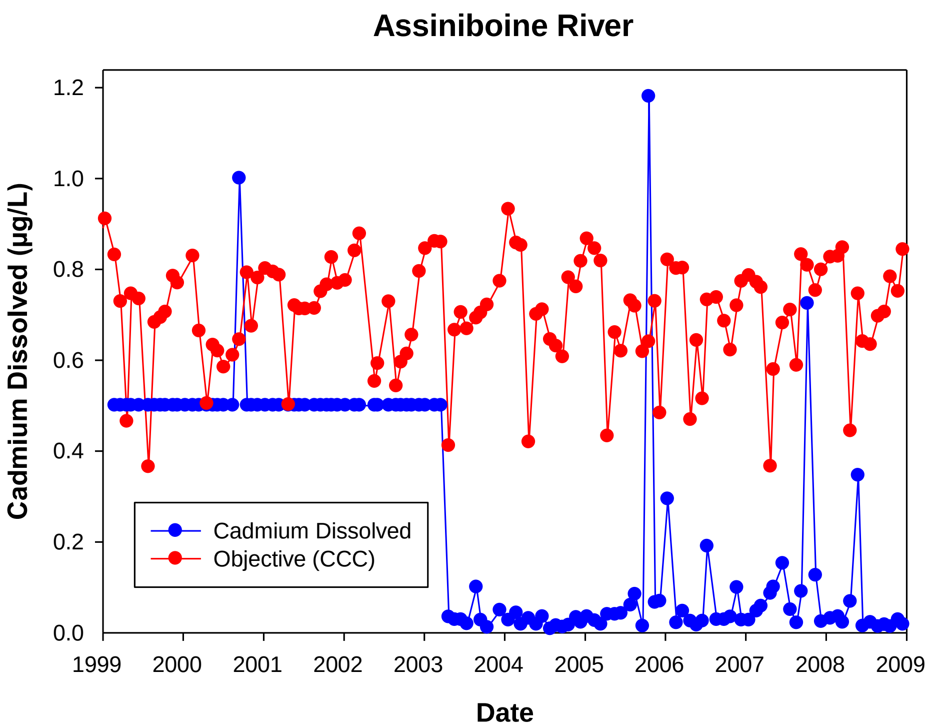

Figure 5-g17: Assiniboine River Cadmium Dissolved

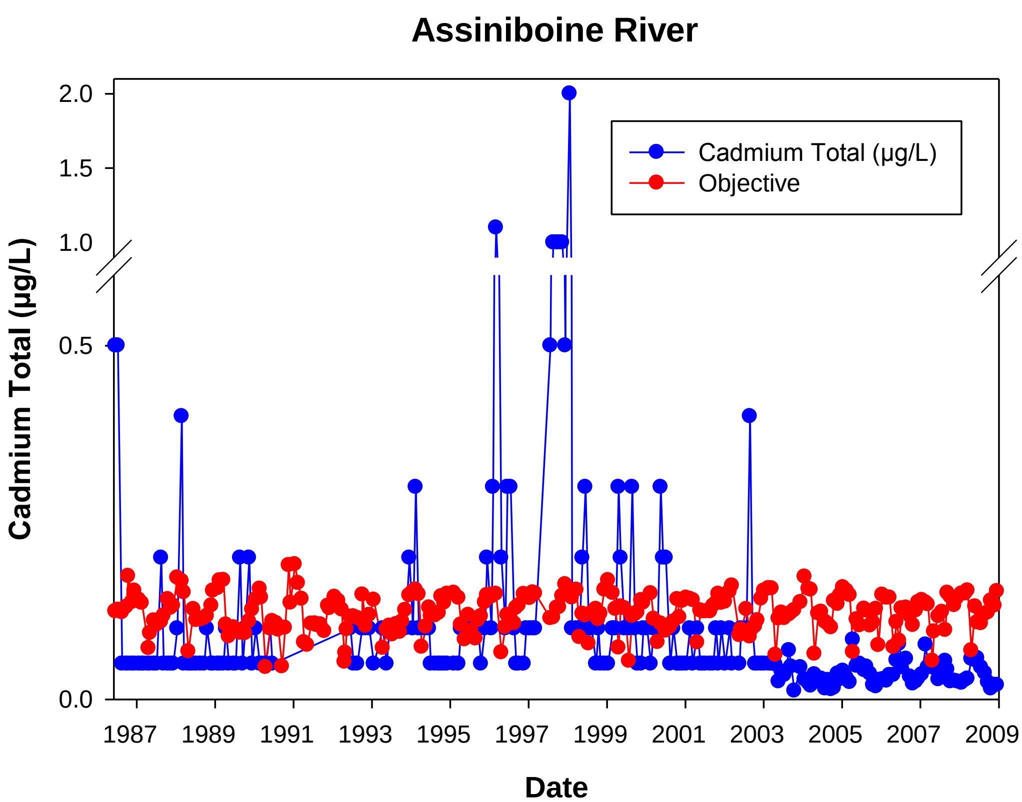

Figure 5-g18: Assiniboine River Cadmium Total

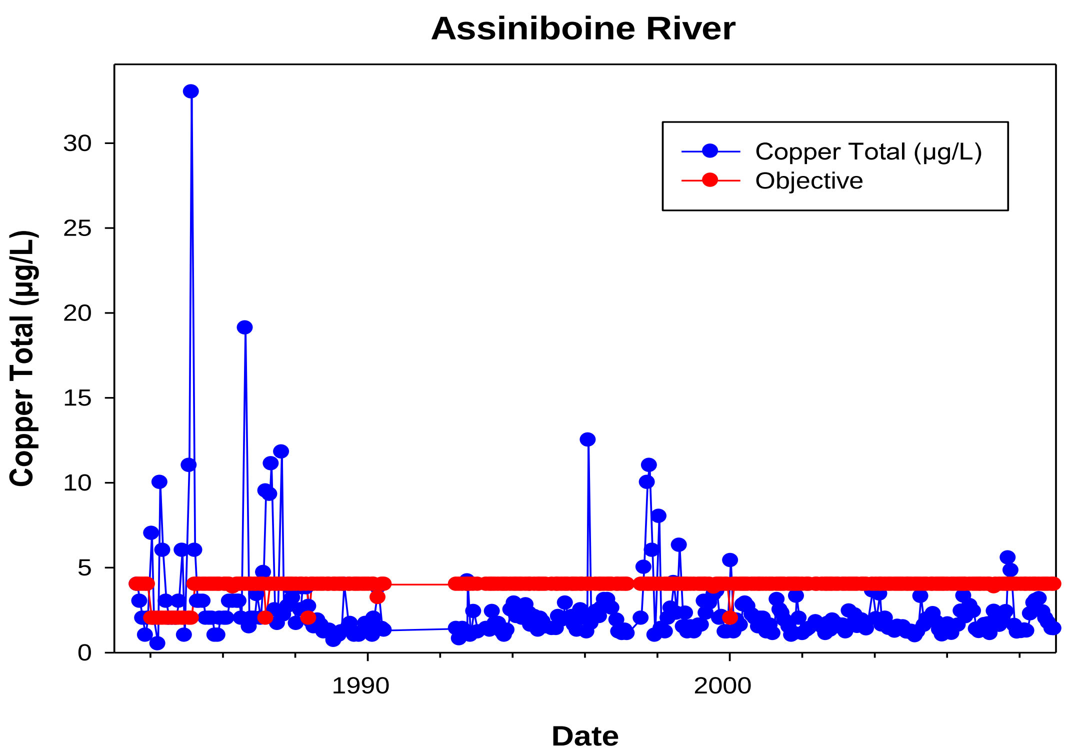

Figure 5-g19: Assiniboine River Copper Total

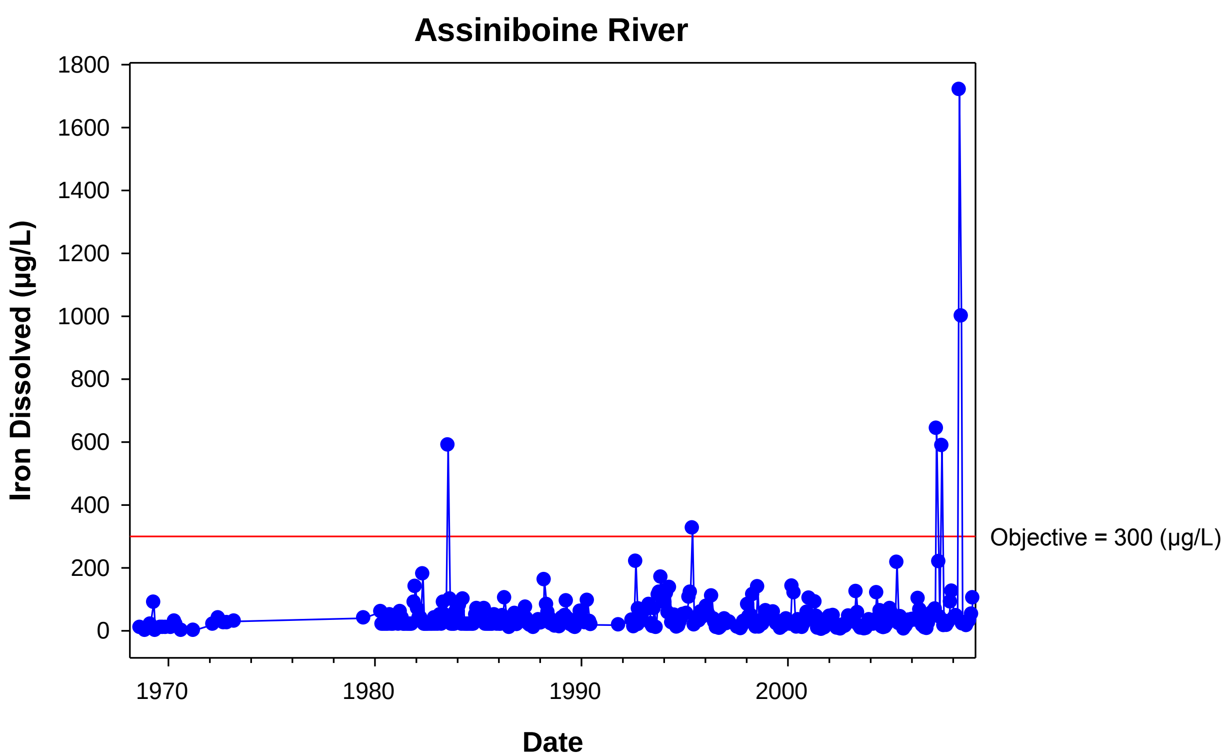

Figure 5-g20: Assiniboine River Iron Dissolved

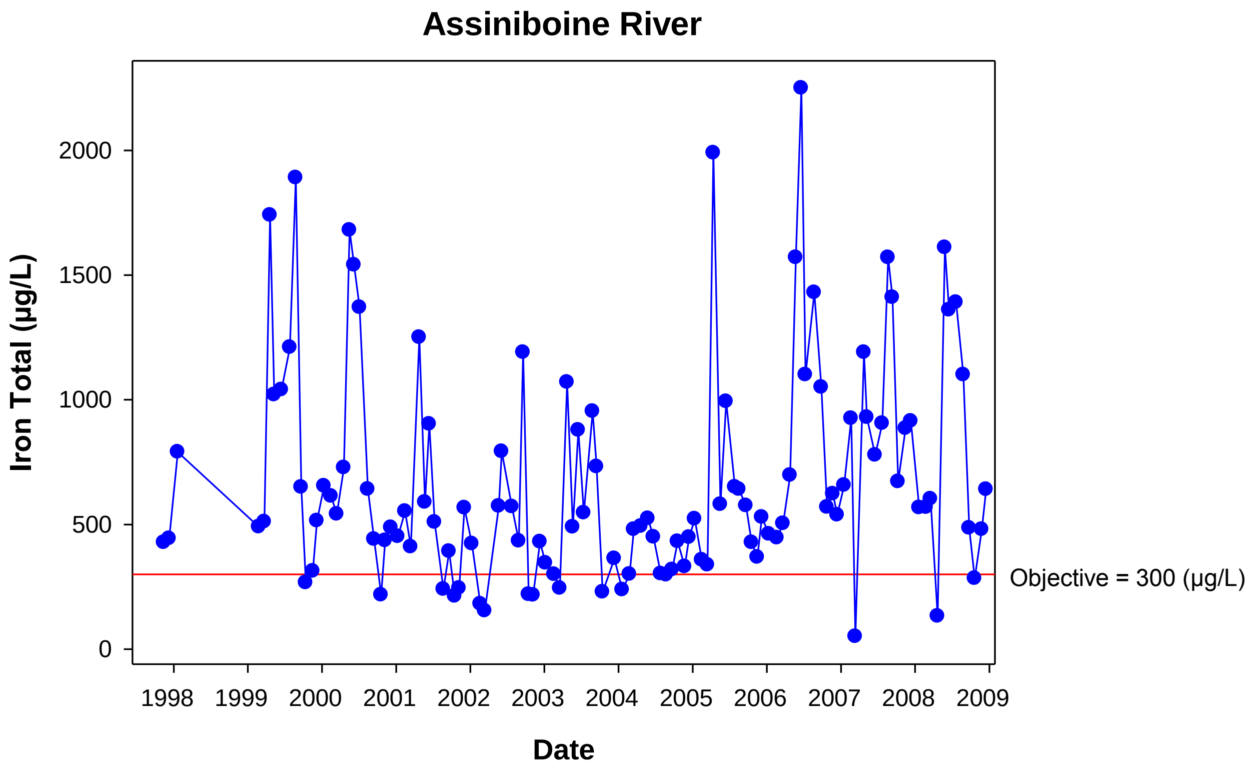

Figure 5-g21: Assiniboine River Iron Total

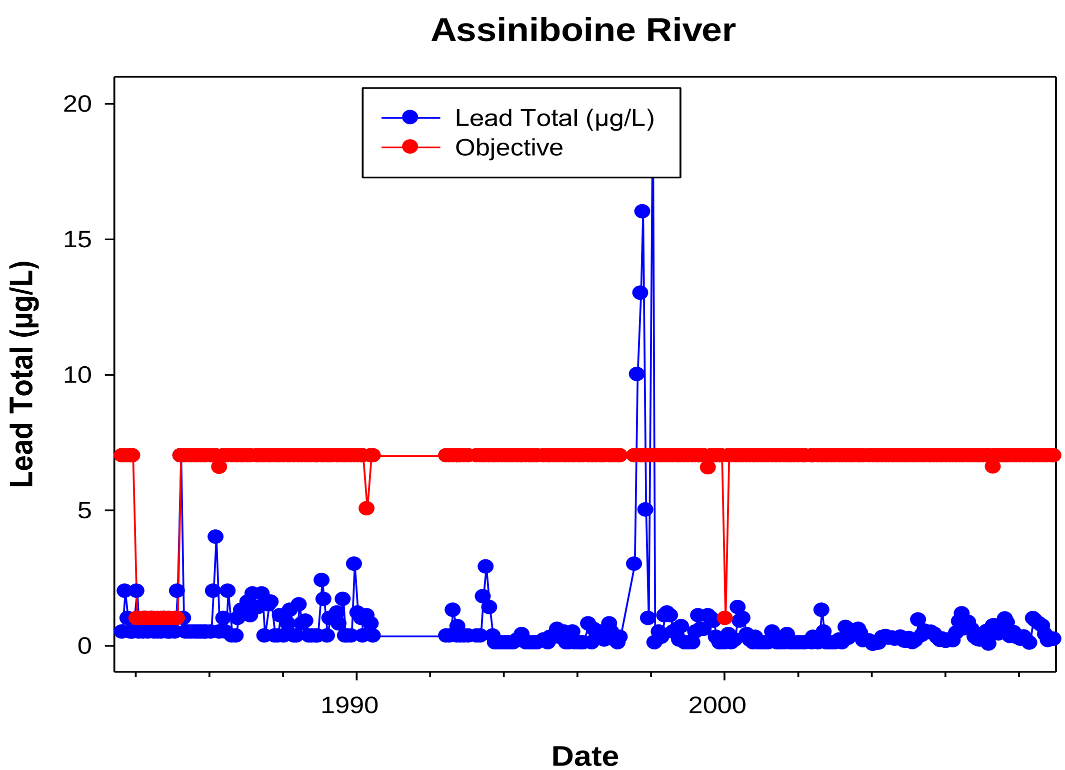

Figure 5-g22: Assiniboine River Lead Total

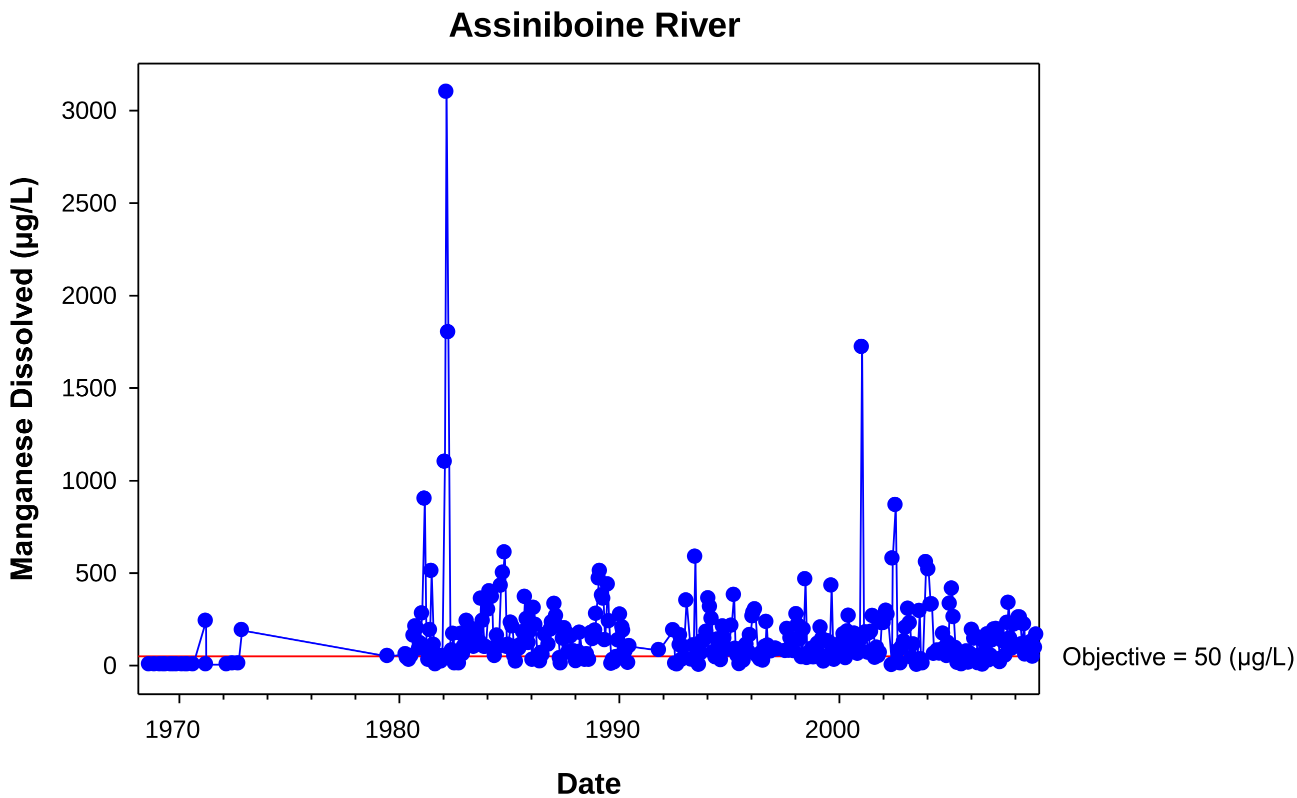

Figure 5-g23: Assiniboine River Manganese Dissolved

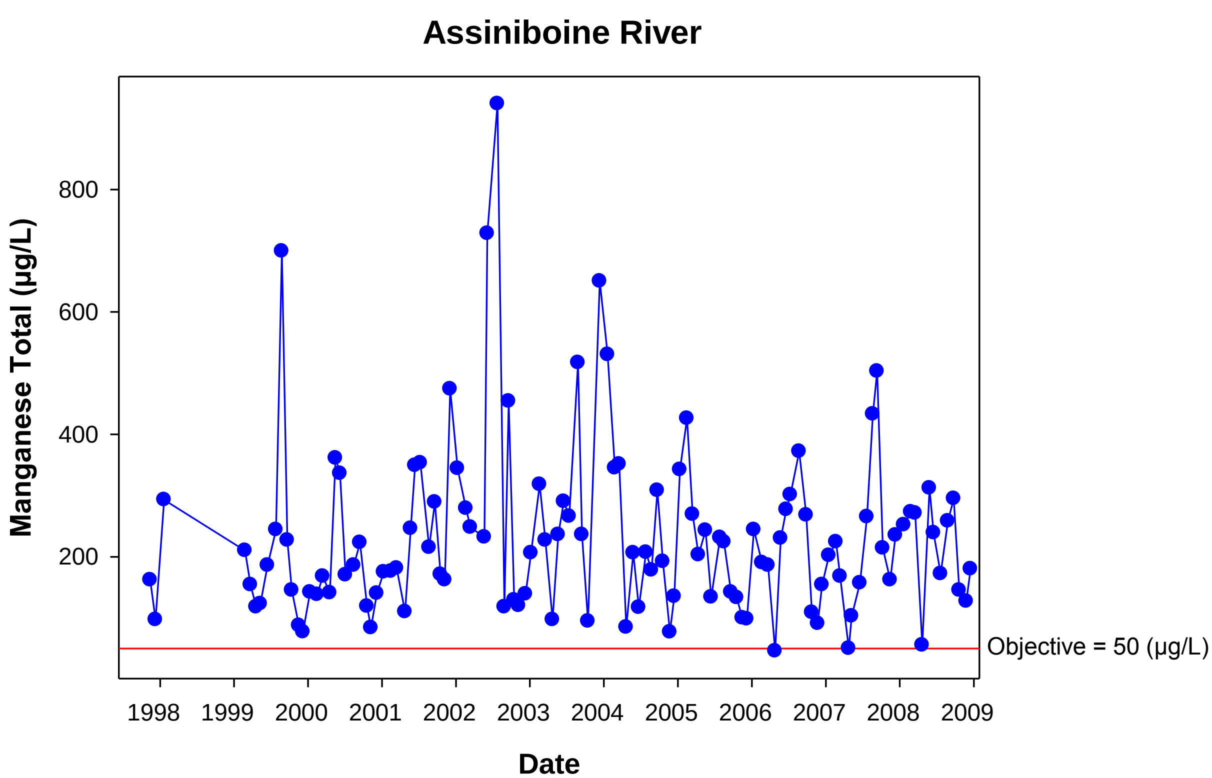

Figure 5-g24: Assiniboine River Manganese Total

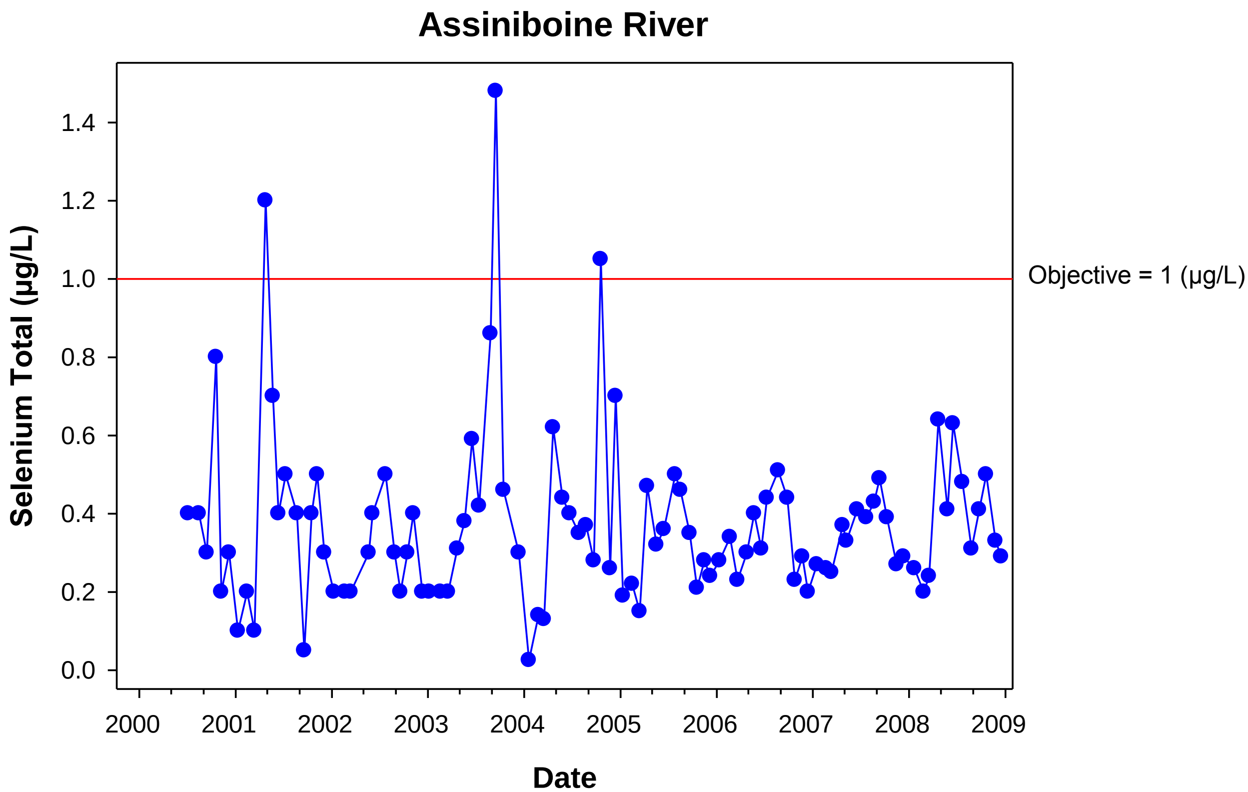

Figure 5-g25: Assiniboine River Selenium Total

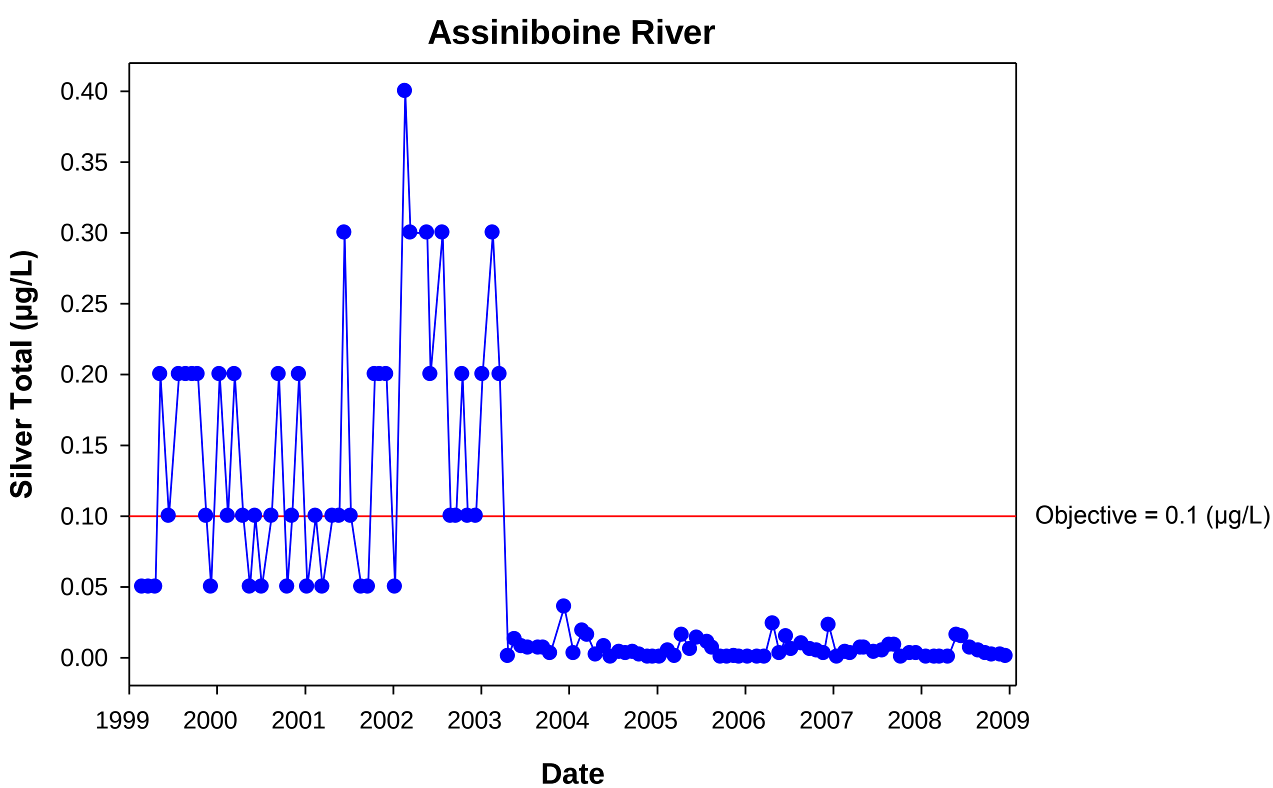

Figure 5-g26: Assiniboine River Silver Total

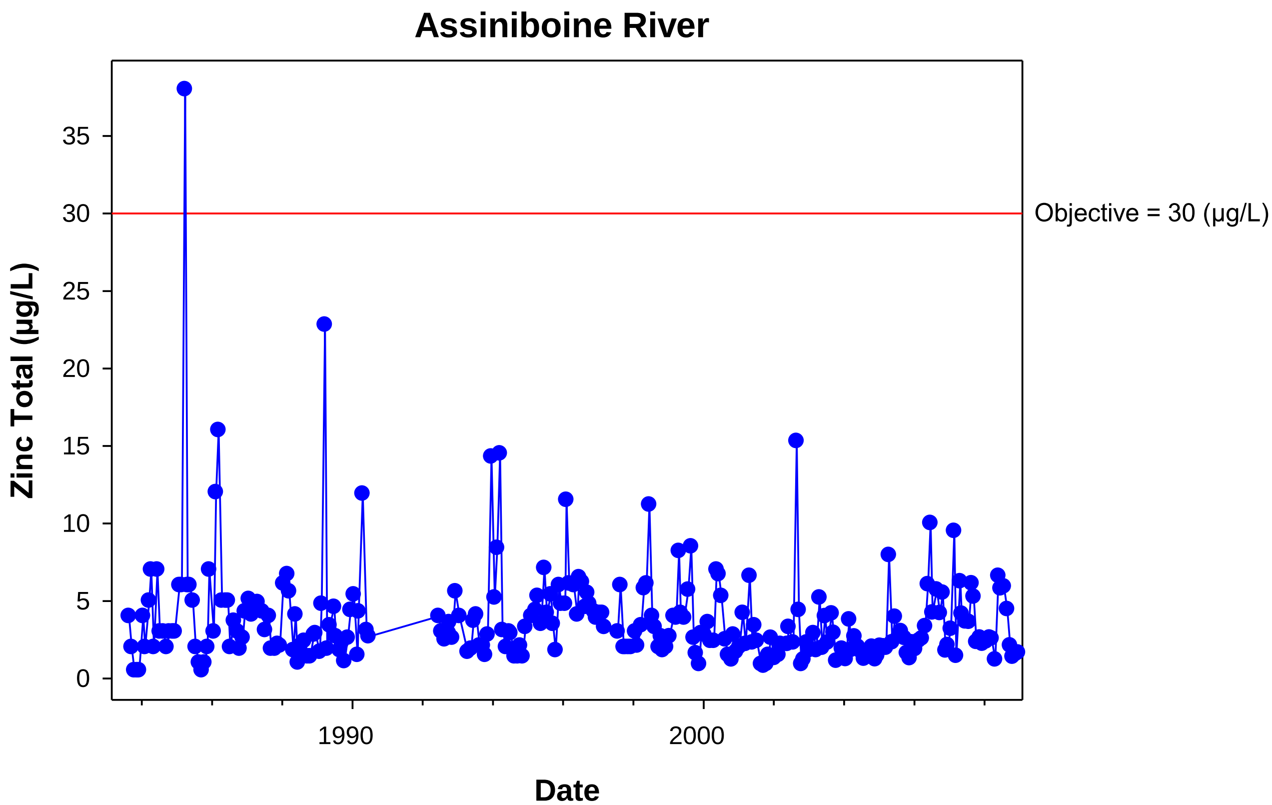

Figure 5-g27: Assiniboine River Zinc Total

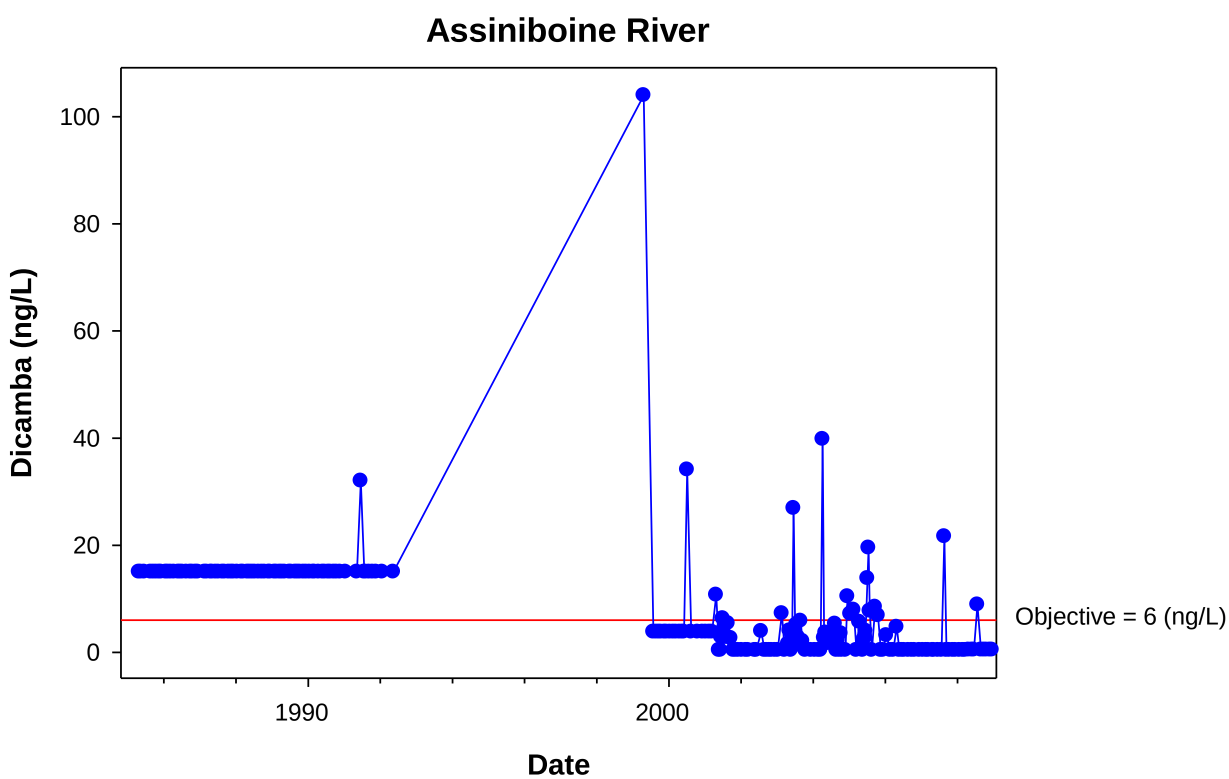

Figure 5-g28: Assiniboine River Dicamba

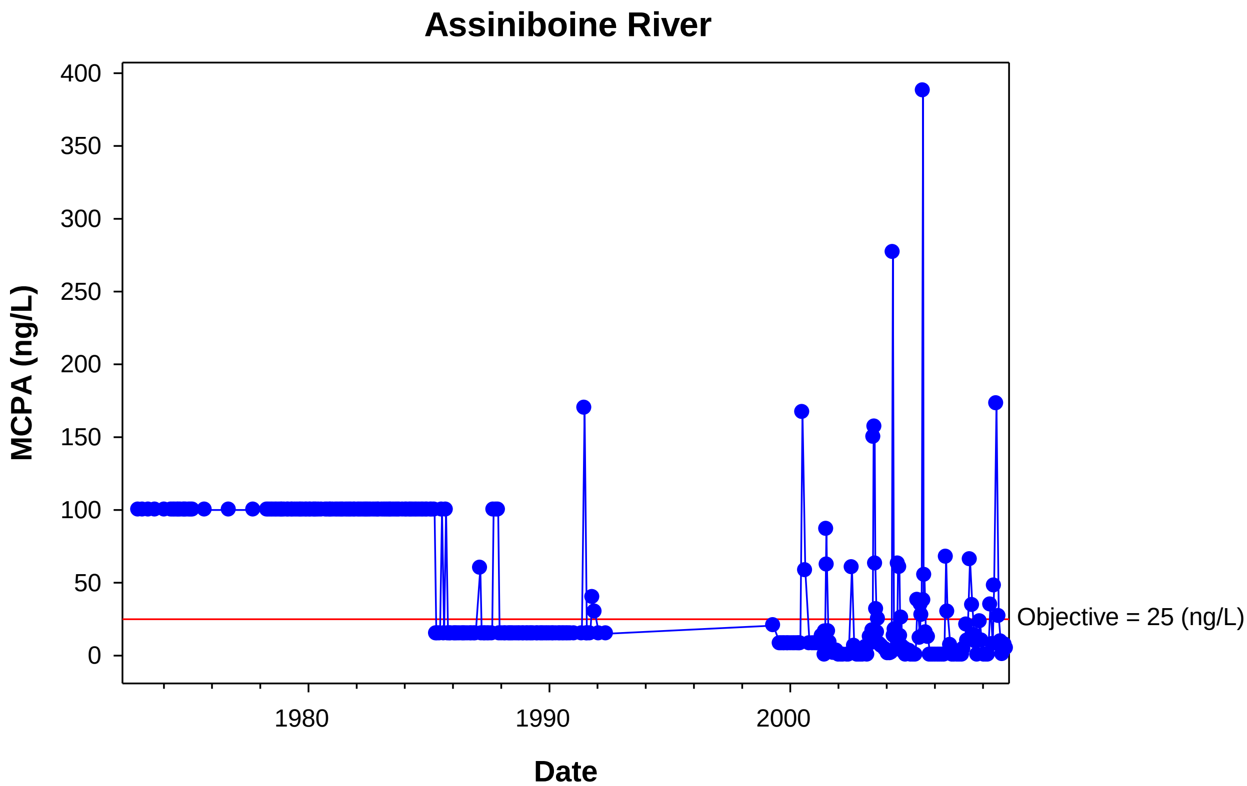

Figure 5-g29: Assiniboine River MCPA

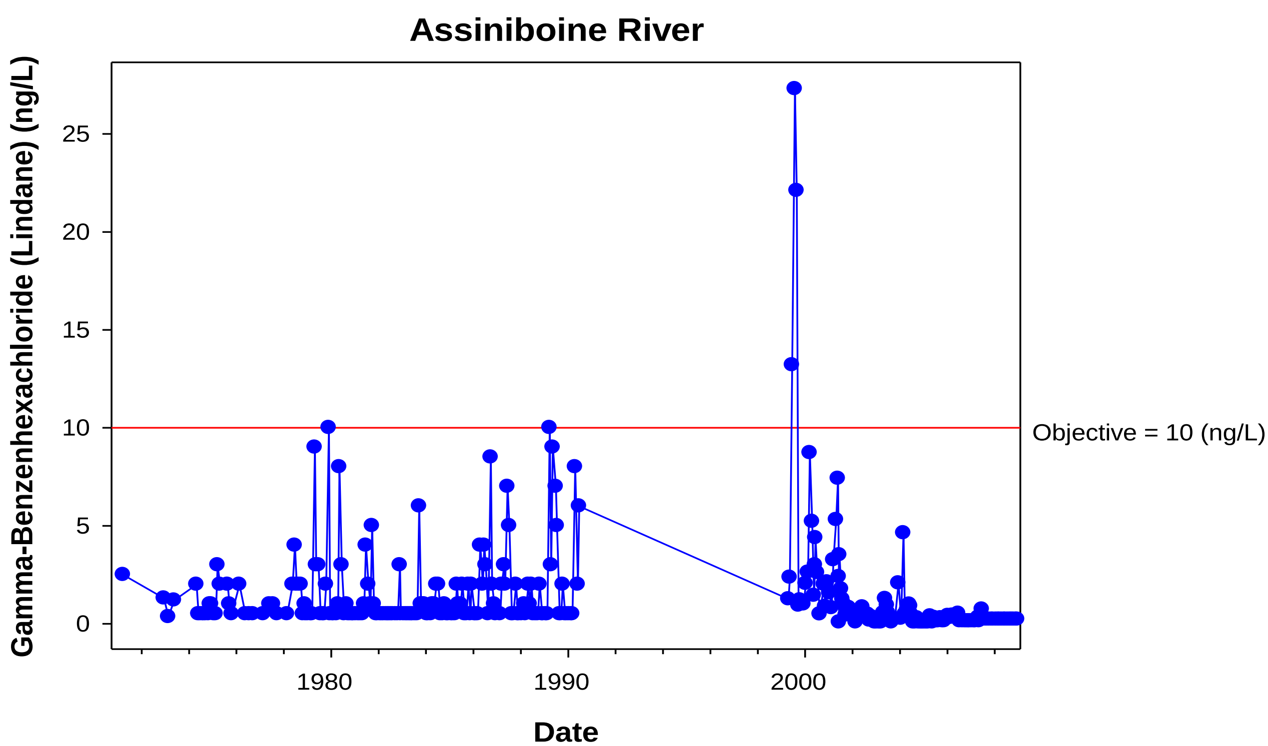

Figure 5-g30: Assiniboine River Lindane

Appendix 5-h: Carrot River

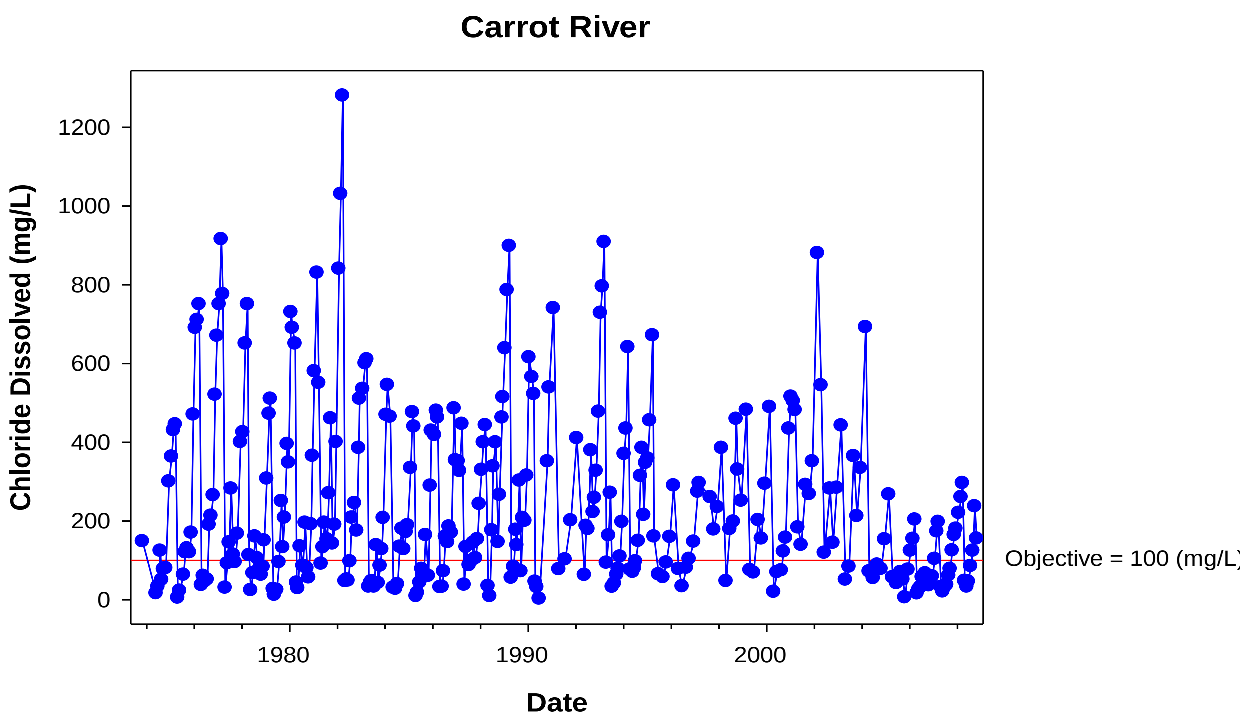

Figure 5-h1: Carrot River Chloride Dissolved

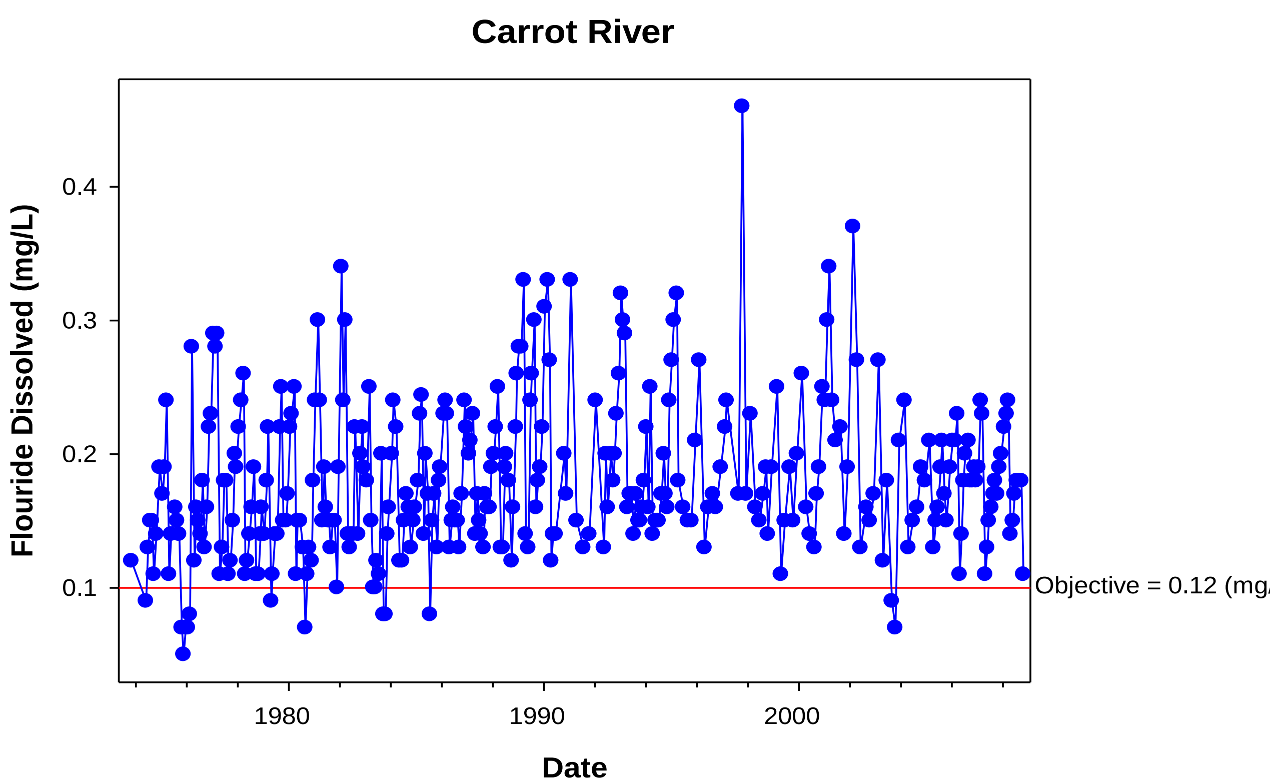

Figure 5-h2: Carrot River Fluoride Dissolved

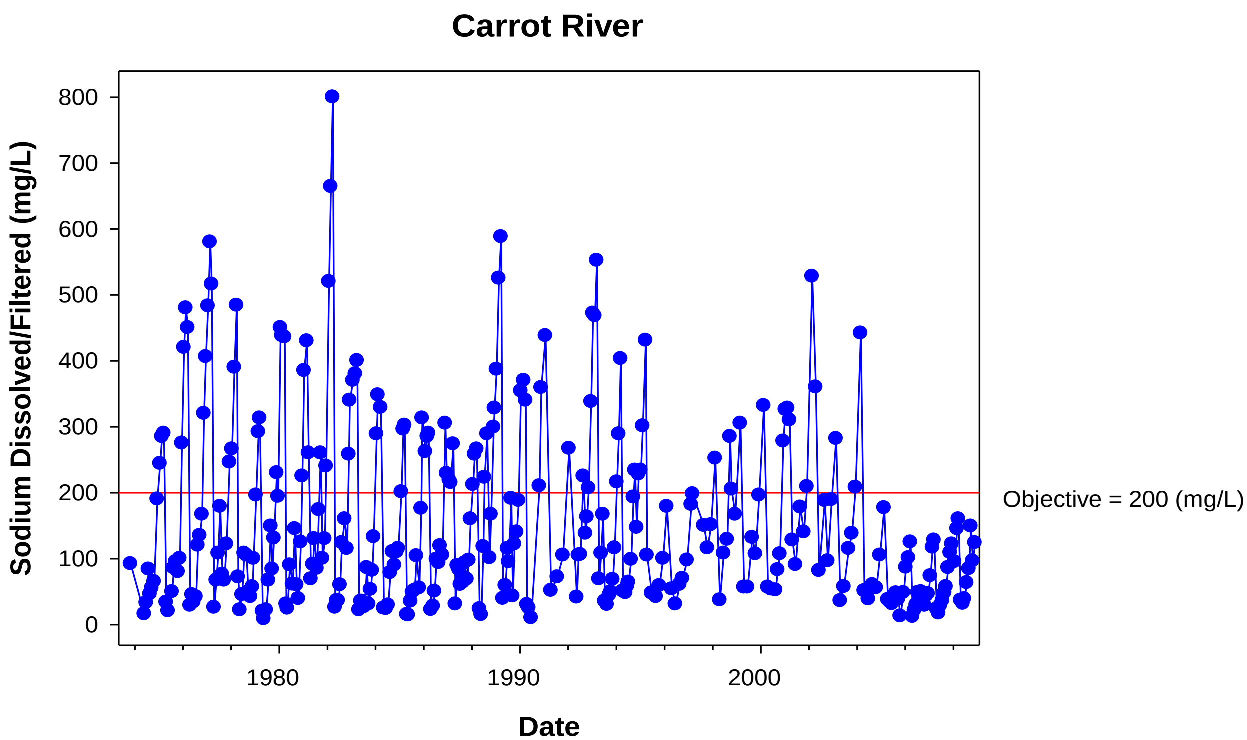

Figure 5-h3: Carrot River Sodium Dissolved/Filtered

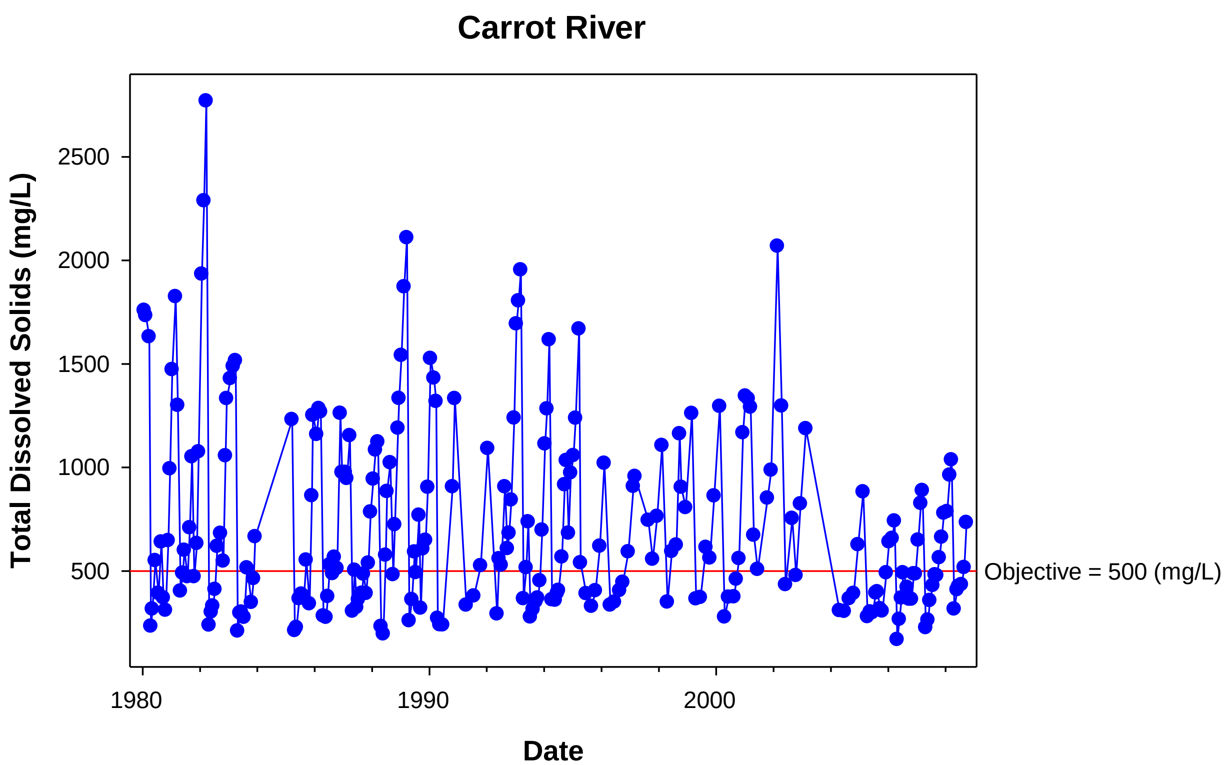

Figure 5-h4: Carrot River Total Dissolved Solids

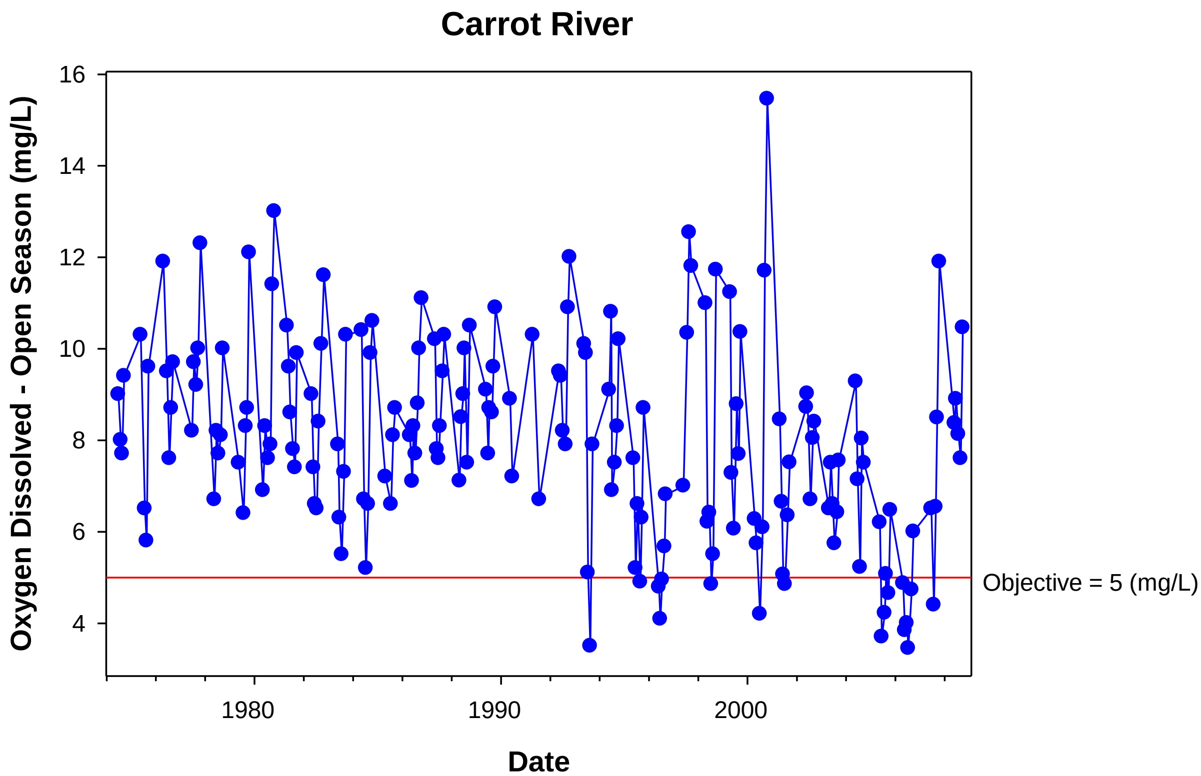

Figure 5-h5: Carrot River Oxygen Dissolved (Open Season)

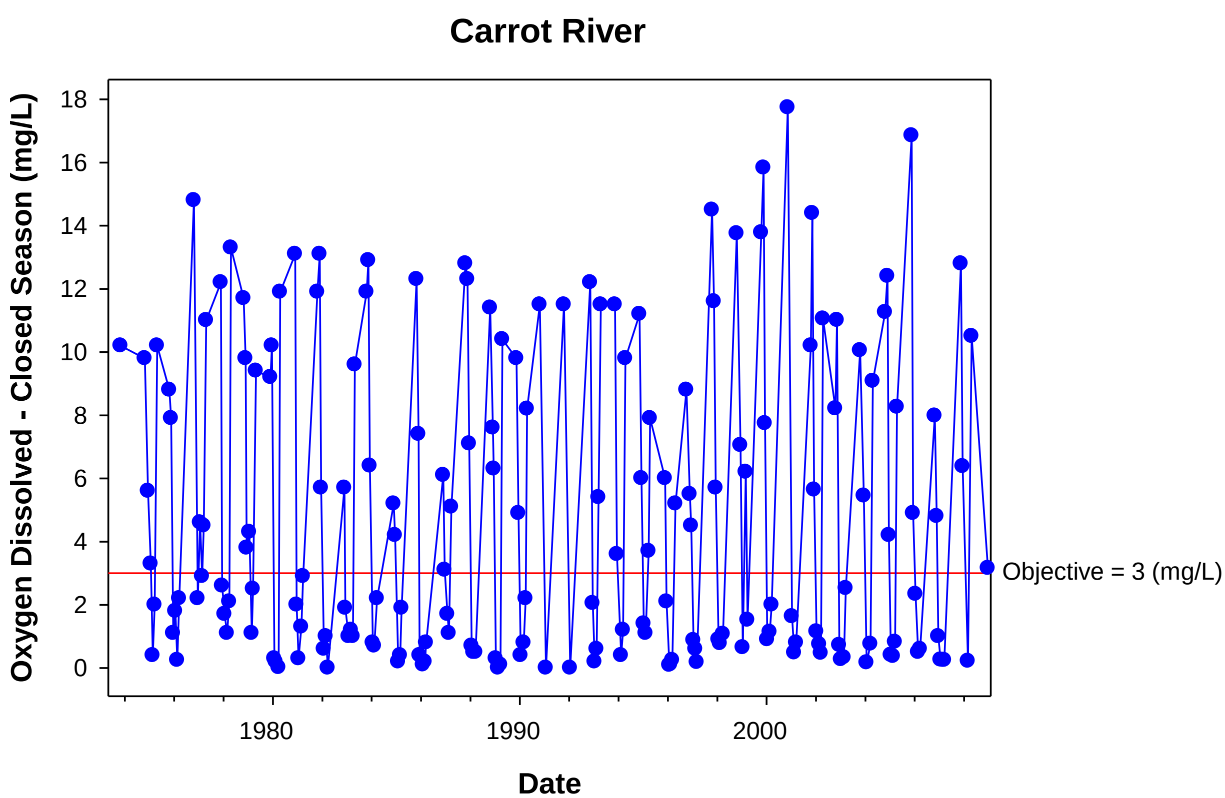

Figure 5-h6: Carrot River Oxygen Dissolved (Closed Season)

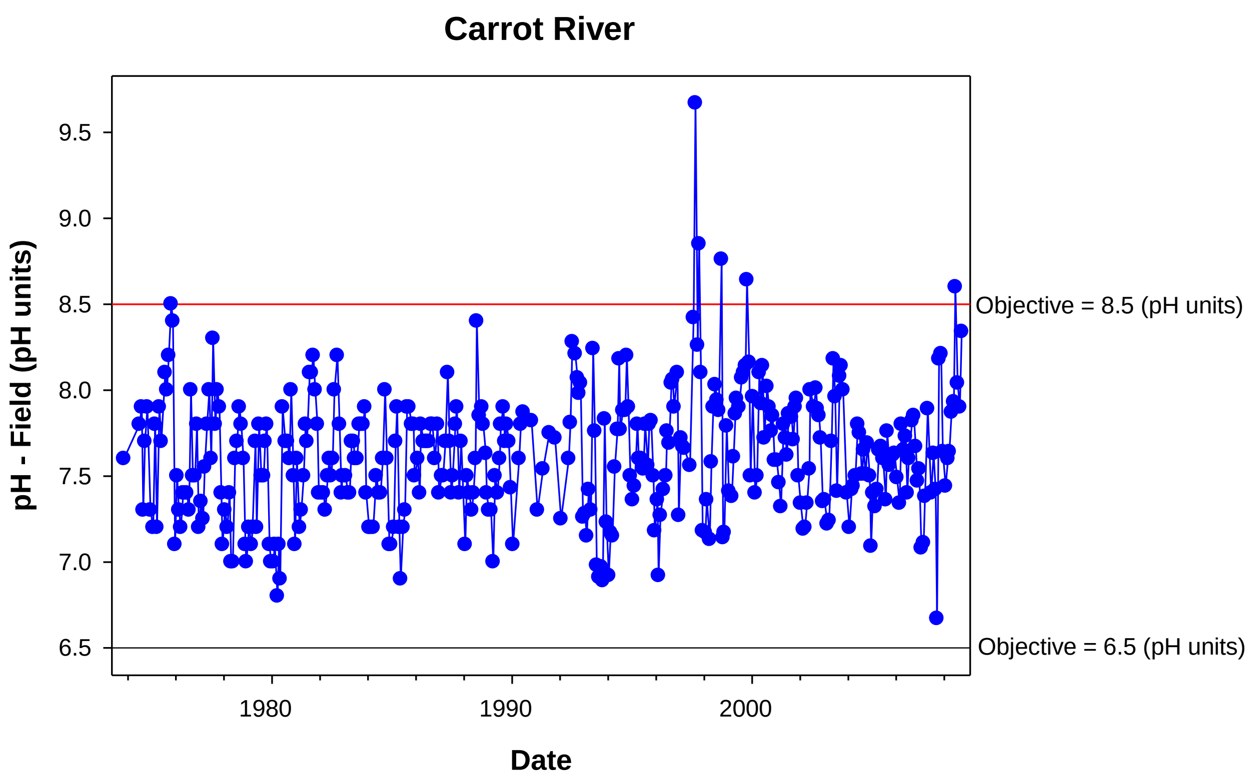

Figure 5-h7: Carrot River pH Field

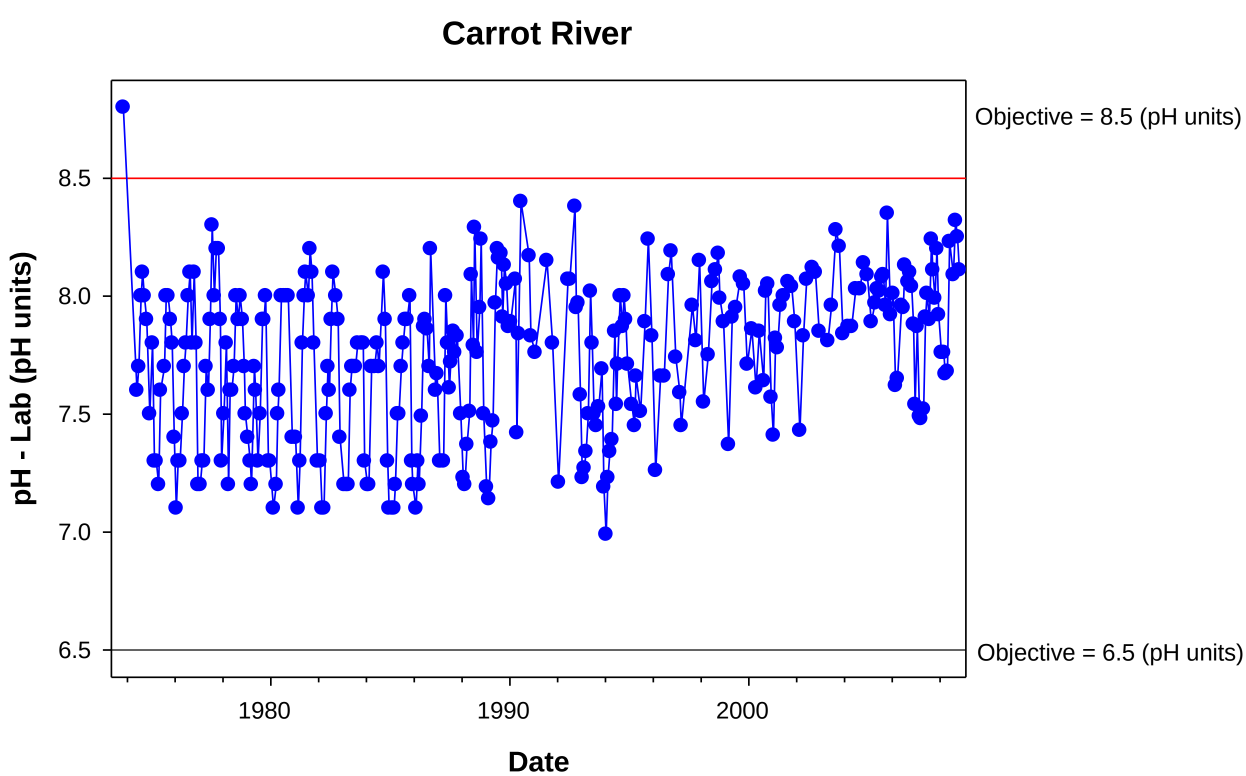

Figure 5-h8: Carrot River pH Lab

Carrot River

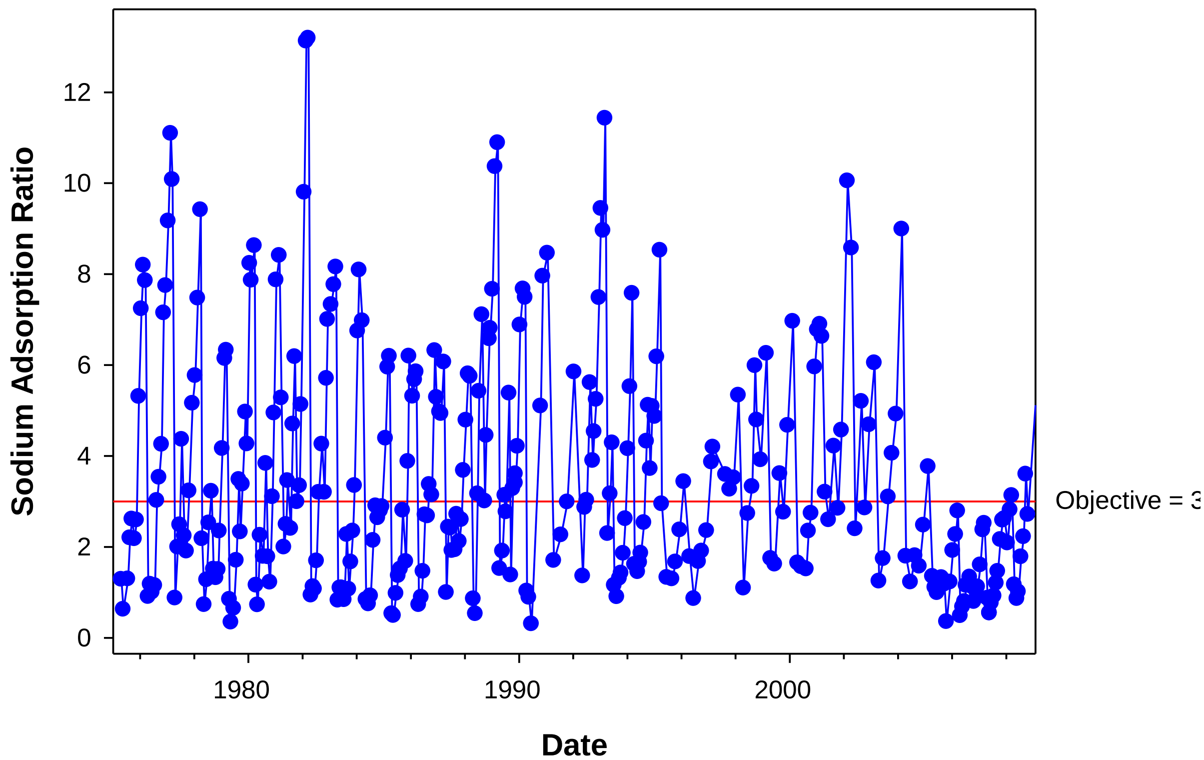

Figure 5-h9: Carrot River Sodium Adsorption Ratio

Carrot River

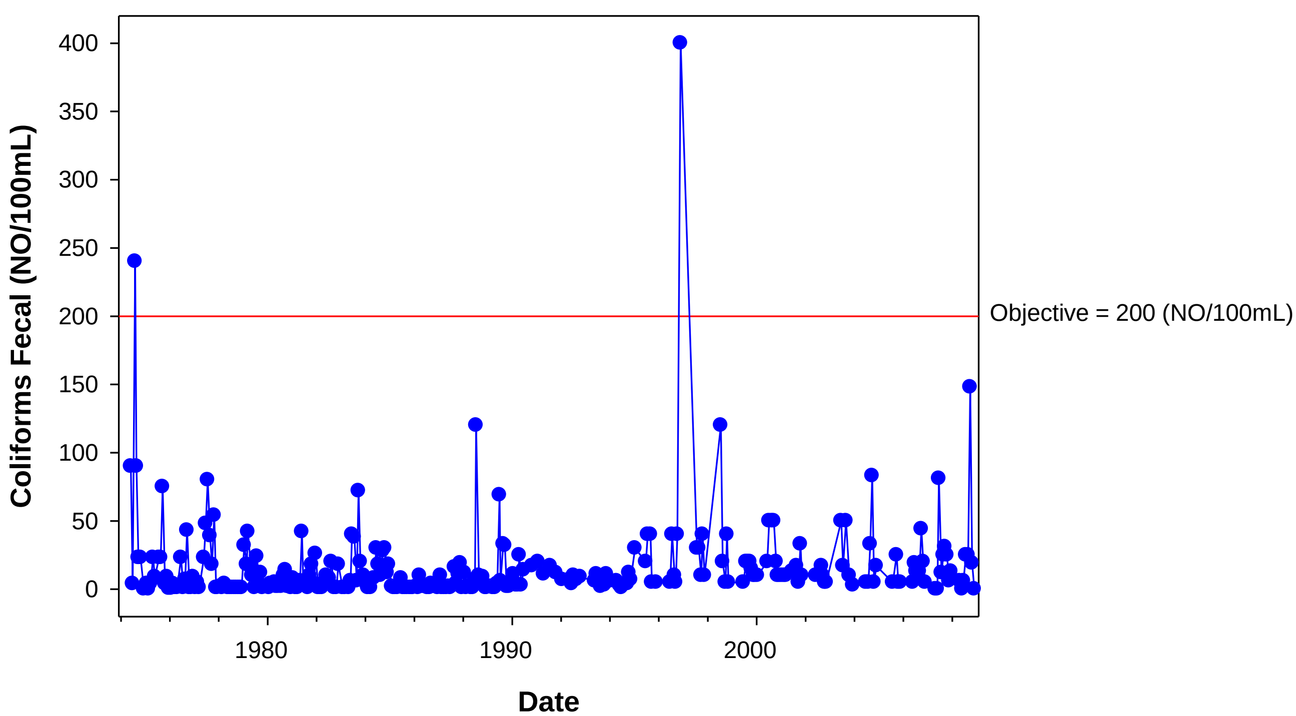

Figure 5-h10: Carrot River Coliforms Fecal

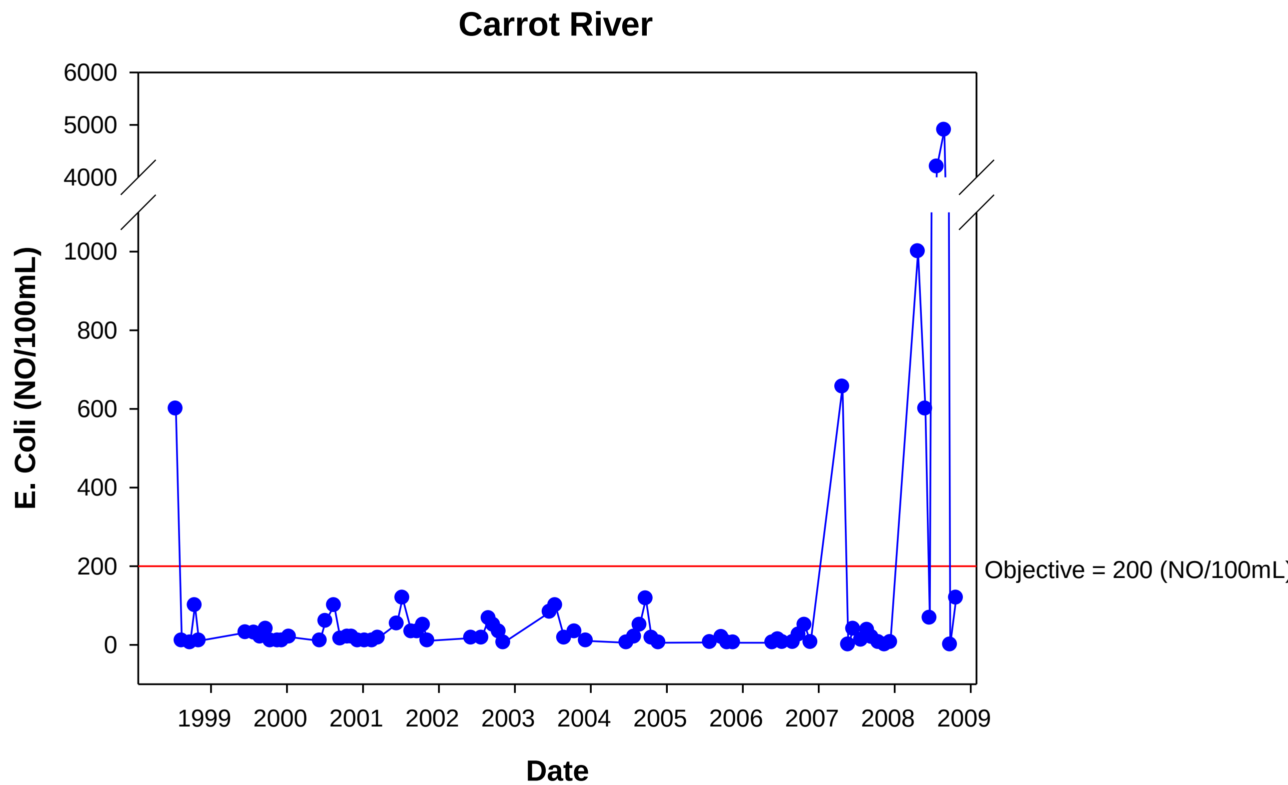

Figure 5-h11: Carrot River E. Coli

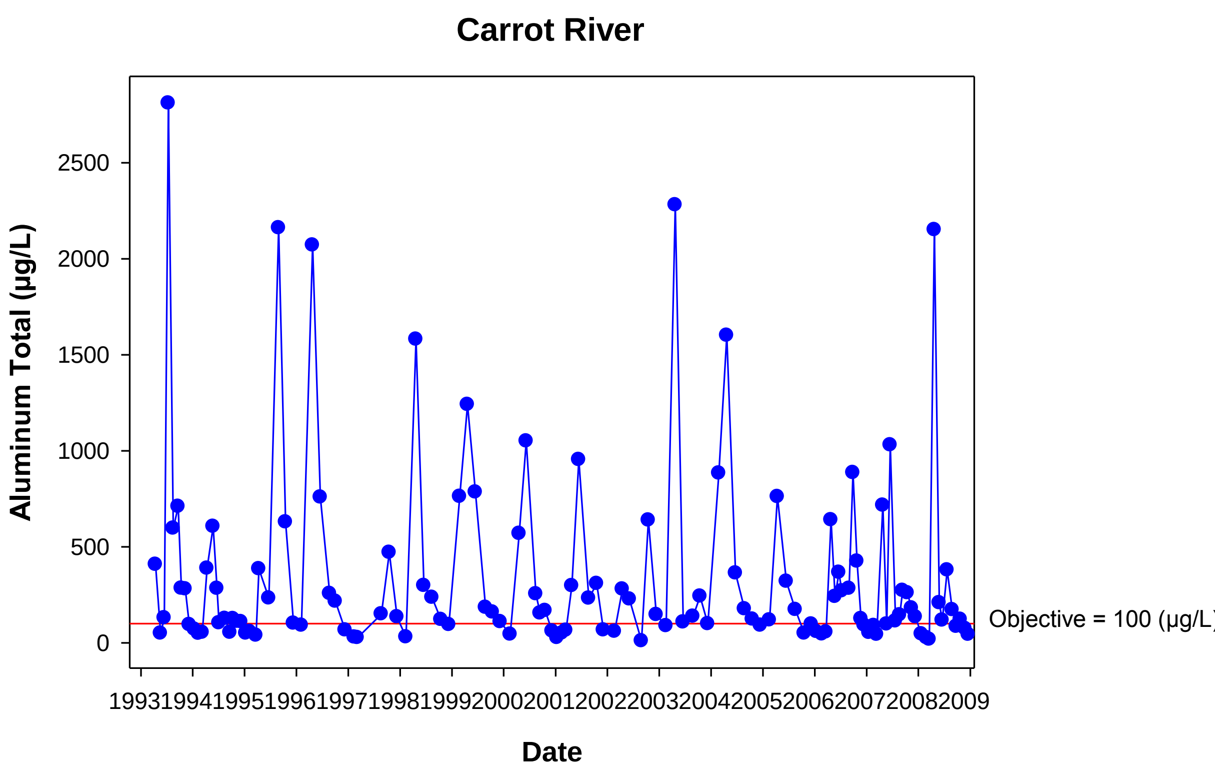

Figure 5-h12: Carrot River Aluminum Total

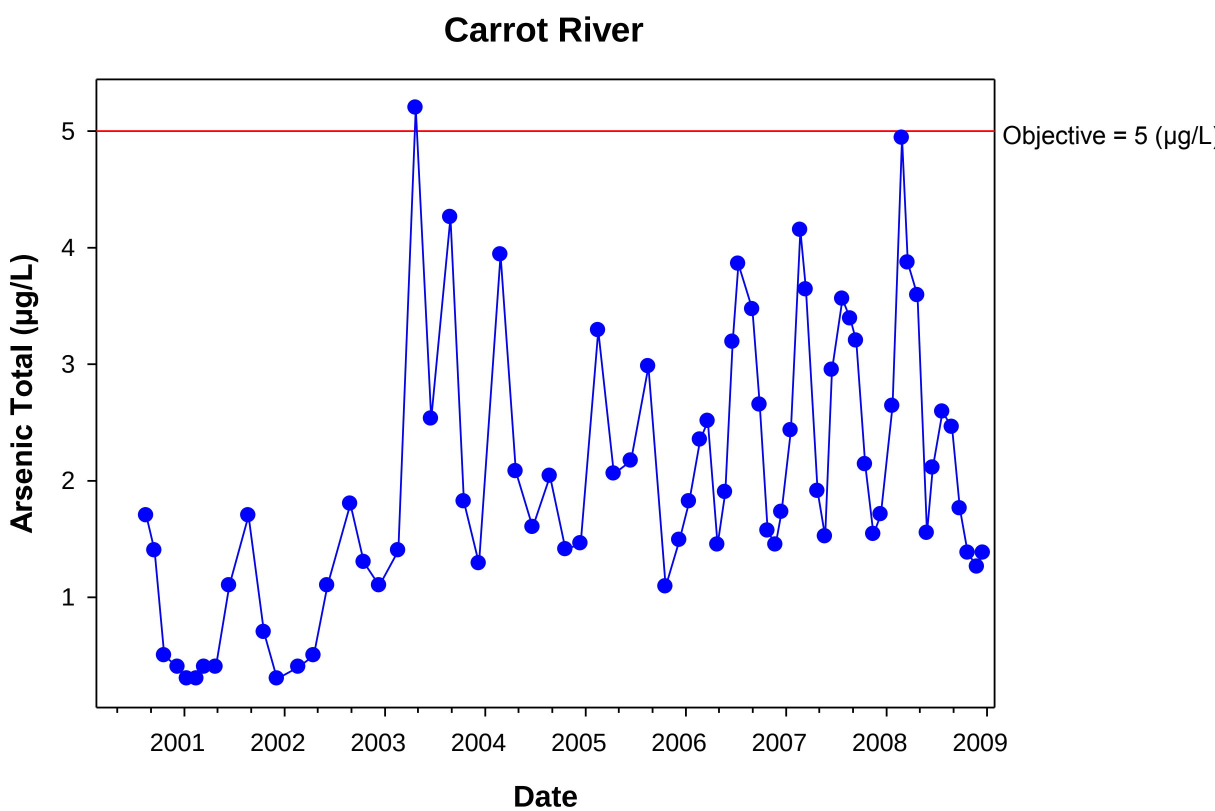

Figure 5-h13: Carrot River Arsenic Total

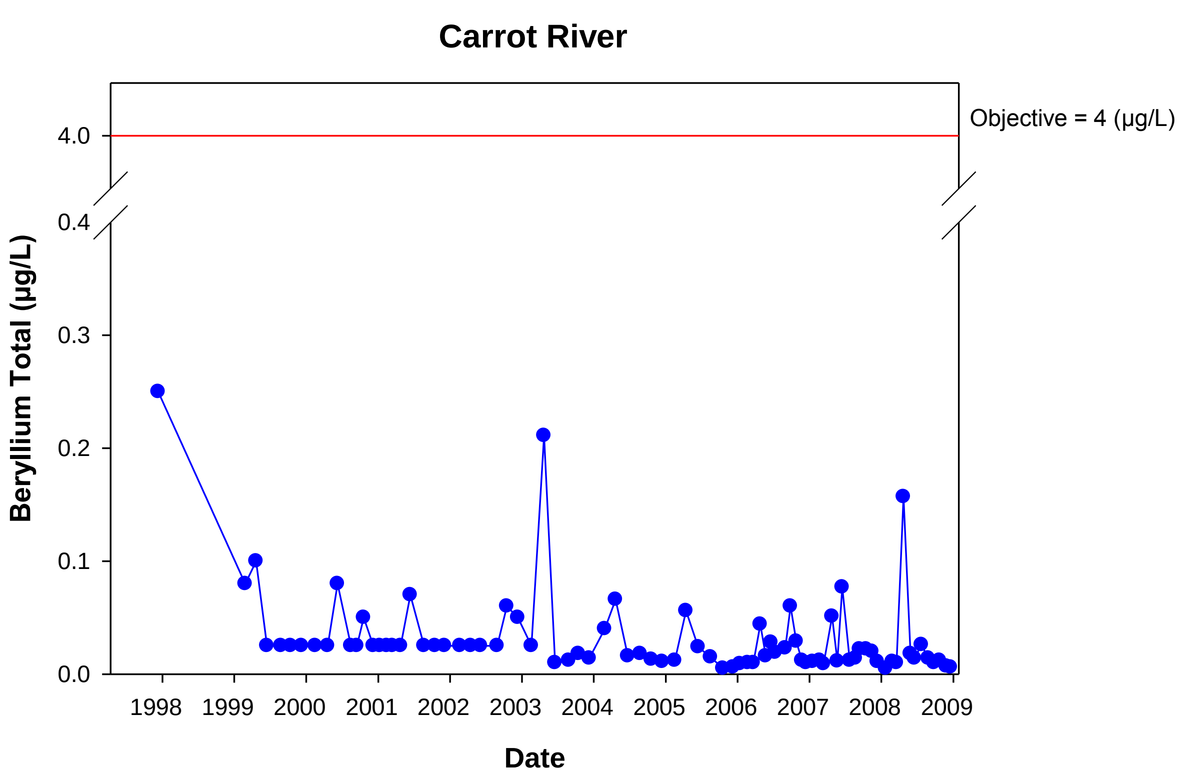

Figure 5-h14: Carrot River Beryllium Total

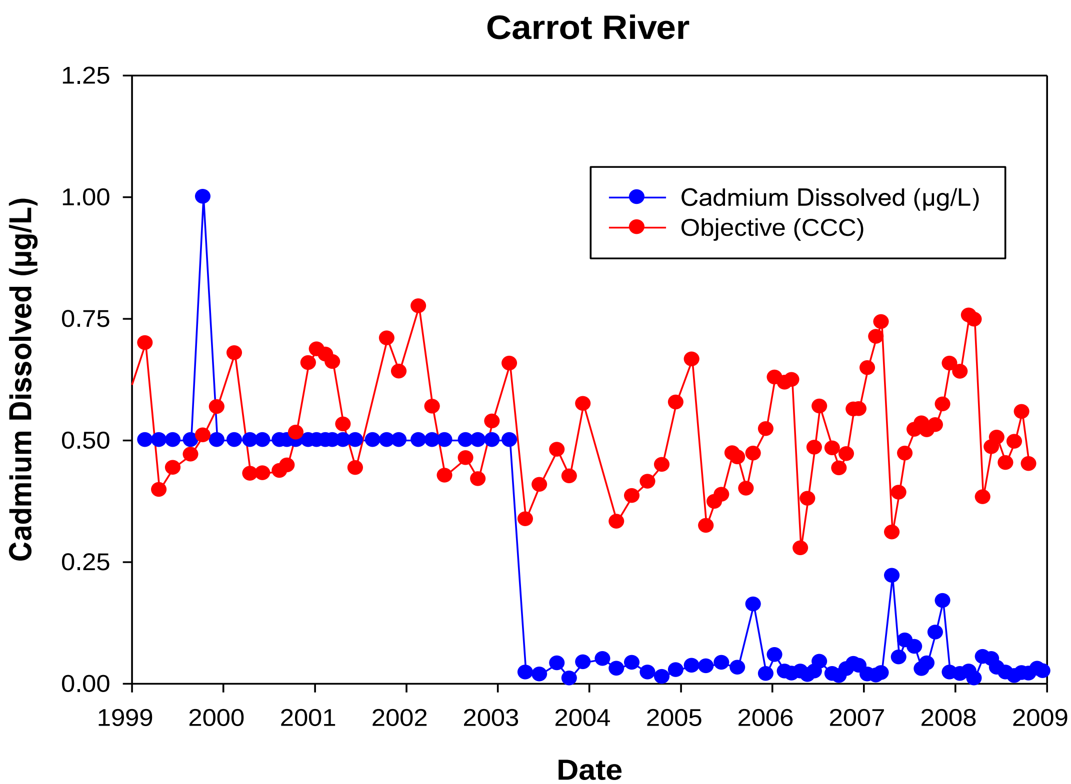

Figure 5-h15: Carrot River Cadmium Dissolved

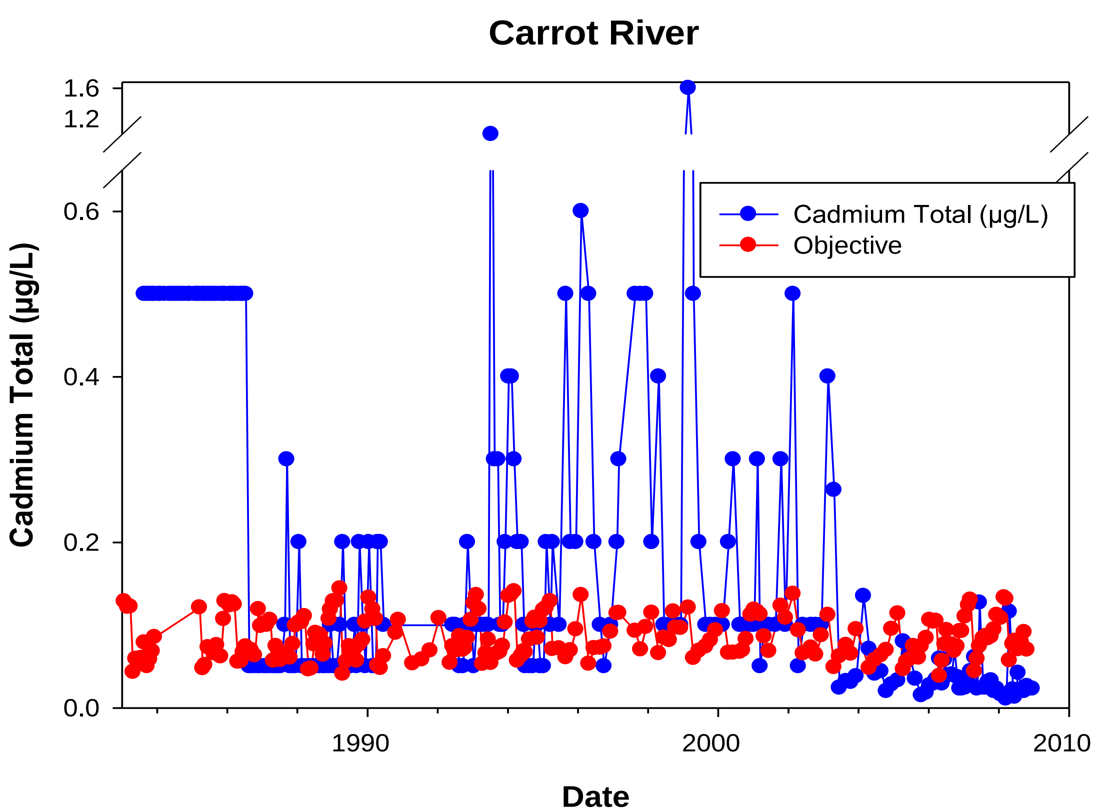

Figure 5-h16: Carrot River Cadmium Total

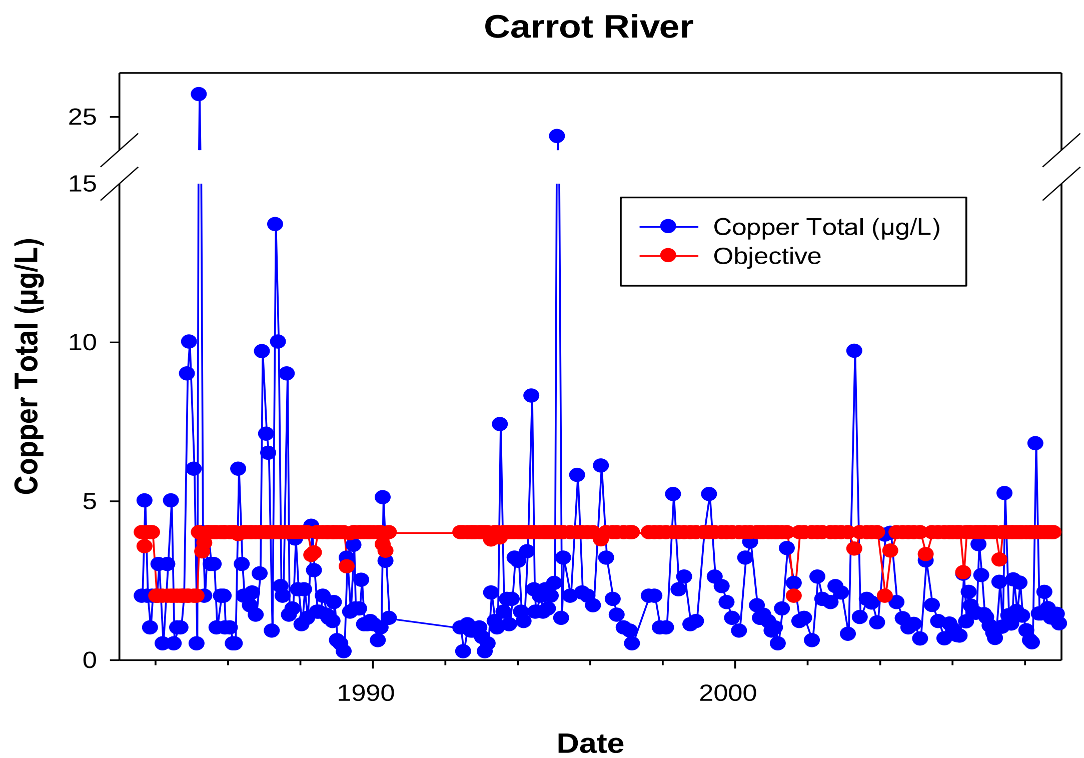

Figure 5-h19: Carrot River Copper Total

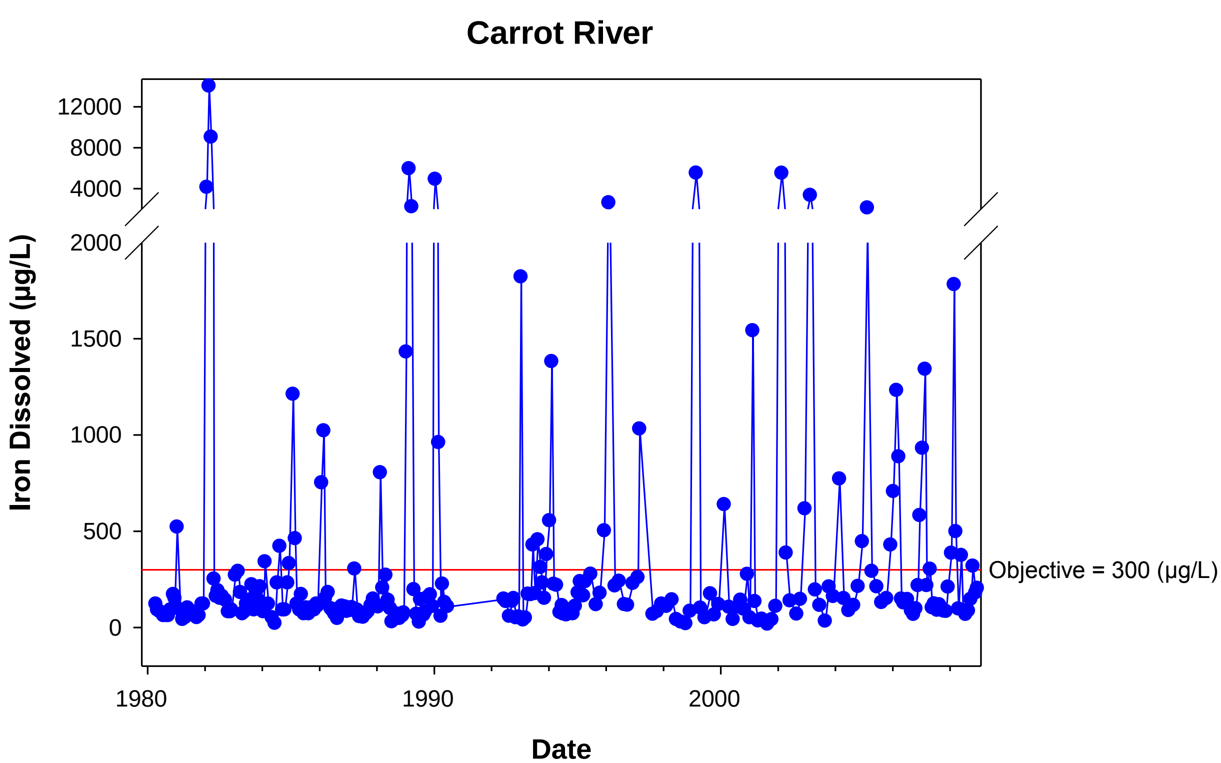

Figure 5-h20: Carrot River Iron Dissolved

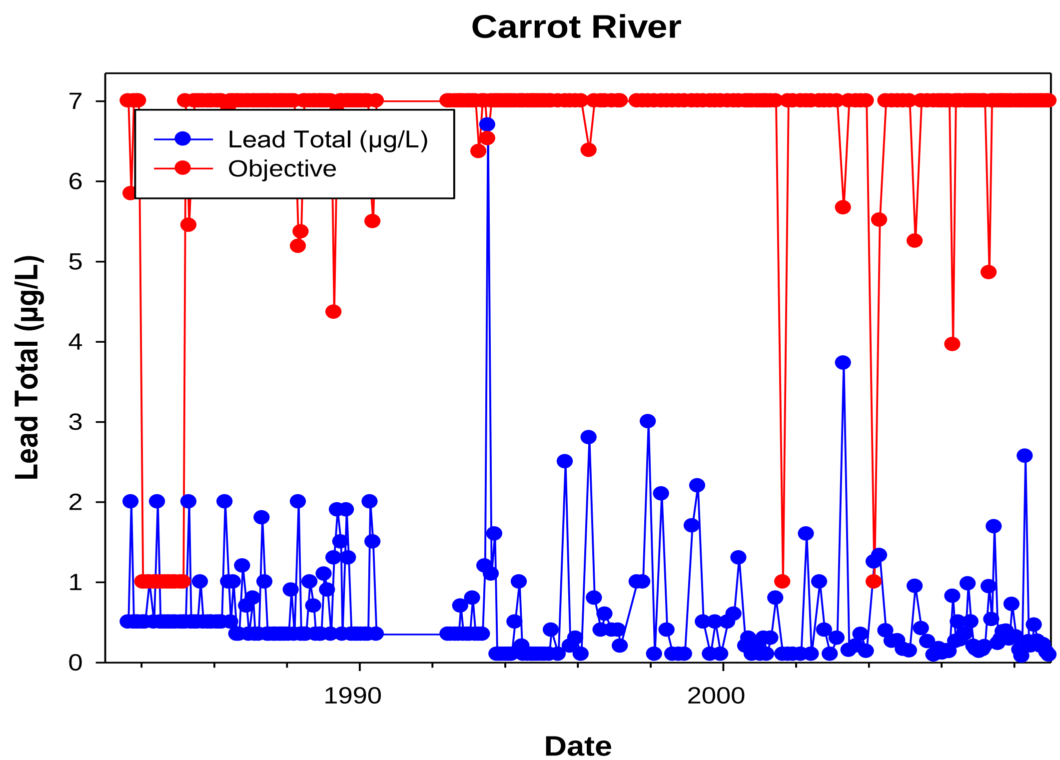

Figure 5-h21: Carrot River Lead Total

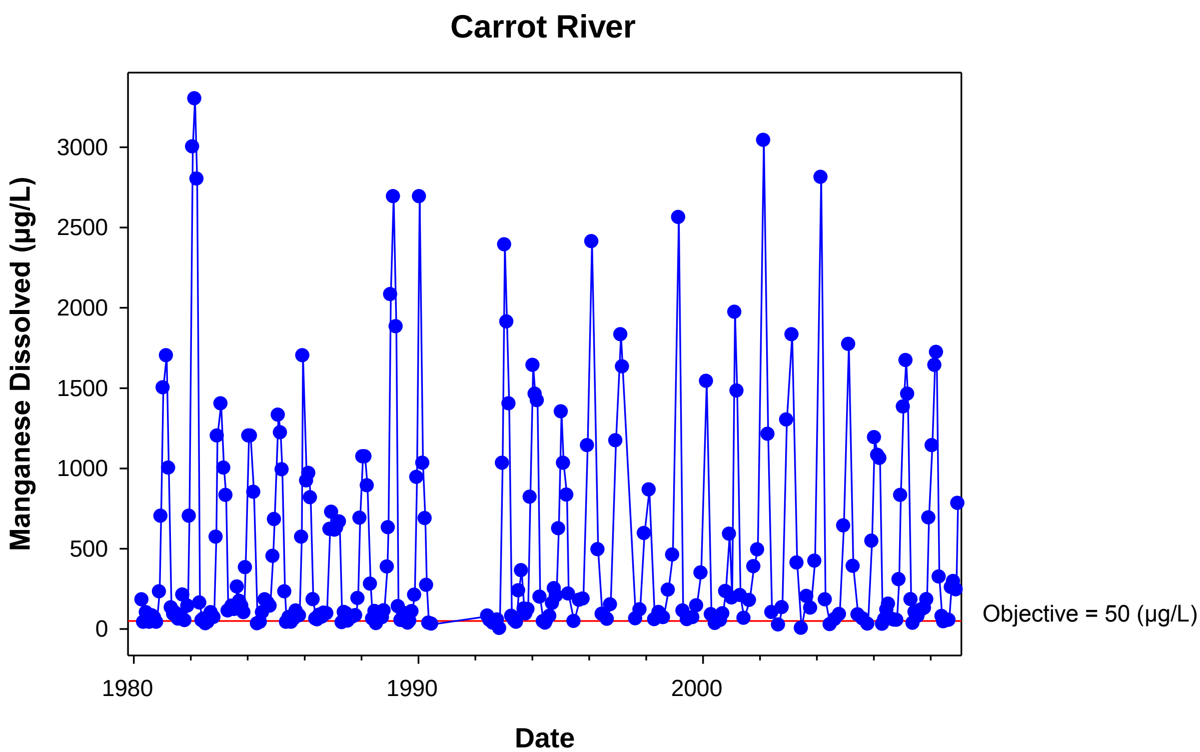

Figure 5-h22: Carrot River Manganese Dissolved

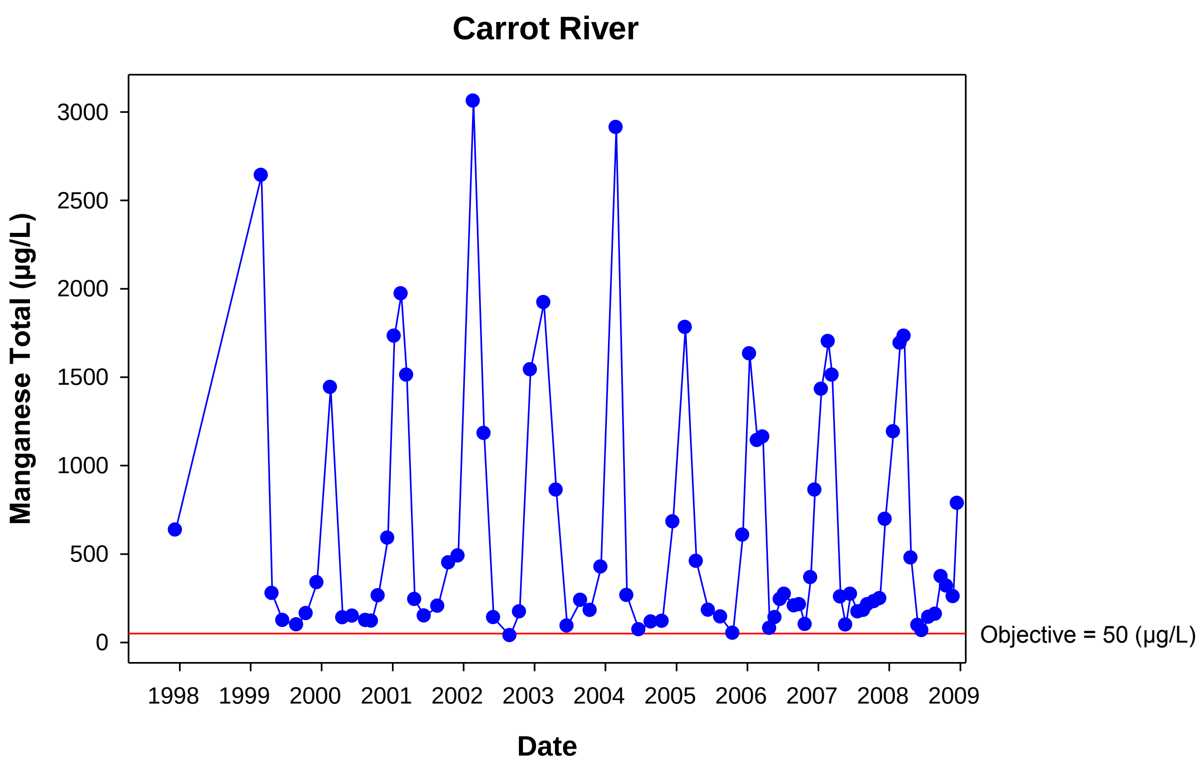

Figure 5-h23: Carrot River Manganese Total

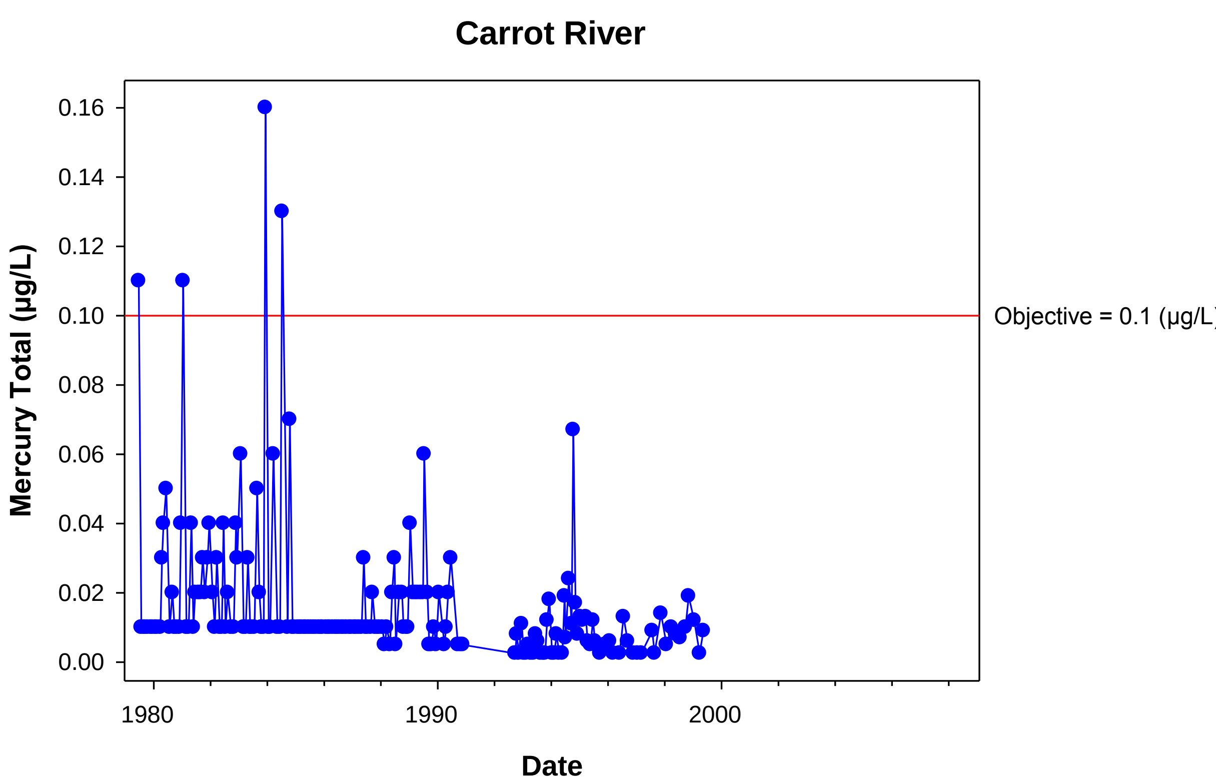

Figure 5-h24: Carrot River Mercury Total

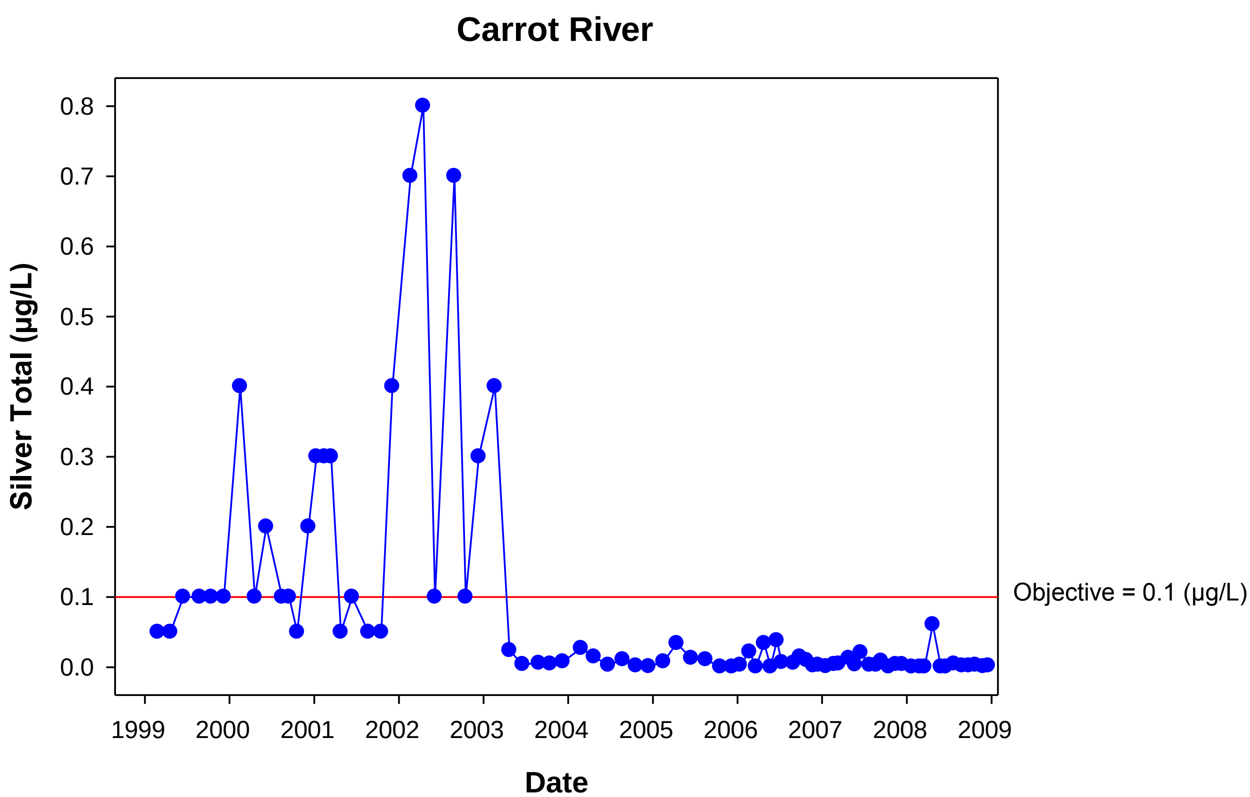

Figure 5-h27: Carrot River Silver Total

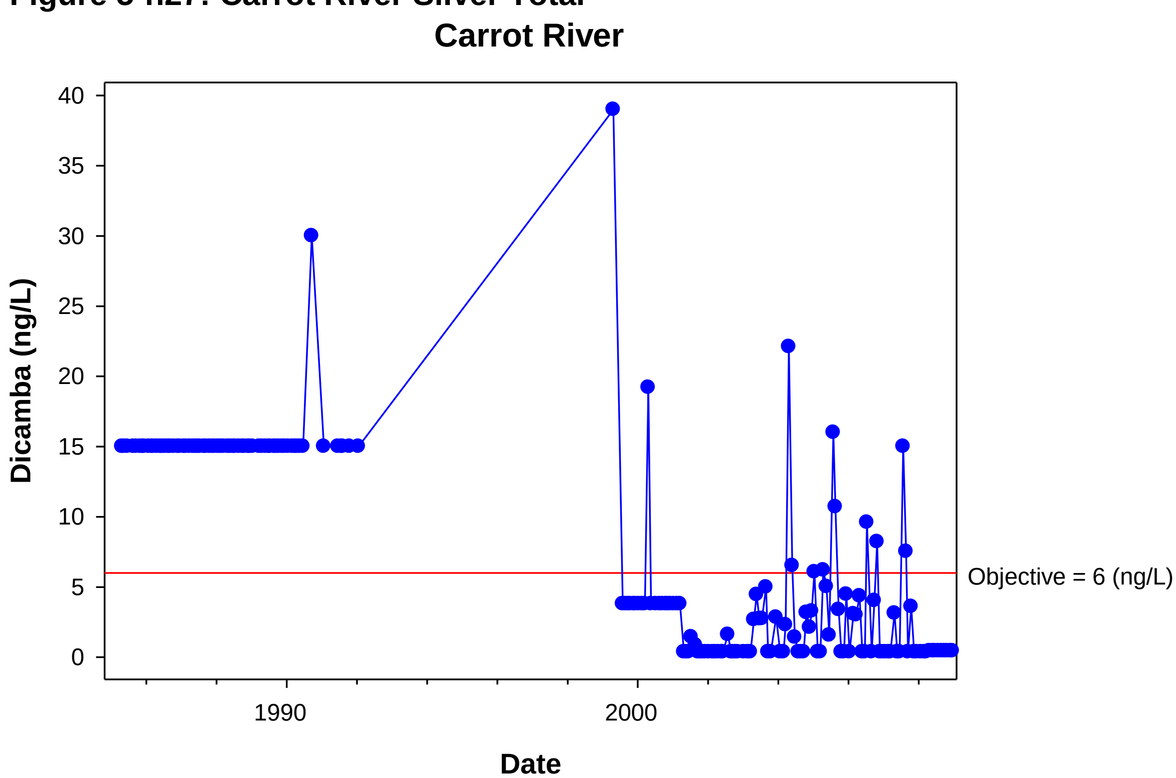

Figure 5-h28: Carrot River Dicamba

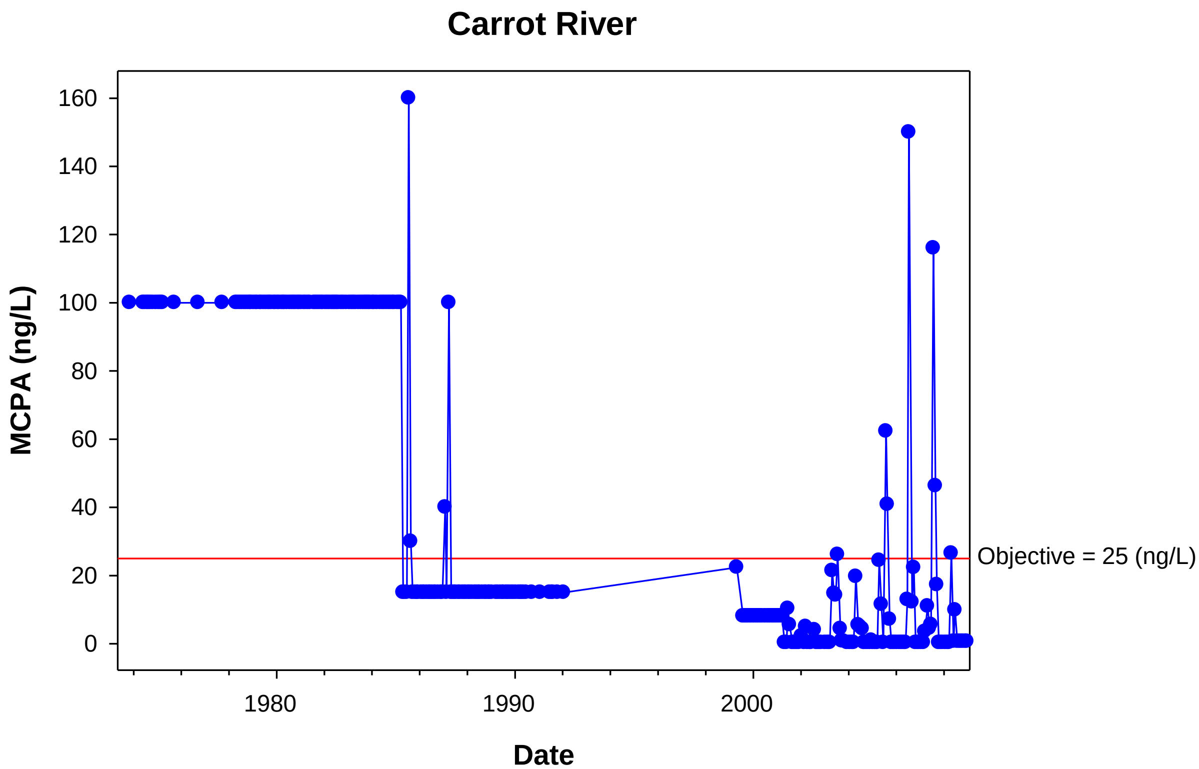

Figure 5-h29: Carrot River MCPA

Appendix 5-i: Churchill River

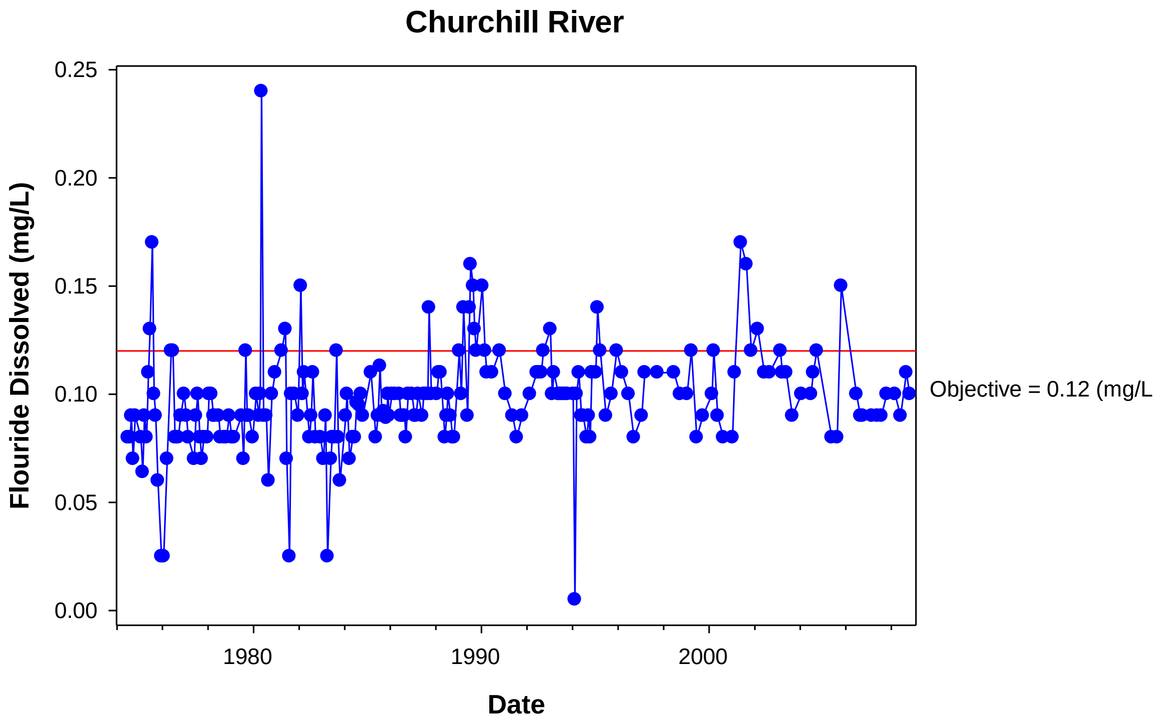

Figure 5-i1: Churchill River Fluoride Dissolved

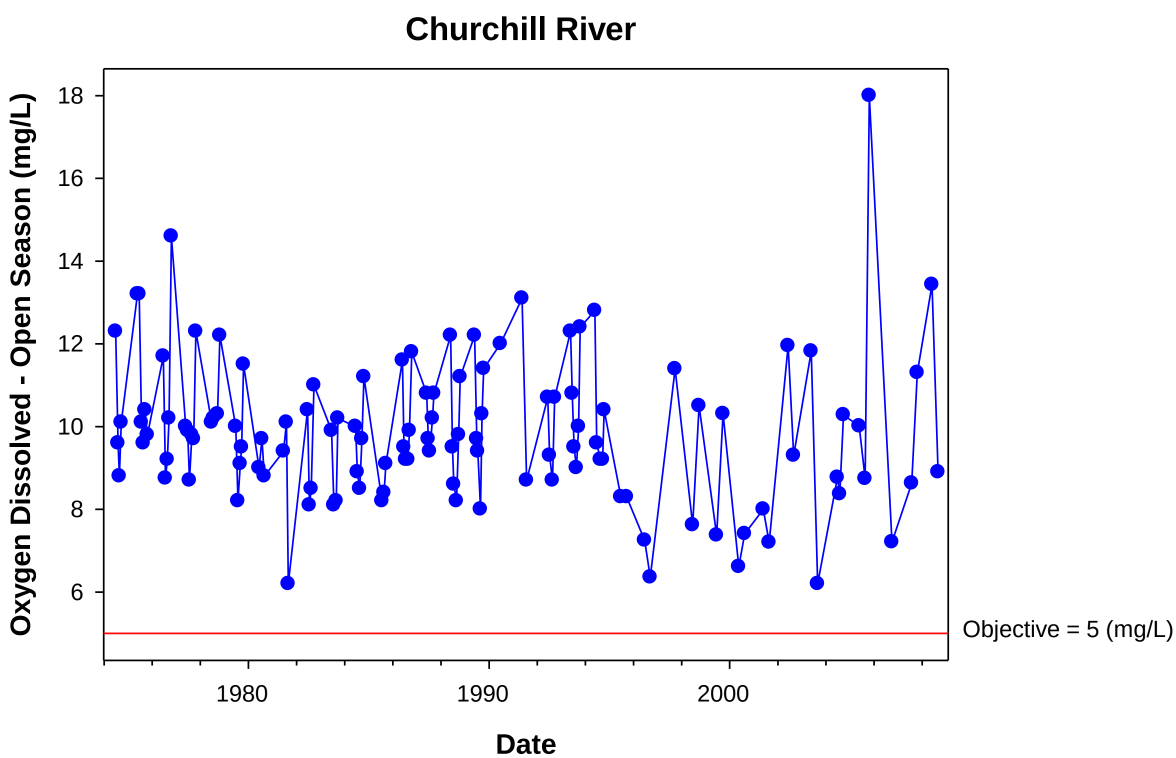

Figure 5-i2: Churchill River Oxygen Dissolved (Open Season)

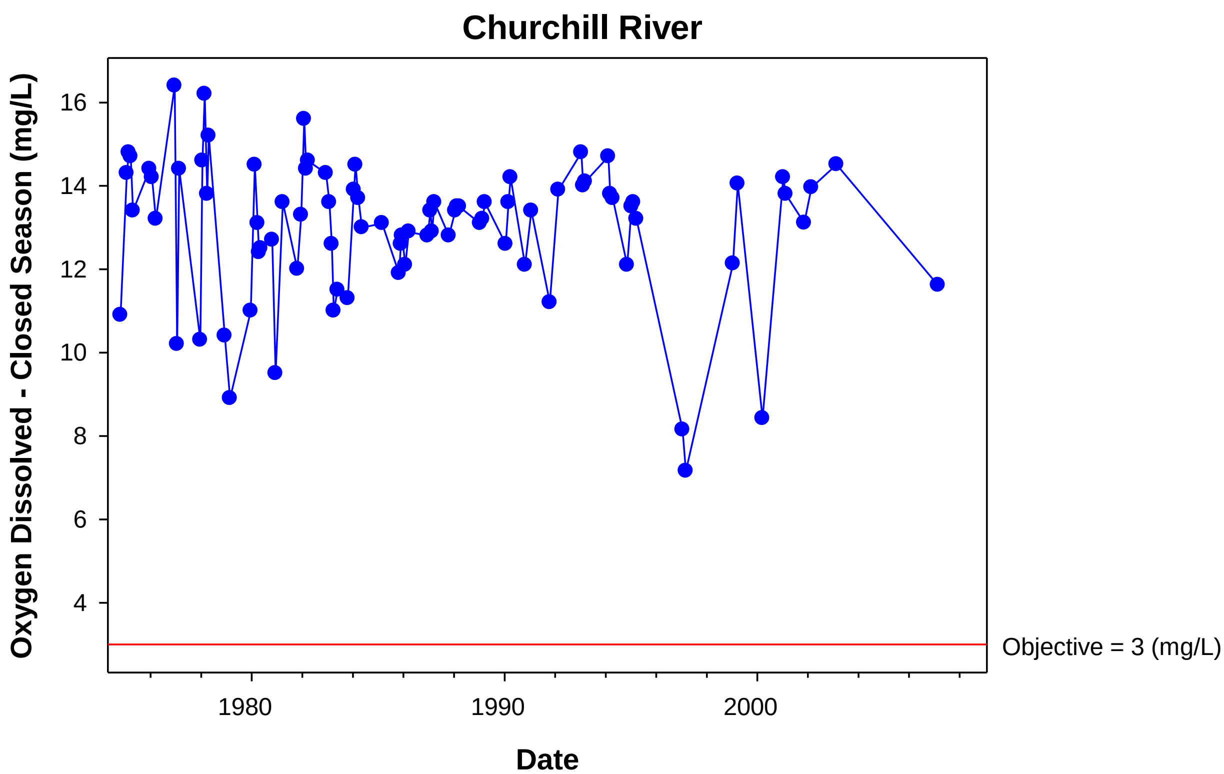

Figure 5-i3: Churchill River Oxygen Dissolved (Closed Season)

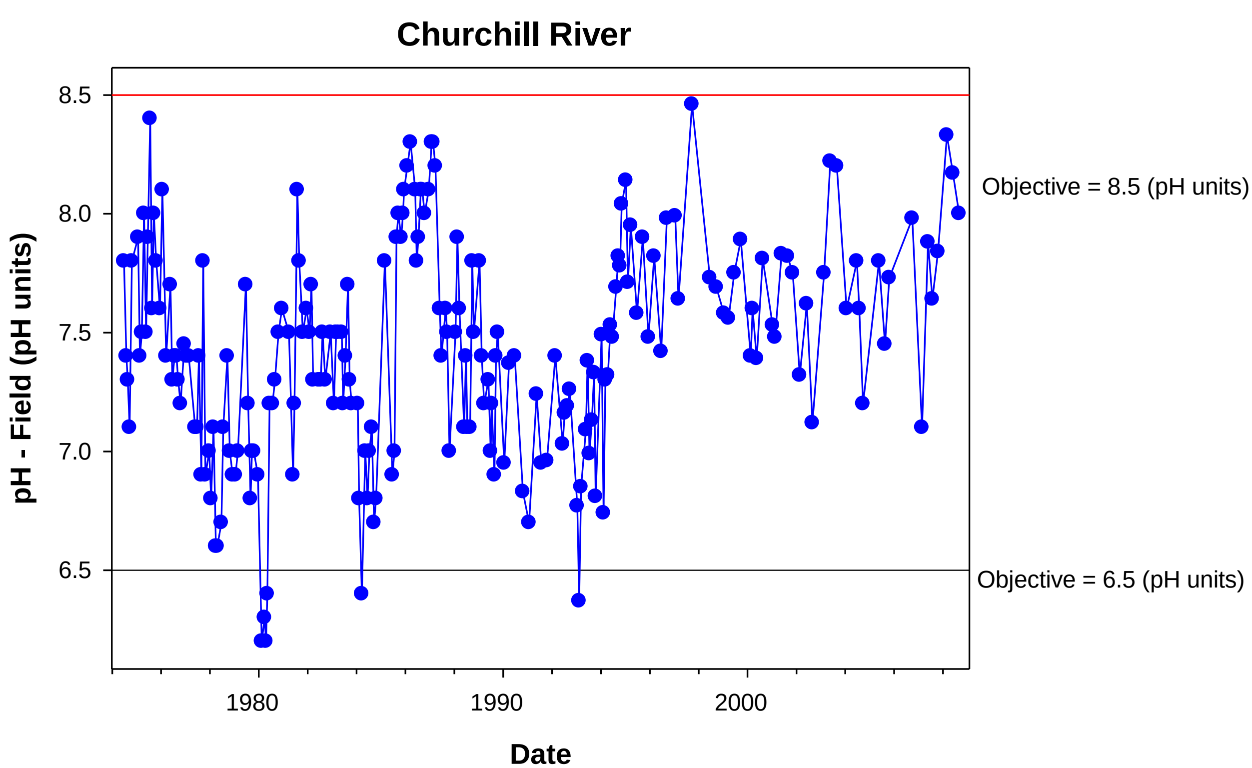

Figure 5-i4: Churchill River pH Field

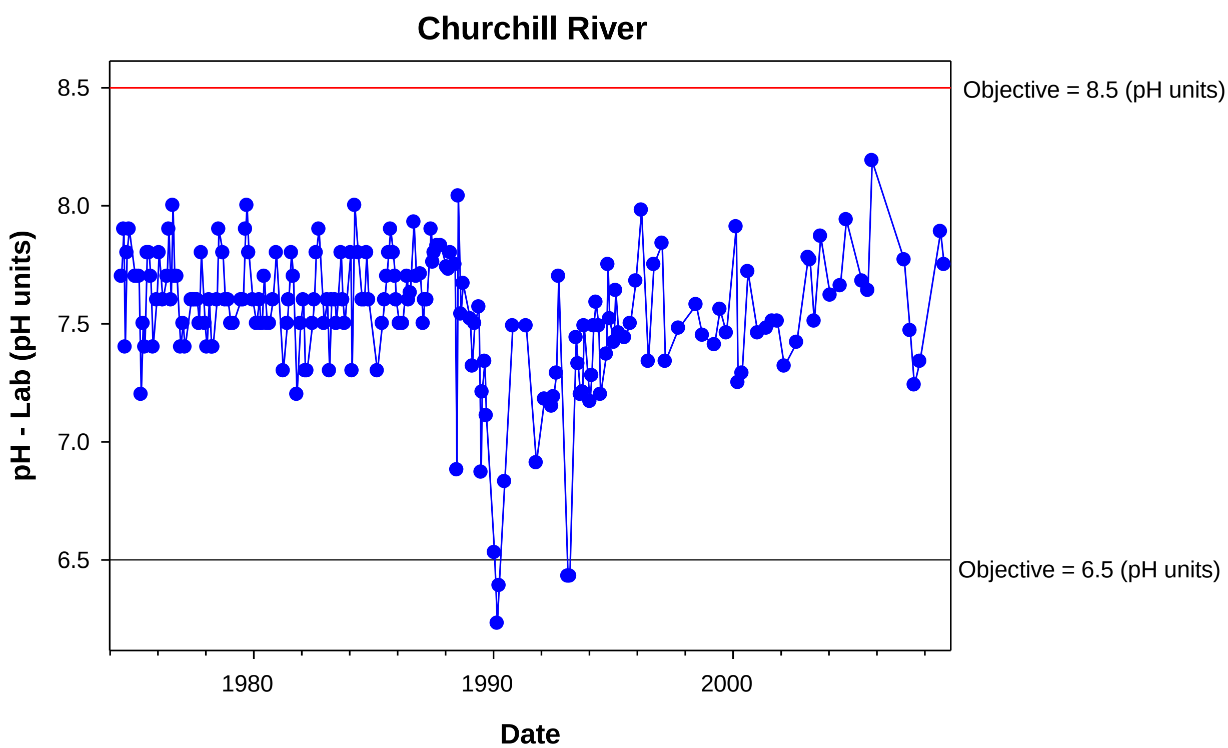

Figure 5-i5: Churchill River pH Lab

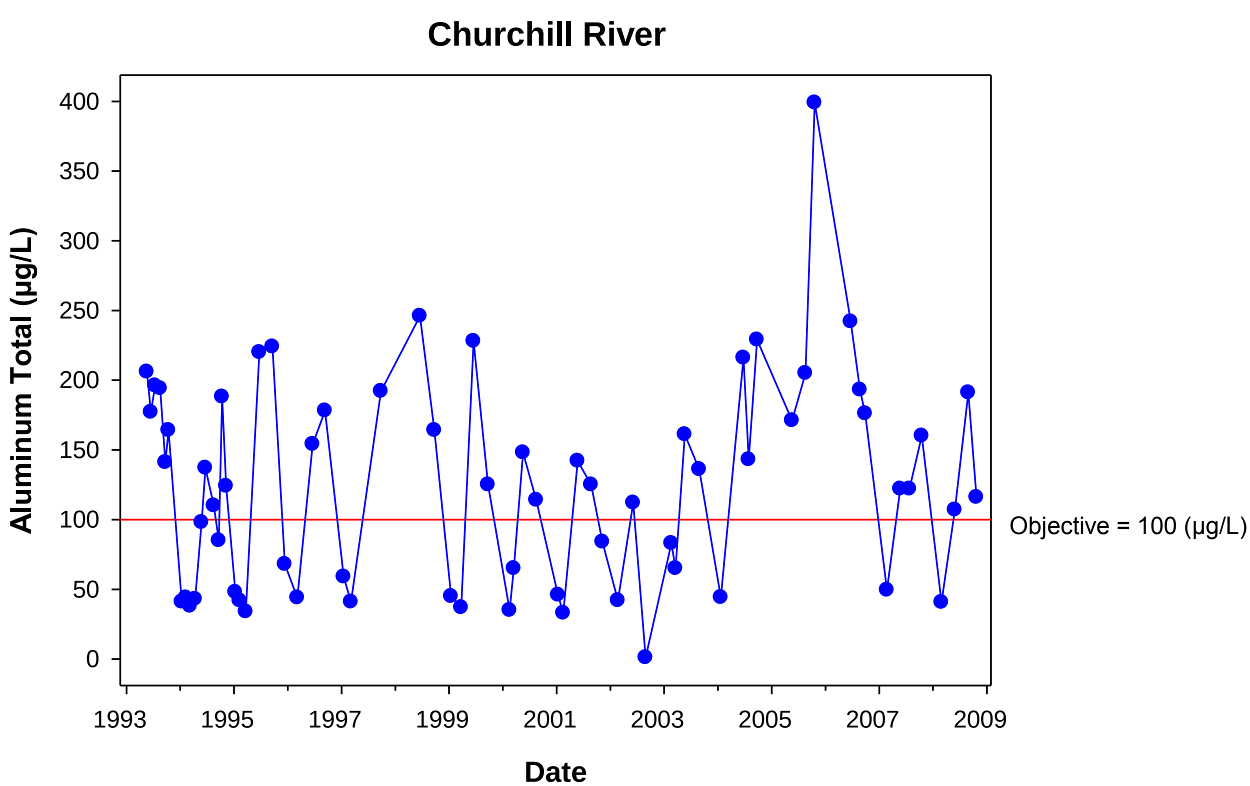

Figure 5-i6: Churchill River Aluminum Total

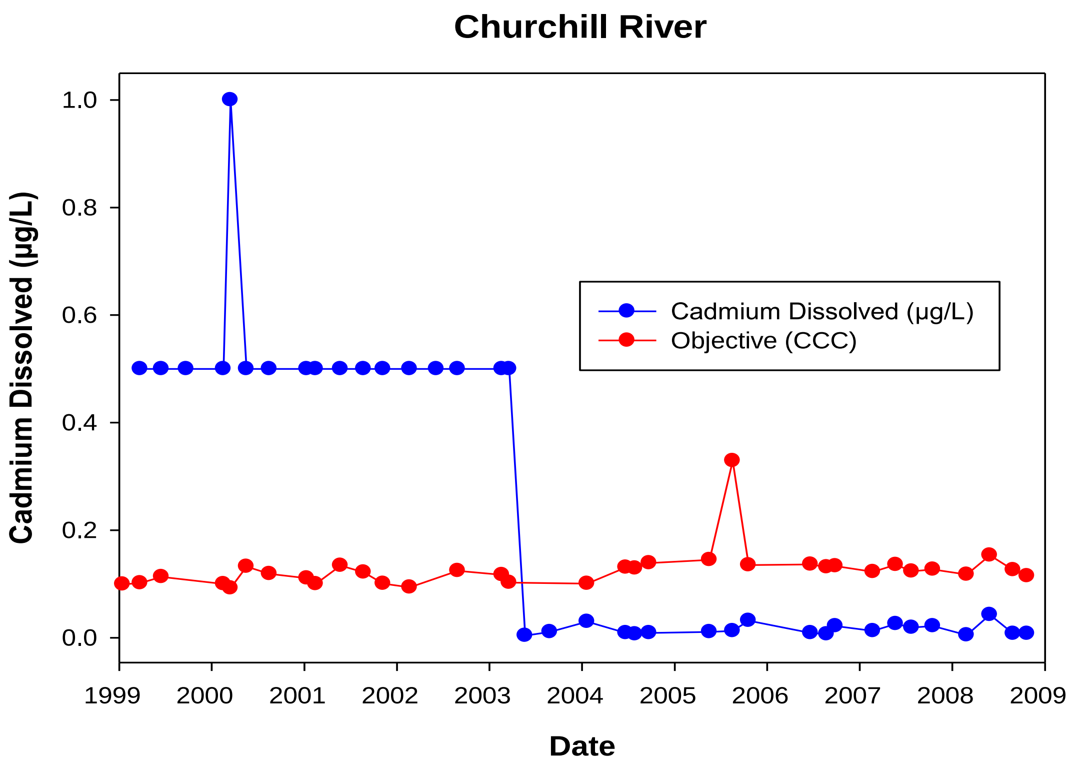

Figure 5-i7: Churchill River Cadmium Dissolved

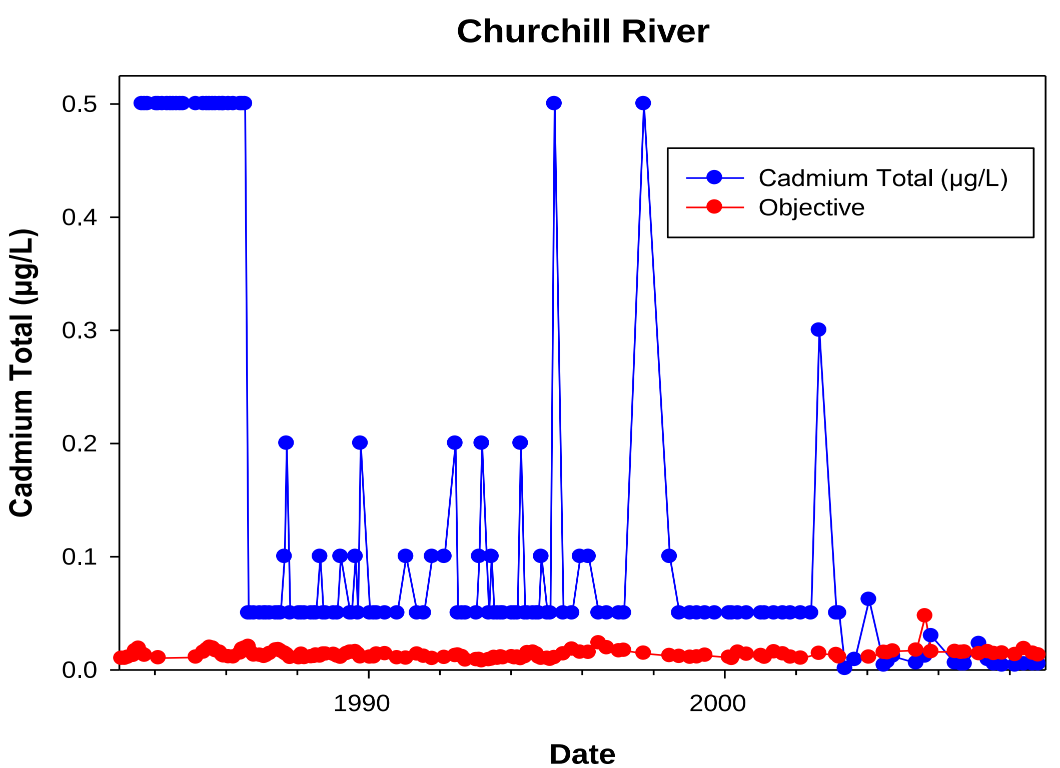

Figure 5-i8: Churchill River Cadmium Total

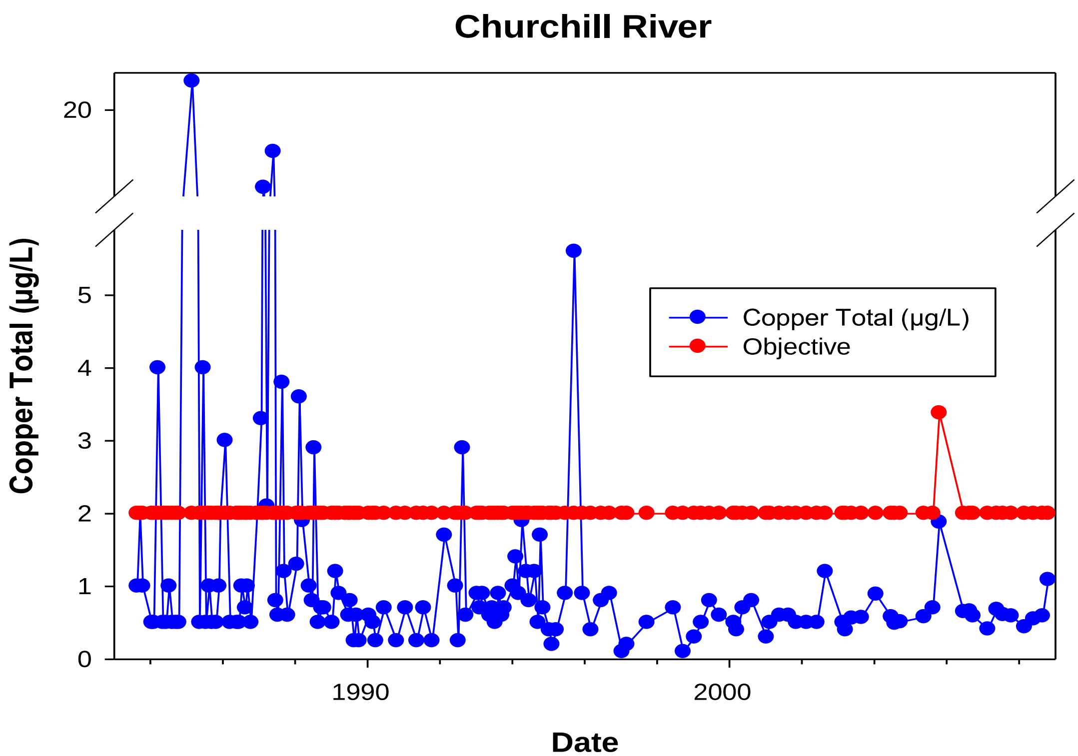

Figure 5-i9: Churchill River Copper Total

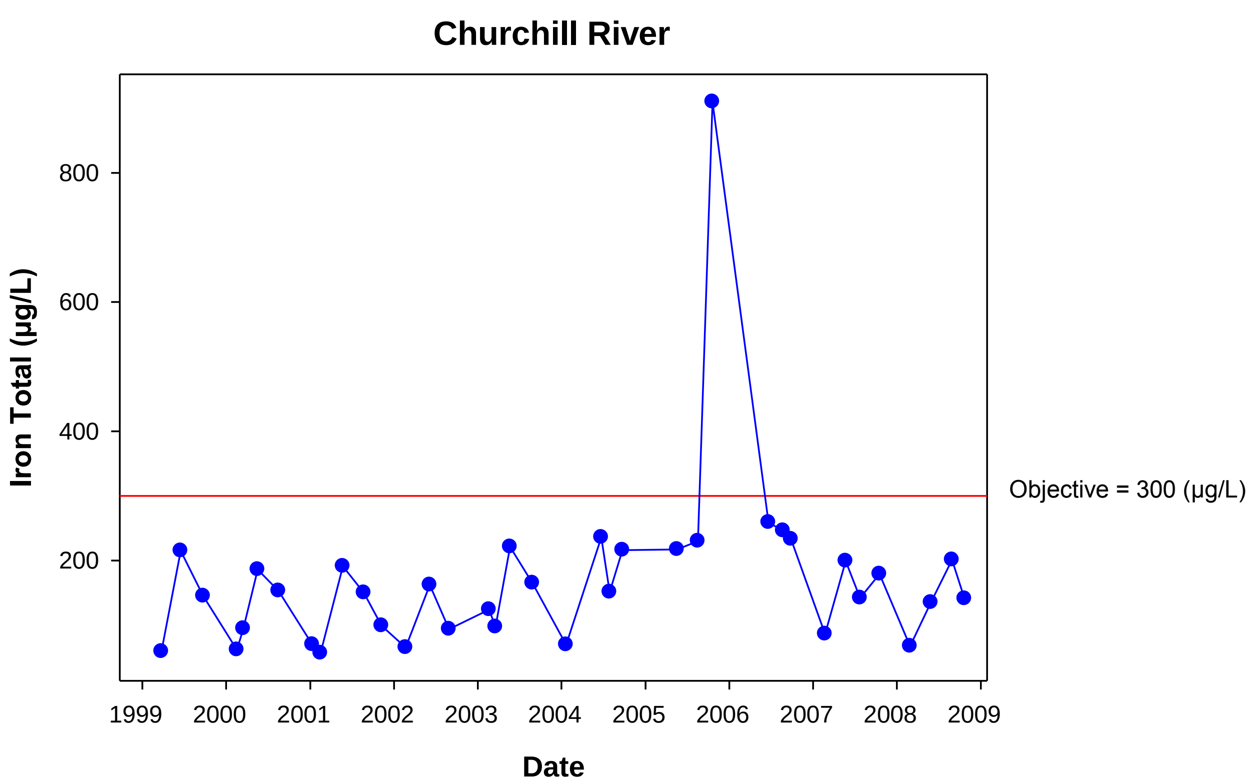

Figure 5-i10: Churchill River Iron Total

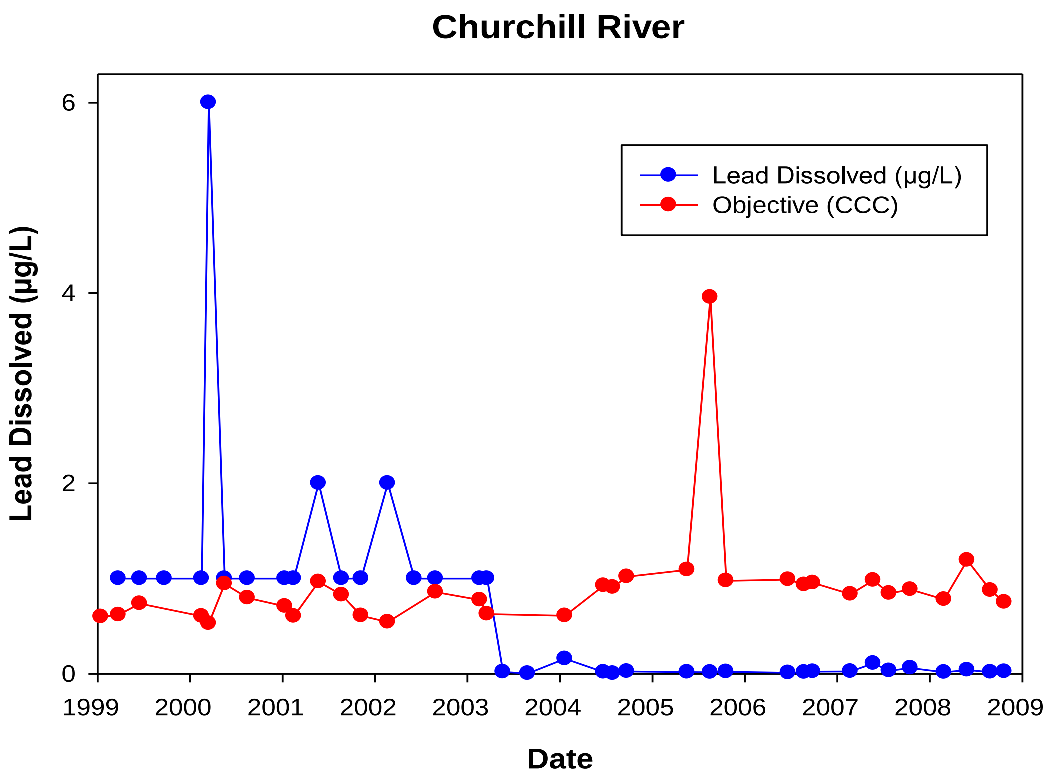

Figure 5-i11: Churchill River Lead Dissolved

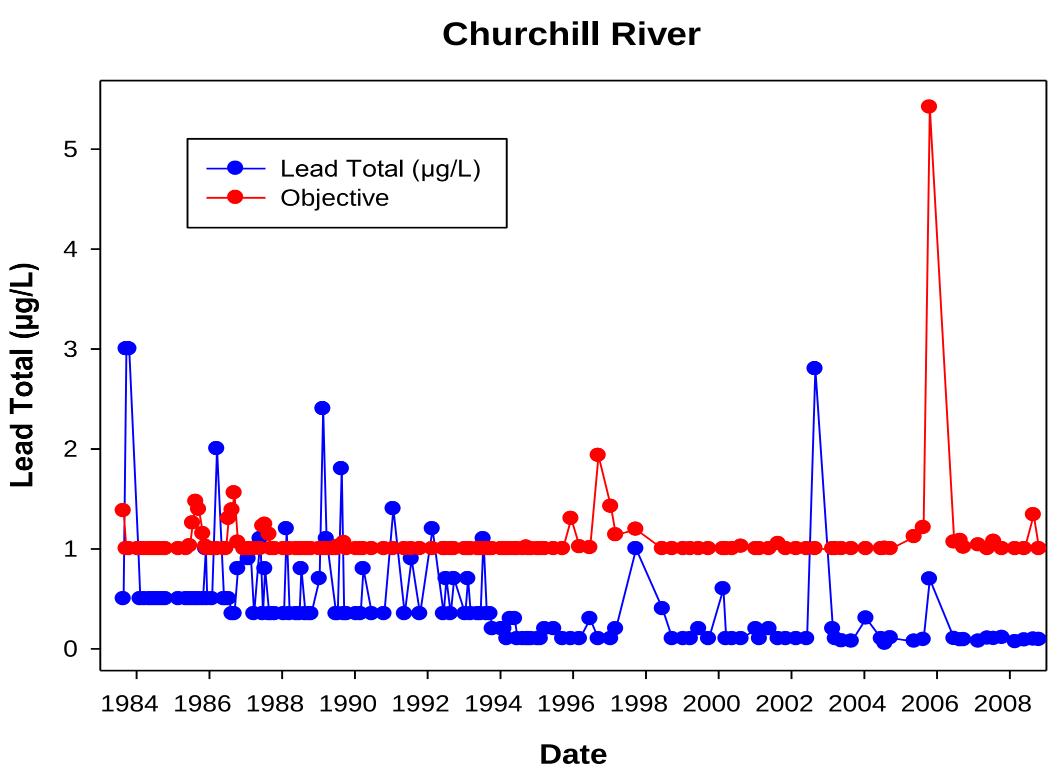

Figure 5-i12: Churchill River Lead Total

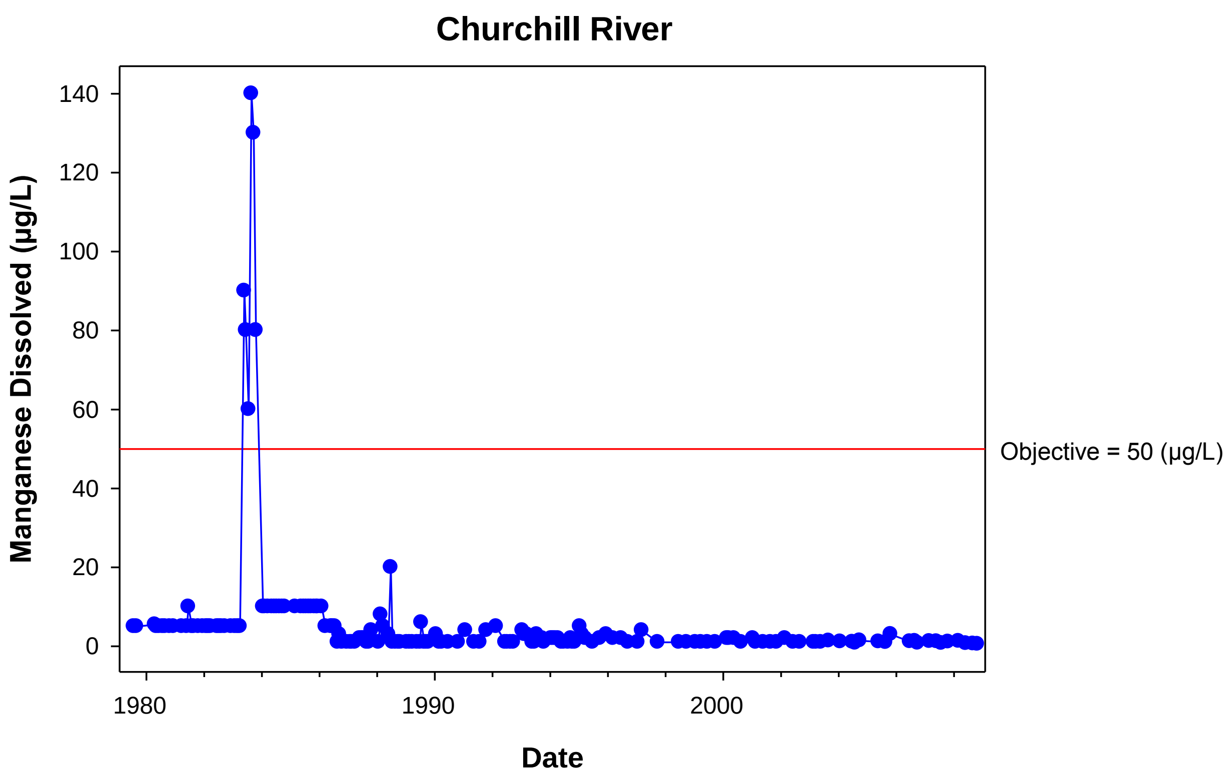

Figure 5-i13: Churchill River Manganese Dissolved

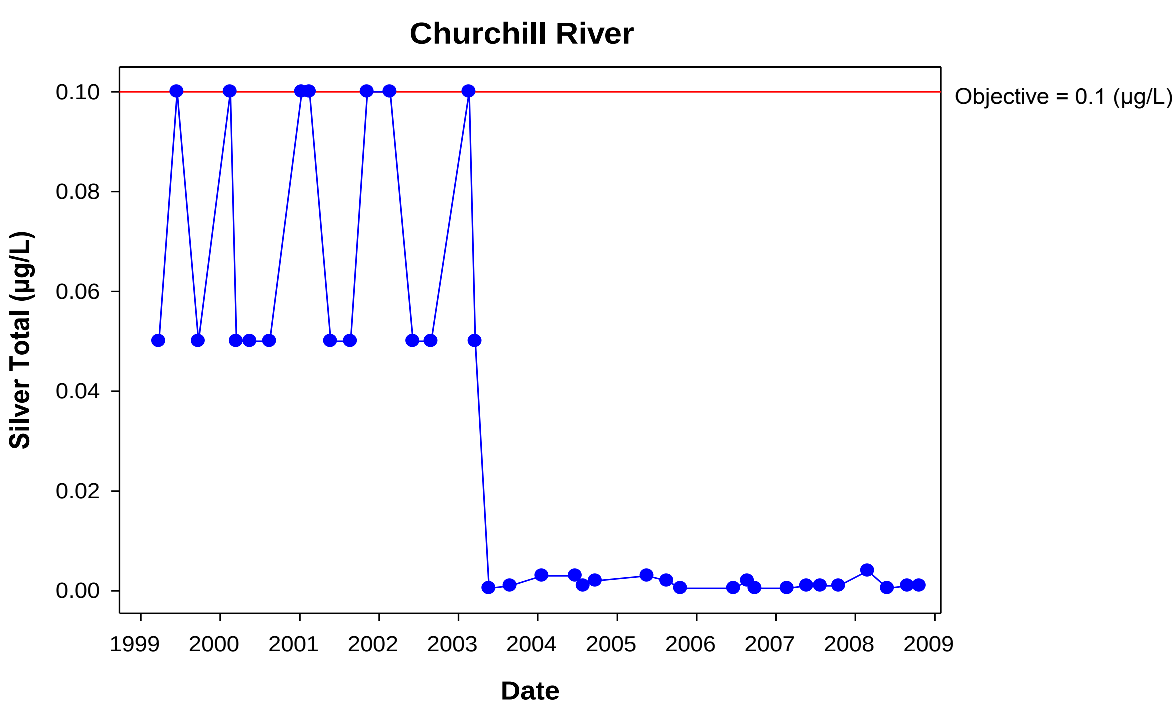

Figure 5-i14: Churchill River Silver Total

Appendix 5-j: Qu'Appelle River

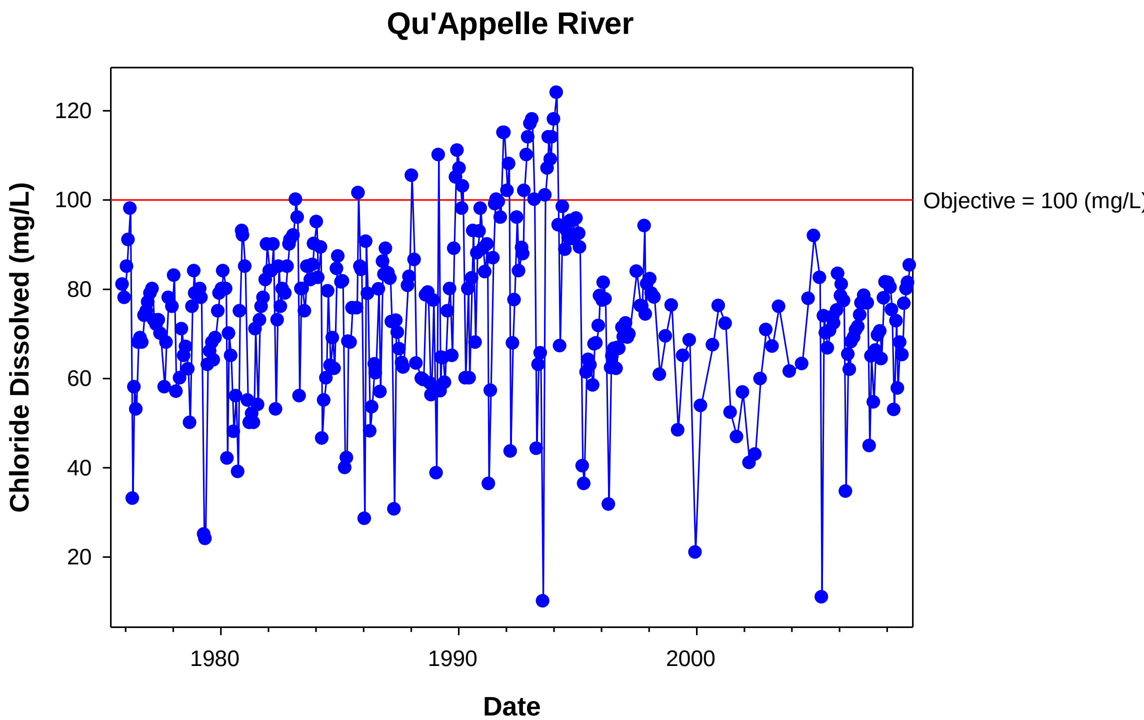

Figure 5-j1: Qu'Appelle River Chloride Dissolved

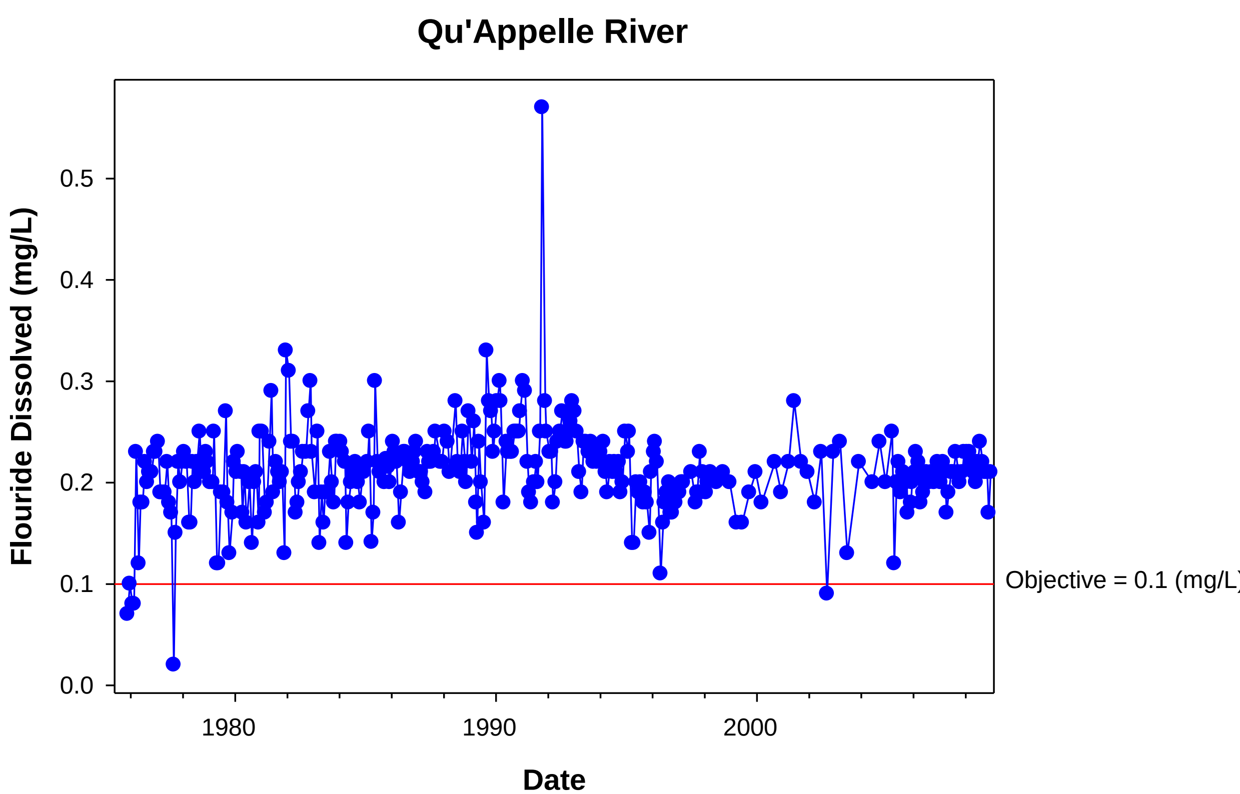

Figure 5-j2: Qu'Appelle River Fluoride Dissolved

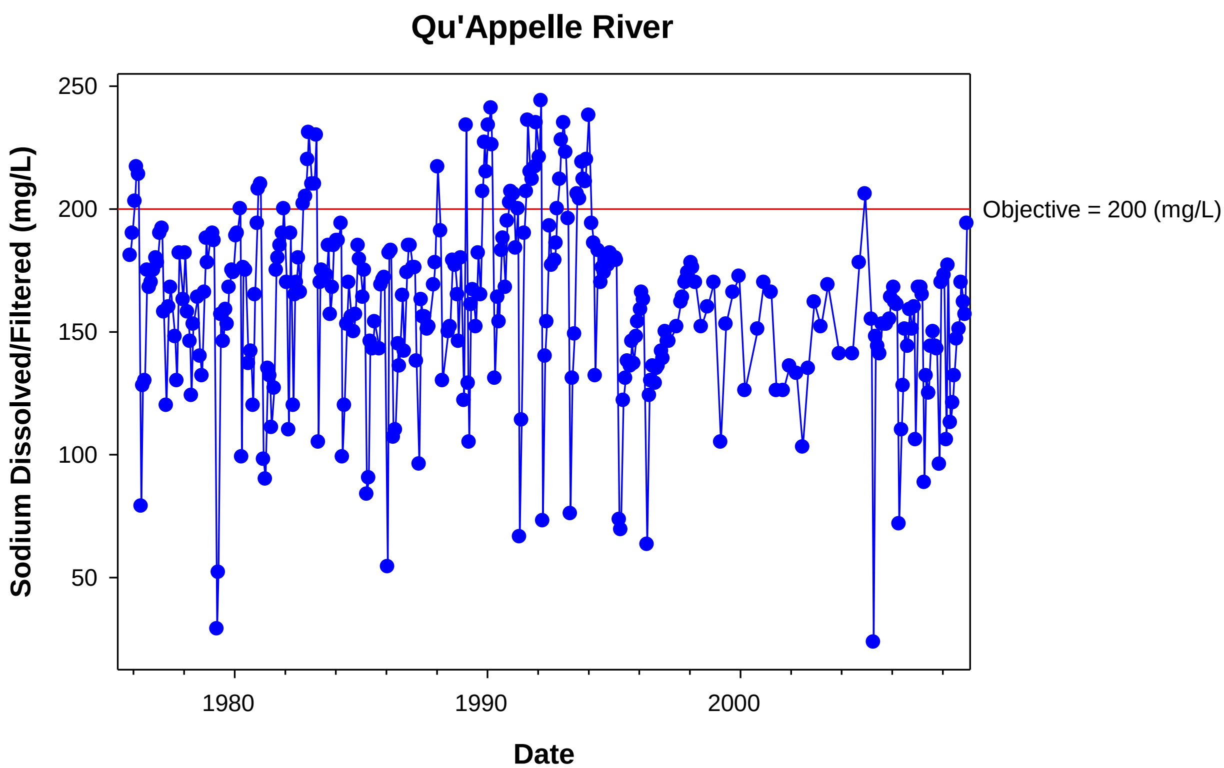

Figure 5-j3: Qu’Appelle River Sodium Dissolved/Filtered

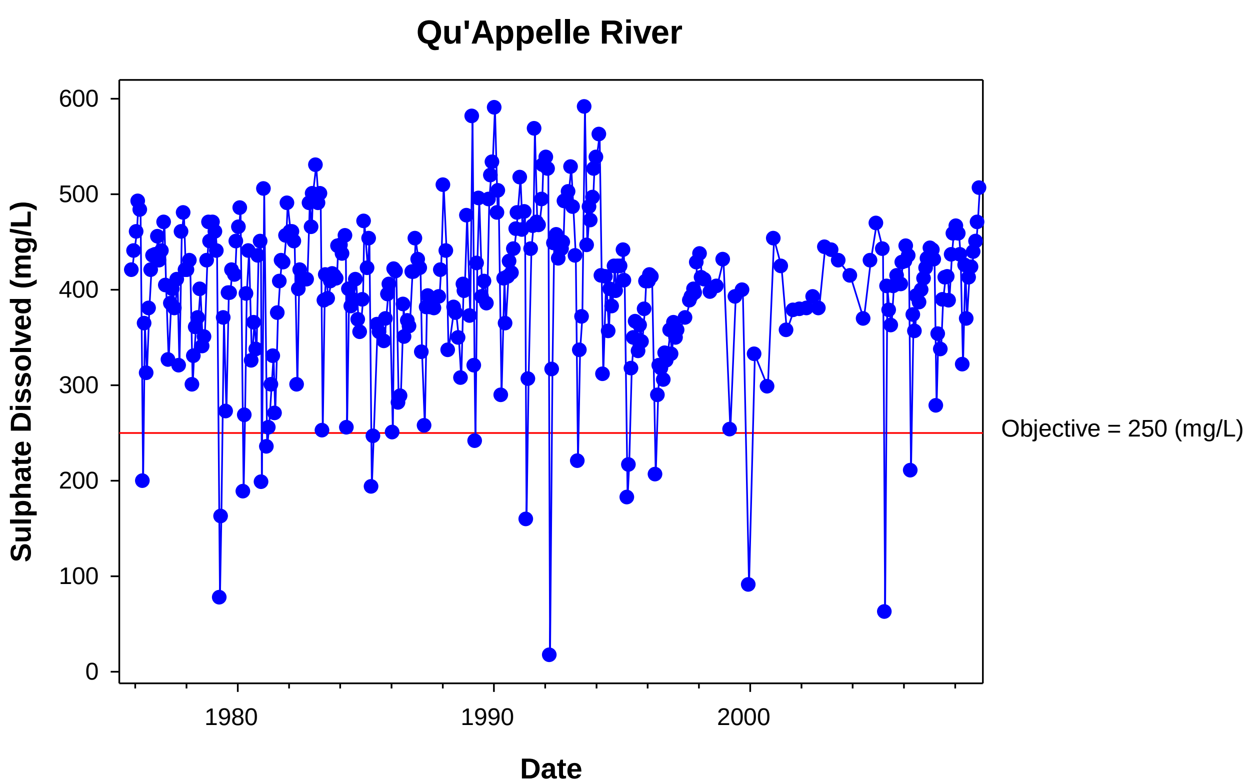

Figure 5-j4: Qu’Appelle River Sulphate Dissolved

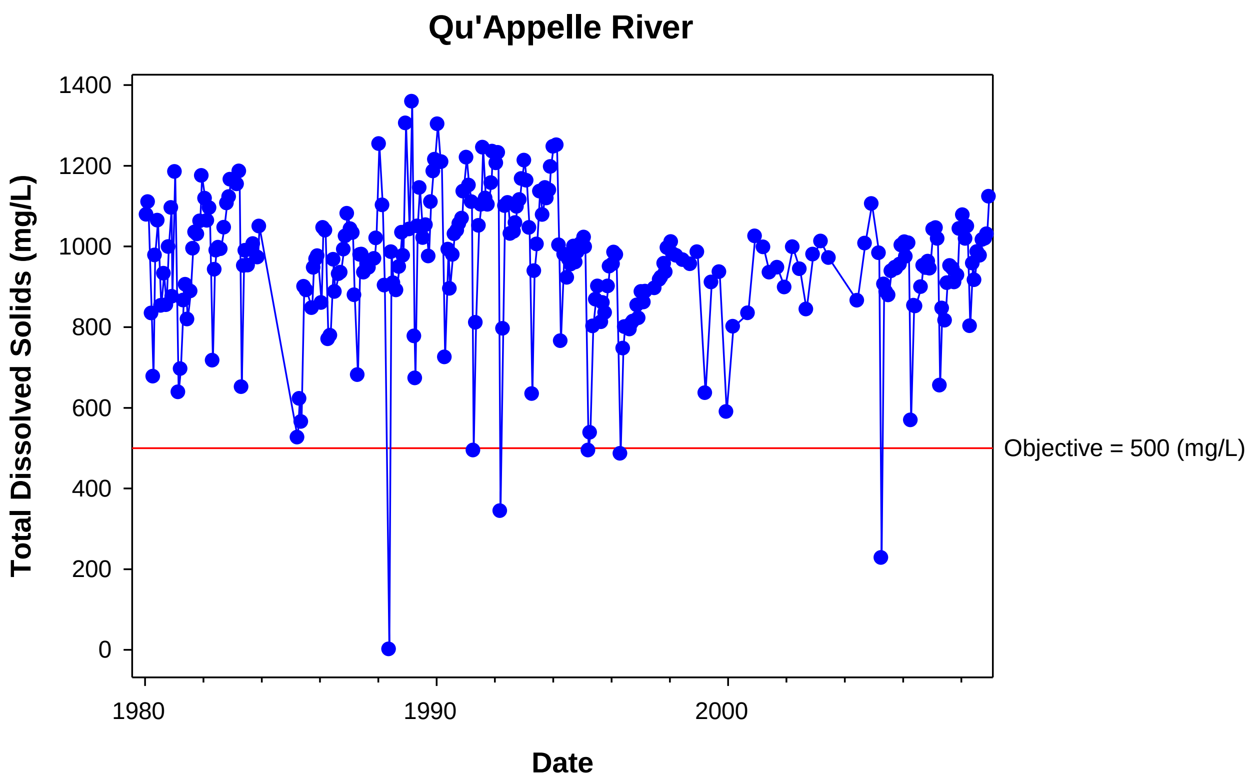

Figure 5-j5: Qu’Appelle River Total Dissolved Solids

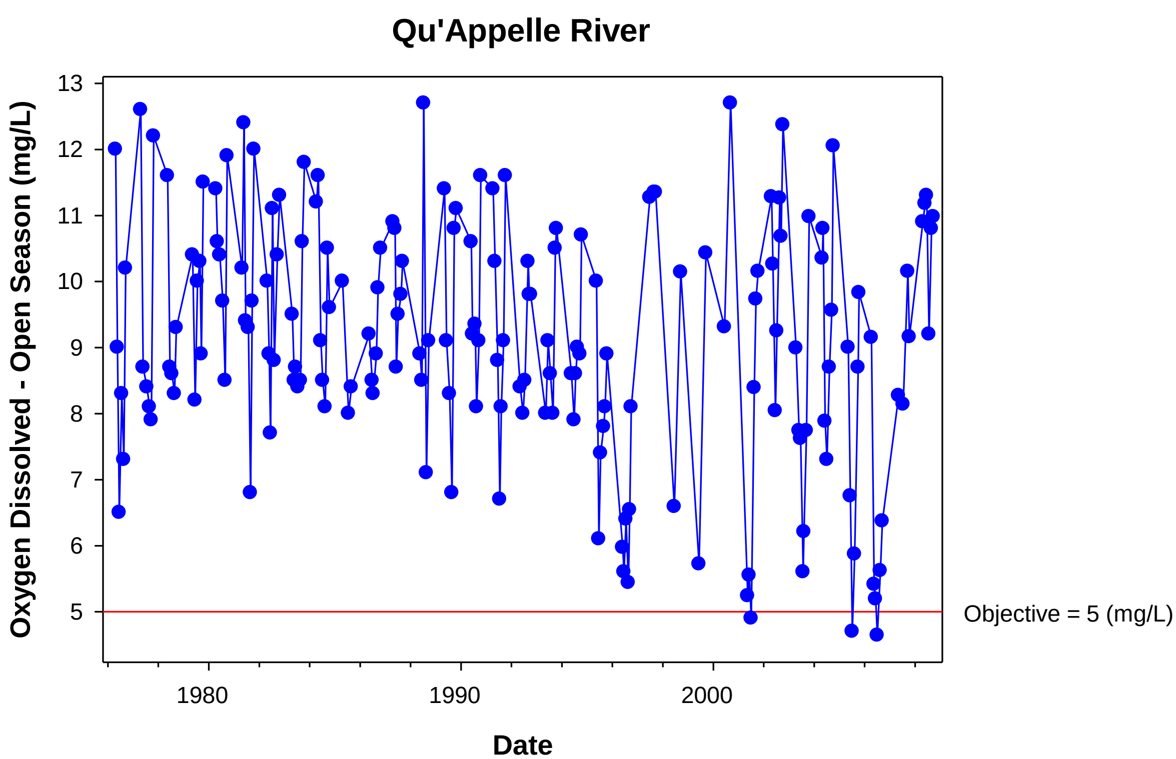

Figure 5-j6: Qu’Appelle River Oxygen Dissolved (Open Season)

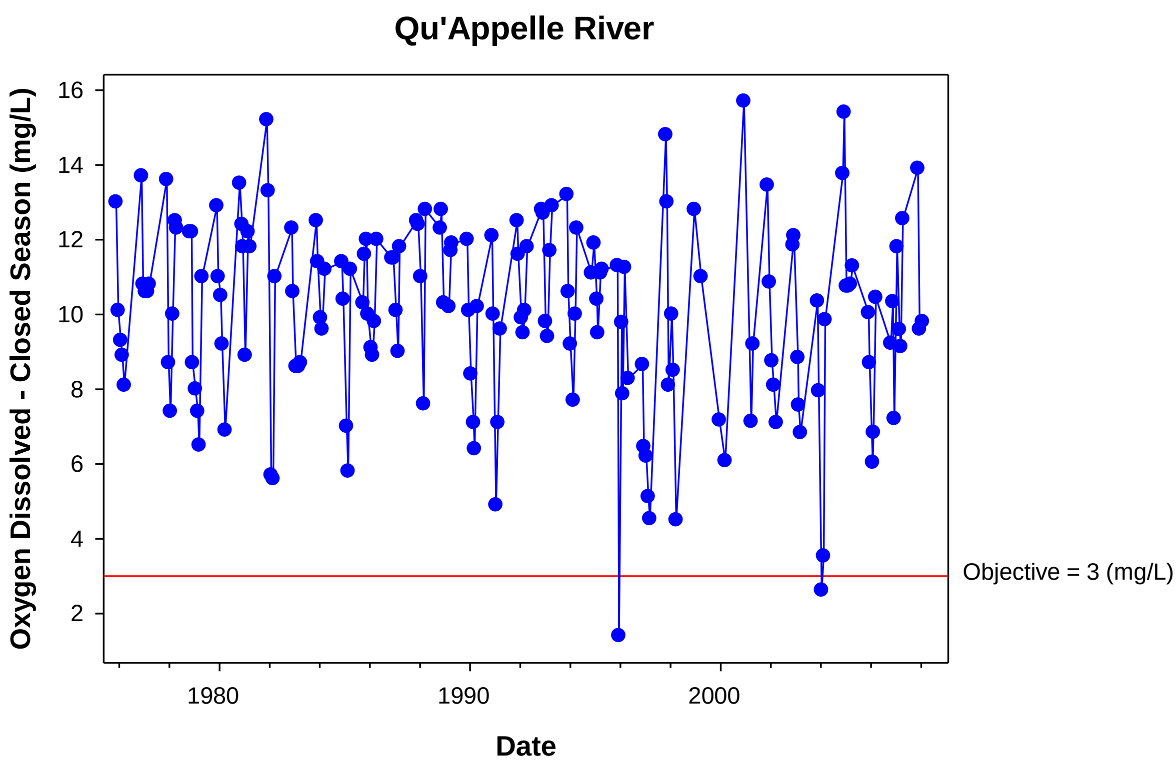

Figure 5-j7: Qu’Appelle River Oxygen Dissolved (Closed Season)

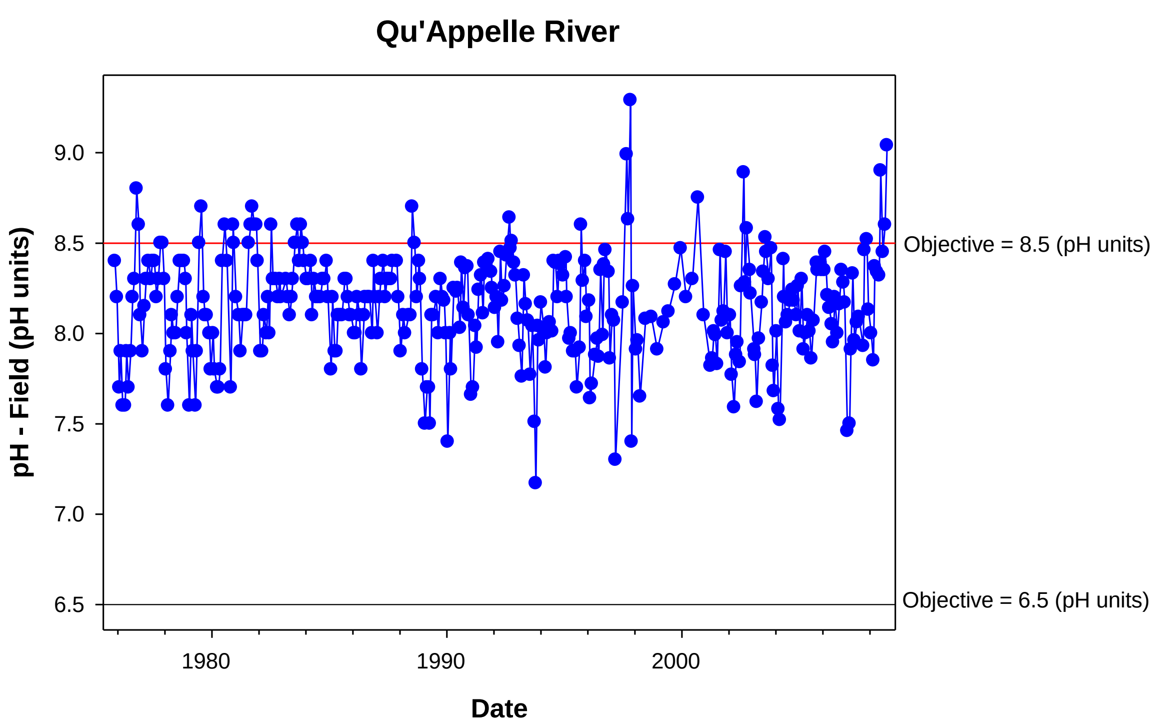

Figure 5-j8: Qu’Appelle River pH Field

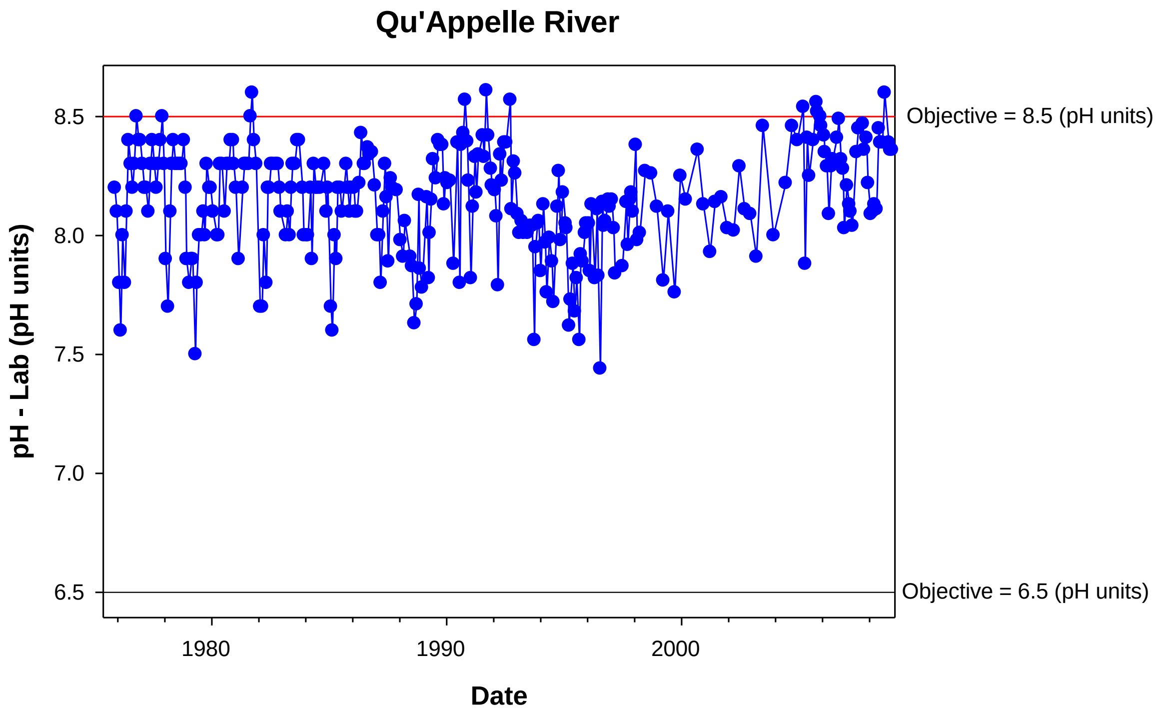

Figure 5-j9: Qu'Appelle River pH Lab

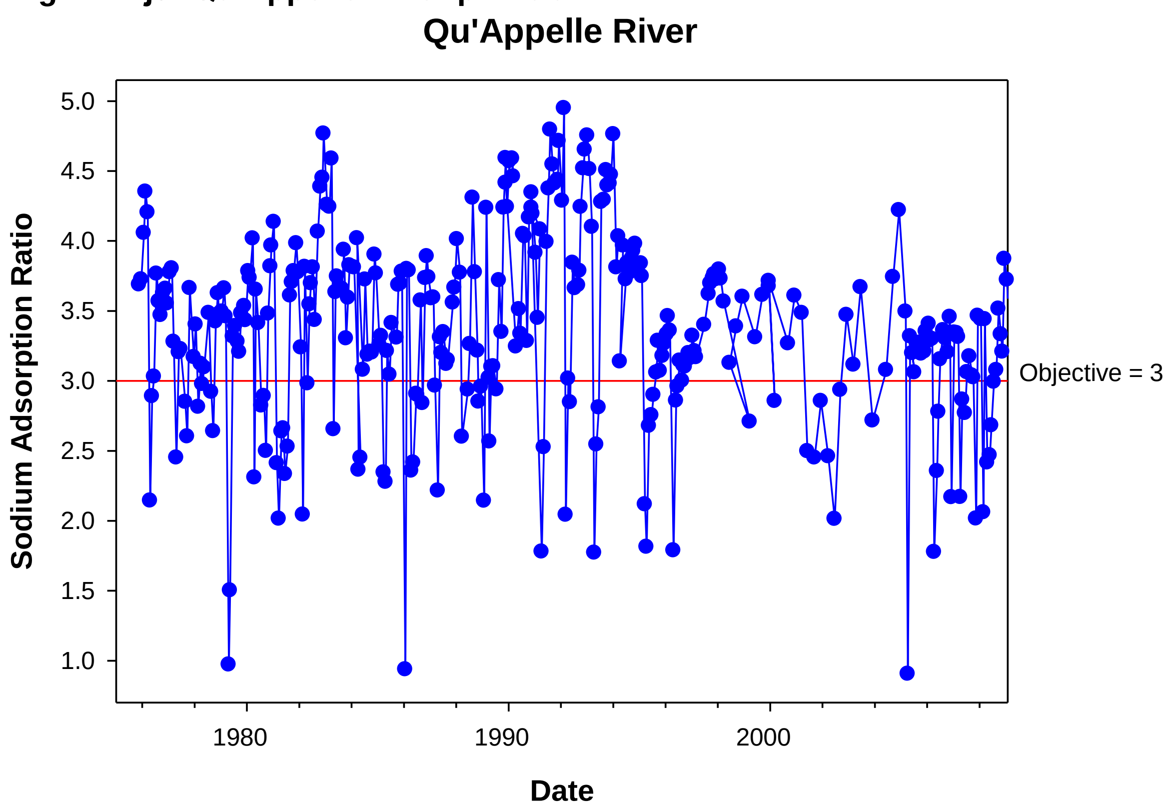

Figure 5-j10: Qu'Appelle River Sodium Adsorption Ratio

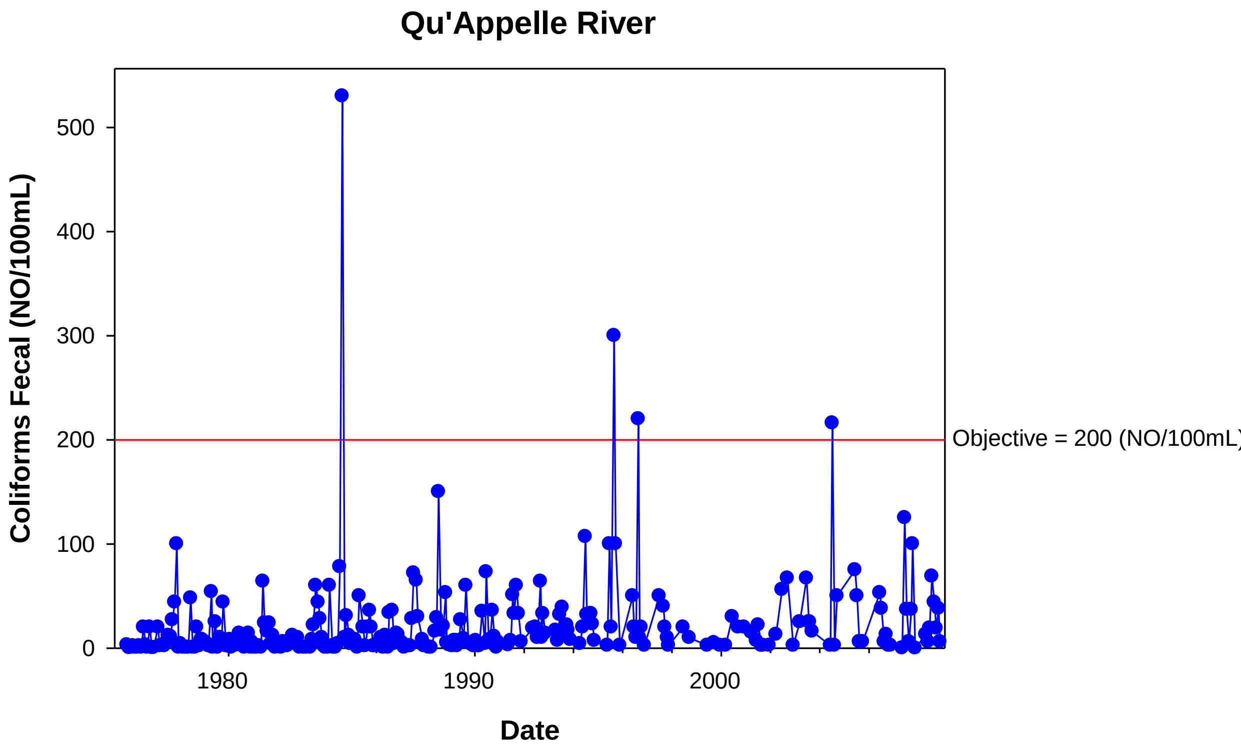

Figure 5-j11: Qu’Appelle River Coliforms Fecal

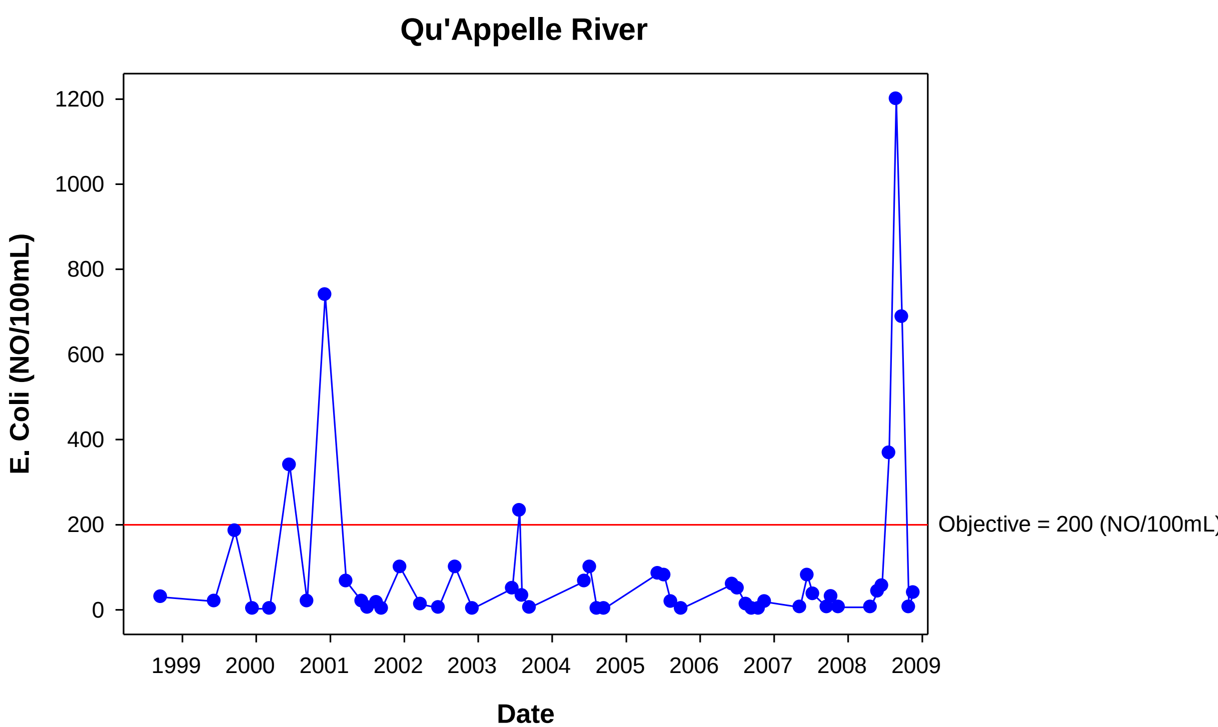

Figure 5-j12: Qu’Appelle River E. Coli

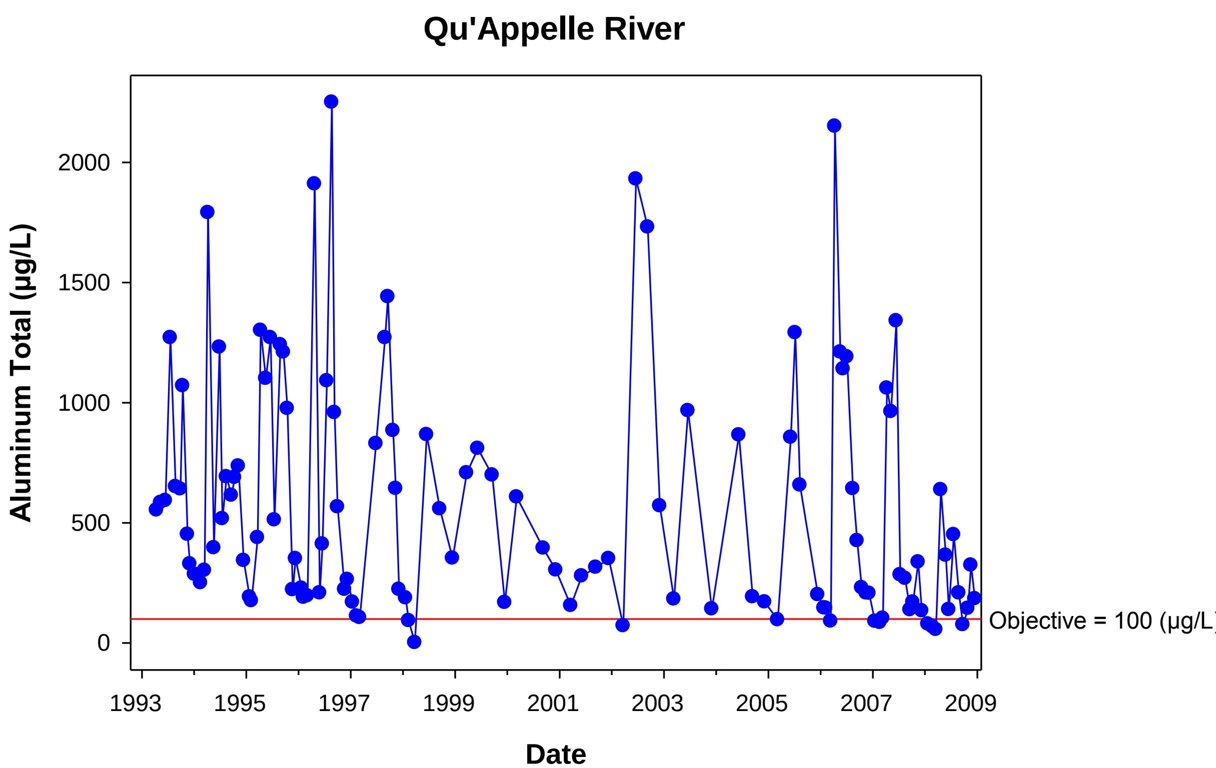

Figure 5-j13: Qu'Appelle River Aluminum Total

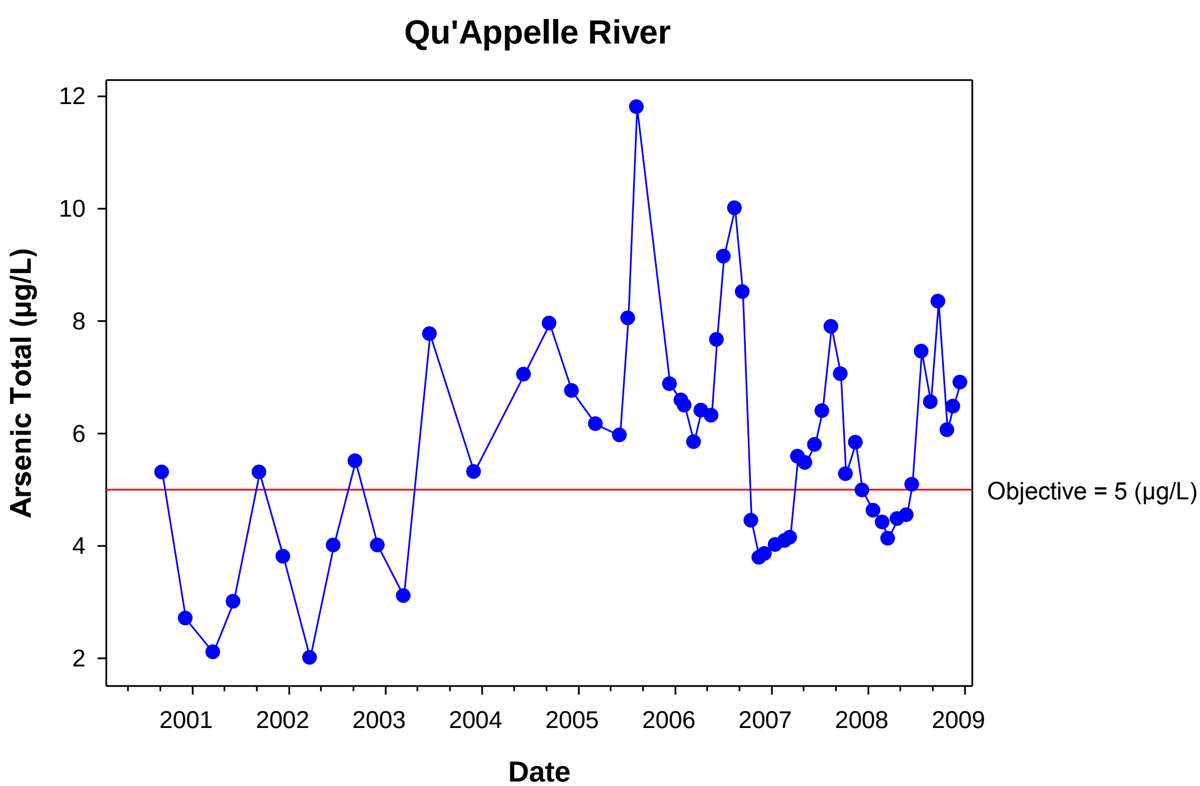

Figure 5-j14: Qu'Appelle River Arsenic Total

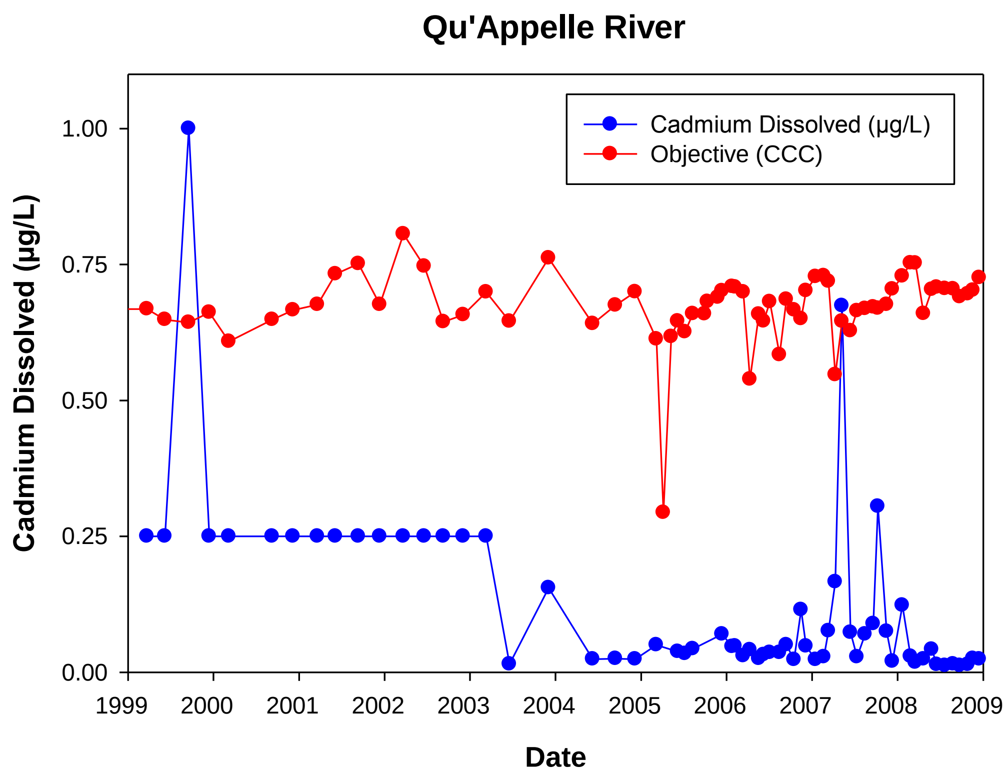

Figure 5-j15: Qu’Appelle River Cadmium Dissolved

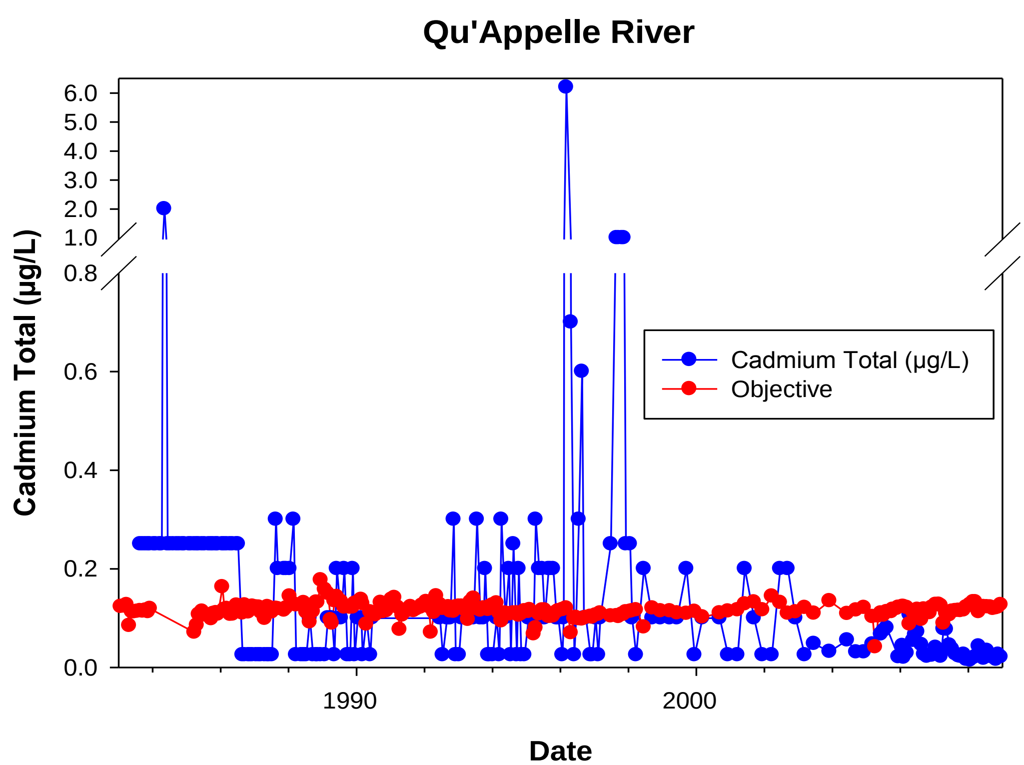

Figure 5-j16: Qu’Appelle River Cadmium Total

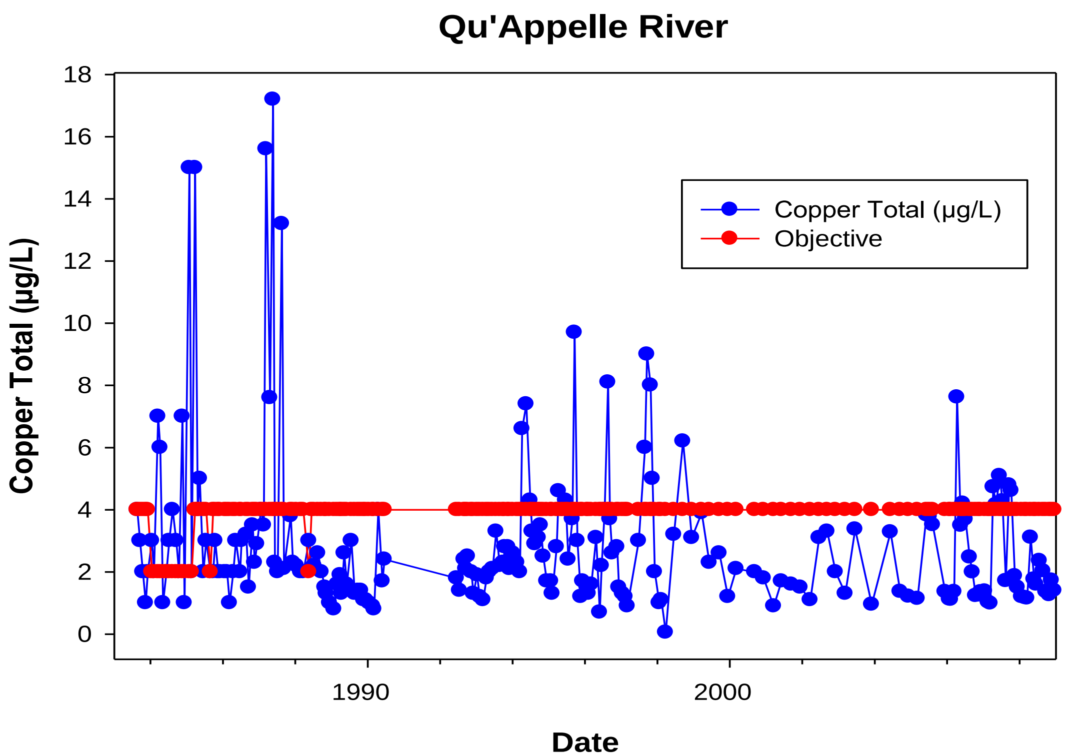

Figure 5-j17: Qu’Appelle River Copper Total

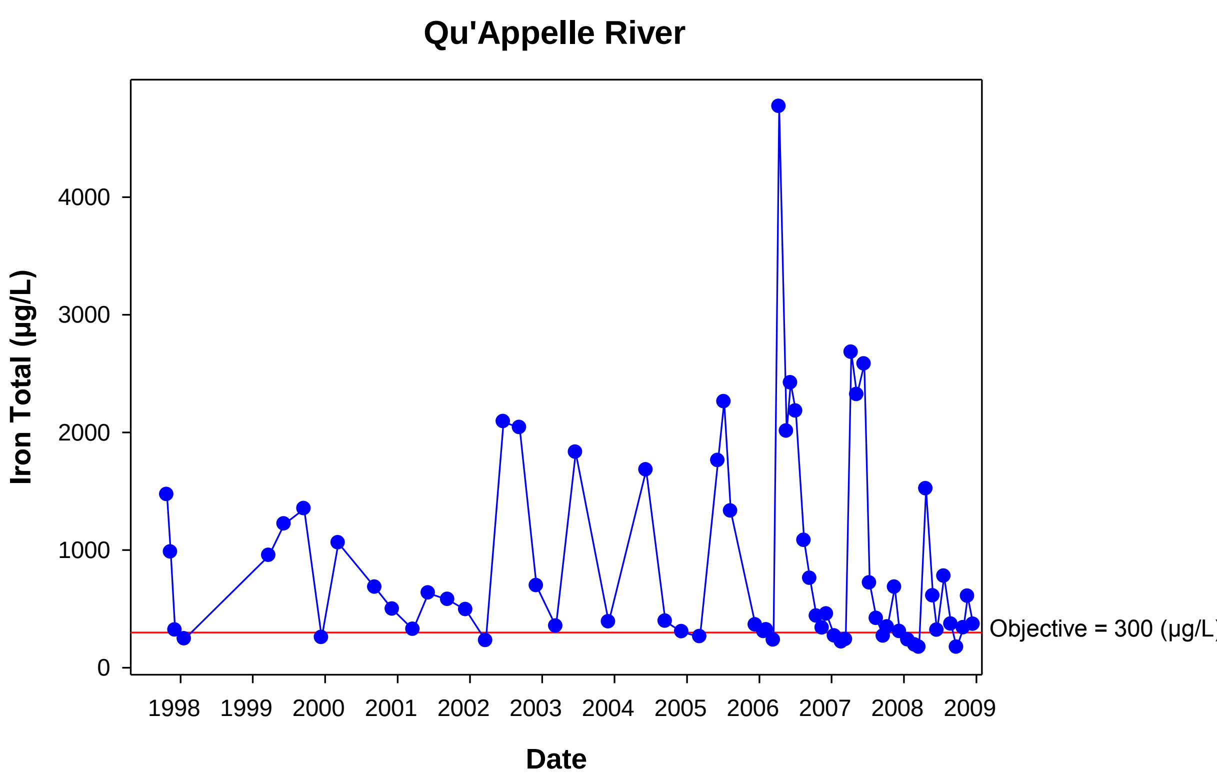

Figure 5-j18: Qu’Appelle River Iron Total

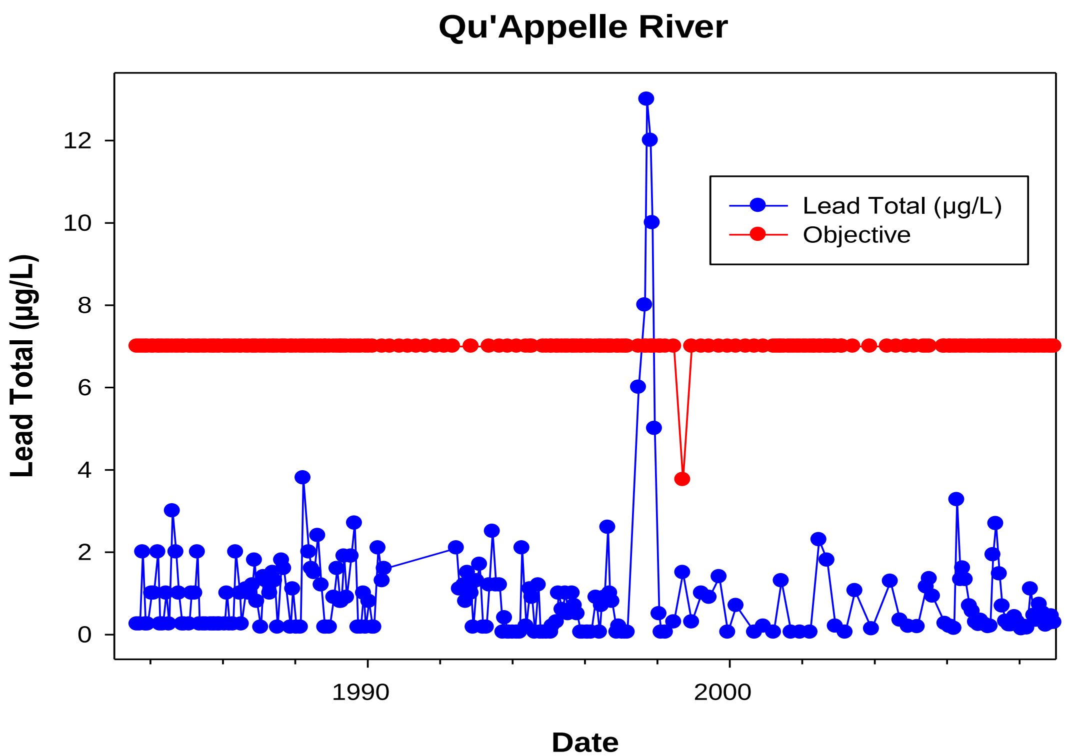

Figure 5-j19: Qu’Appelle River Lead Total

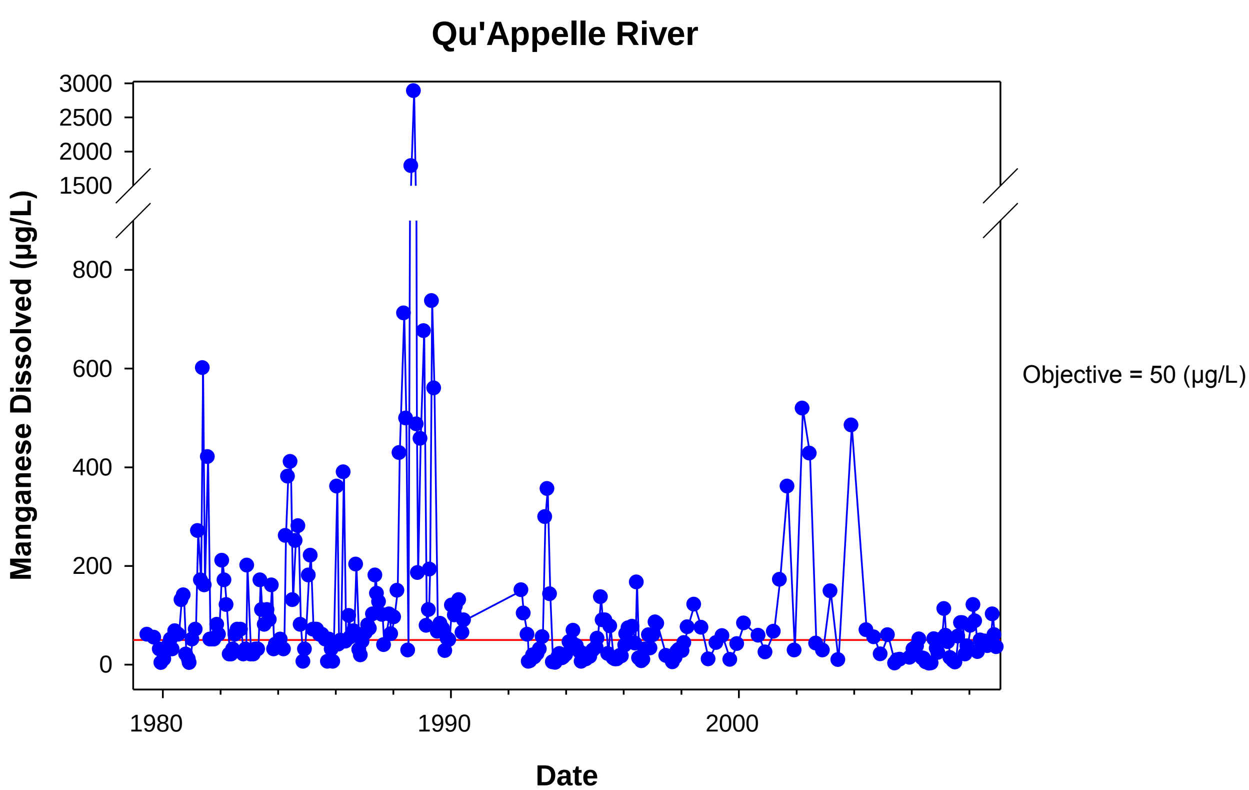

Figure 5-j20: Qu’Appelle River Manganese Dissolved

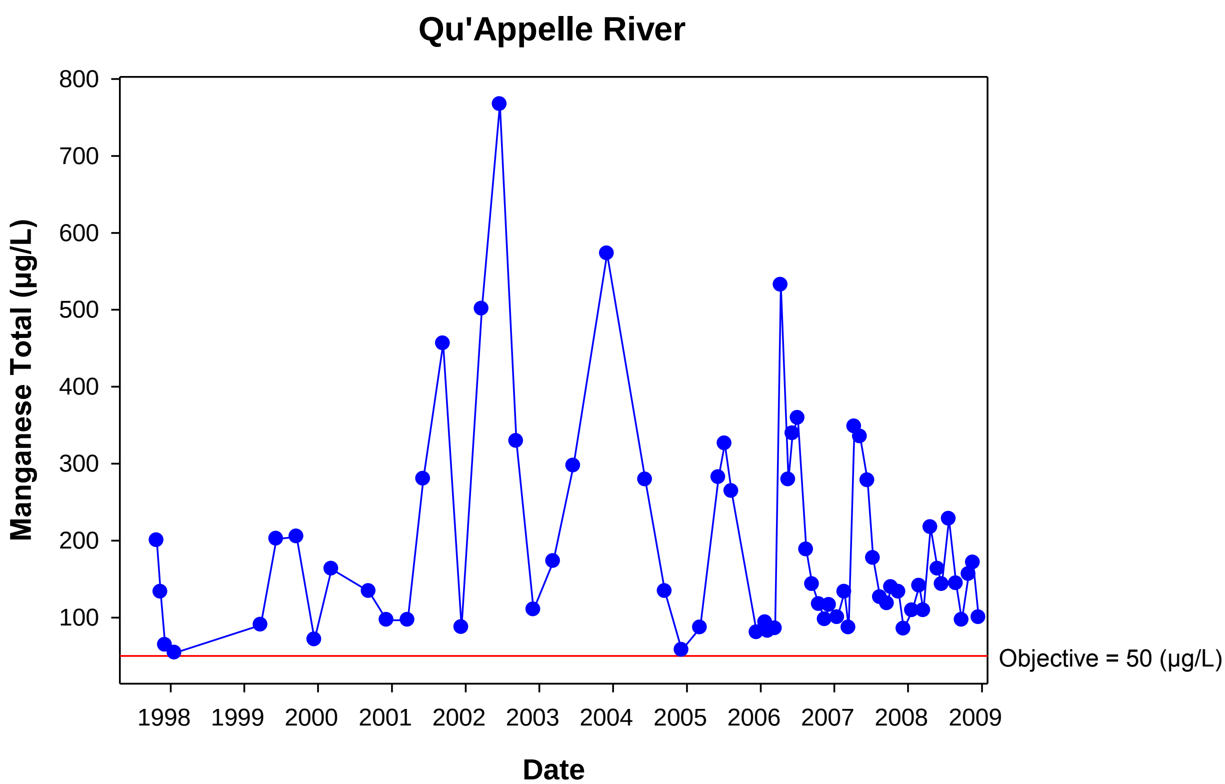

Figure 5-j21: Qu'Appelle River Manganese Total

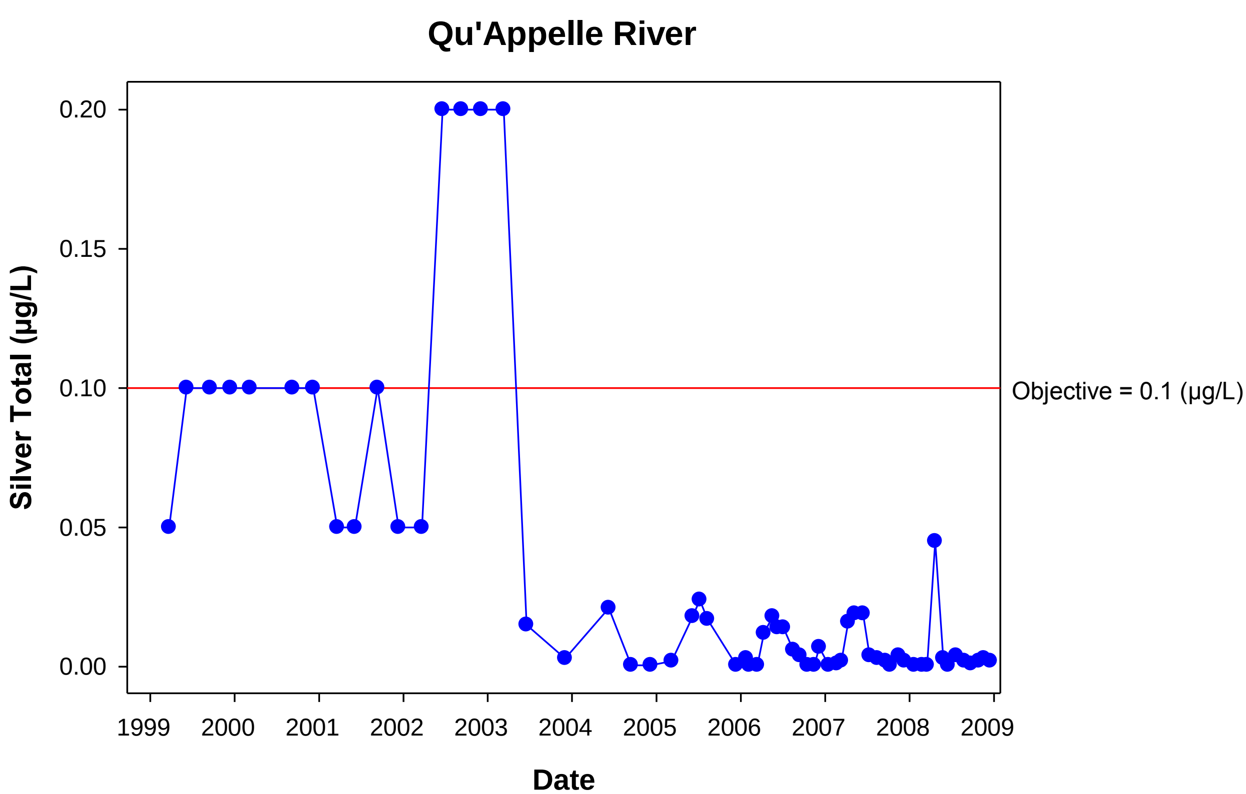

Figure 5-j22: Qu'Appelle River Silver Total

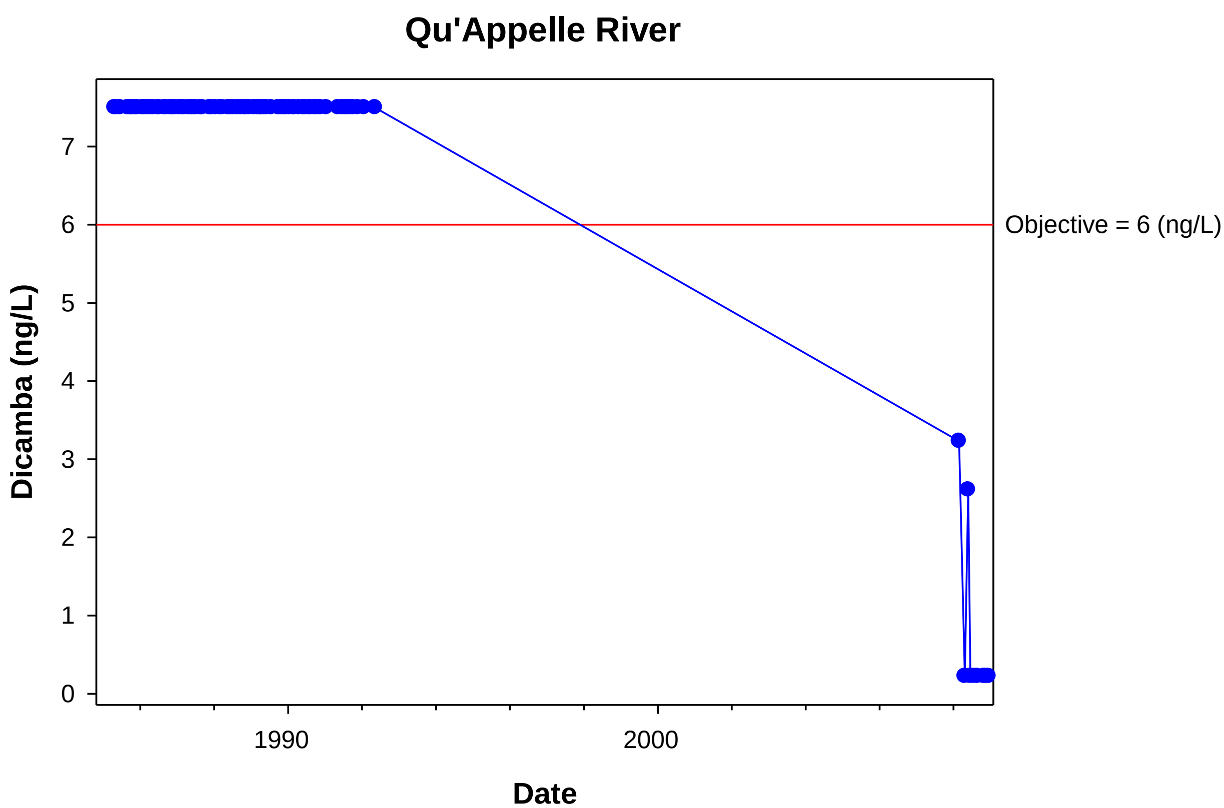

Figure 5-j23: Qu'Appelle River Dicamba

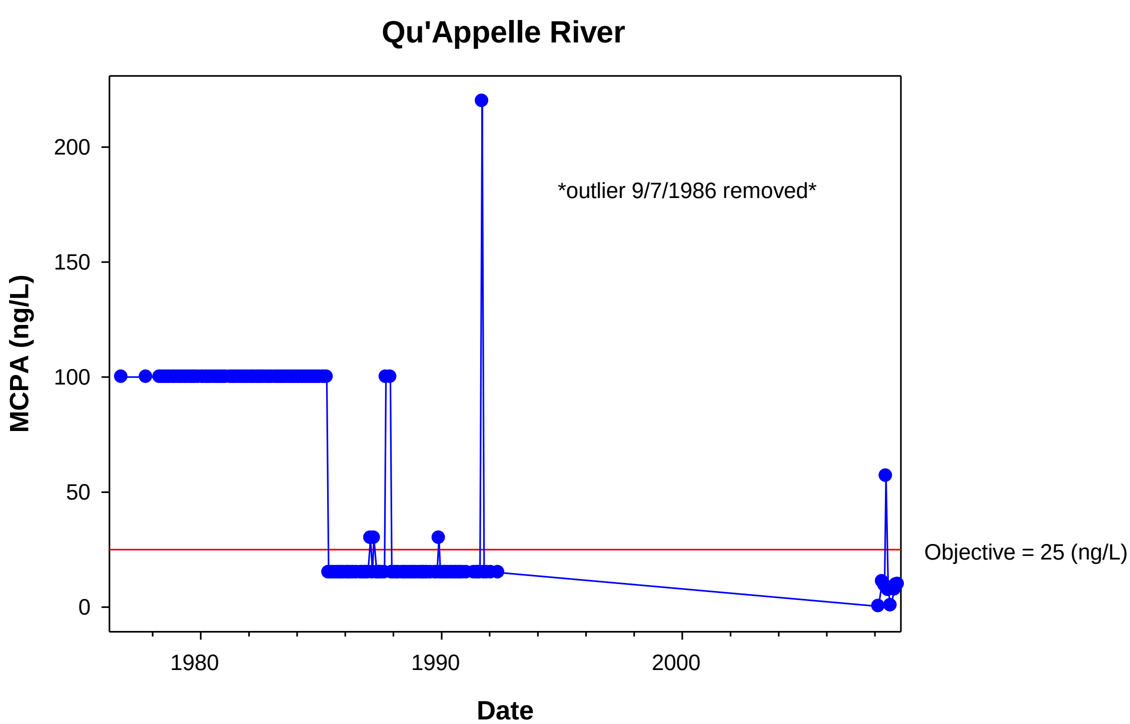

Figure 5-j24: Qu'Appelle River MCPA

Appendix 5-k: Red Deer River (SK-MB)

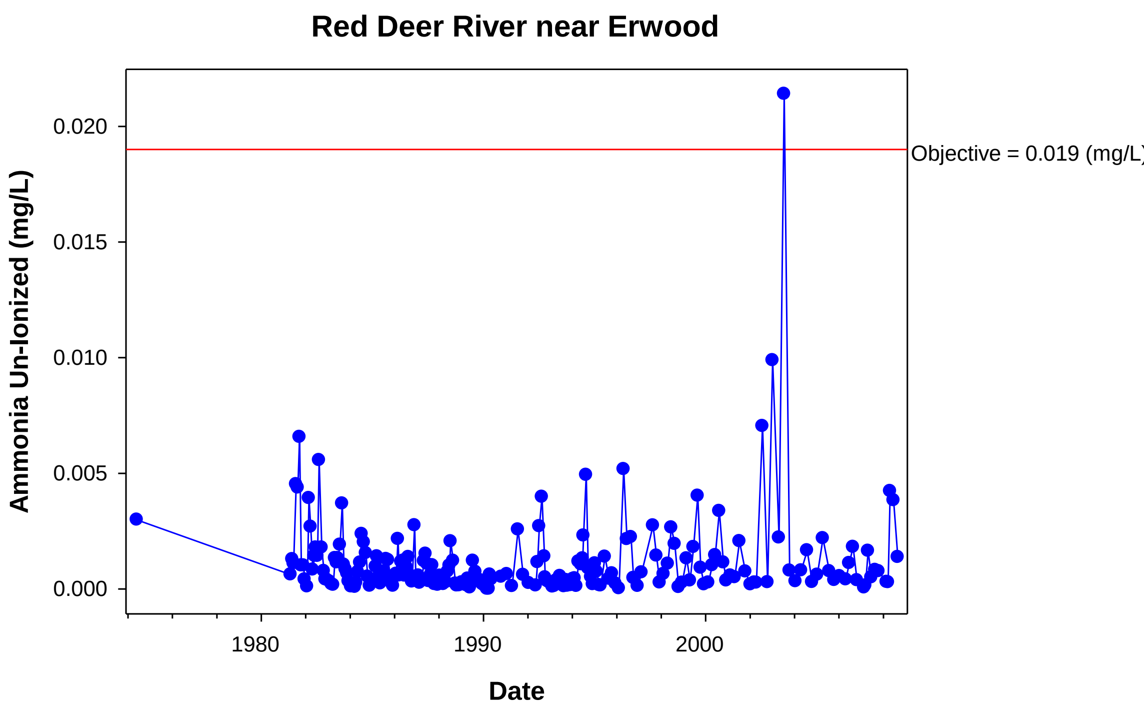

Figure 5-k1: Red Deer River (SK-MB) Ammonia Un-Ionized

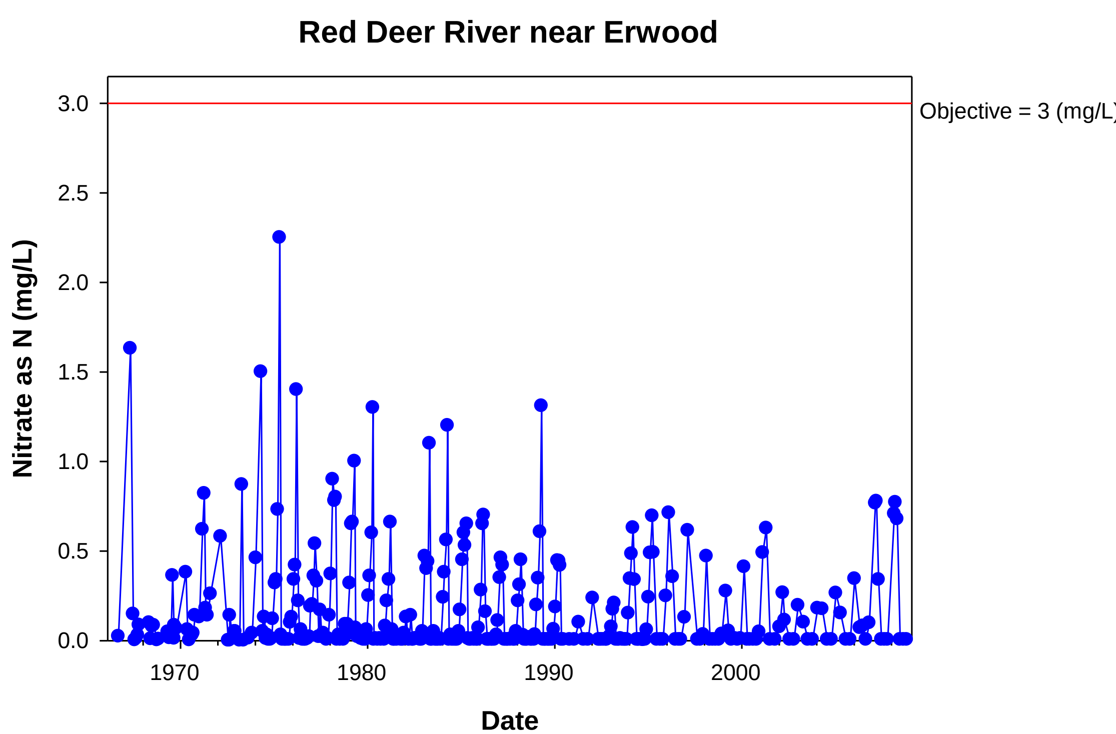

Figure 5-k2: Red Deer River (SK-MB) Nitrate as N

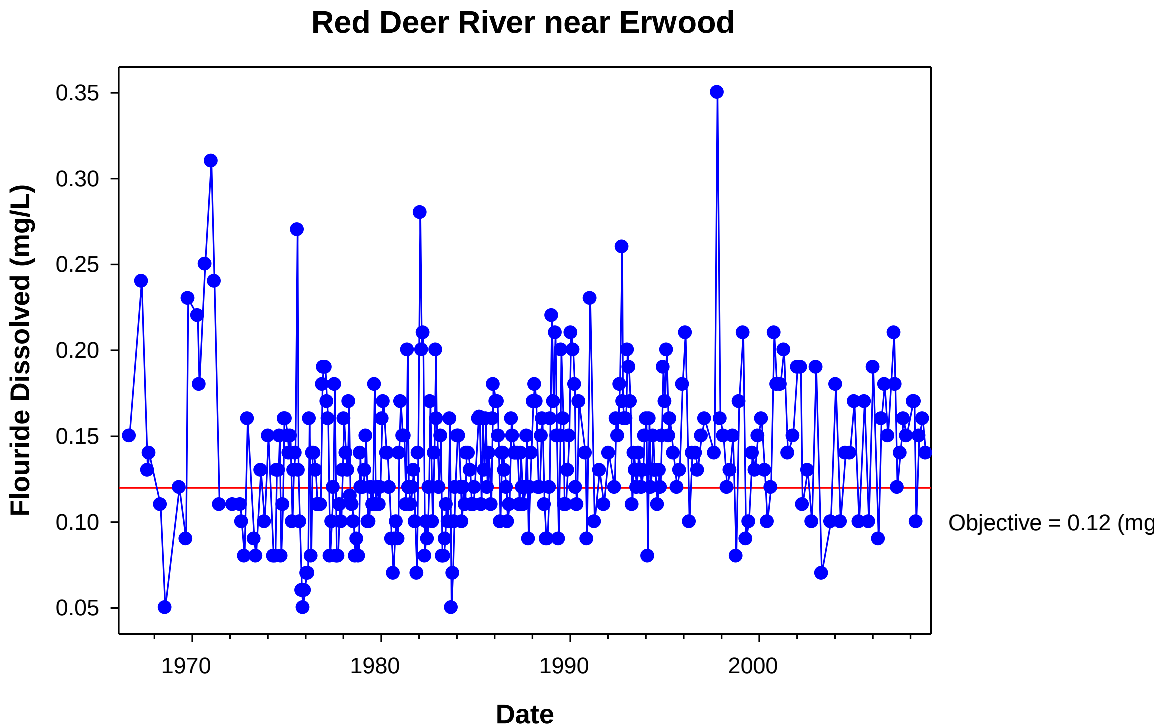

Figure 5-k3: Red Deer River (SK-MB) Fluoride Dissolved

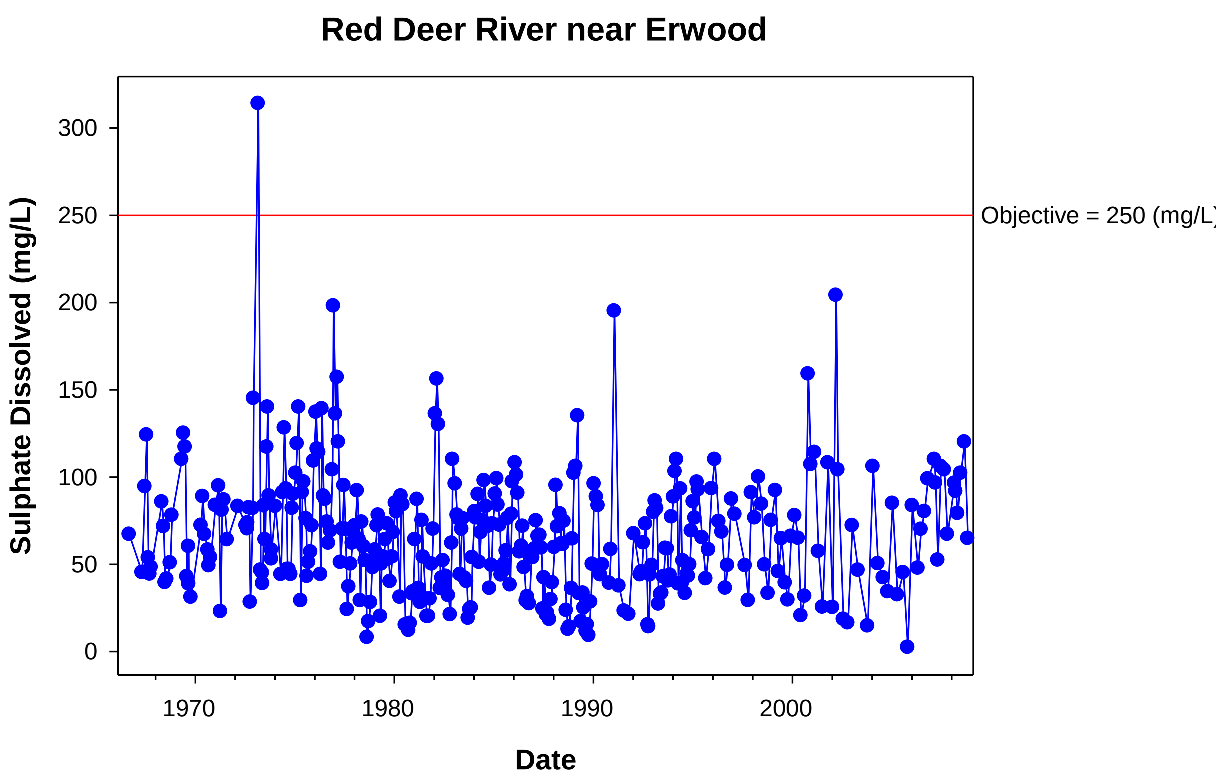

Figure 5-k4: Red Deer River (SK-MB) Sulphate Dissolved

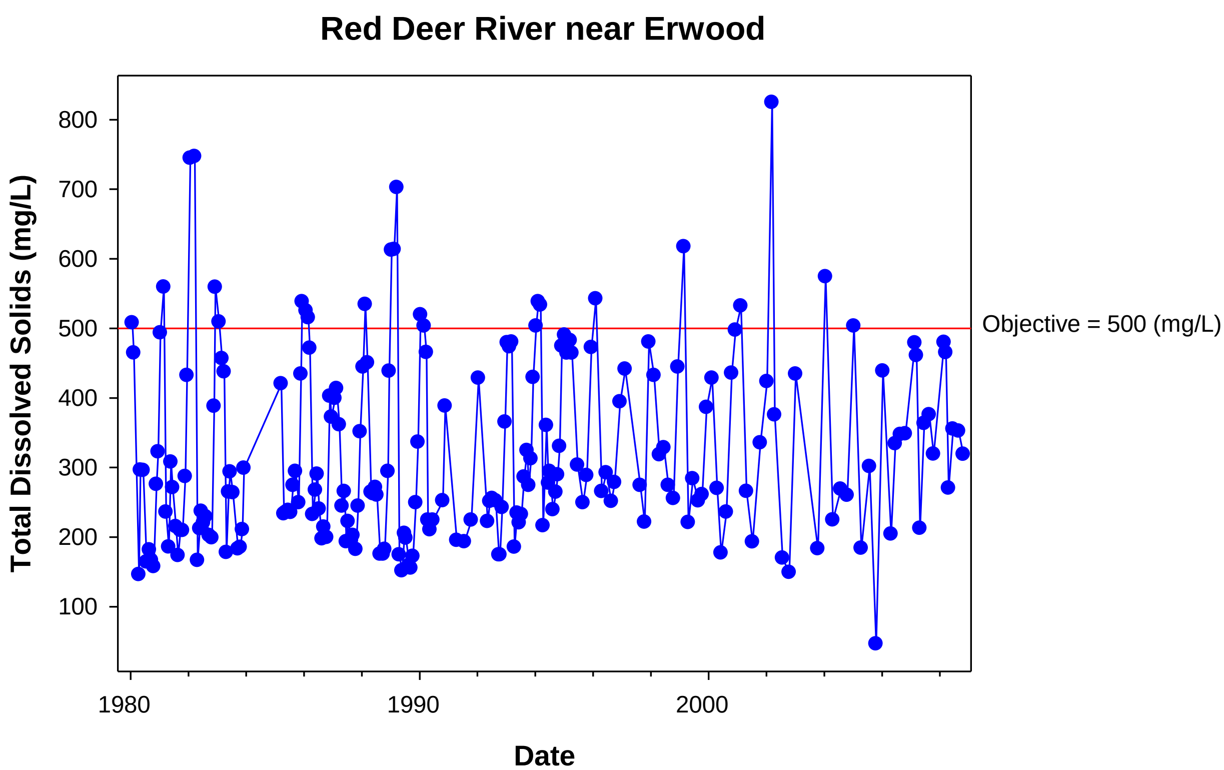

Figure 5-k5: Red Deer River (SK-MB) Total Dissolved Solids

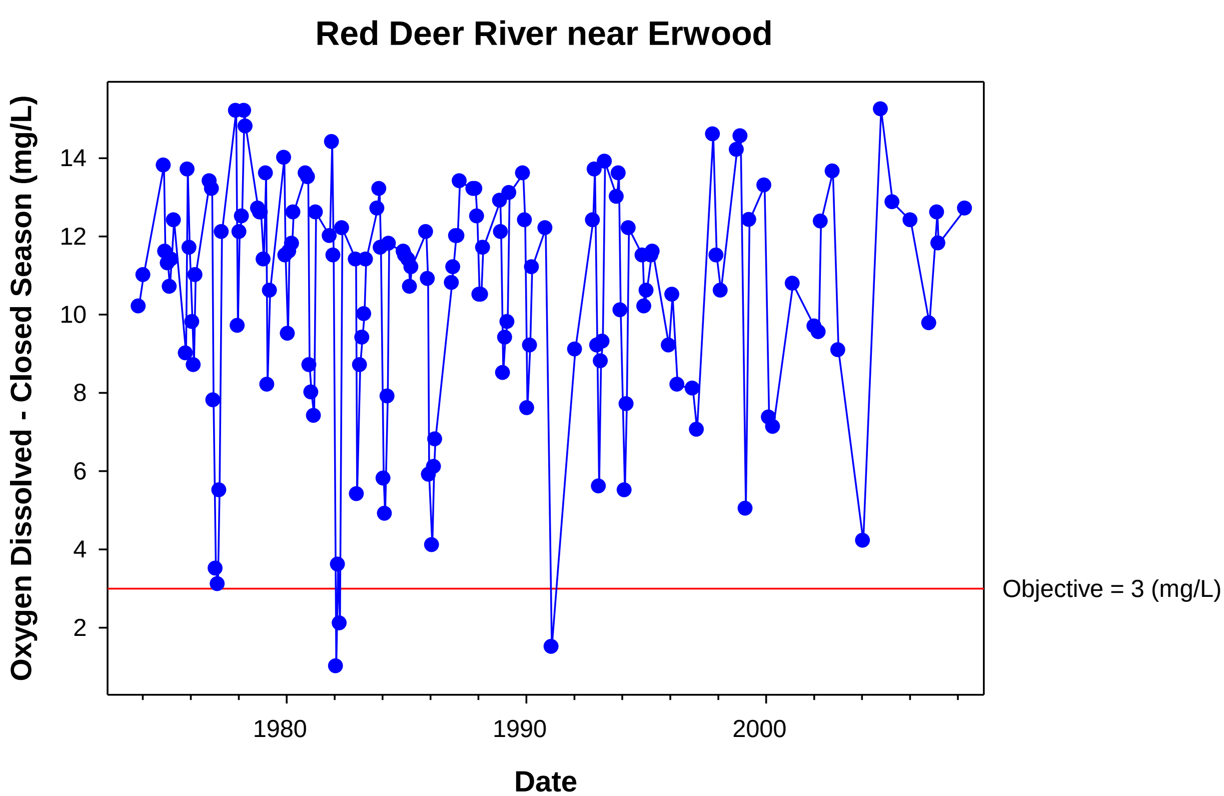

Figure 5-k6: Red Deer River (SK-MB) Oxygen Dissolved (Closed Season)

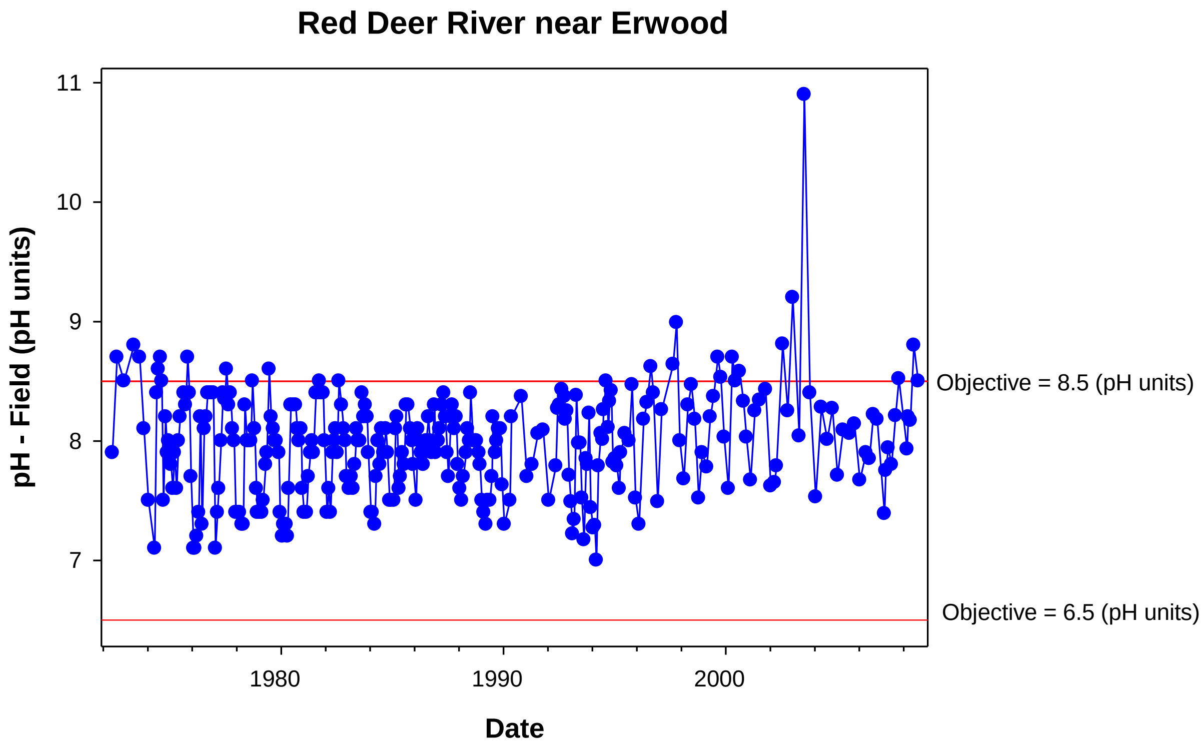

Figure 5-k7: Red Deer River (SK-MB) pH Field

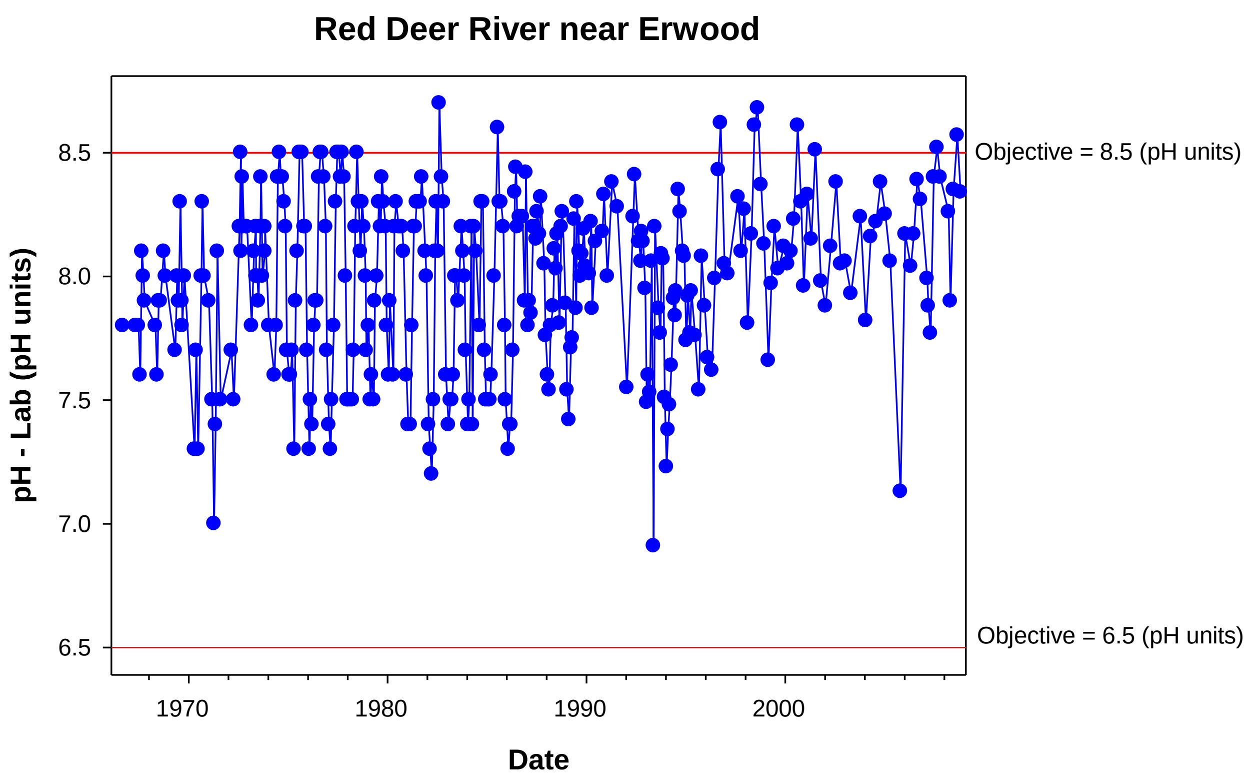

Figure 5-k8: Red Deer River (SK-MB) pH Lab

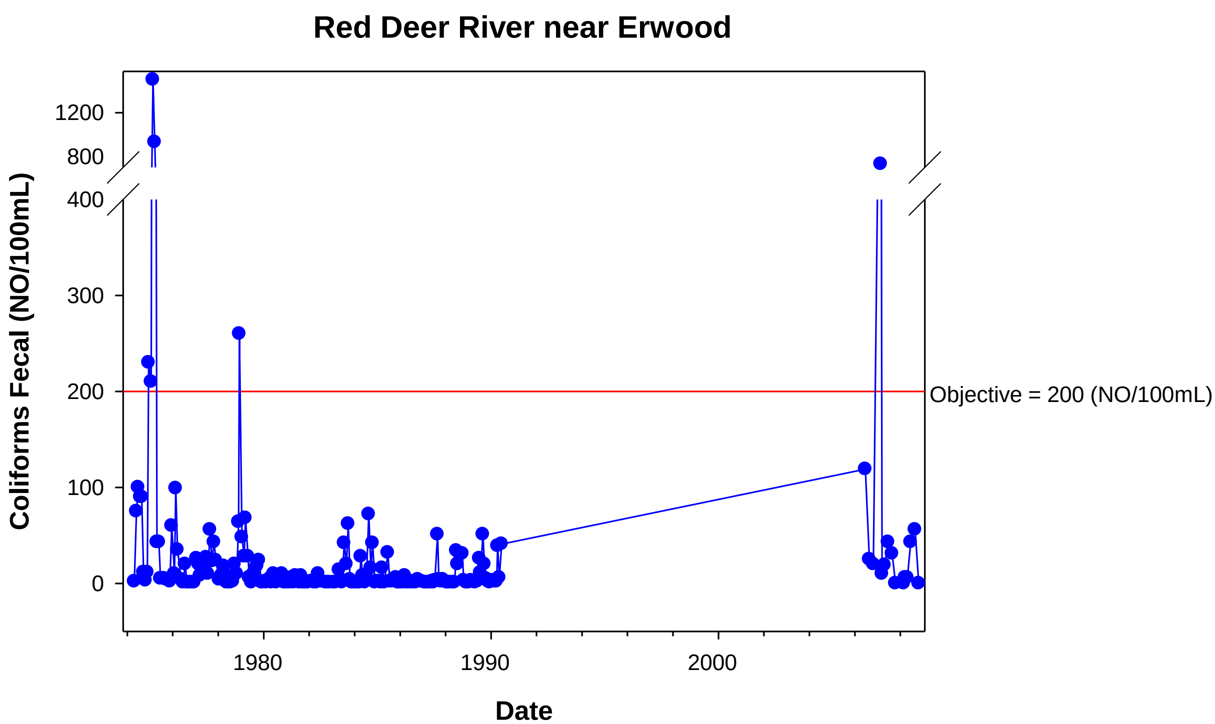

Figure 5-k9: Red Deer River (SK-MB) Coliforms Fecal

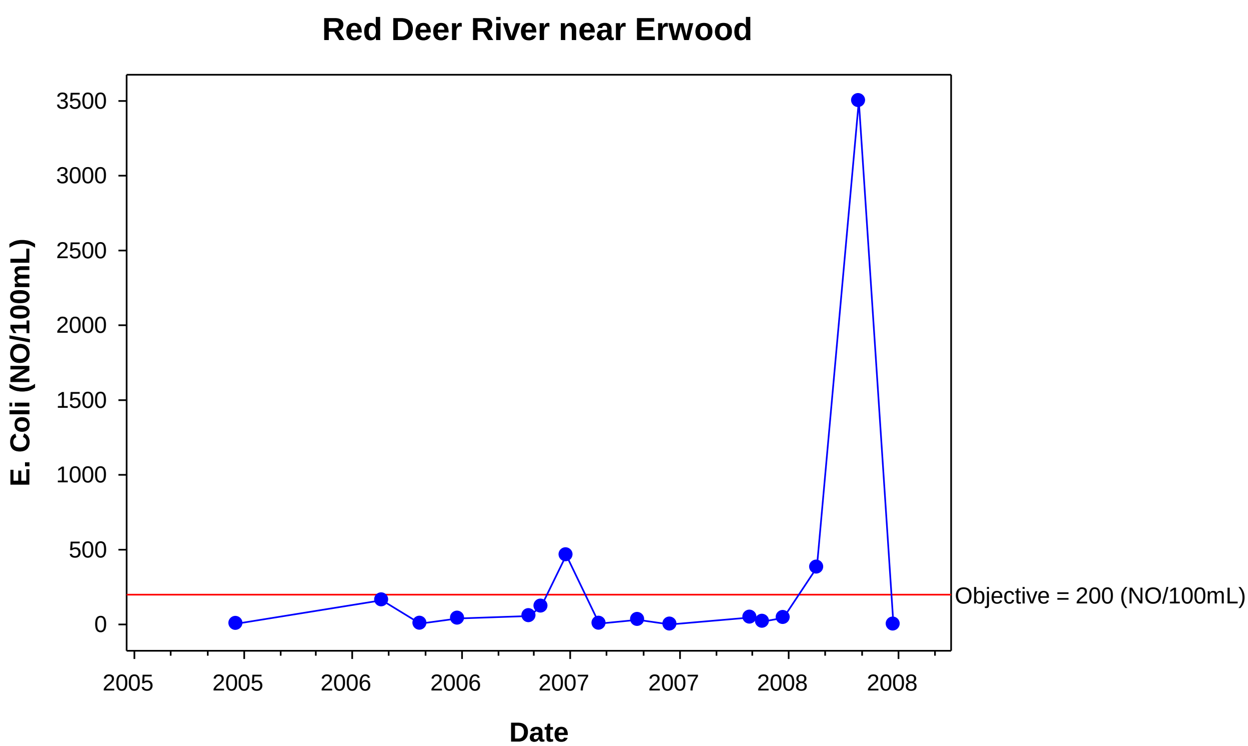

Figure 5-k10: Red Deer River (SK-MB) E. Coli

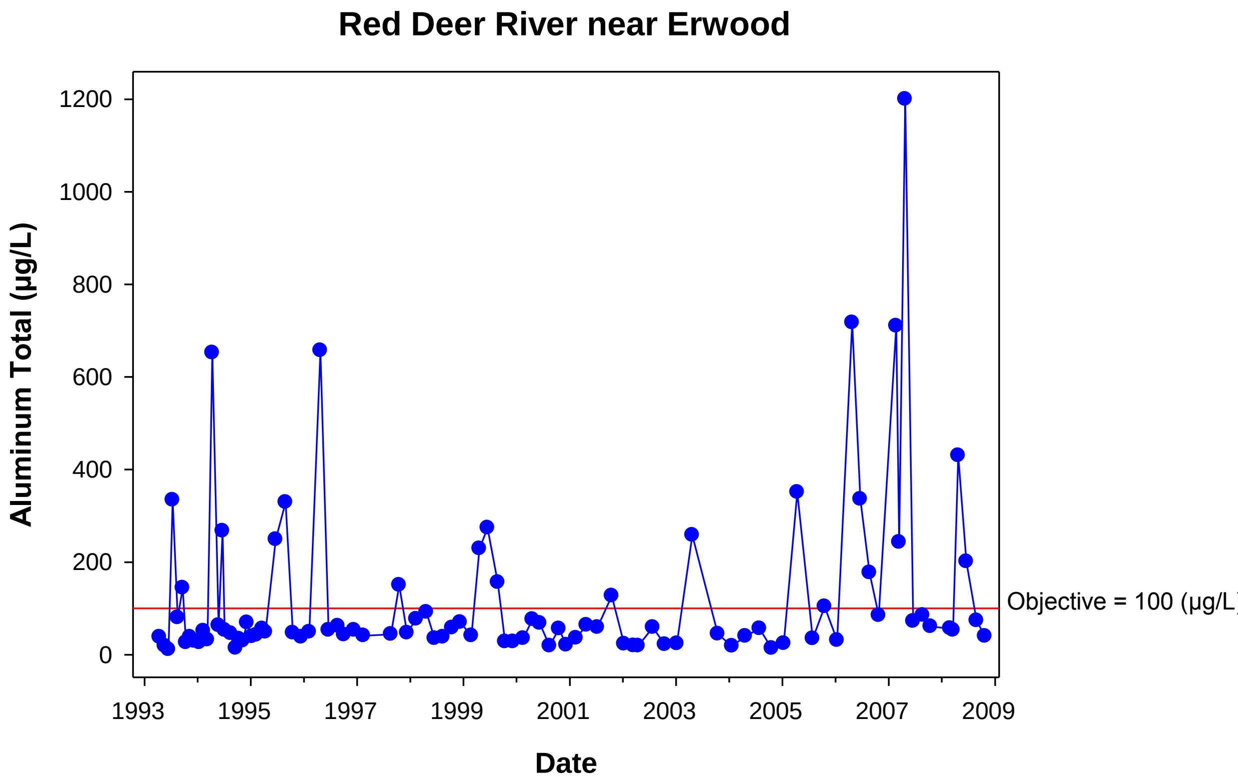

Figure 5-k11: Red Deer River (SK-MB) Aluminum Total

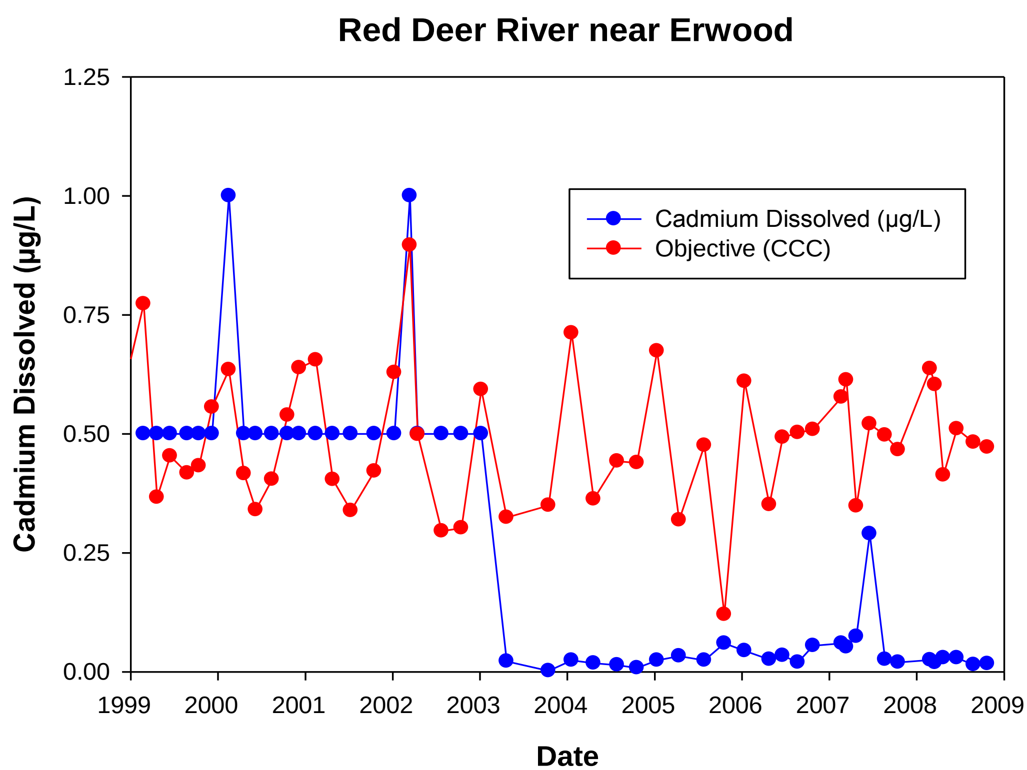

Figure 5-k12: Red Deer River (SK-MB) Cadmium Dissolved

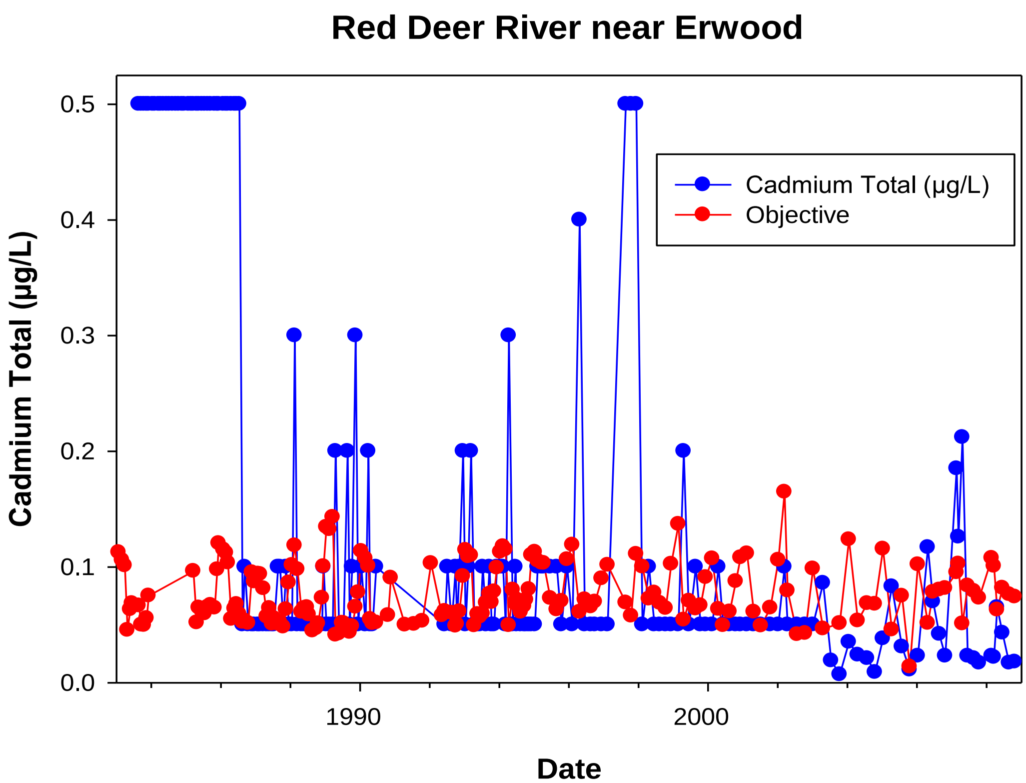

Figure 5-k13: Red Deer River (SK-MB) Cadmium Total

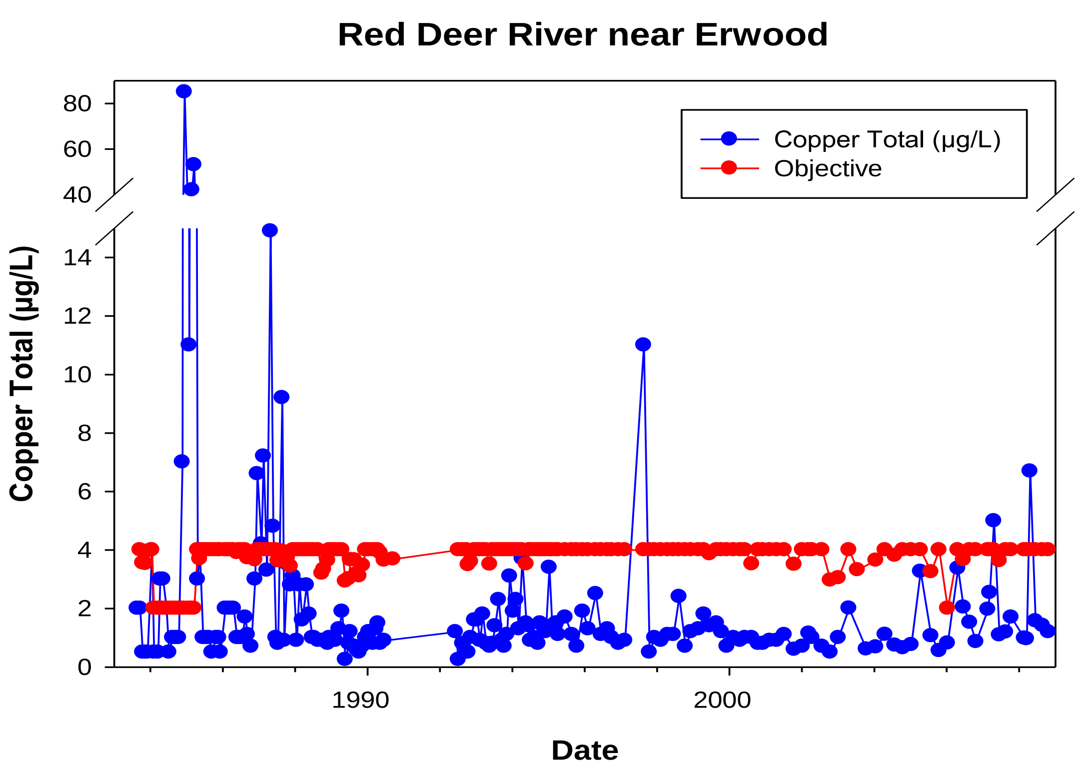

Figure 5-k14: Red Deer River (SK-MB) Copper Total

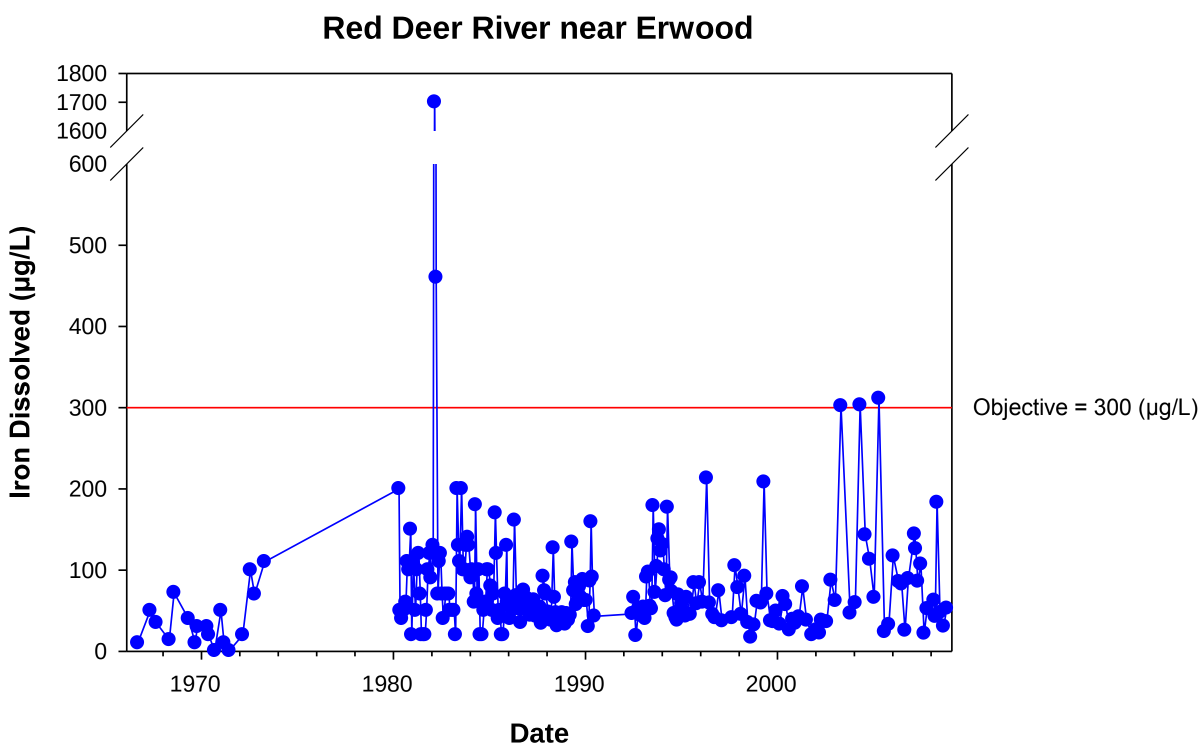

Figure 5-k15: Red Deer River (SK-MB) Iron Dissolved

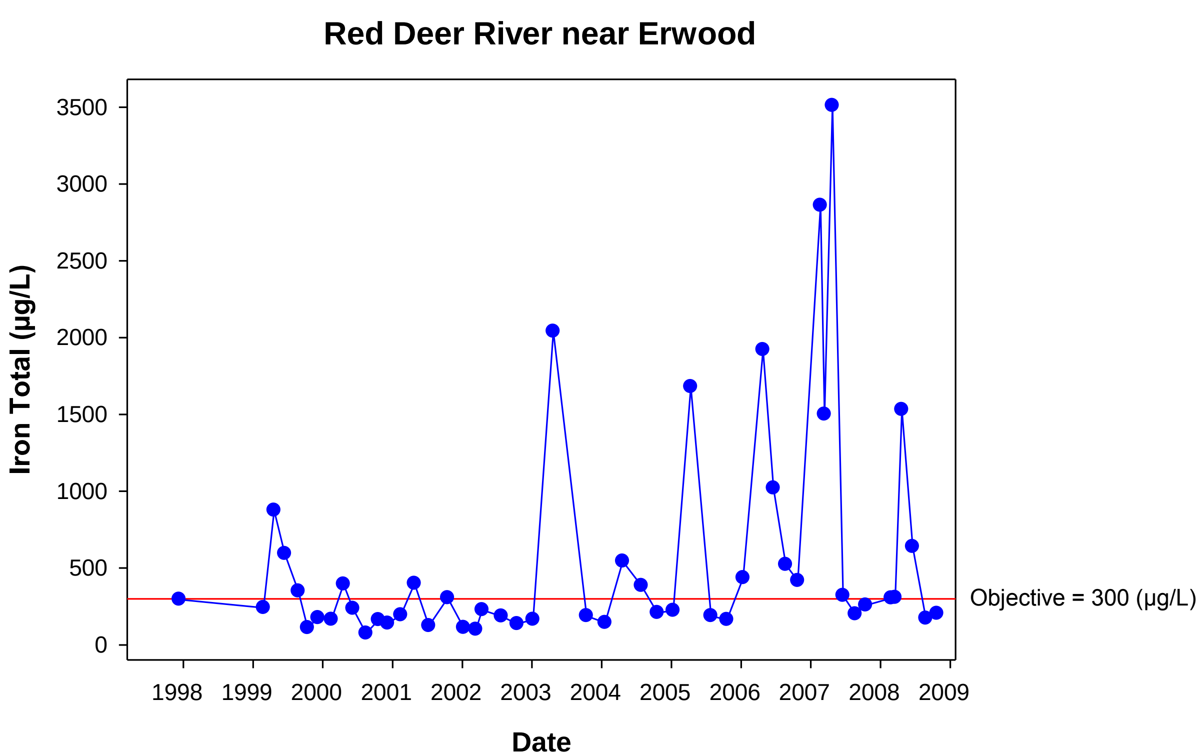

Figure 5-k16: Red Deer River (SK-MB) Iron Total

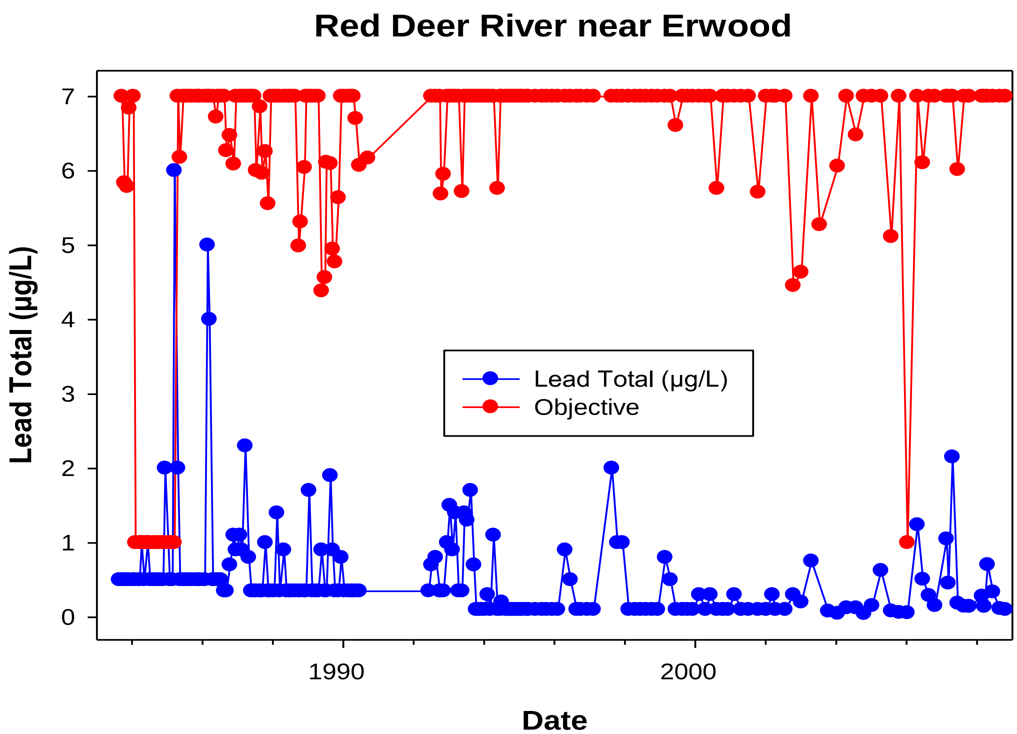

Figure 5-k17: Red Deer River (SK-MB) Lead Total

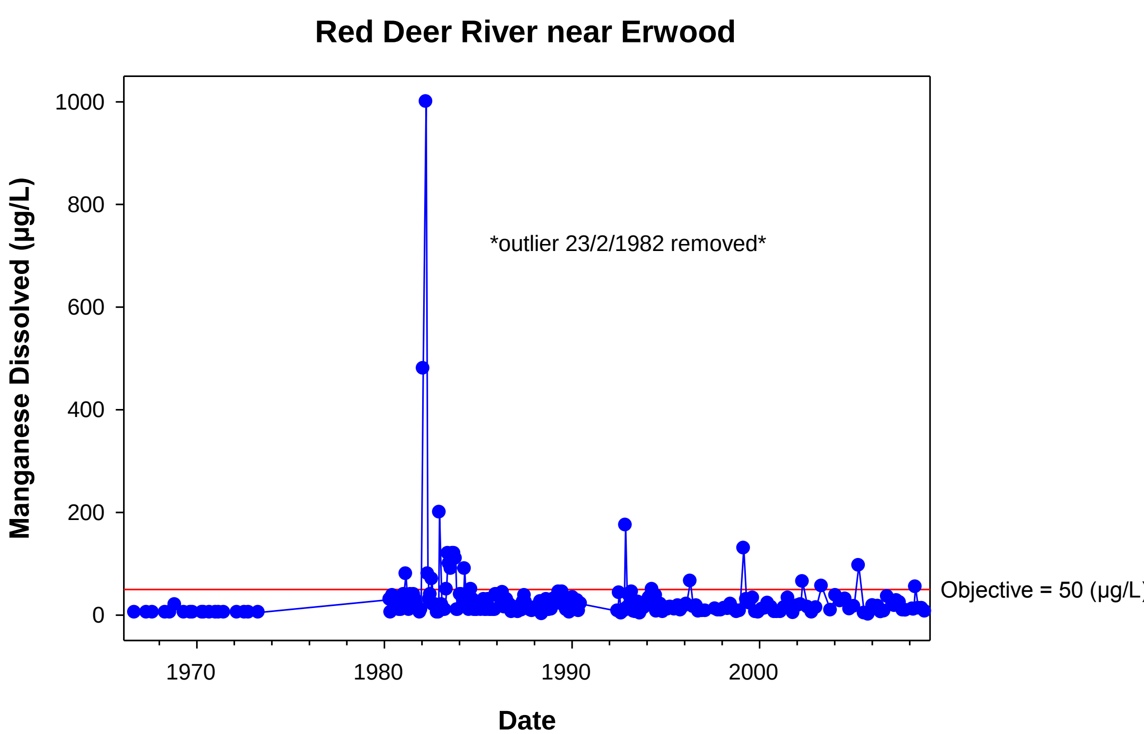

Figure 5-k18: Red Deer River (SK-MB) Manganese Dissolved

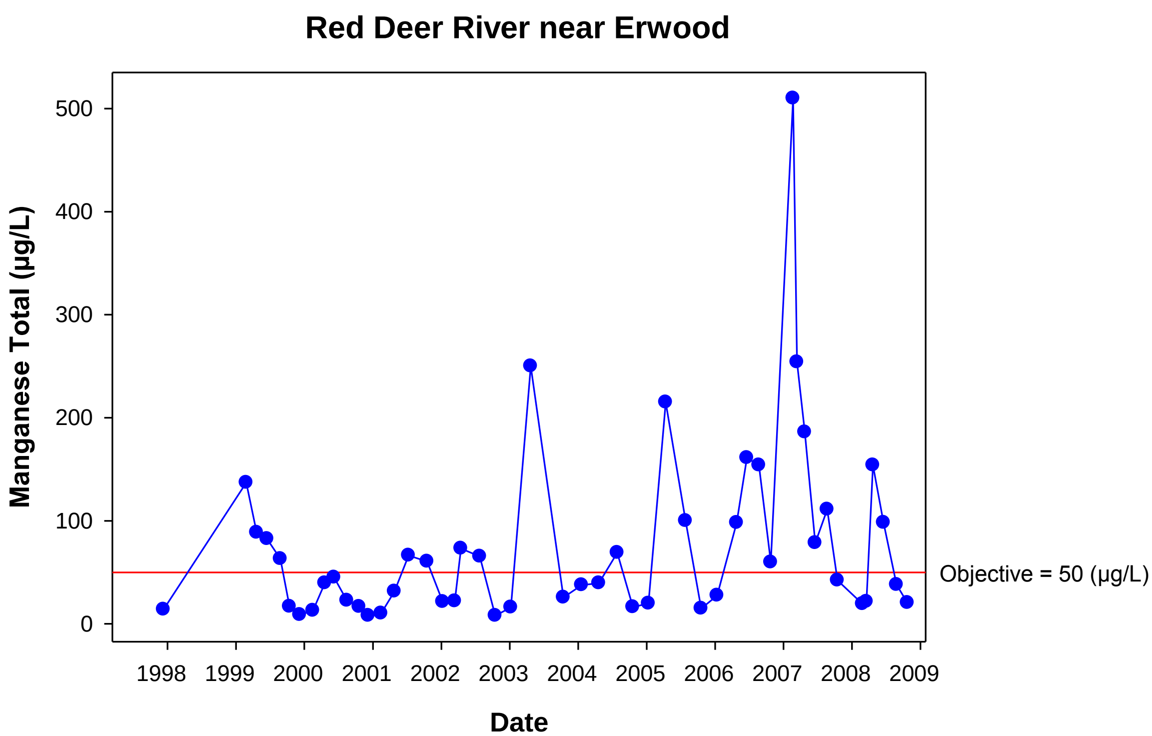

Figure 5-k19: Red Deer River (SK-MB) Manganese Total

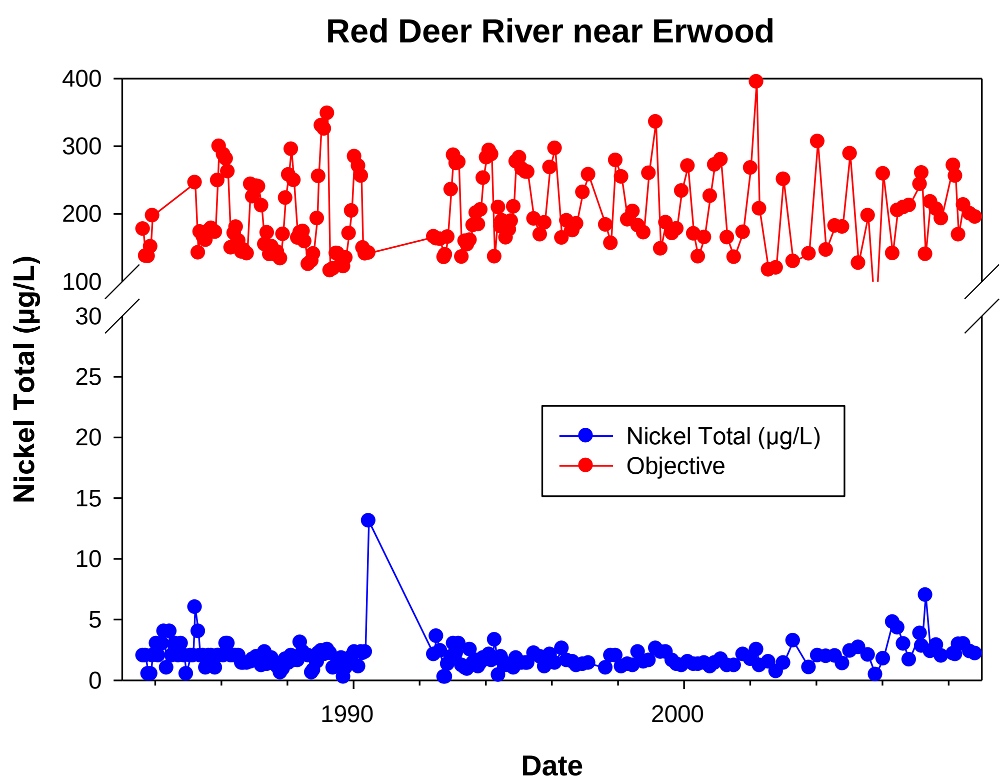

Figure 5-k20: Red Deer River (SK-MB) Nickel Total

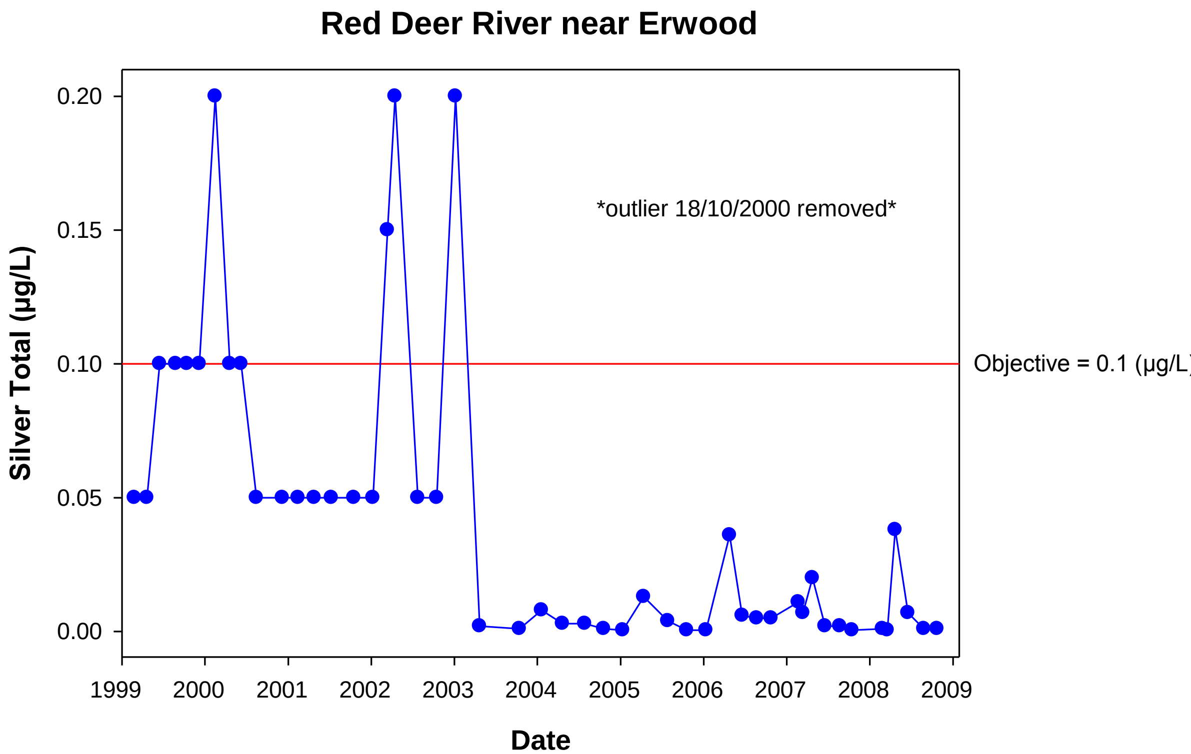

Figure 5-k21: Red Deer River (SK-MB) Silver Total

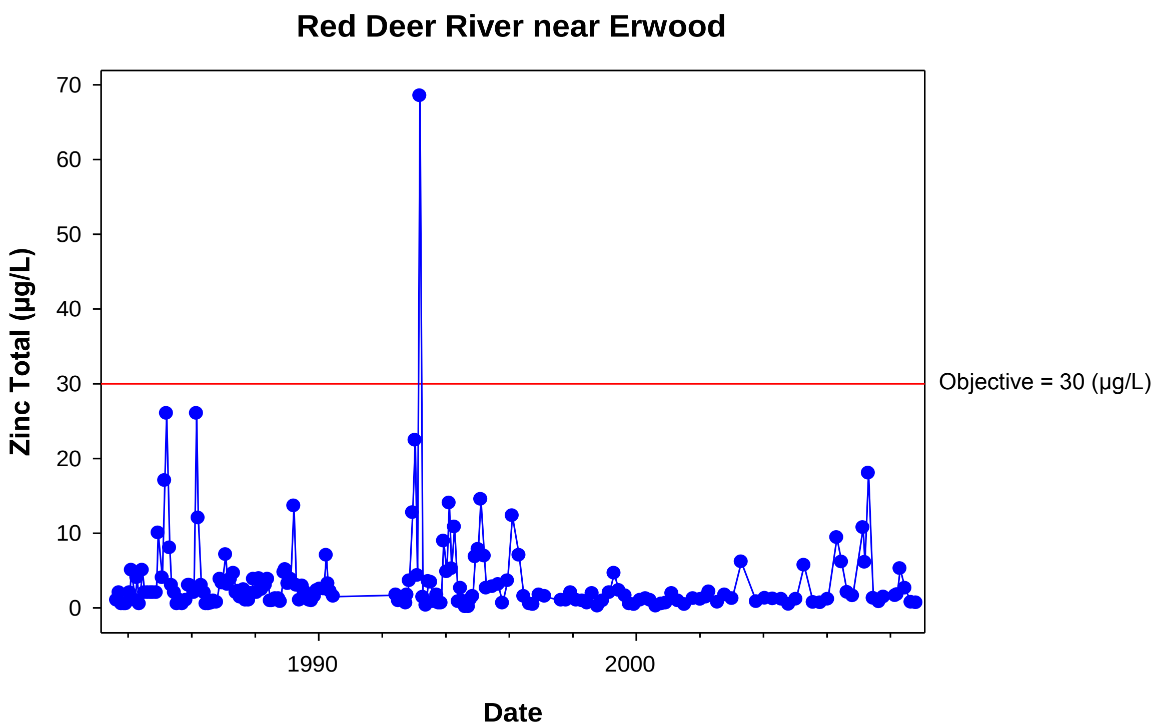

Figure 5-k22: Red Deer River (SK-MB) Zinc Total

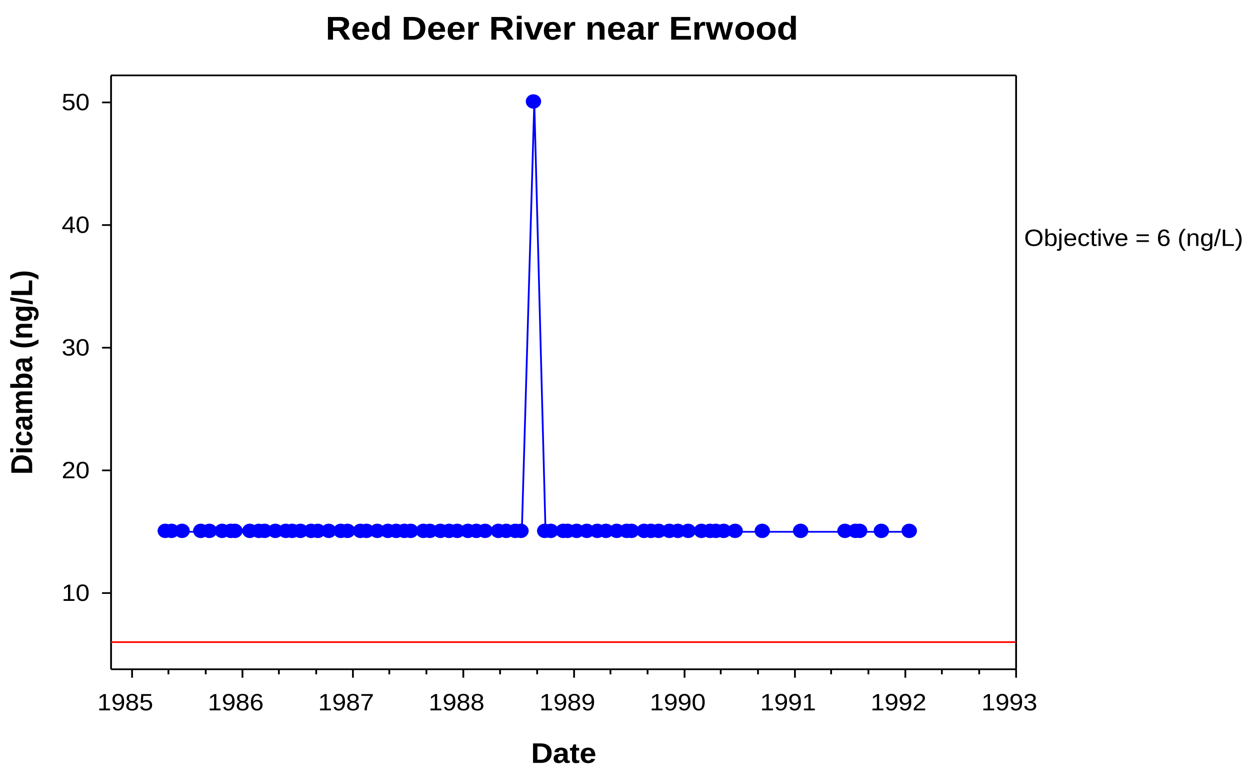

Figure 5-k23: Red Deer River (SK-MB) Dicamba

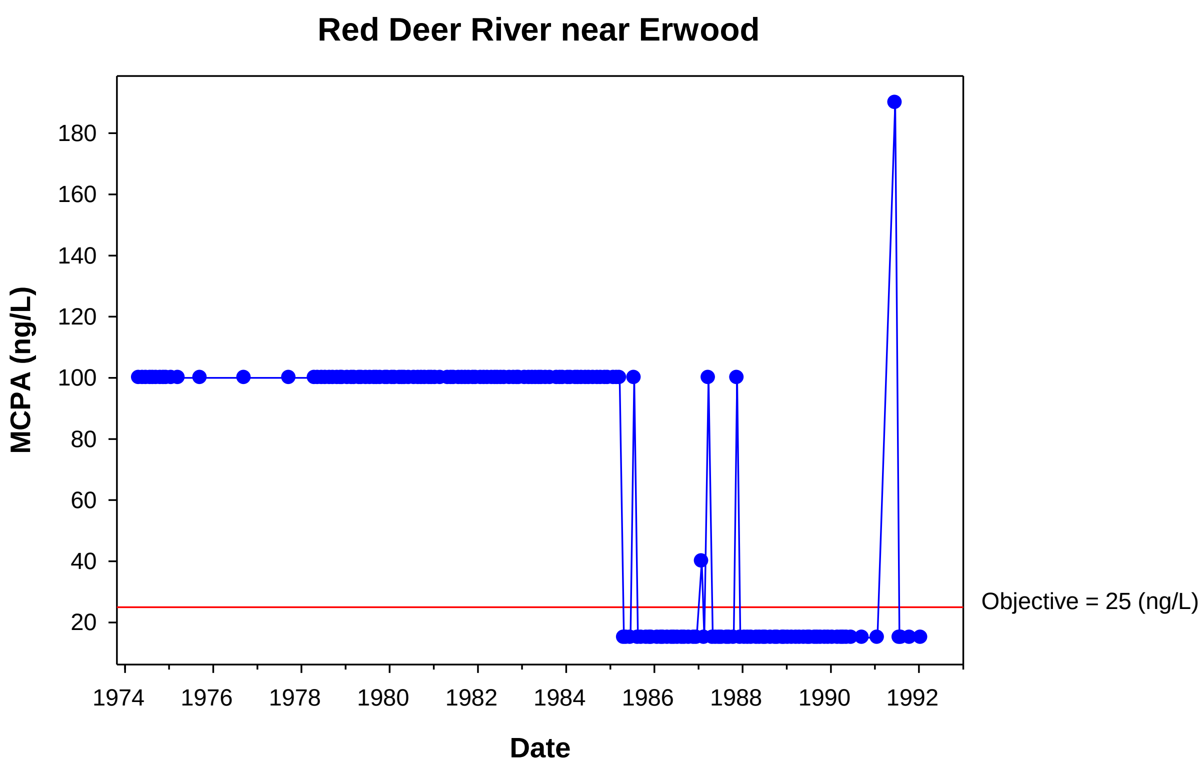

Figure 5-k24: Red Deer River (SK-MB) MCPA

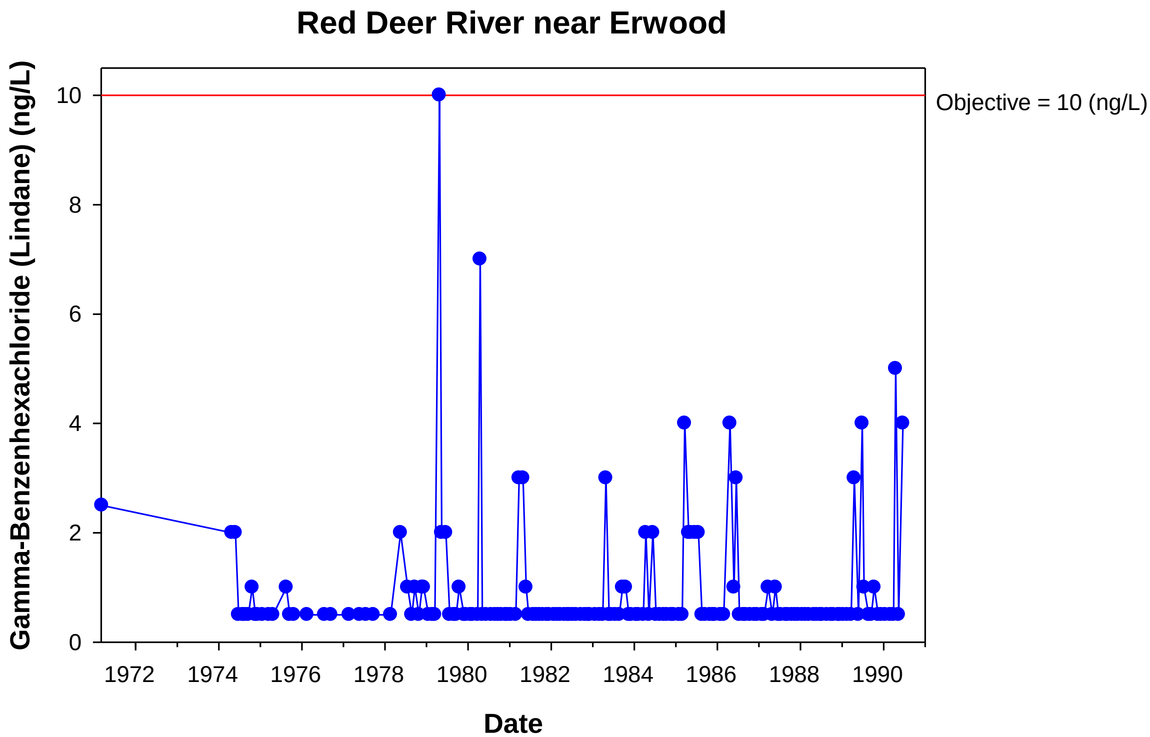

Figure 5-k25: Red Deer River (SK-MB) Lindane

Appendix 5-I: Saskatchewan River

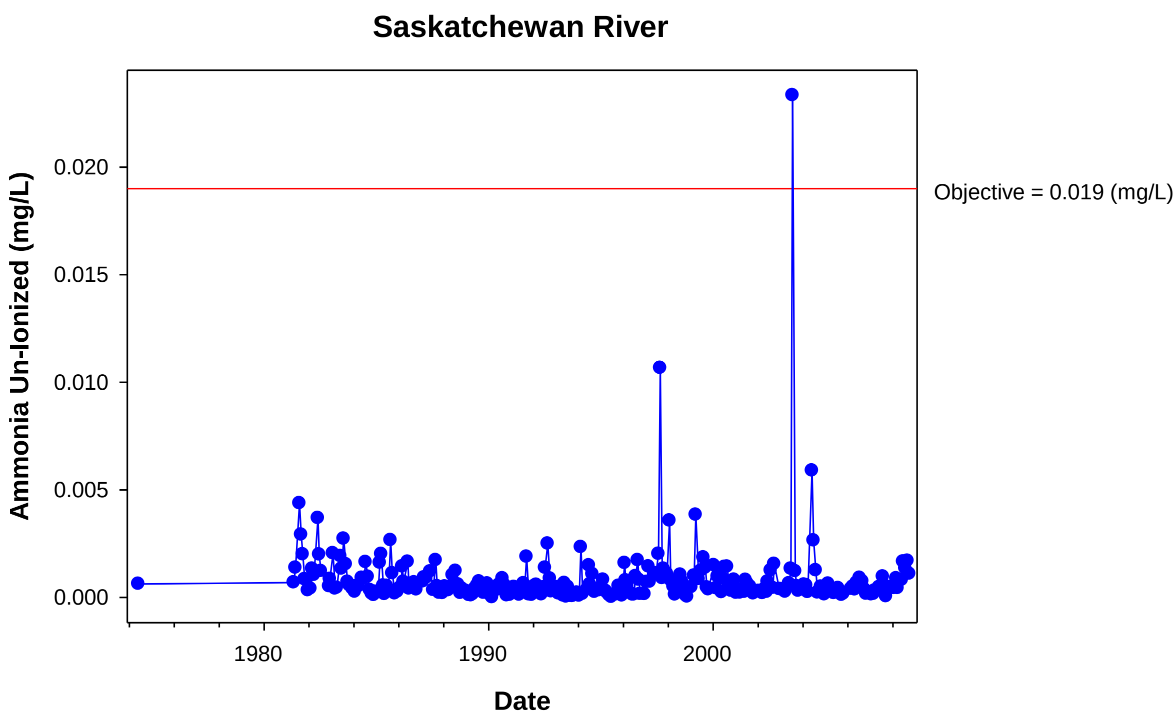

Figure 5-I1: Saskatchewan River Ammonia Un-Ionized

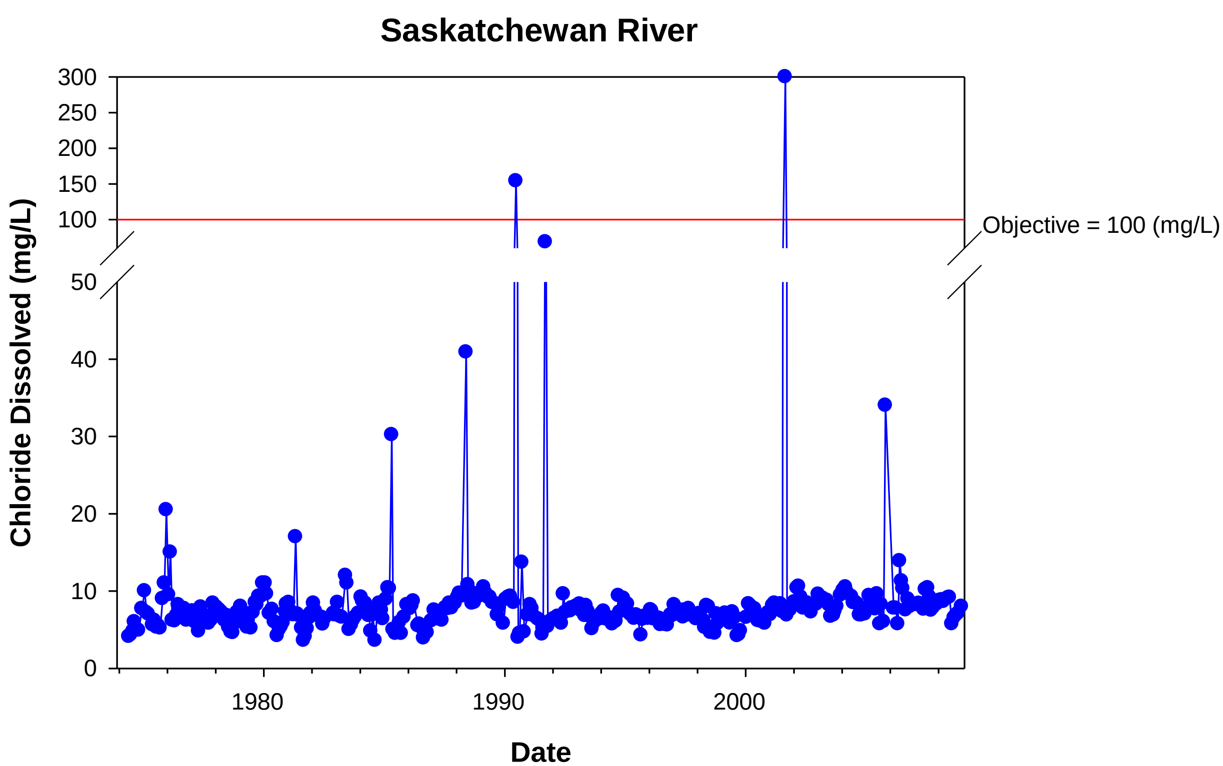

Figure 5-I2: Saskatchewan River Chloride Dissolved

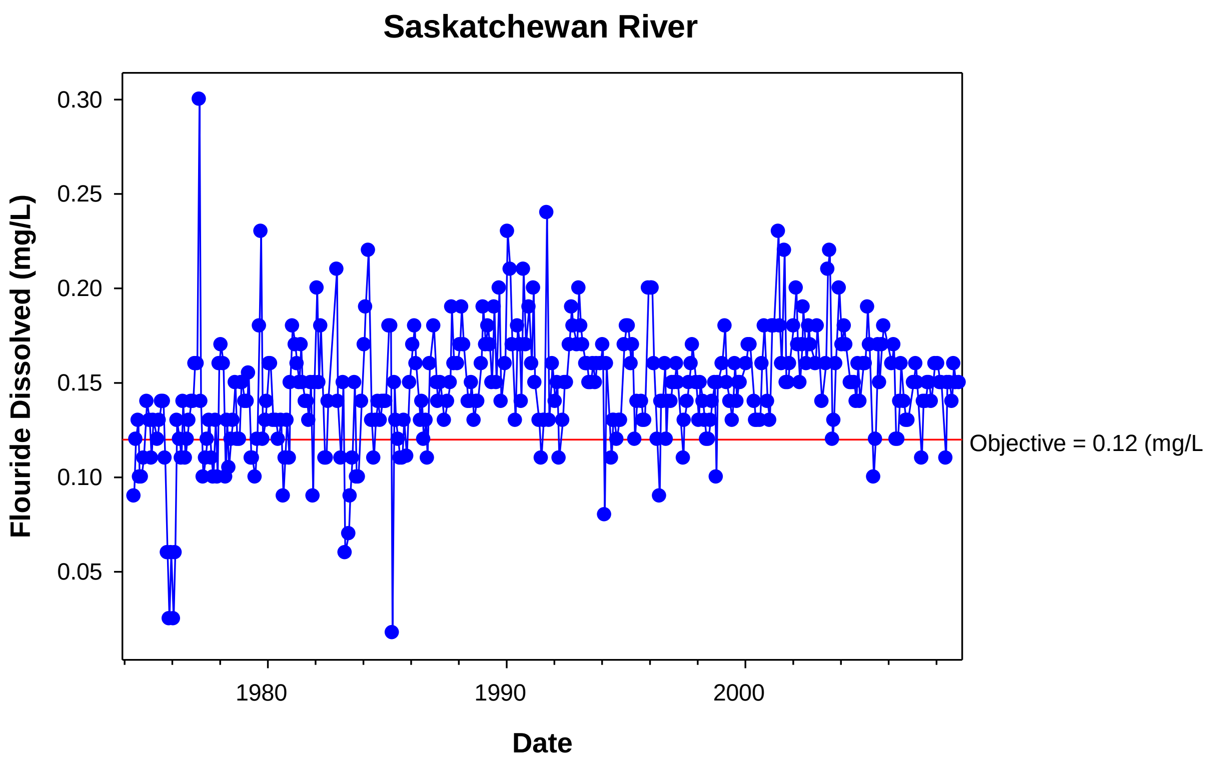

Figure 5-I3: Saskatchewan River Fluoride Dissolved

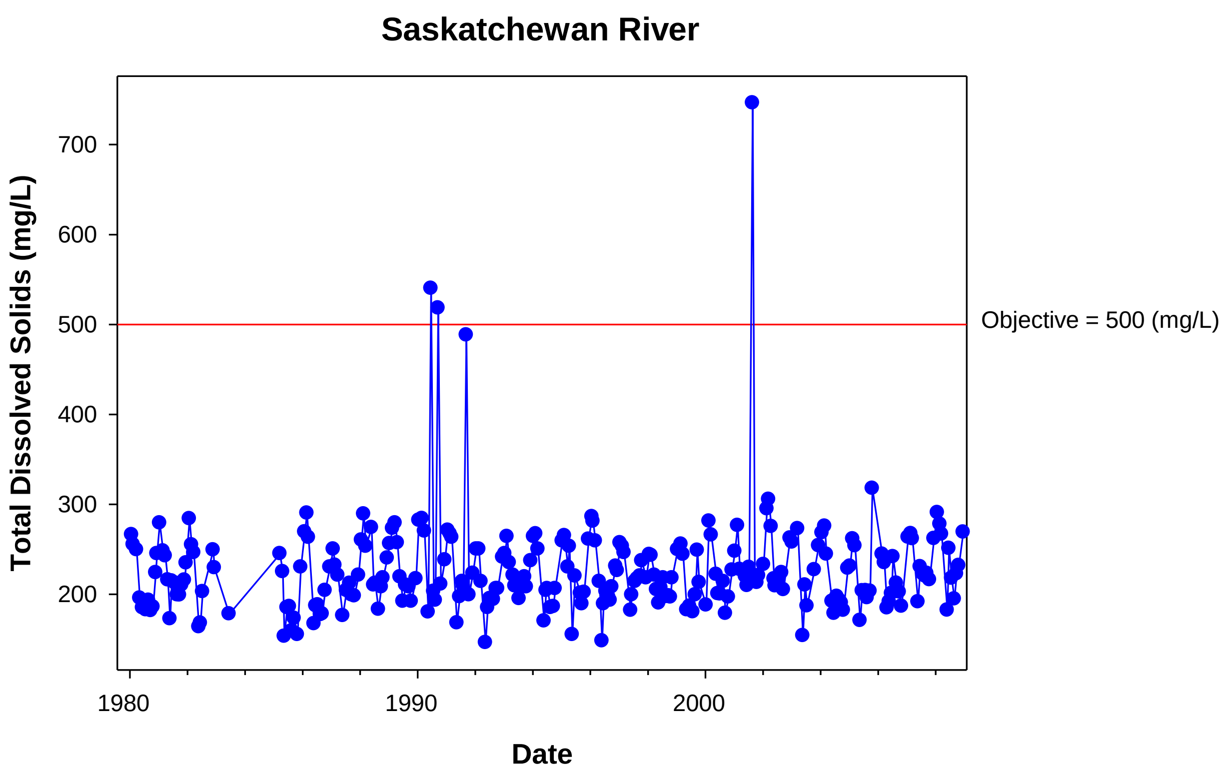

Figure 5-I4: Saskatchewan River Total Dissolved Solids

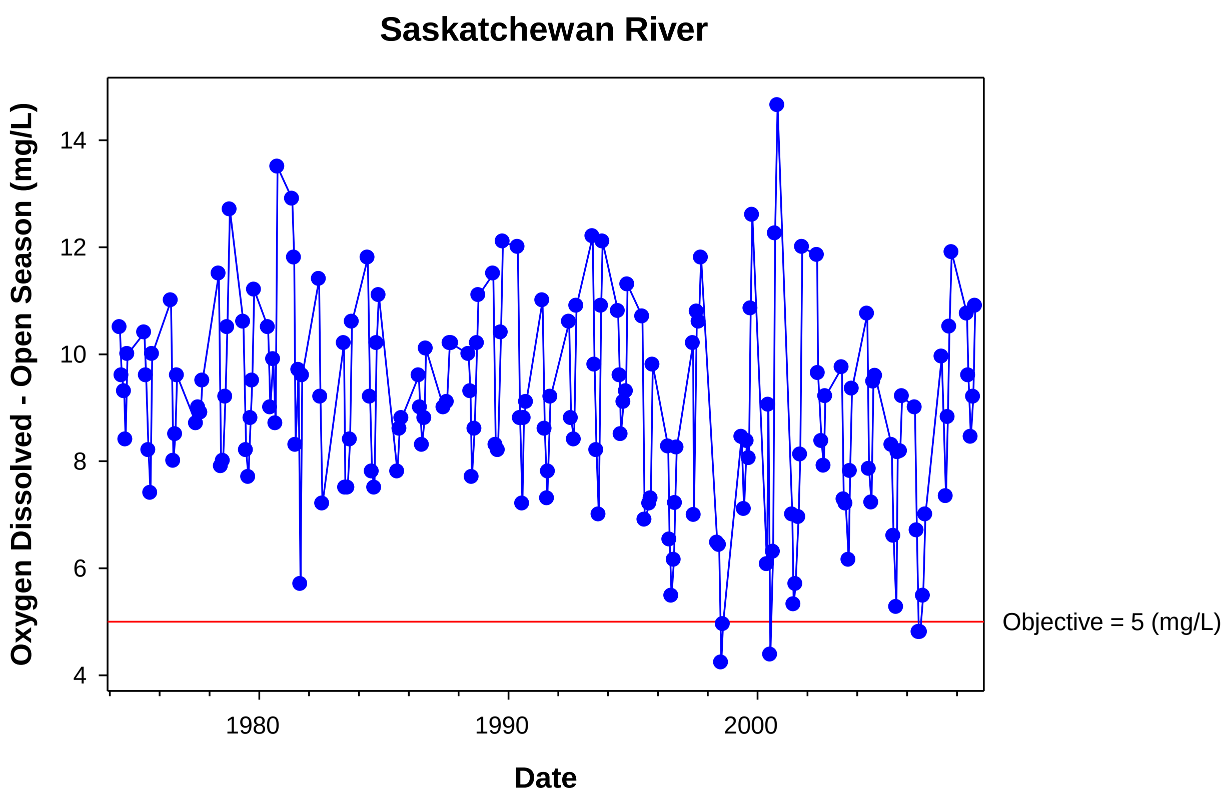

Figure 5-I5: Saskatchewan River Oxygen Dissolved (Open Season)

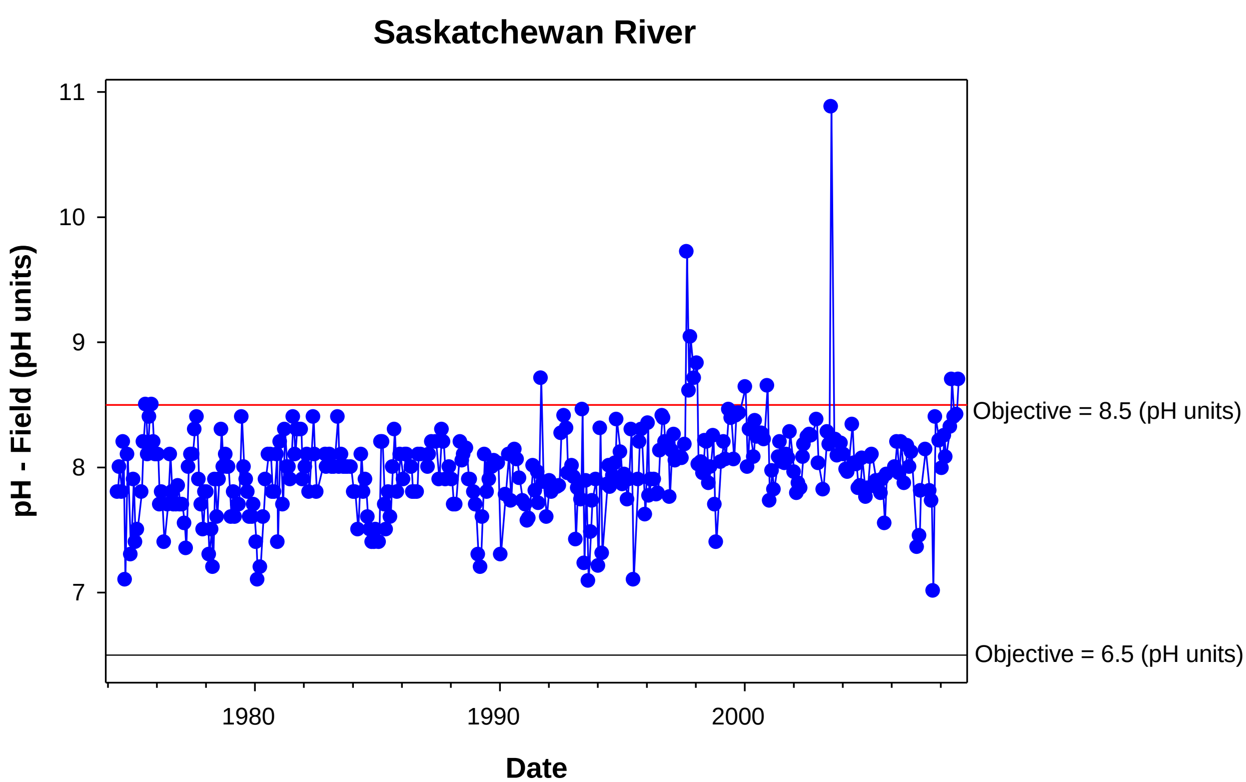

Figure 5-I6: Saskatchewan River pH Field

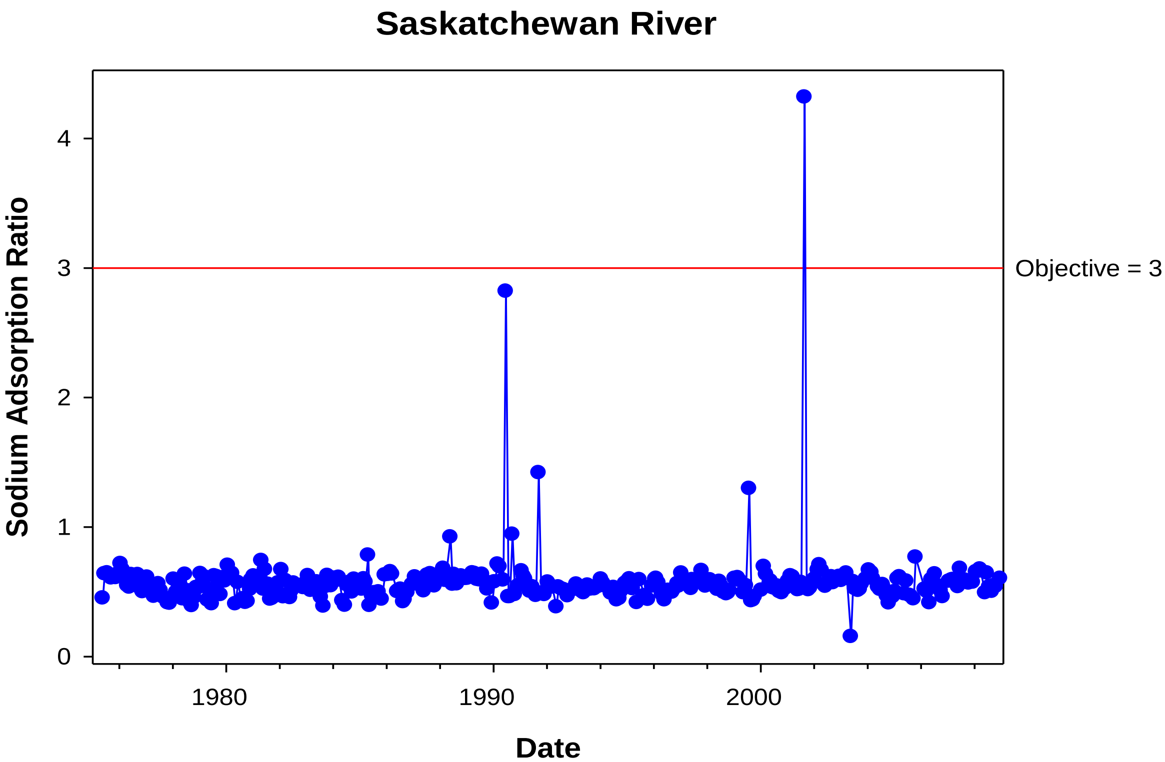

Figure 5-I7: Saskatchewan River Sodium Adsorption Ratio

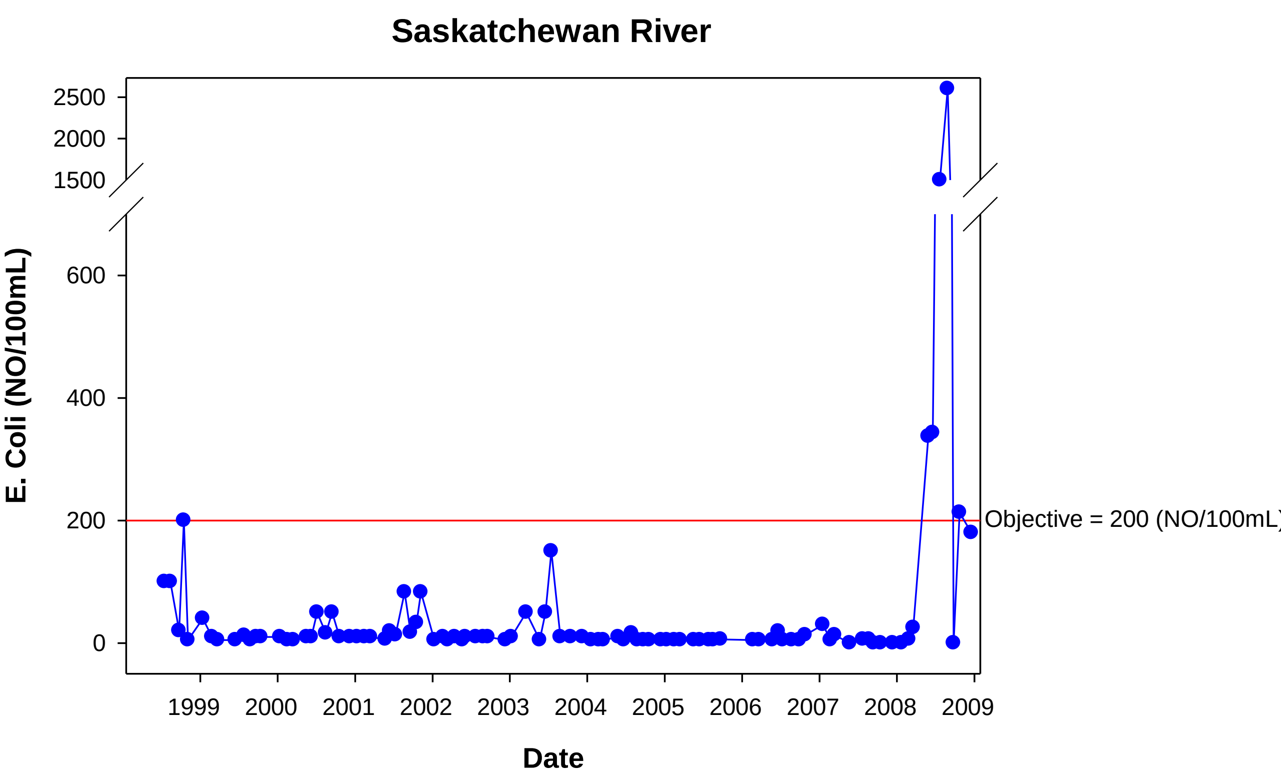

Figure 5-I8: Saskatchewan River E. Coli

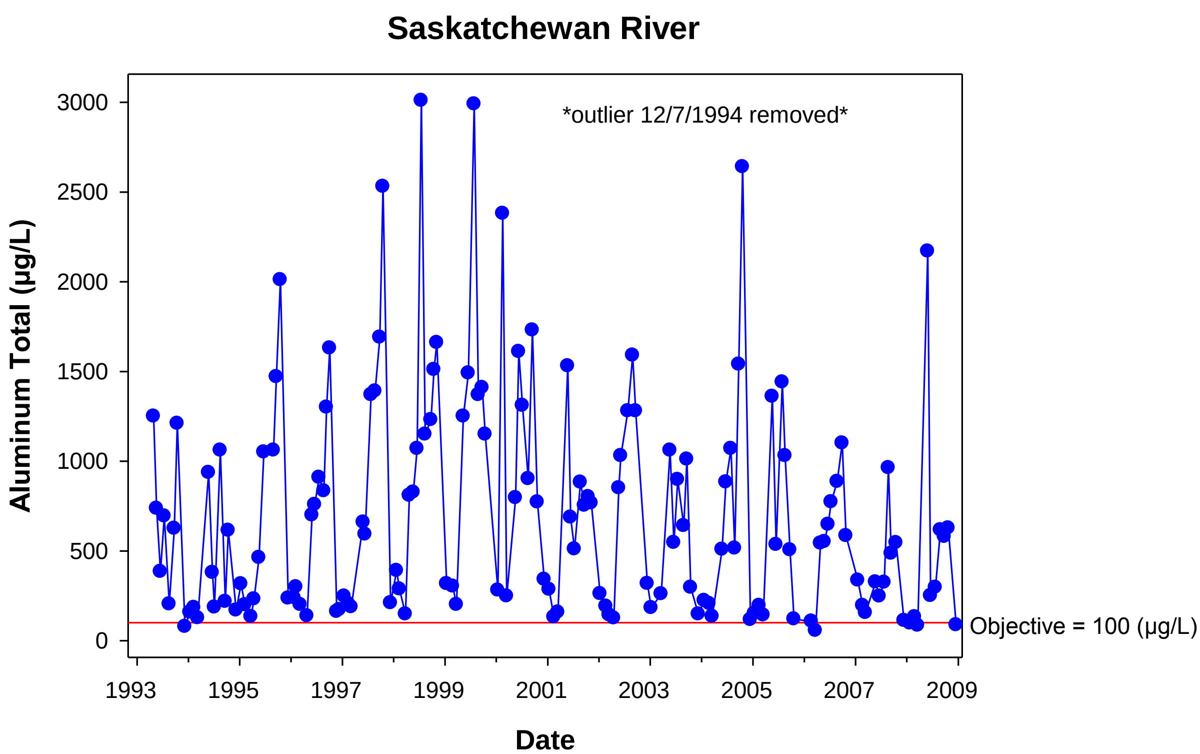

Figure 5-I9: Saskatchewan River Aluminum Total

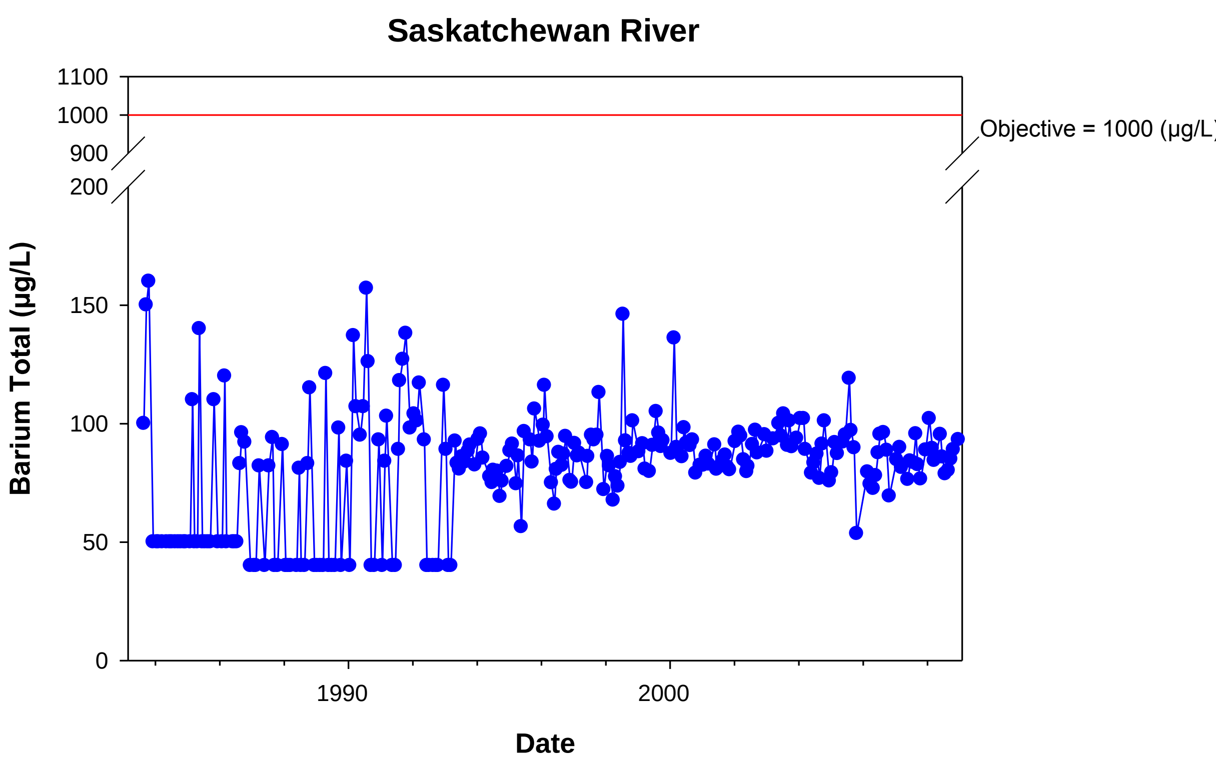

Figure 5-I10: Saskatchewan River Barium Total

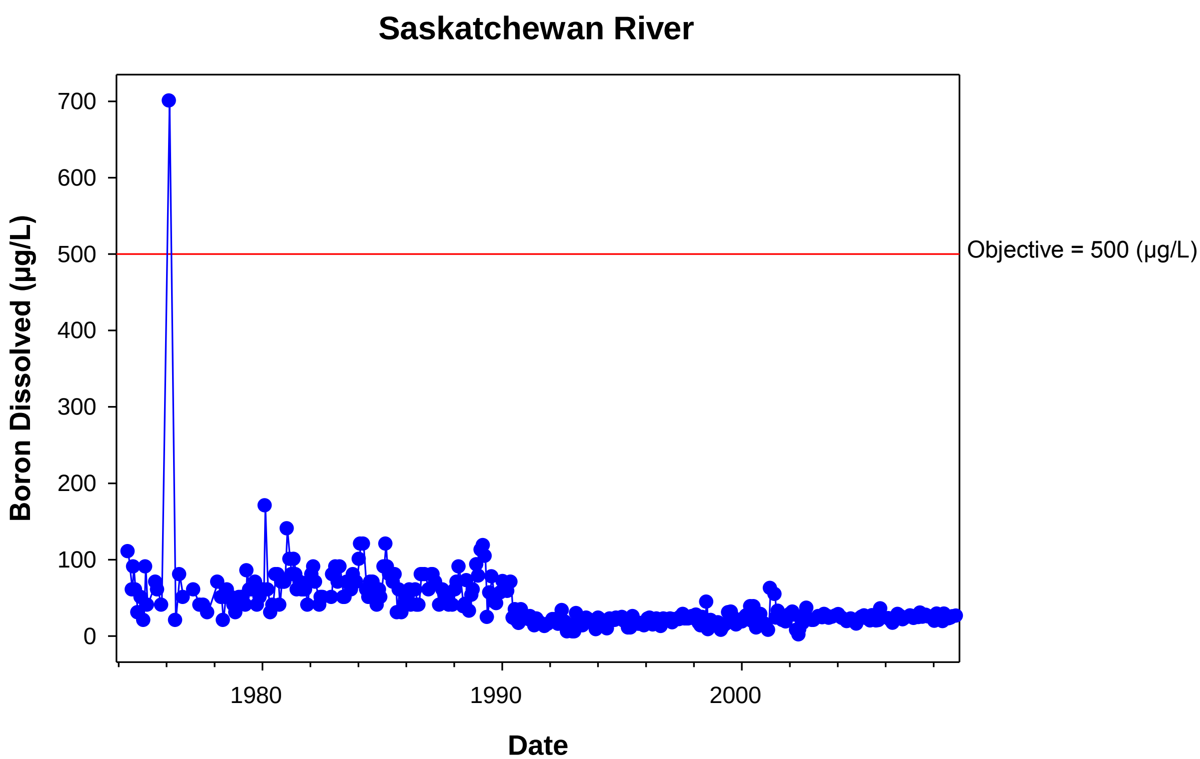

Figure 5-I11: Saskatchewan River Boron Dissolved

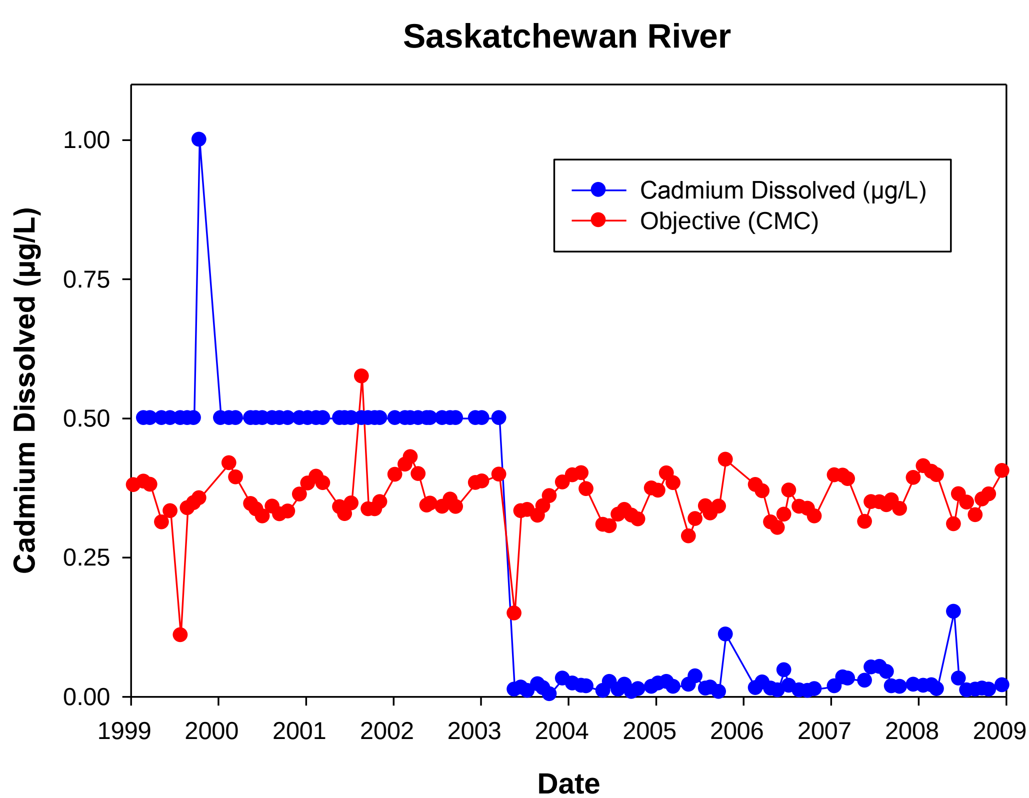

Figure 5-I12: Saskatchewan River Cadmium Dissolved

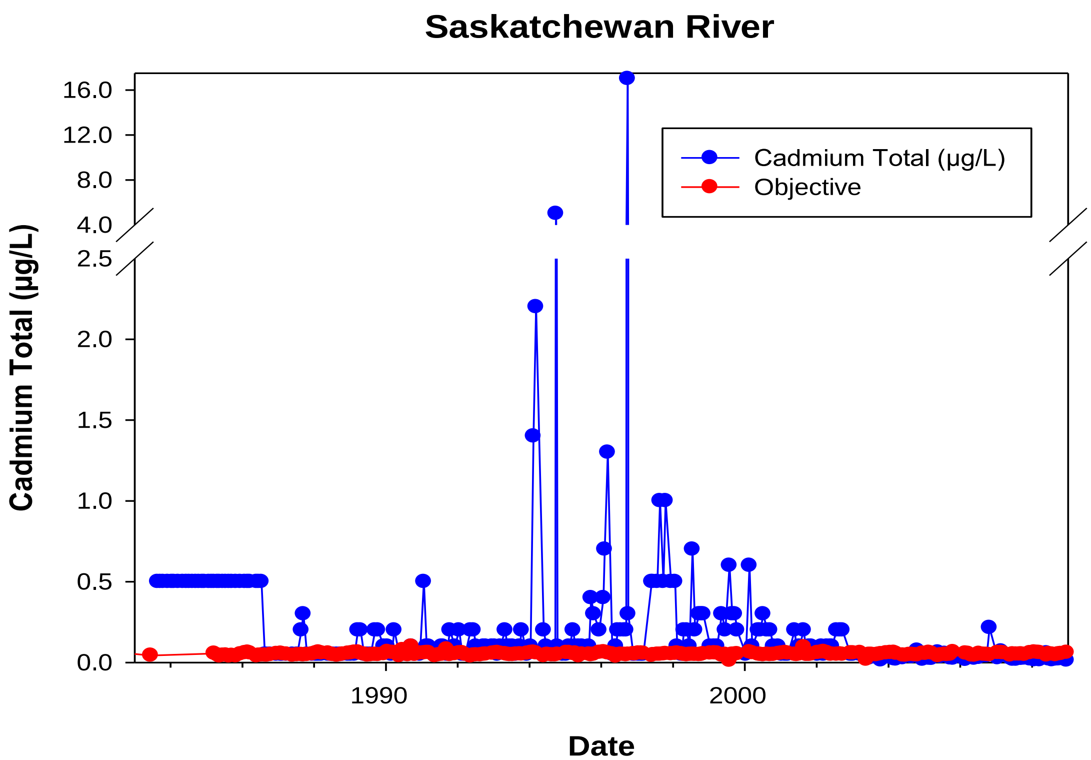

Figure 5-I13: Saskatchewan River Cadmium Total

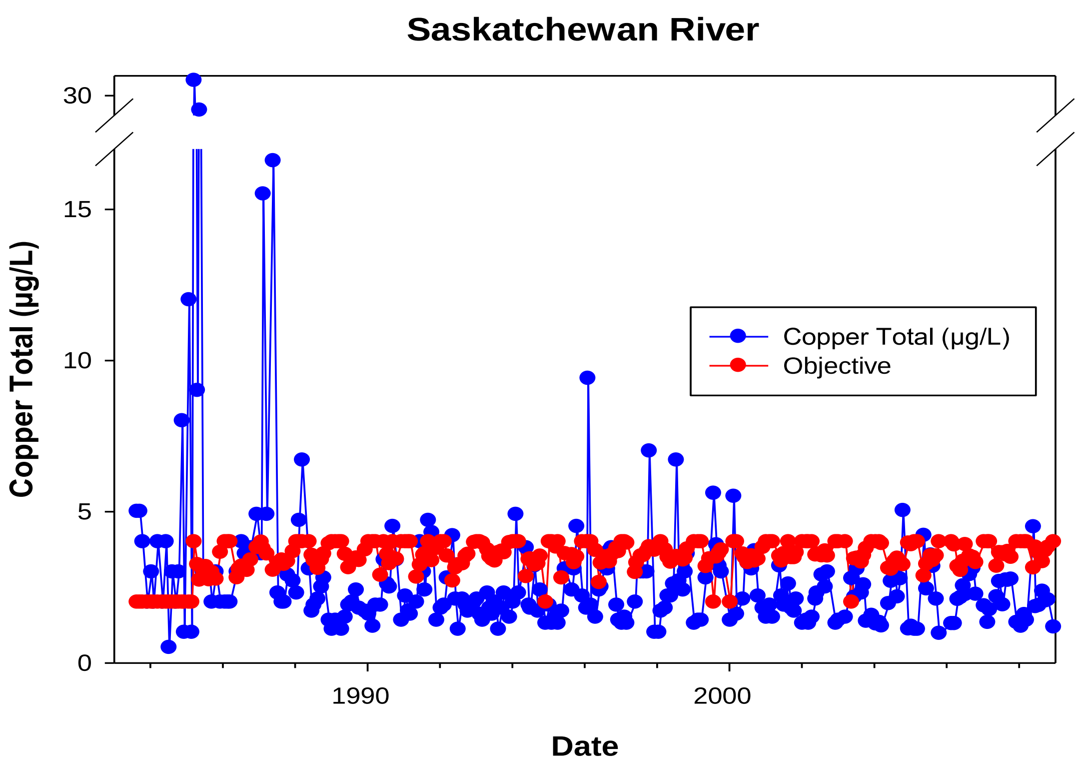

Figure 5-I14: Saskatchewan River Copper Total

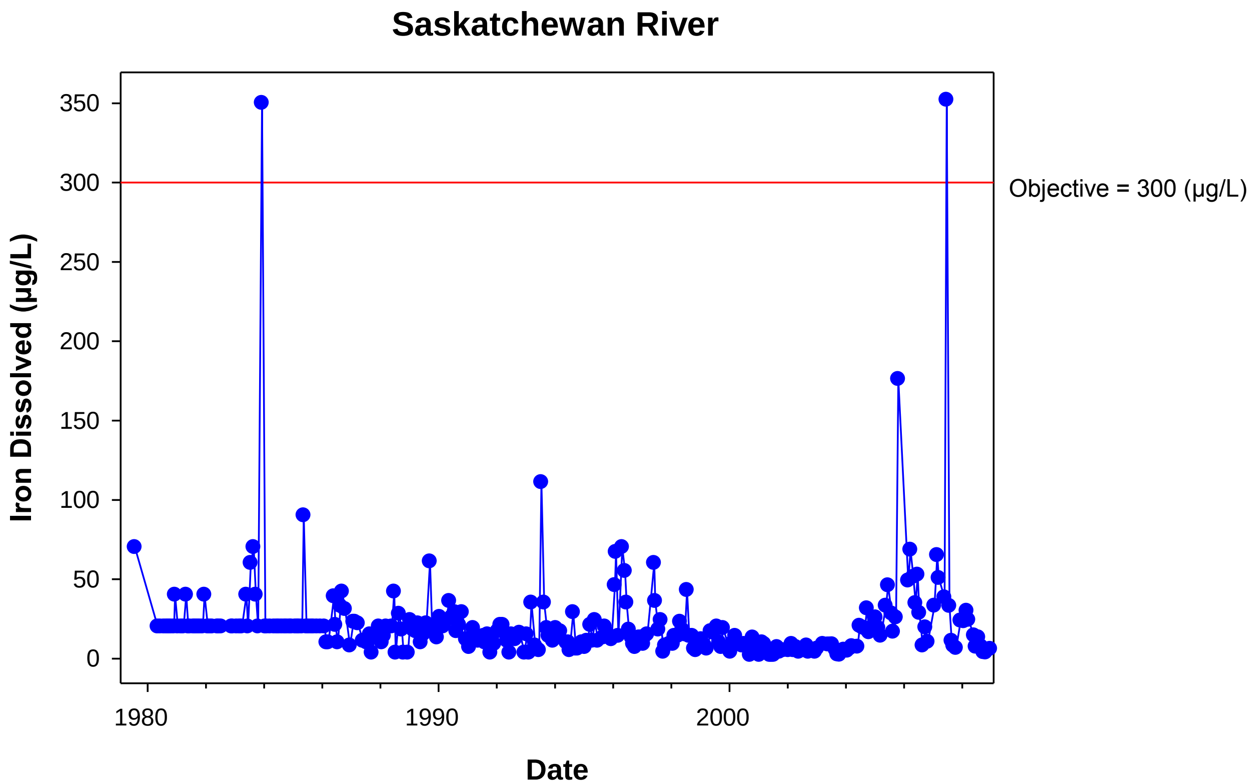

Figure 5-I15: Saskatchewan River Iron Dissolved

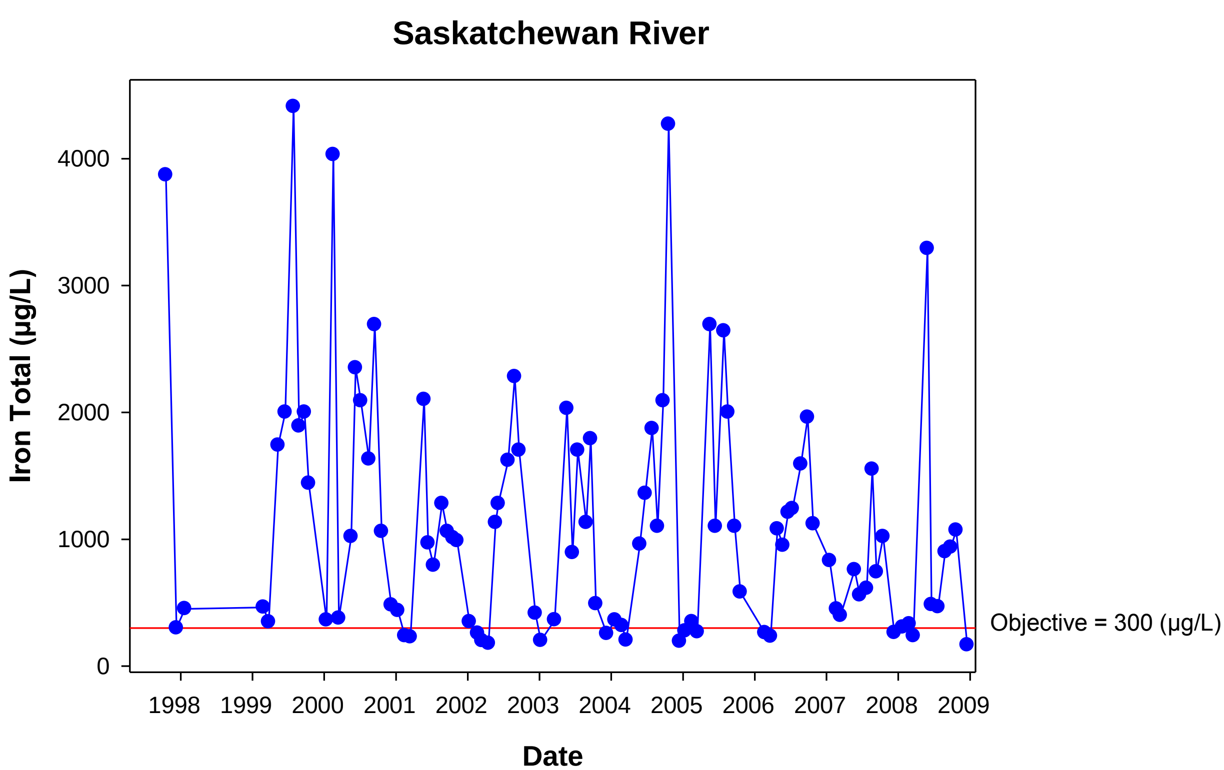

Figure 5-I16: Saskatchewan River Iron Total

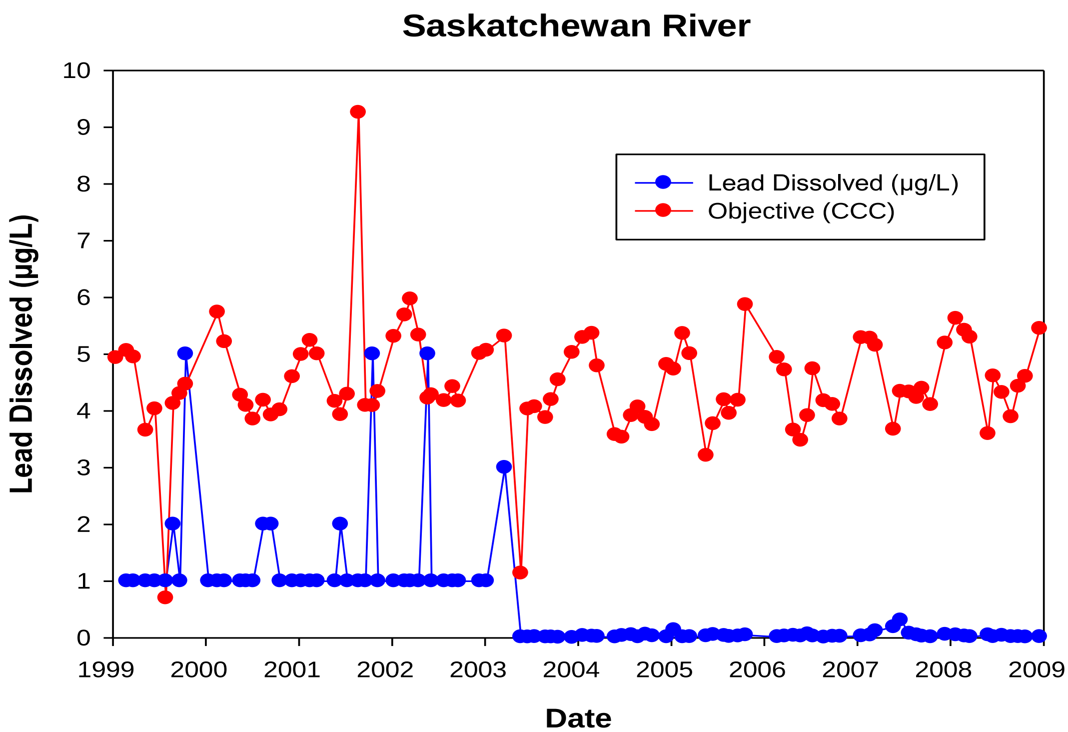

Figure 5-I17: Saskatchewan River Lead Dissolved

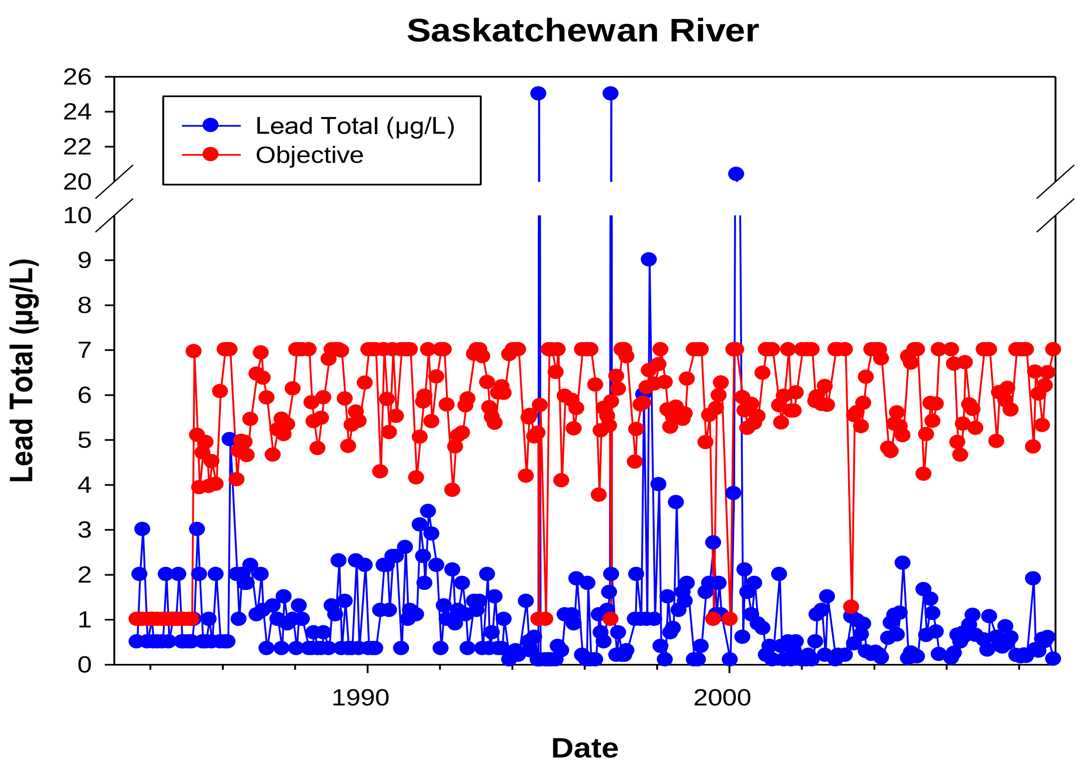

Figure 5-I18: Saskatchewan River Lead Total

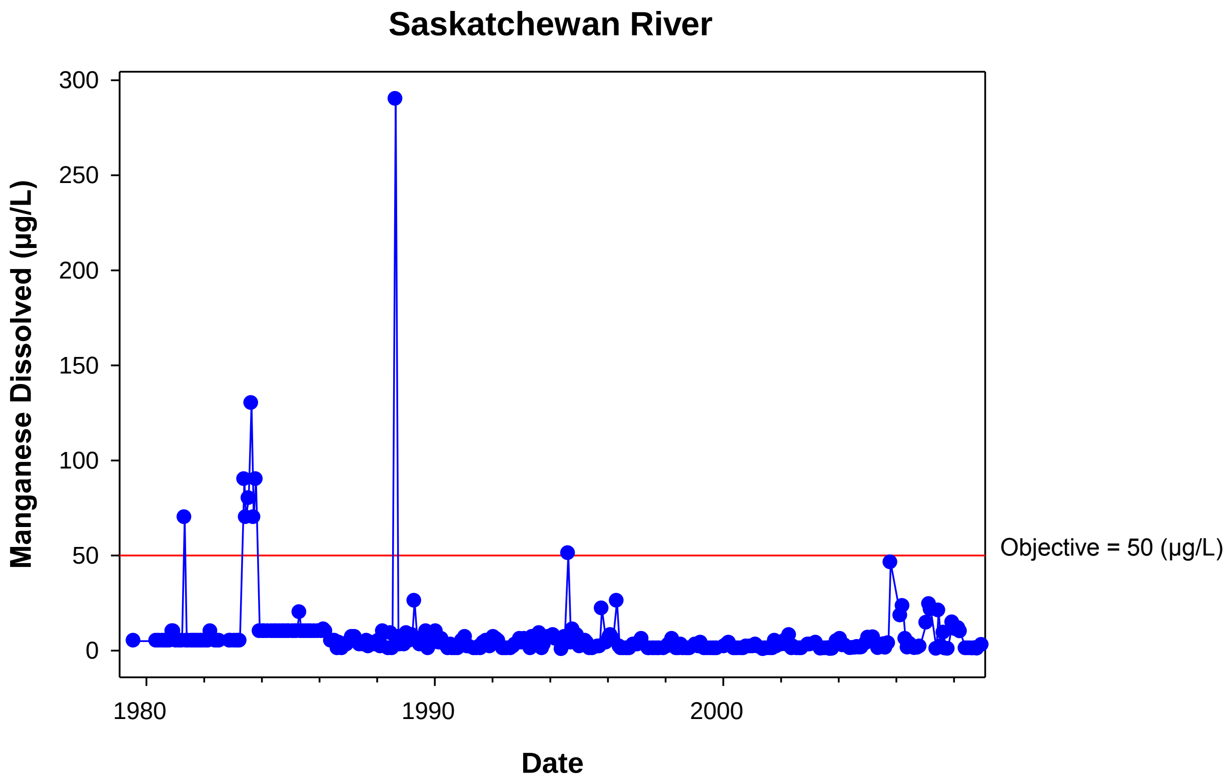

Figure 5-I19: Saskatchewan River Manganese Dissolved

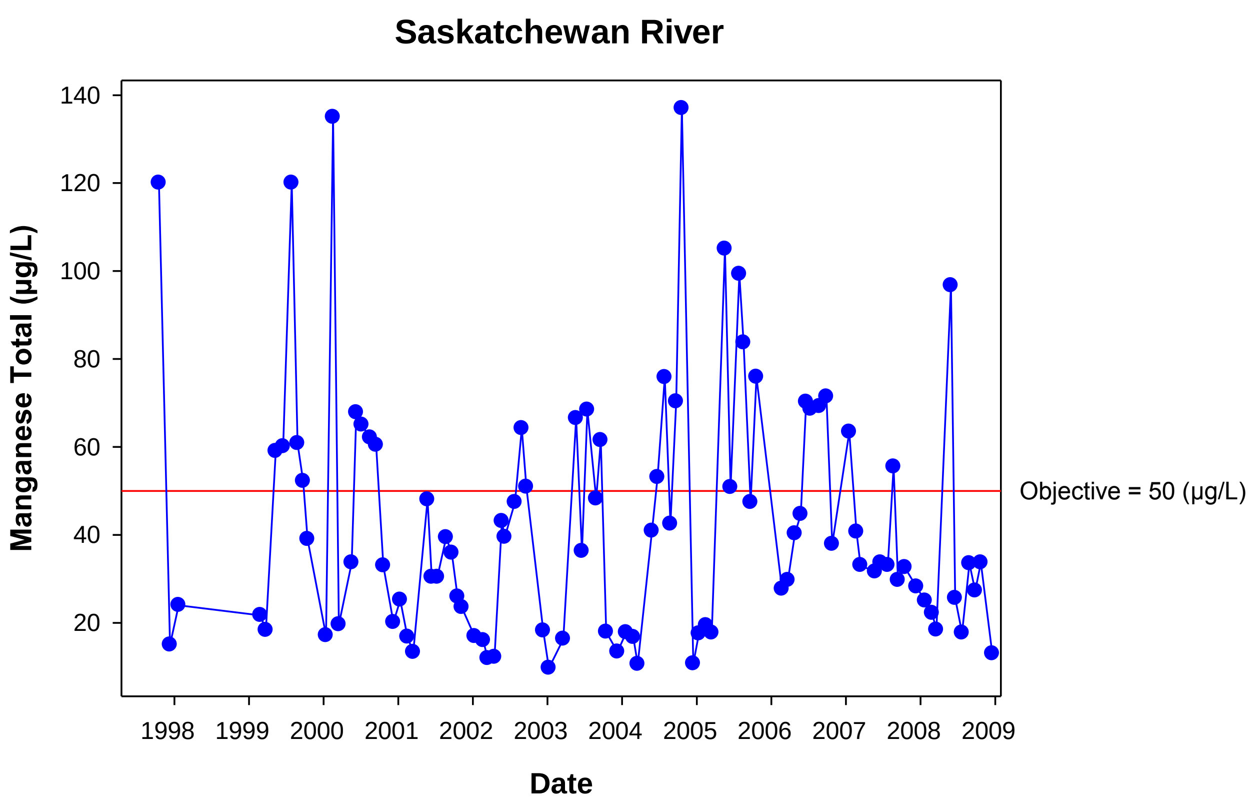

Figure 5-I20: Saskatchewan River Manganese Total

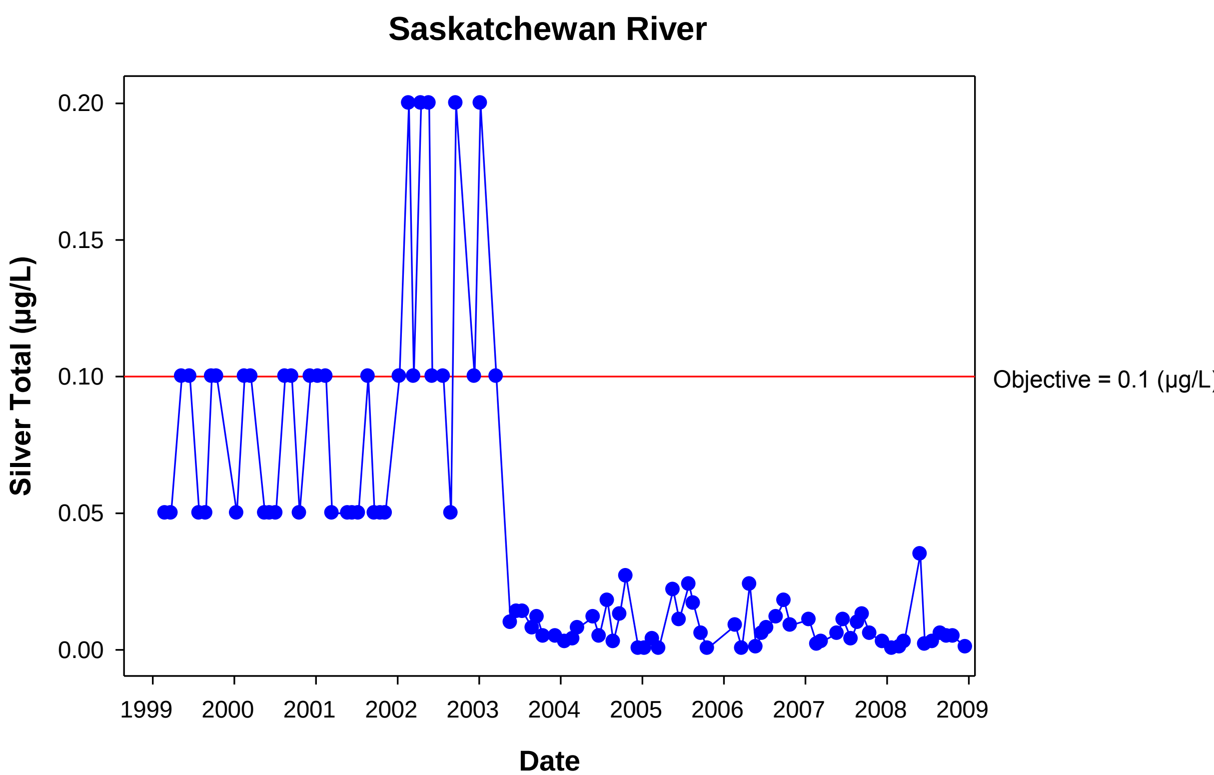

Figure 5-I21: Saskatchewan River Silver Total

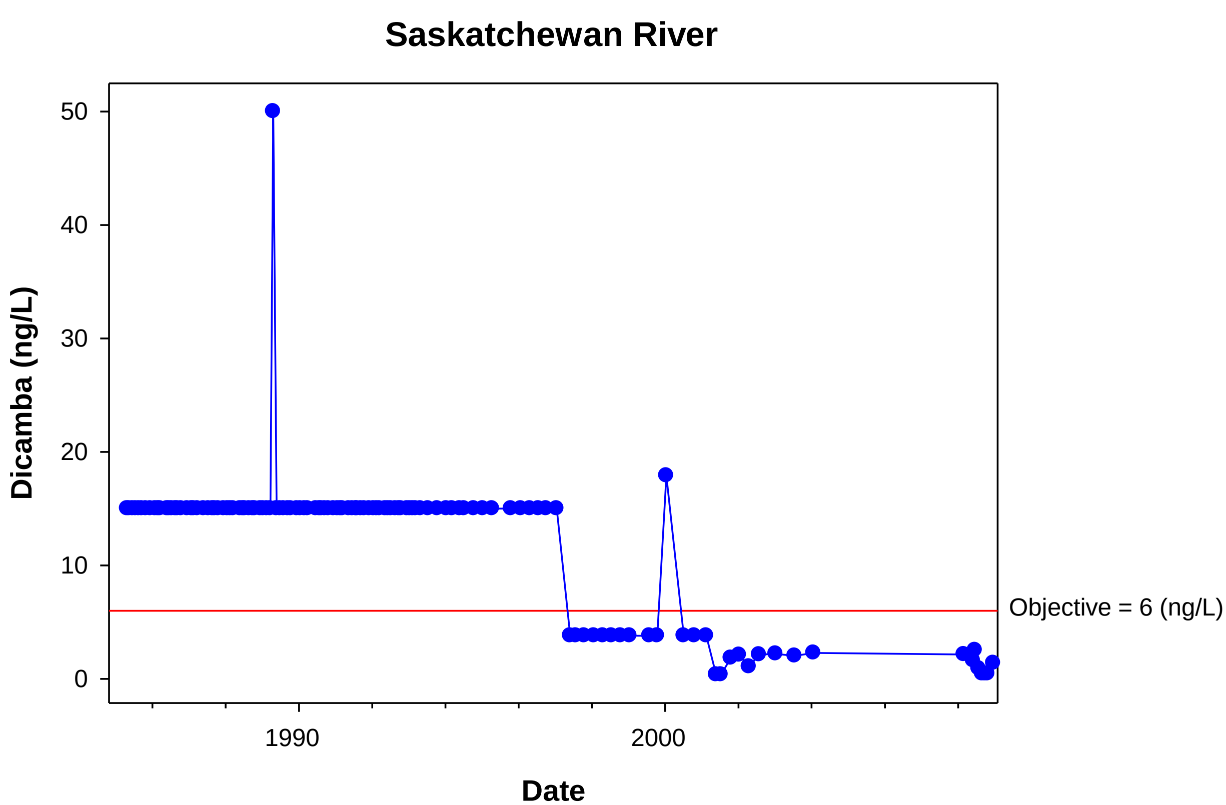

Figure 5-I22: Saskatchewan River Dicamba

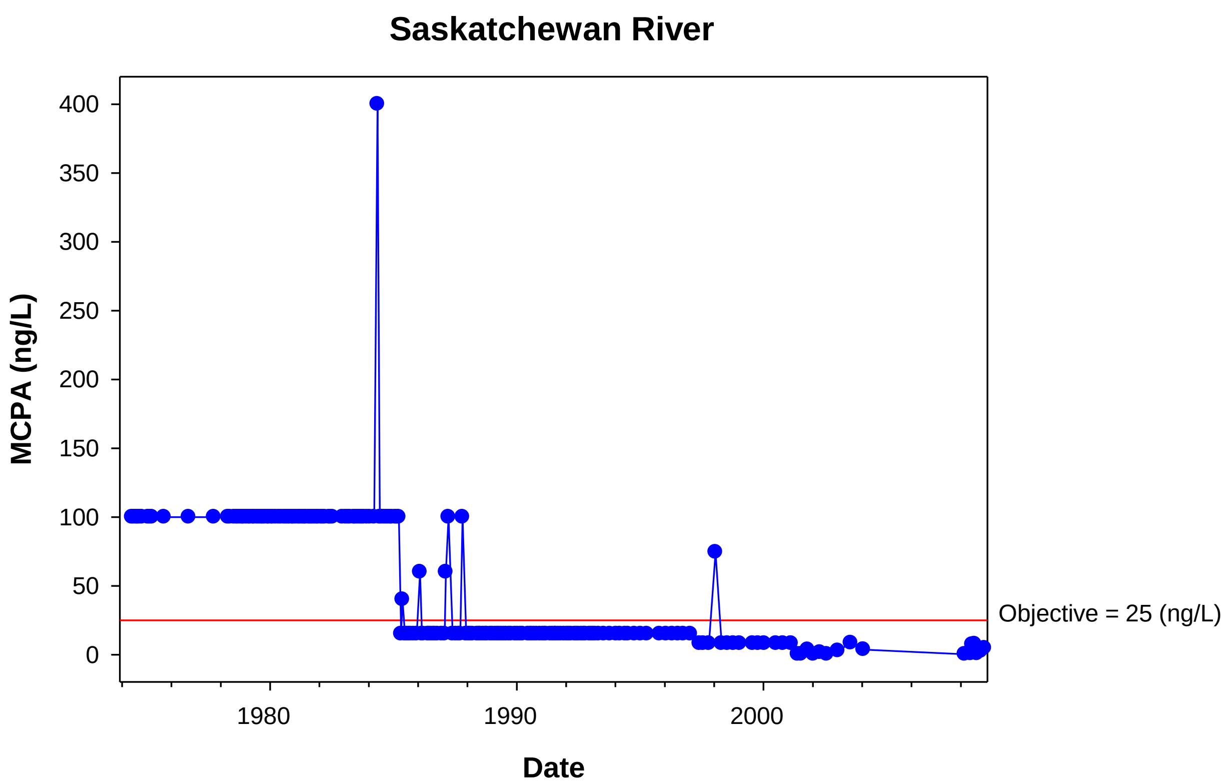

Figure 5-I23: Saskatchewan River MCPA

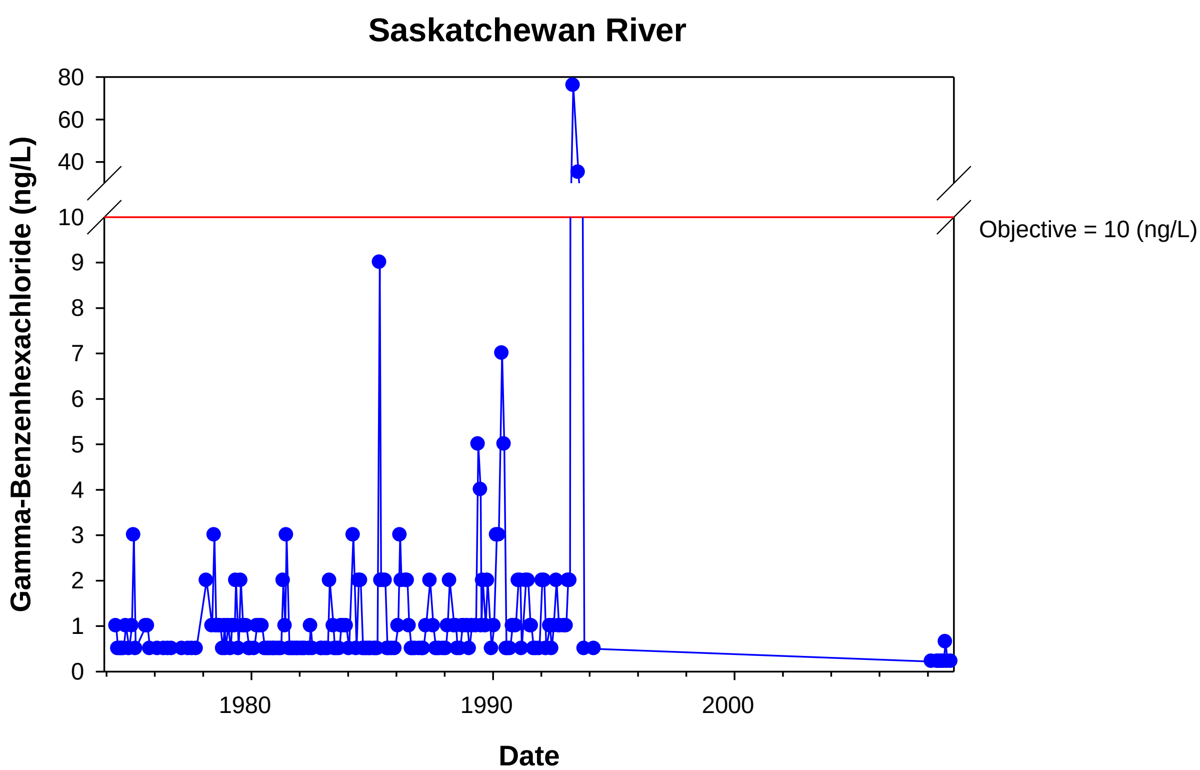

Figure 5-I24: Saskatchewan River Lindane

Appendix 6: Non-Exceedance Graphs

Appendix 6-a: Battle River

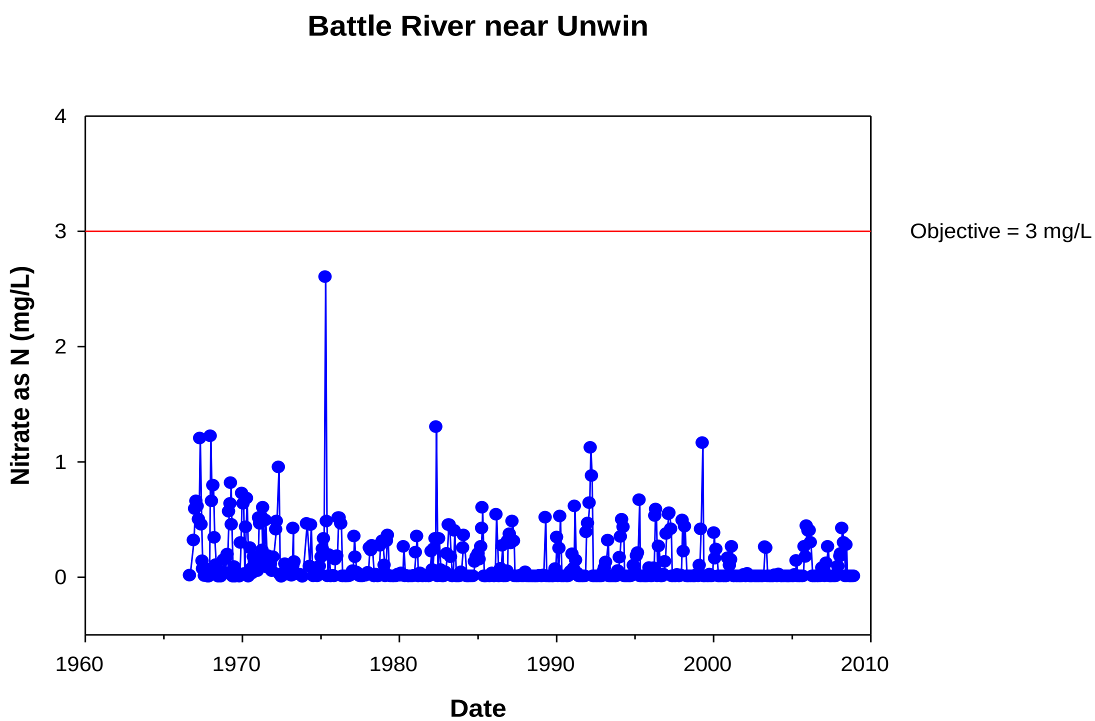

Figure 6-a1: Battle River Nitrate as N

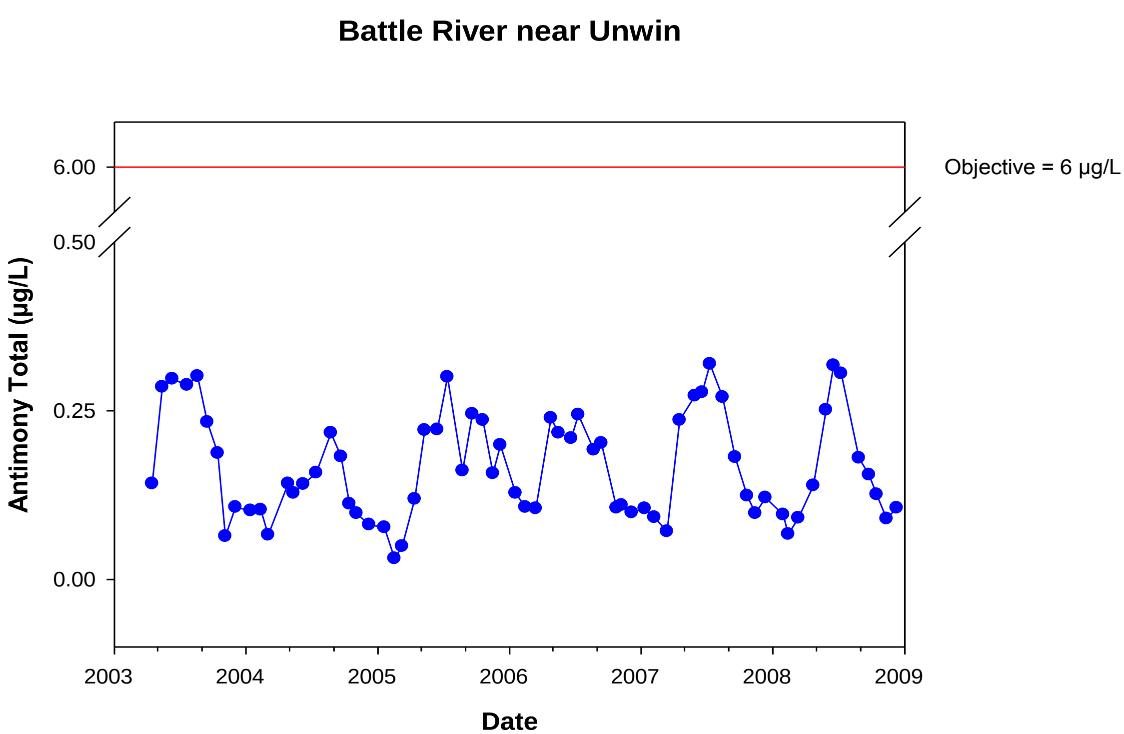

Figure 6-a2: Battle River Antimony Total

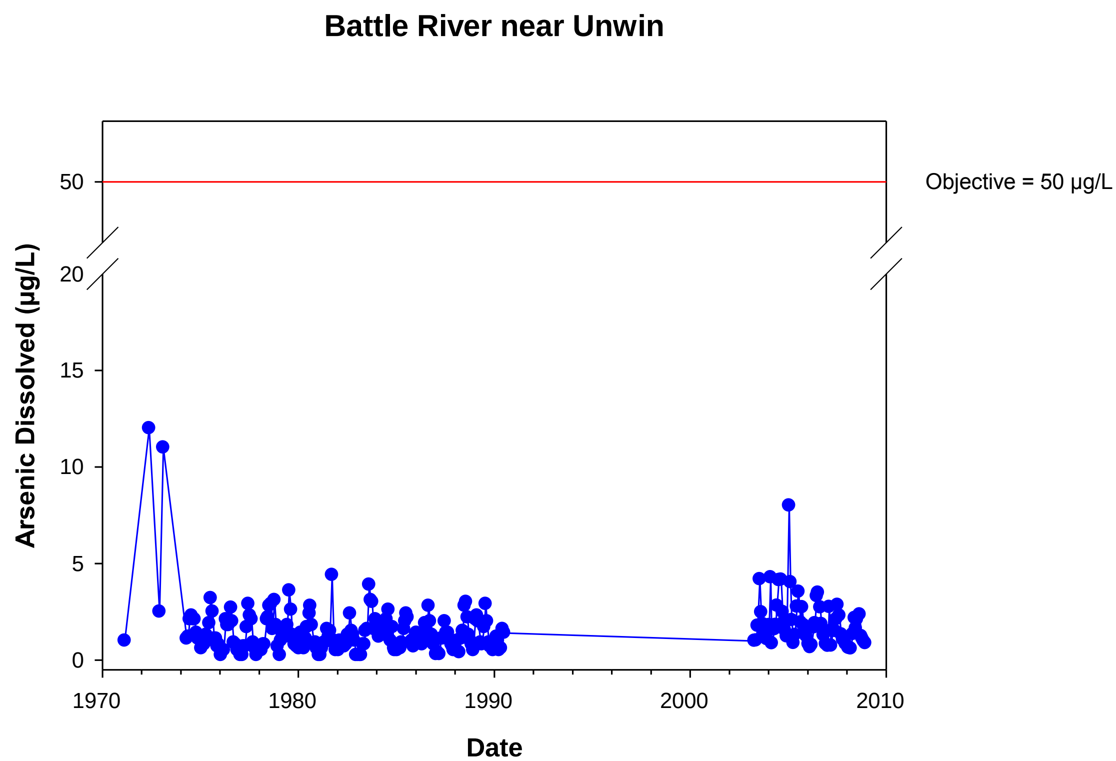

Figure 6-a3: Battle River Arsenic Total

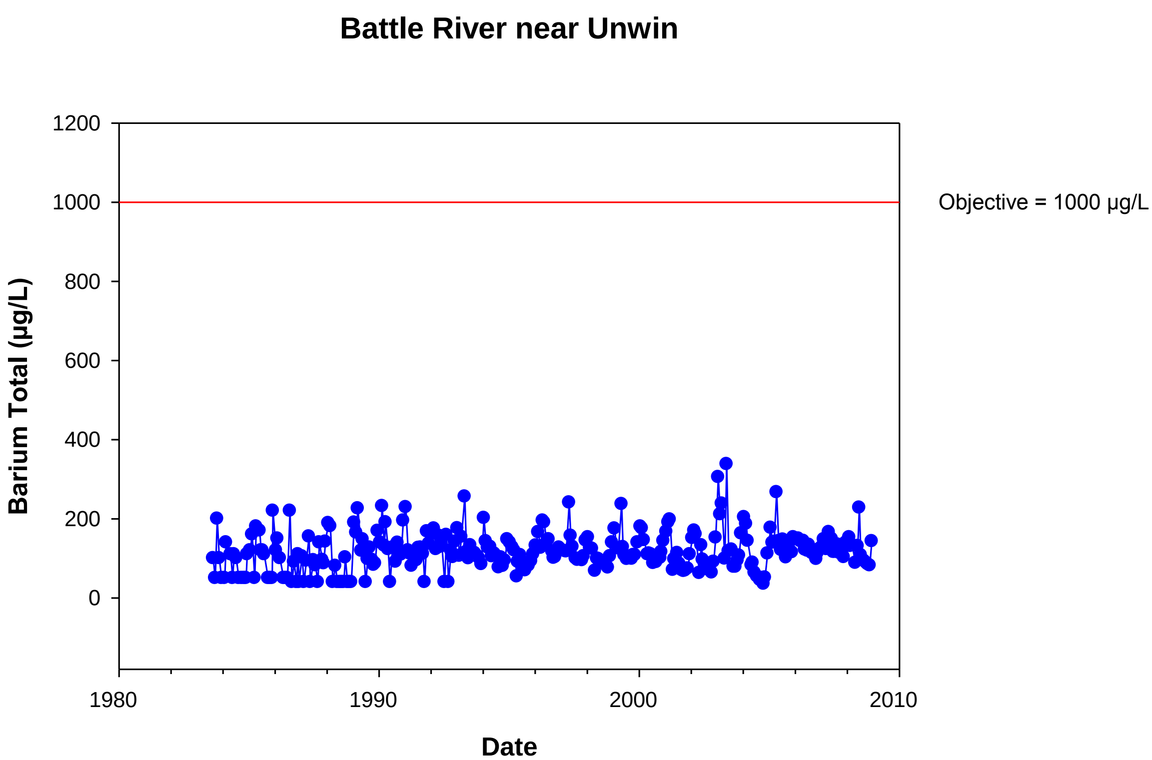

Figure 6-a4: Battle River Barium Total

Battle River near Unwin

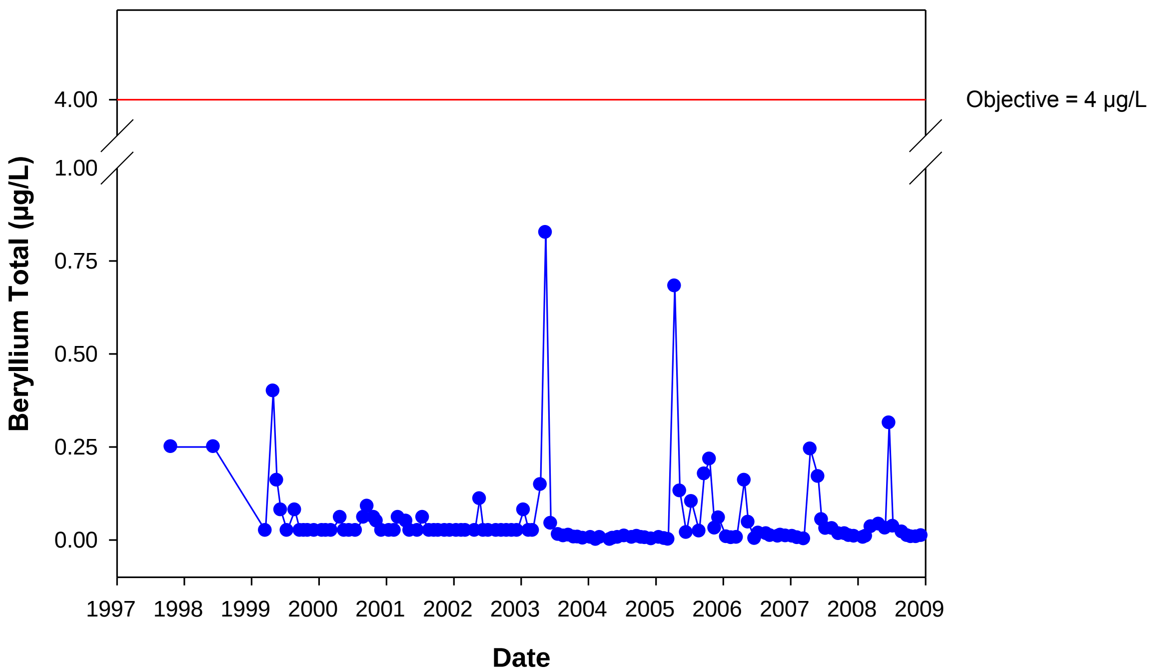

Figure 6-a5: Battle River Beryllium Total

Battle River near Unwin

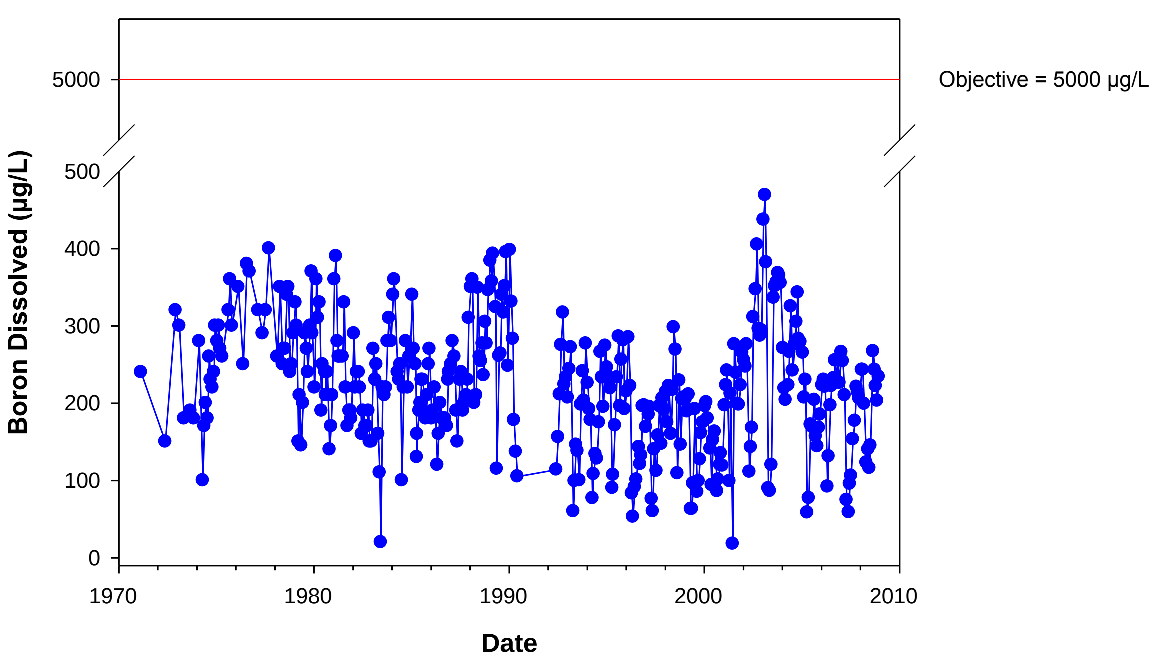

Figure 6-a6: Battle River Boron Dissolved

Battle River near Unwin

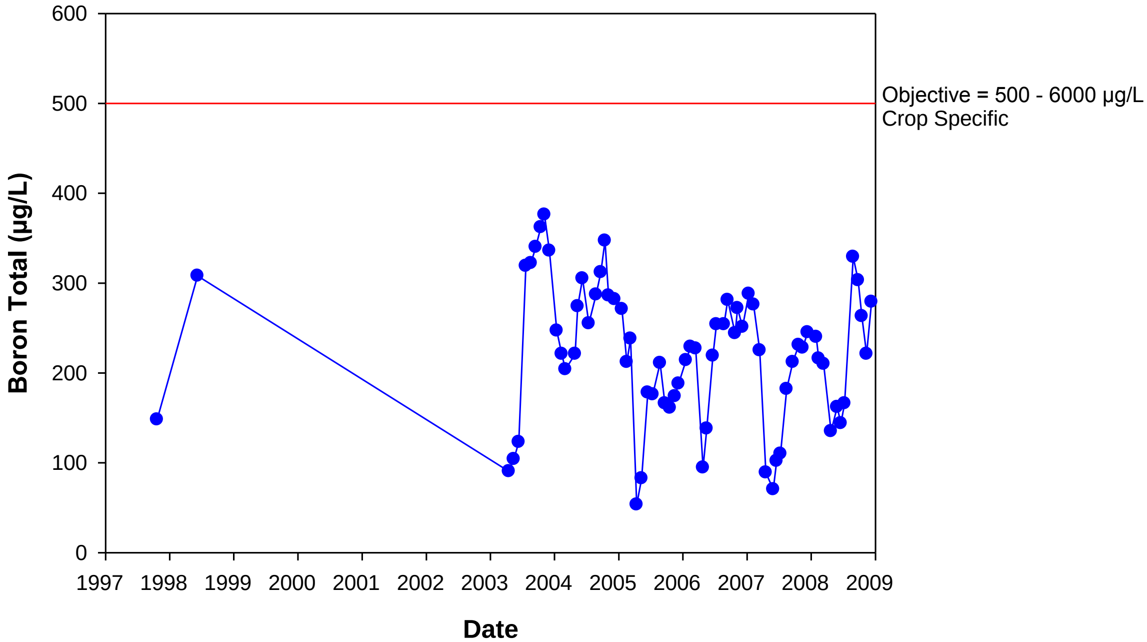

Figure 6-a7: Battle River Boron Total

Battle River near Unwin

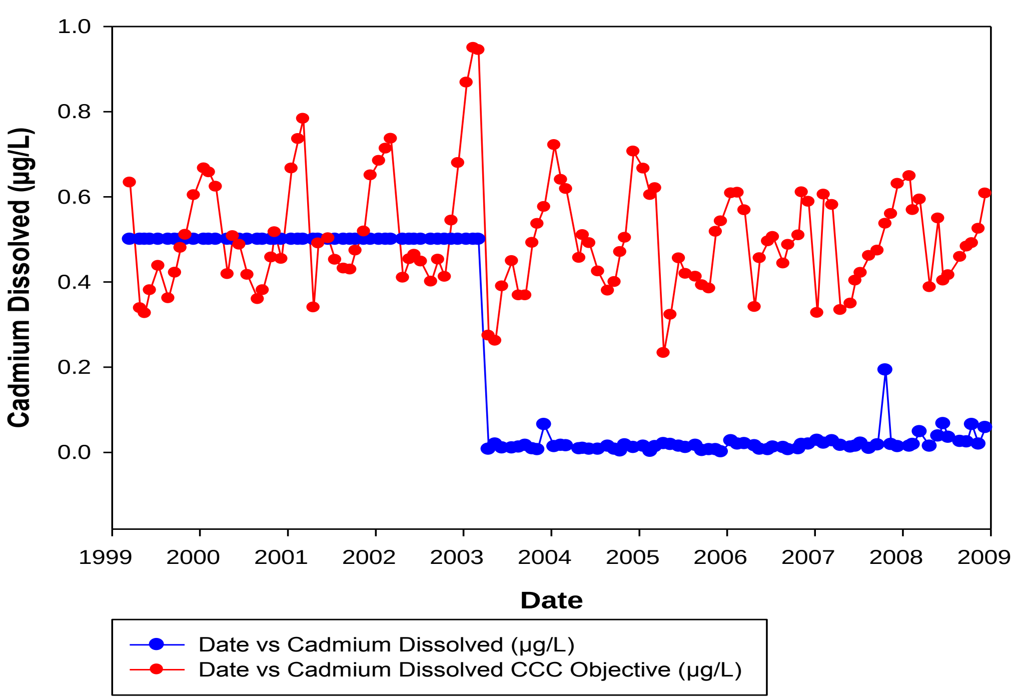

Figure 6-a8: Battle River Cadmium Dissolved

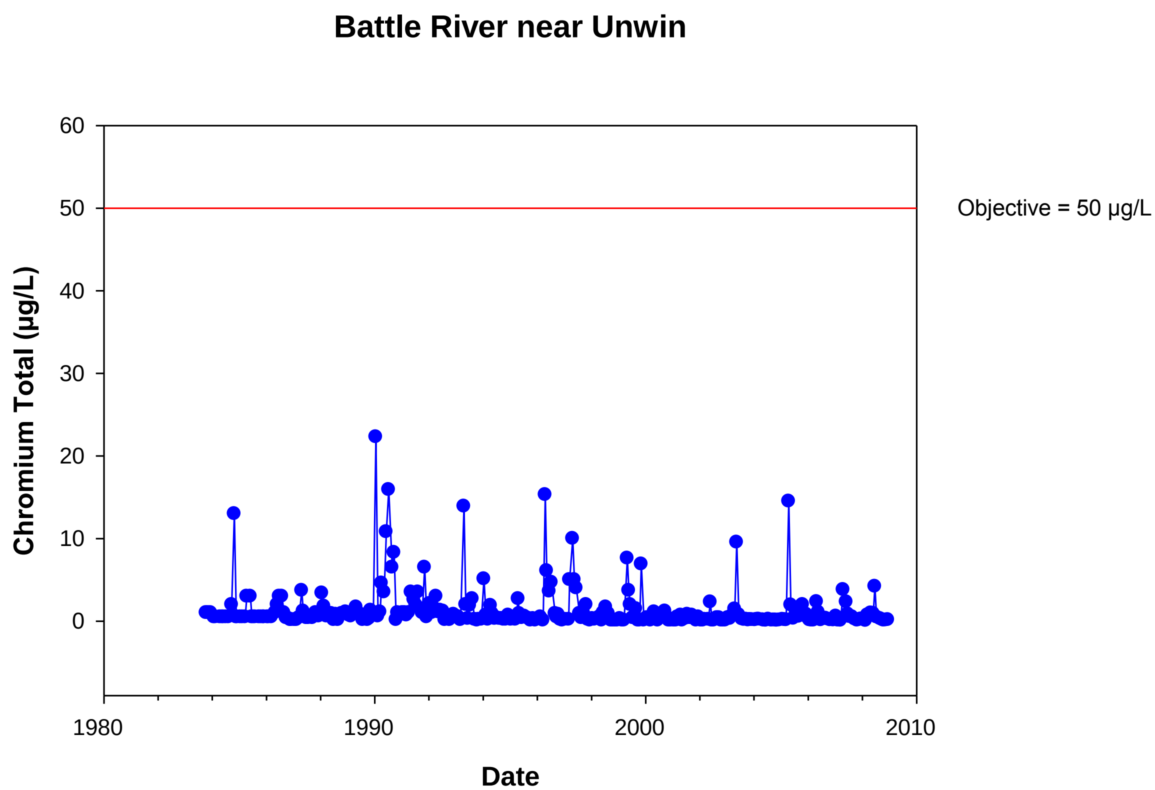

Figure 6-a9: Battle River Chromium Total

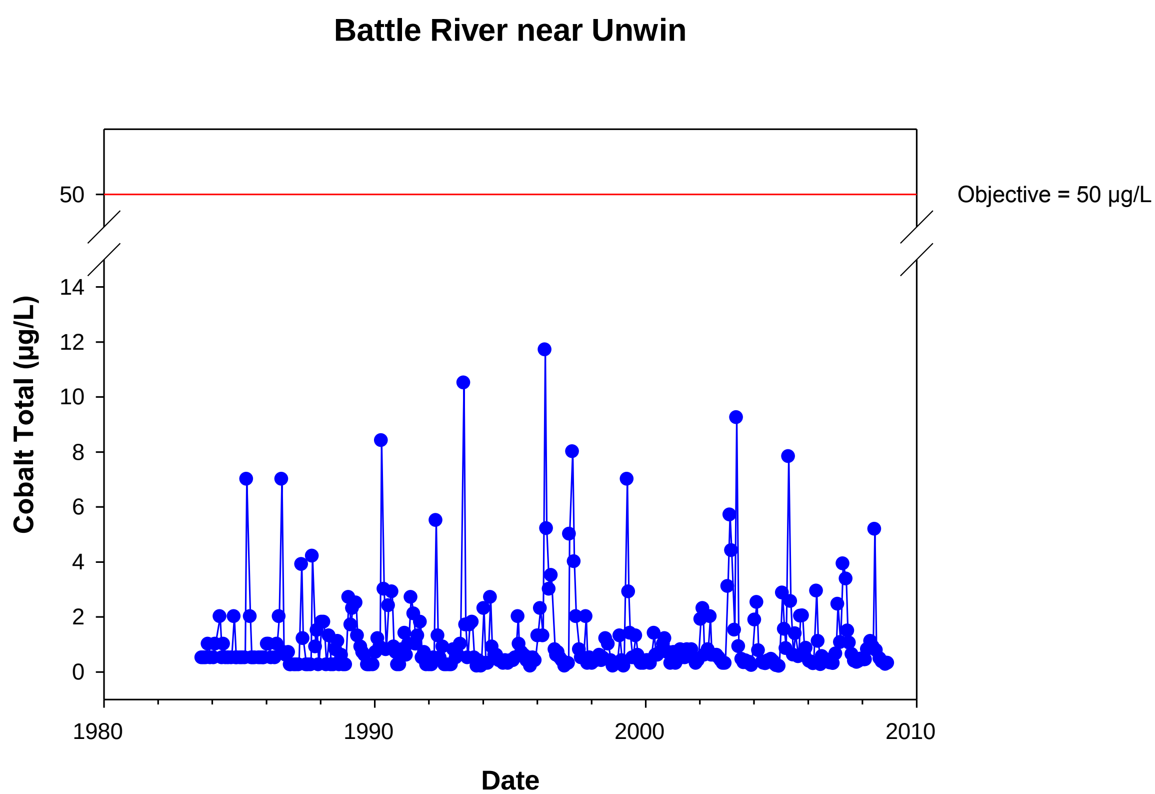

Figure 6-a10: Battle River Cobalt Total

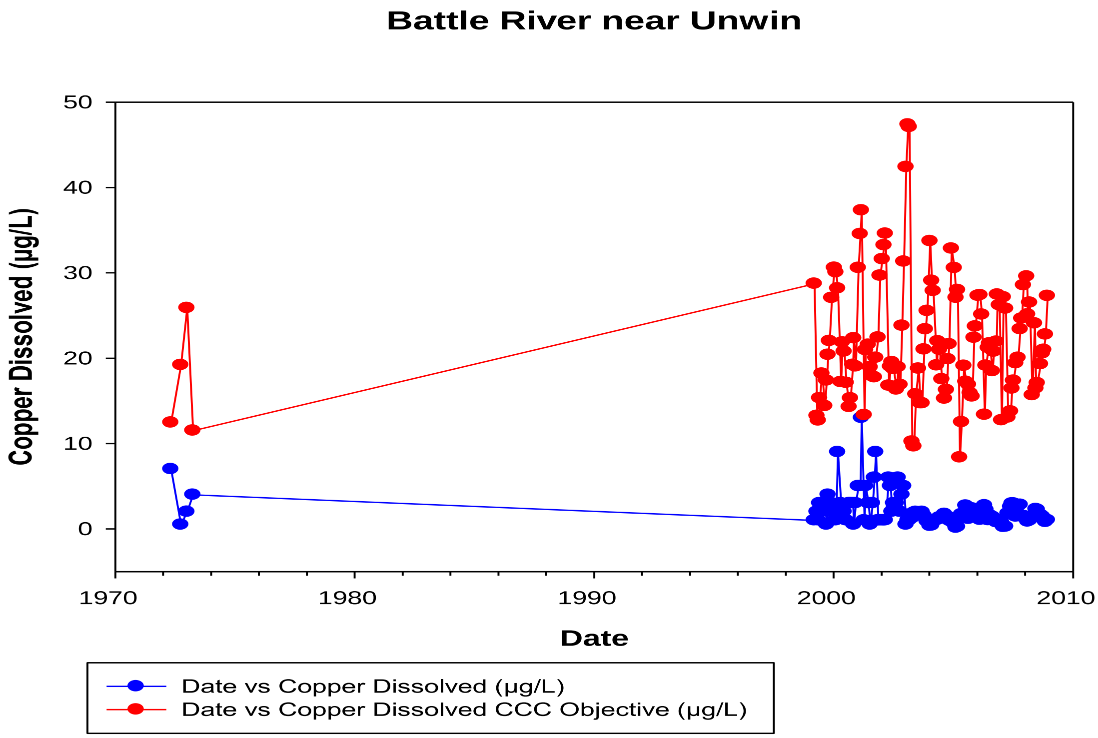

Figure 6-a11: Battle River Copper Dissolved

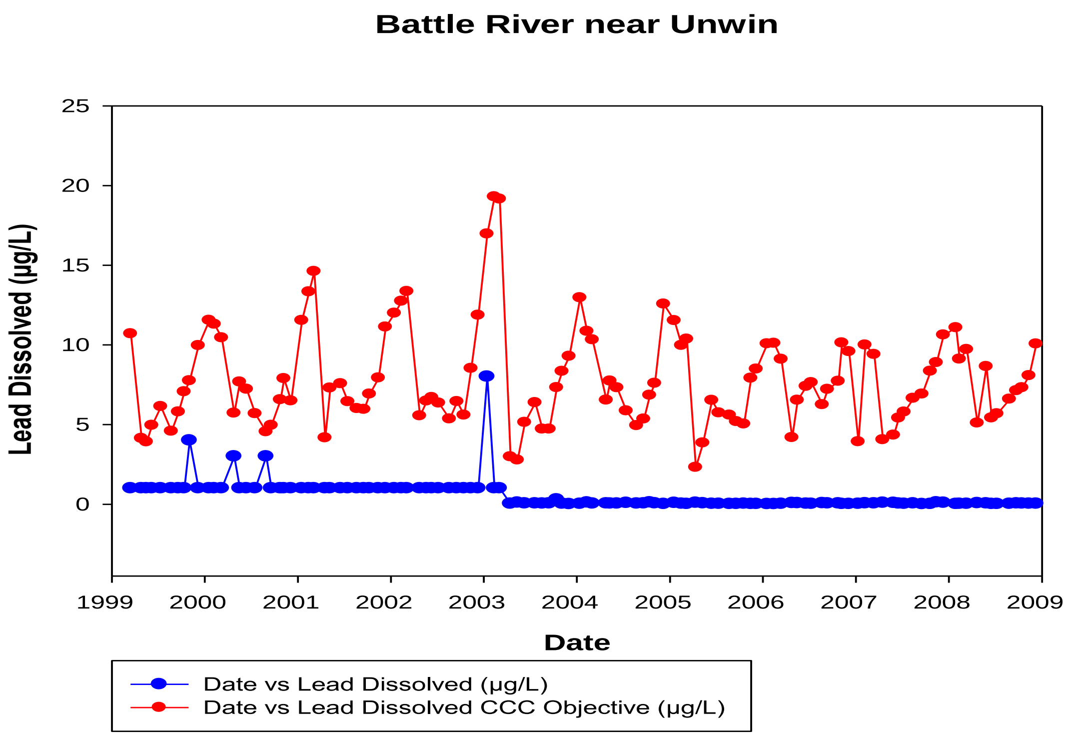

Figure 6-a12: Battle River Lead Dissolved

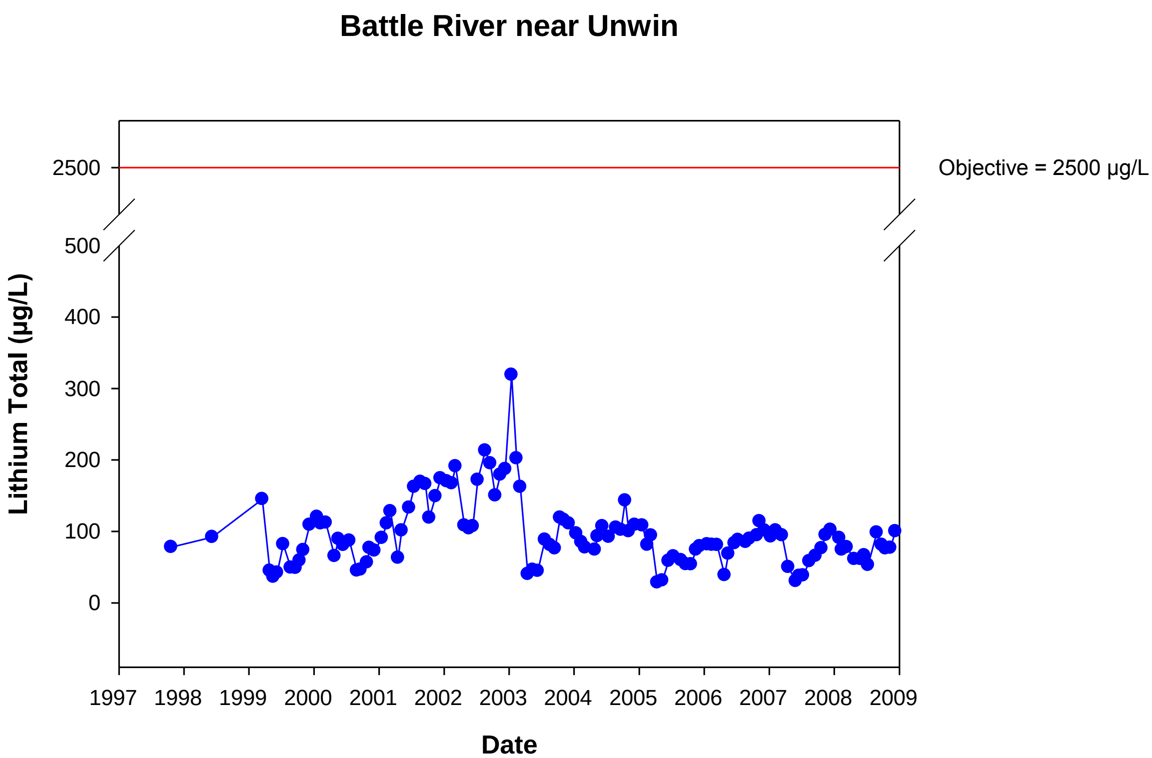

Figure 6-a13: Battle River Lithium Total

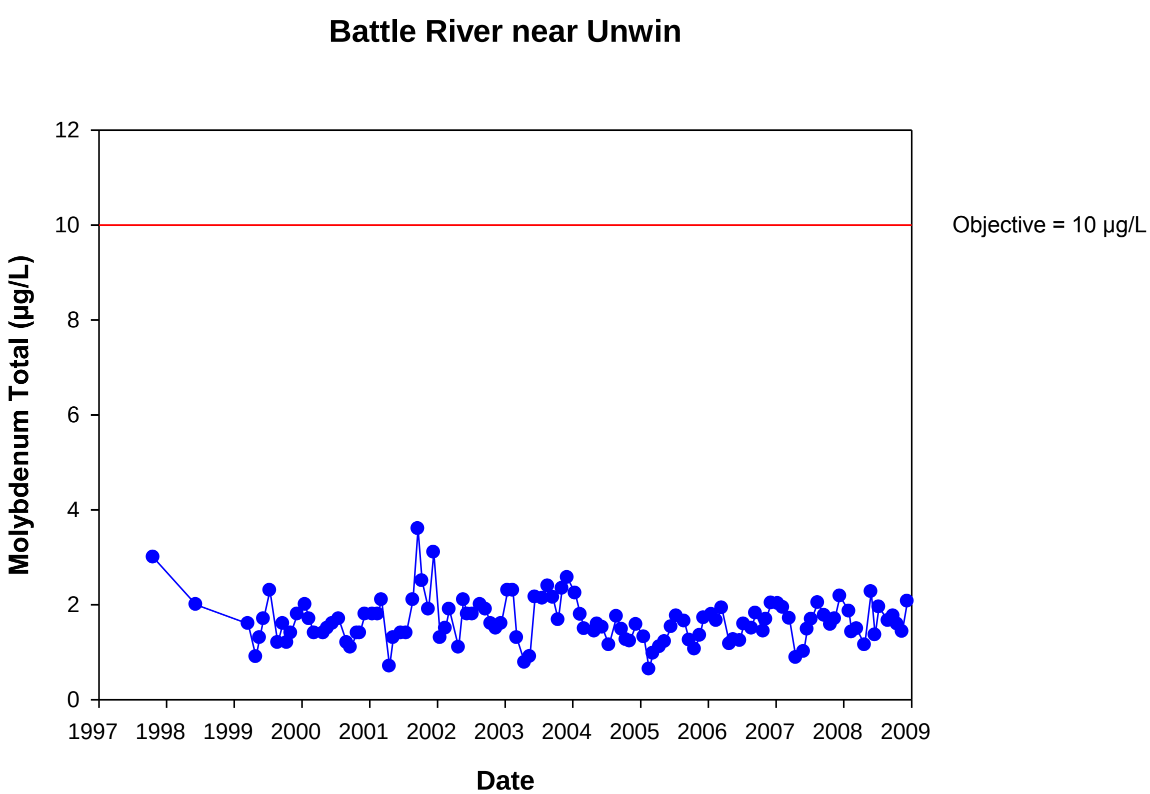

Figure 6-a14: Battle River Molybdenum Total

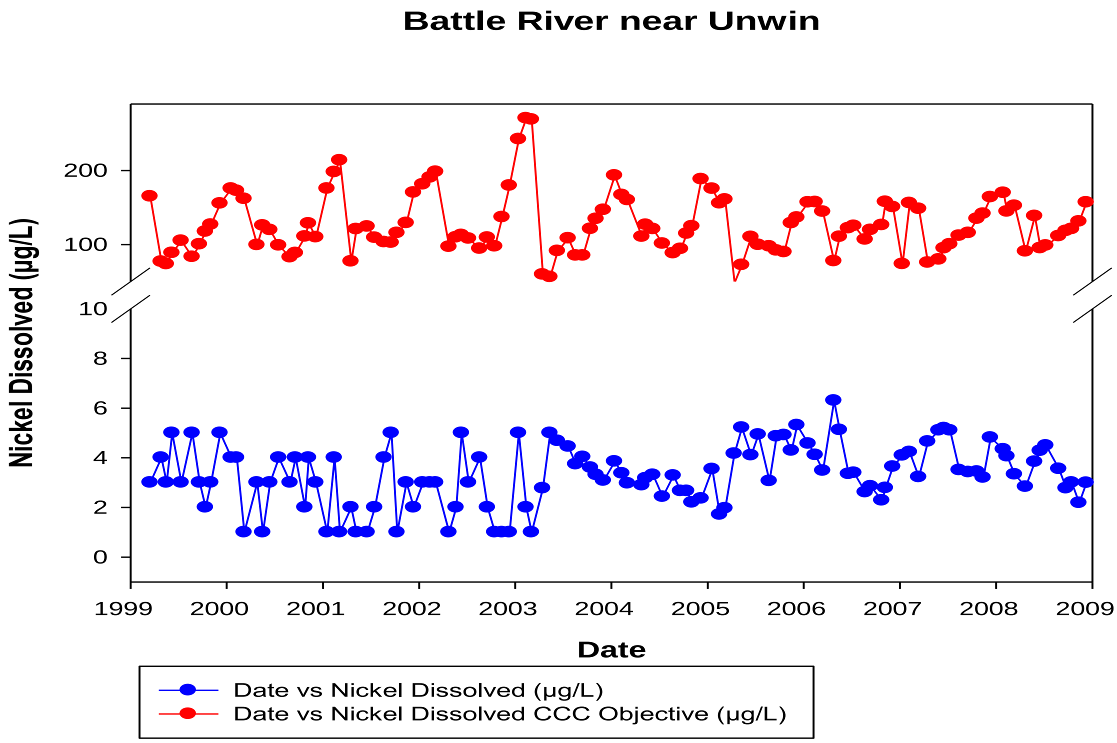

Figure 6-a15: Battle River Nickel Dissolved

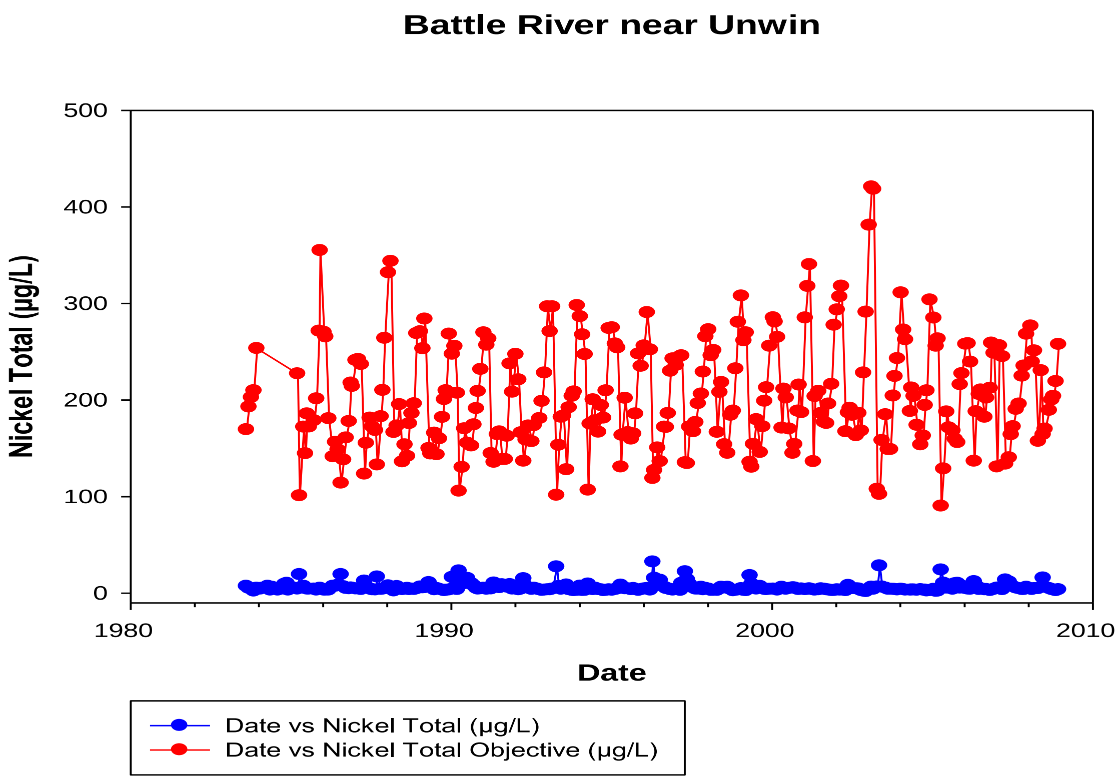

Figure 6-a16: Battle River Nickel Total

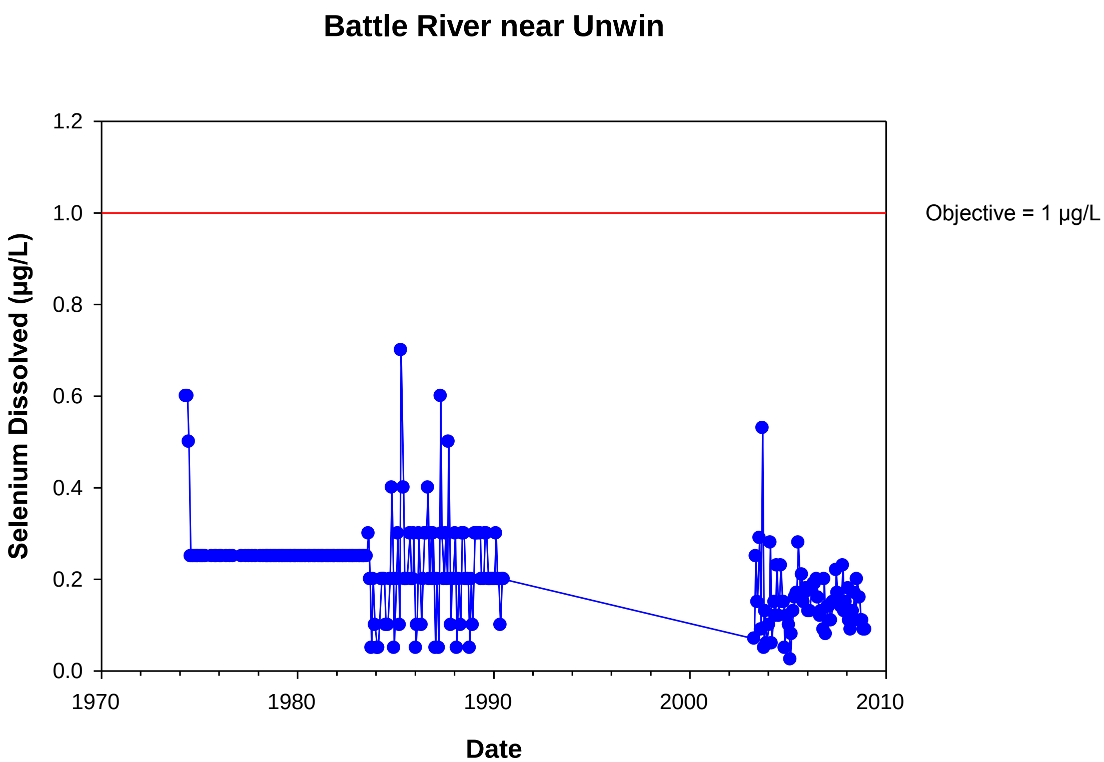

Figure 6-a17: Battle River Selenium Dissolved

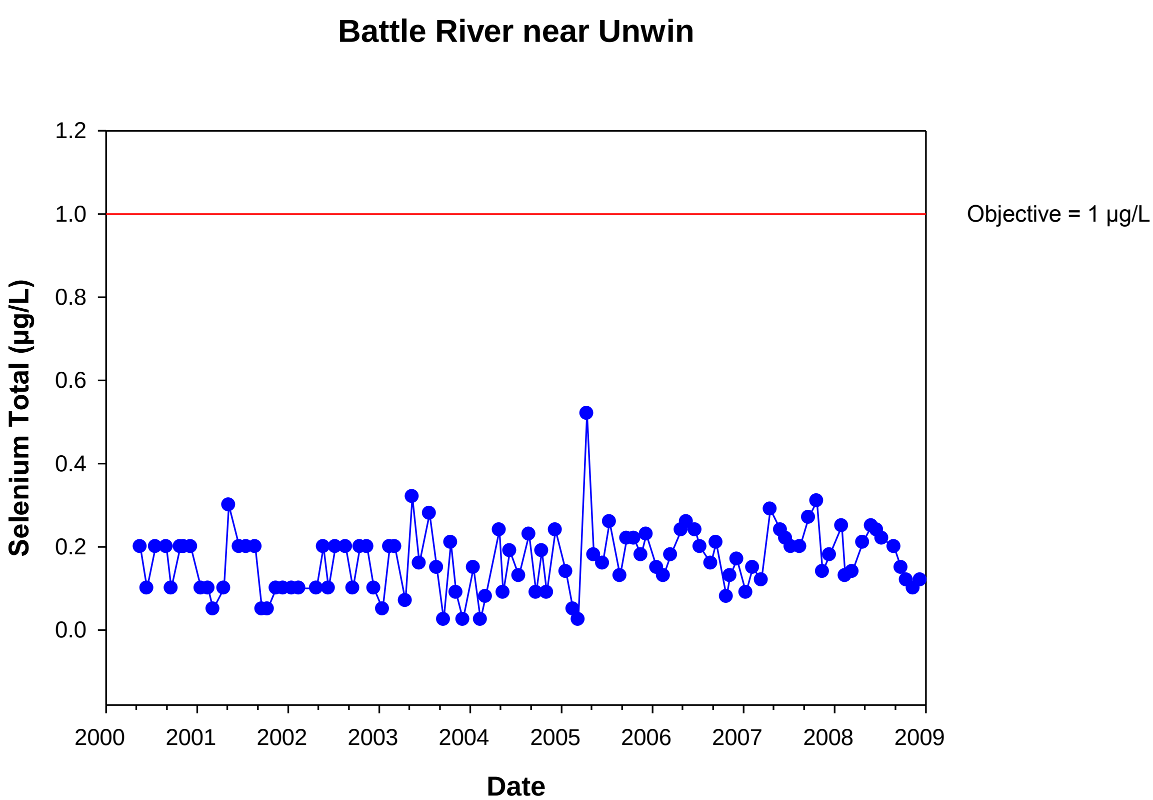

Figure 6-a18: Battle River Selenium Total

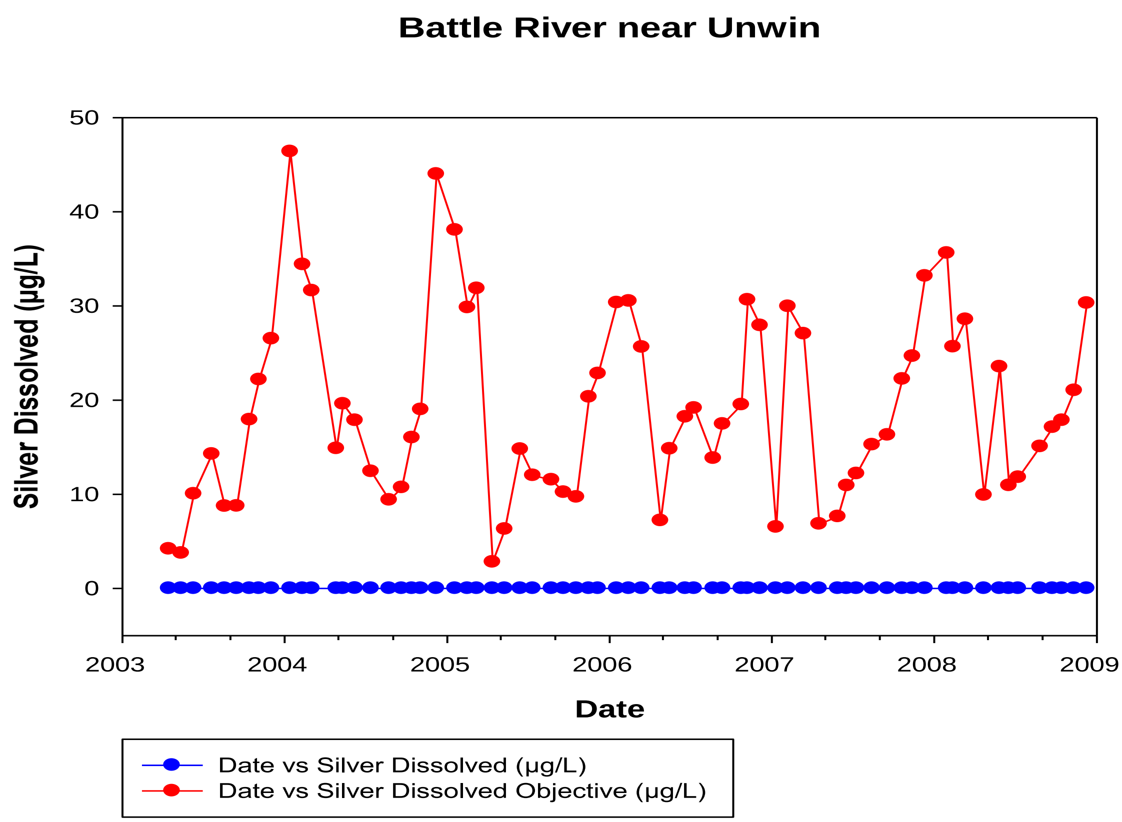

Figure 6-a19: Battle River Silver Dissolved

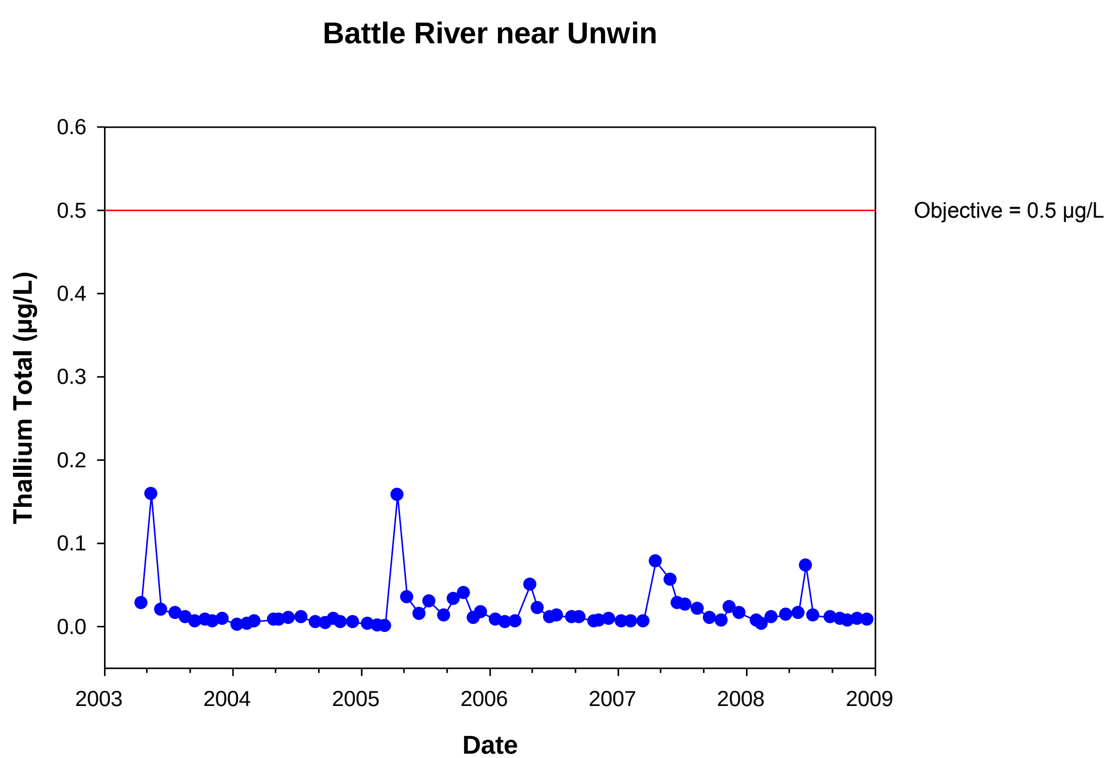

Figure 6-a20: Battle River Thallium Total

Battle River near Unwin

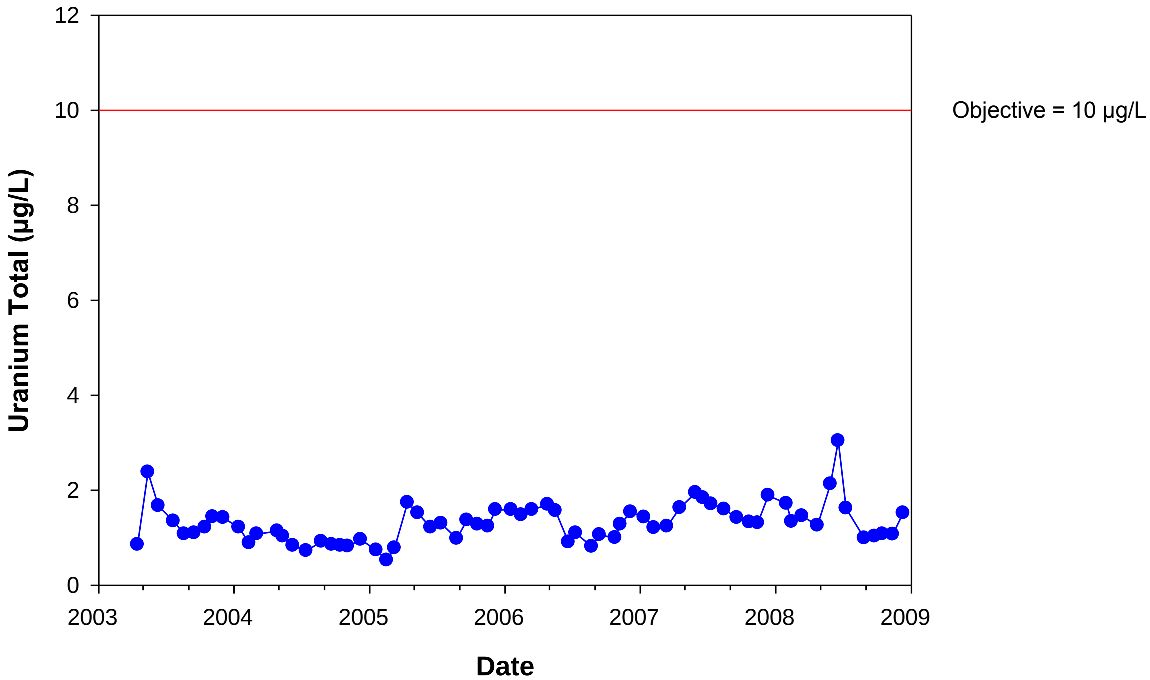

Figure 6-a21: Battle River Uranium Total

Battle River near Unwin

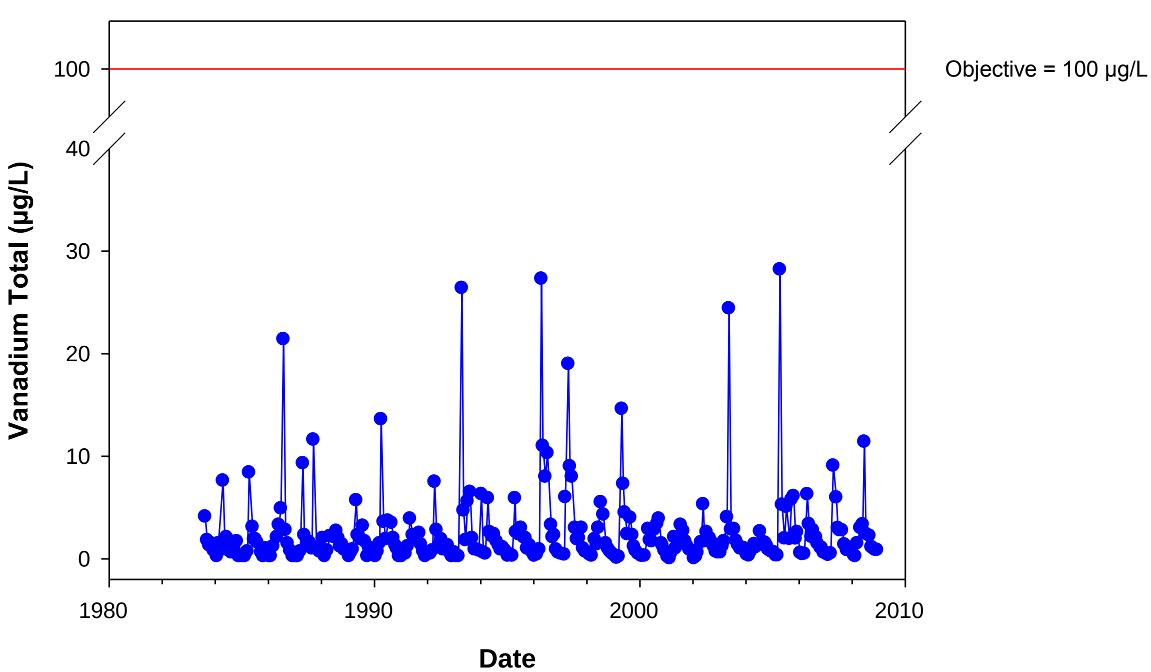

Figure 6-a22: Battle River Vanadium Total

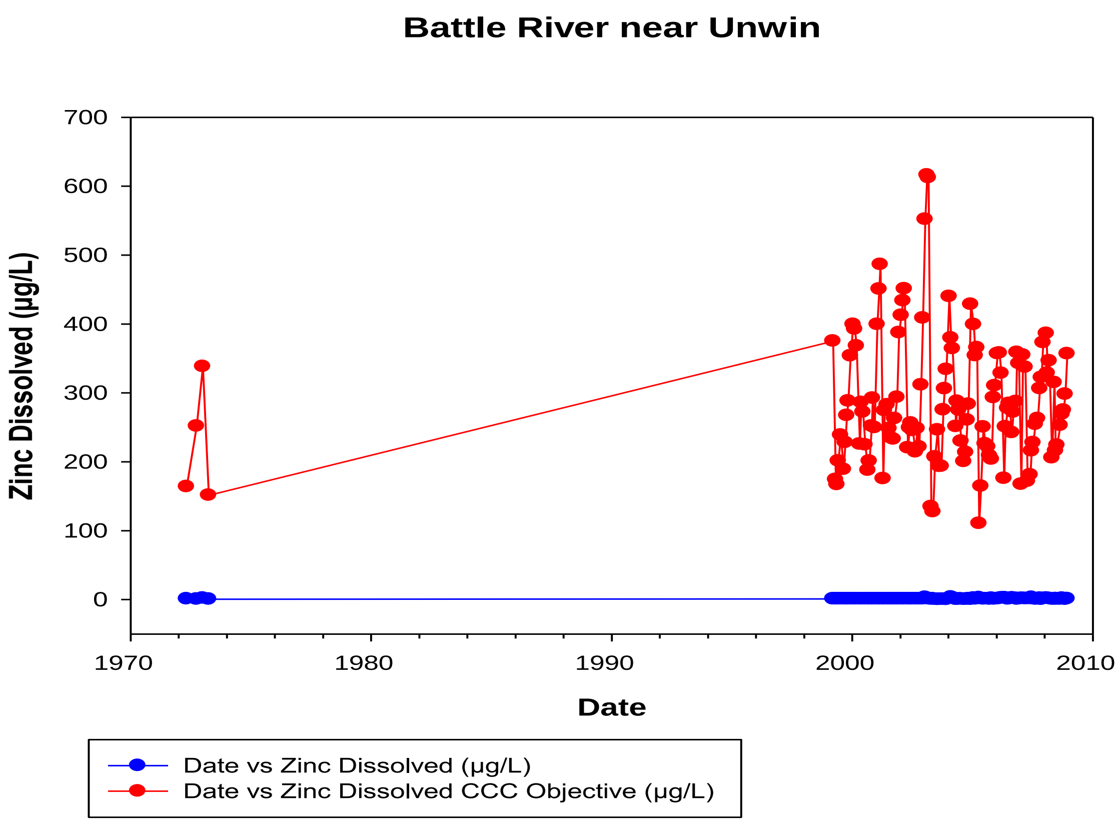

Figure 6-a23: Battle River Zinc Dissolved

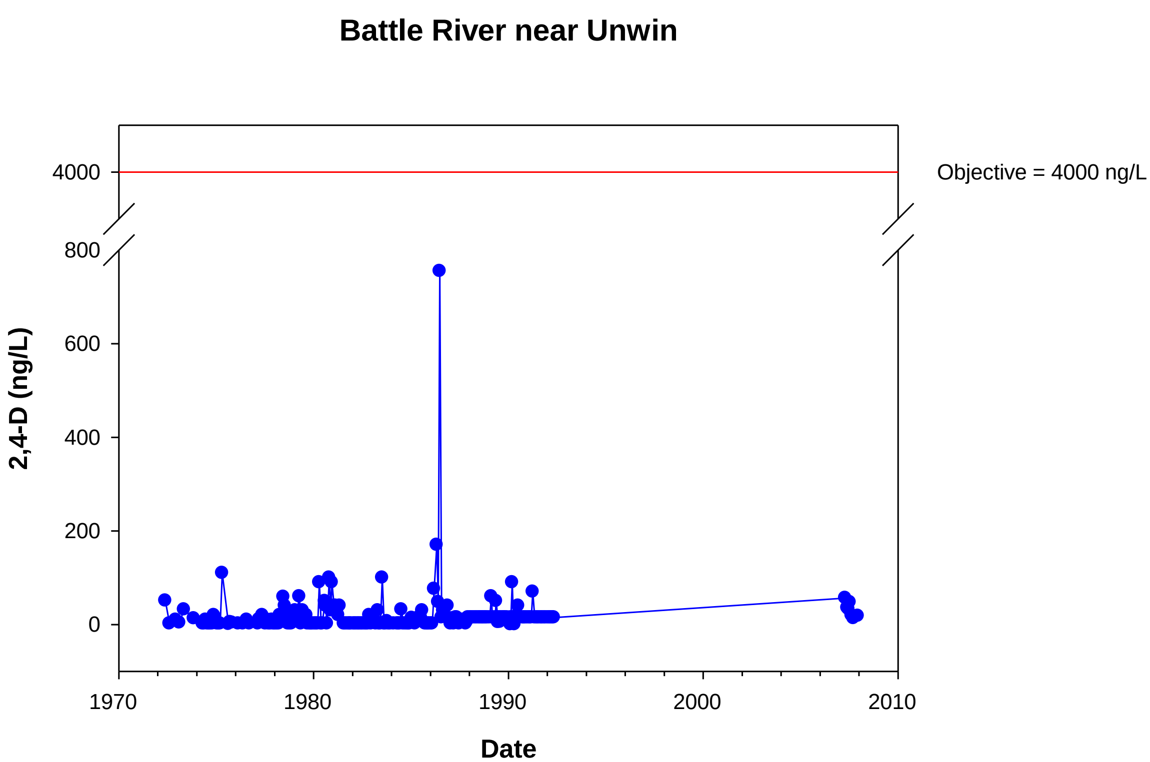

Figure 6-a24: Battle River 2,4-D

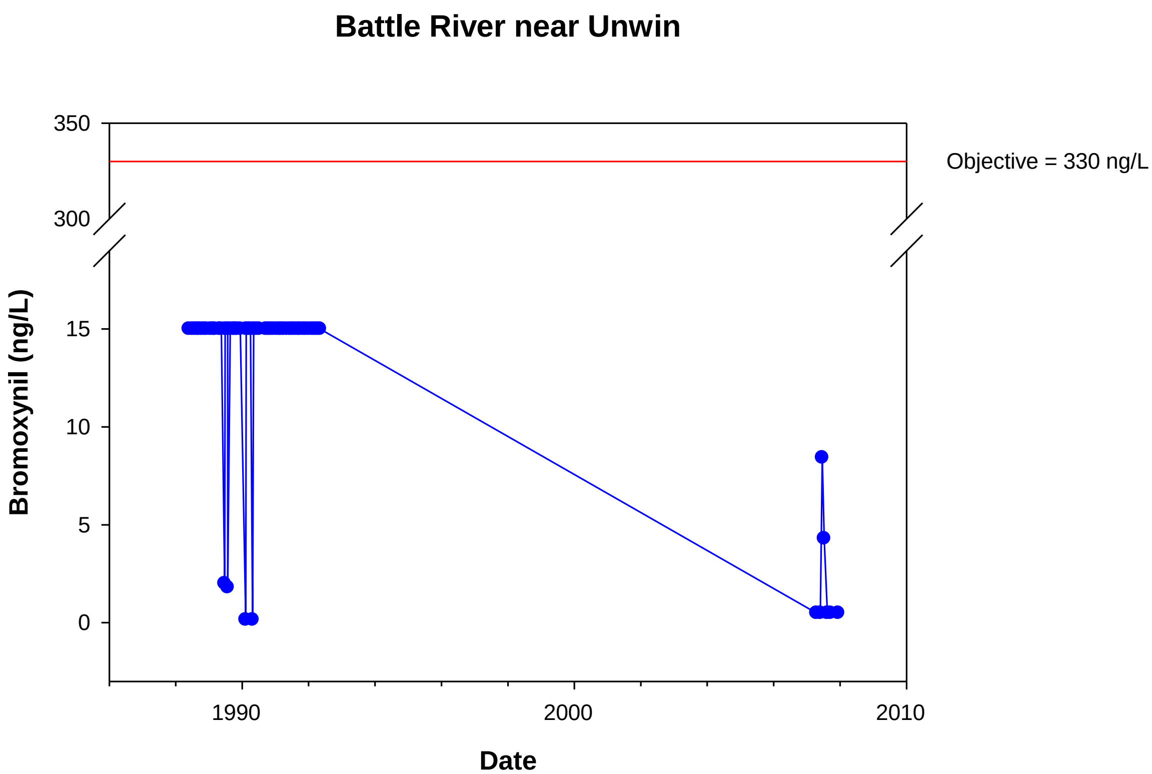

Figure 6-a25: Battle River Bromoxynil

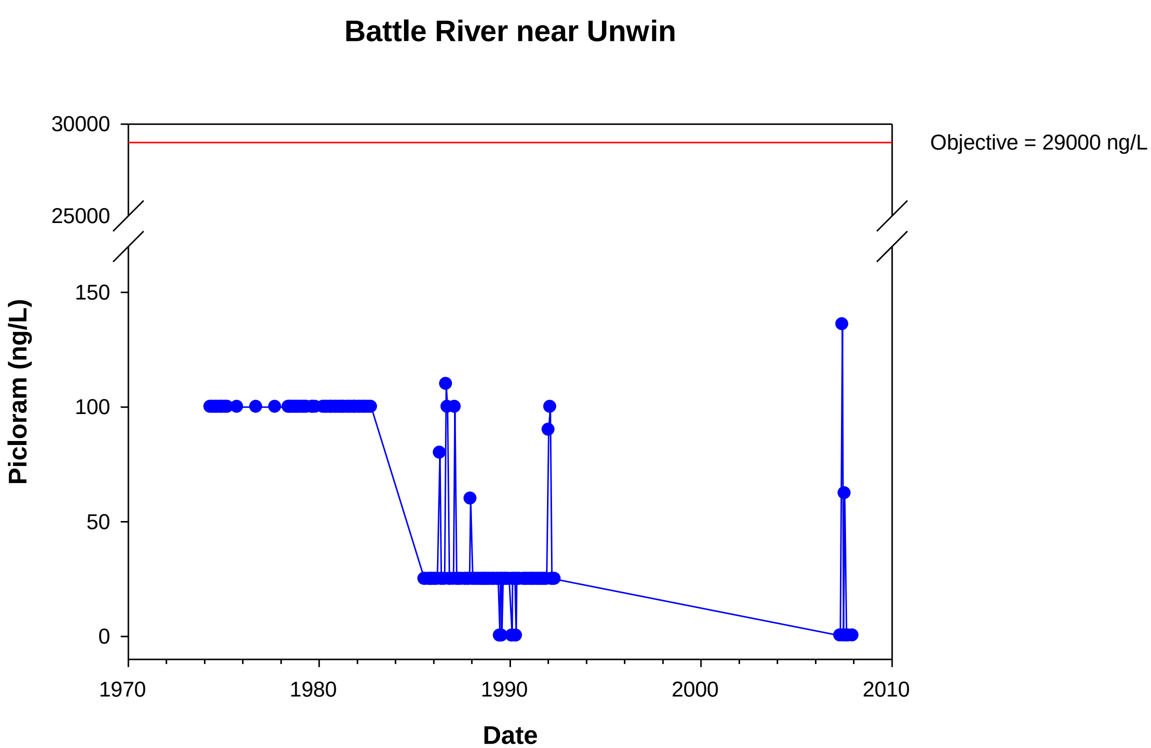

Figure 6-a26: Battle River Picloram

Battle River near Unwin

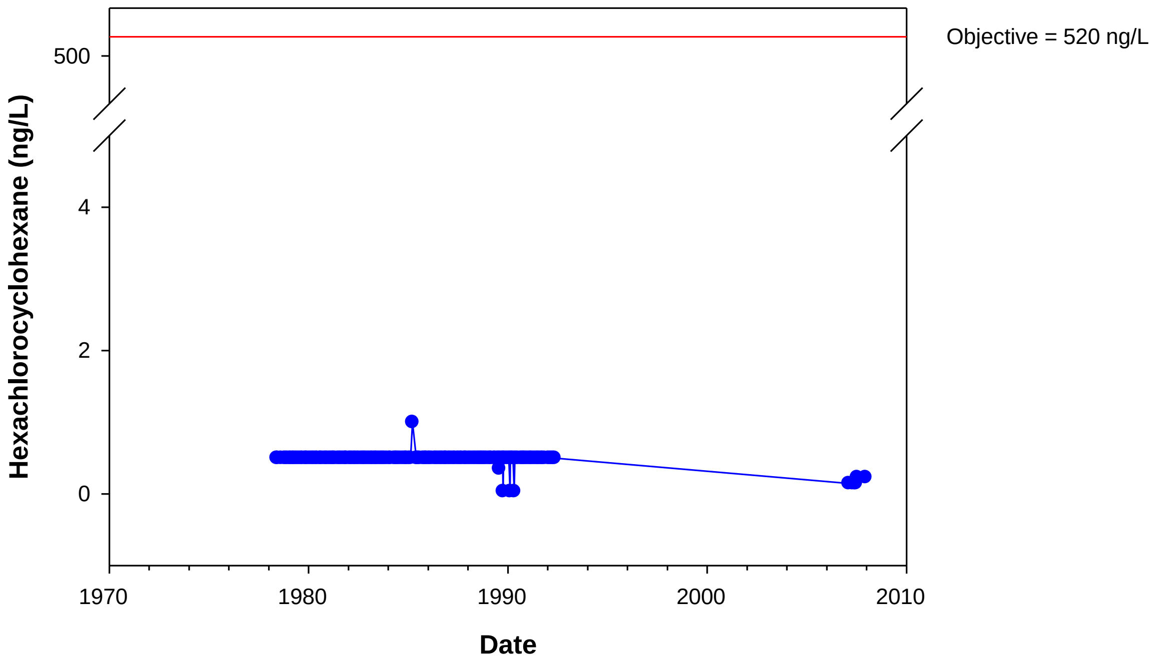

Figure 6-a27: Battle River Hexachlorocyclohexane

Battle River near Unwin

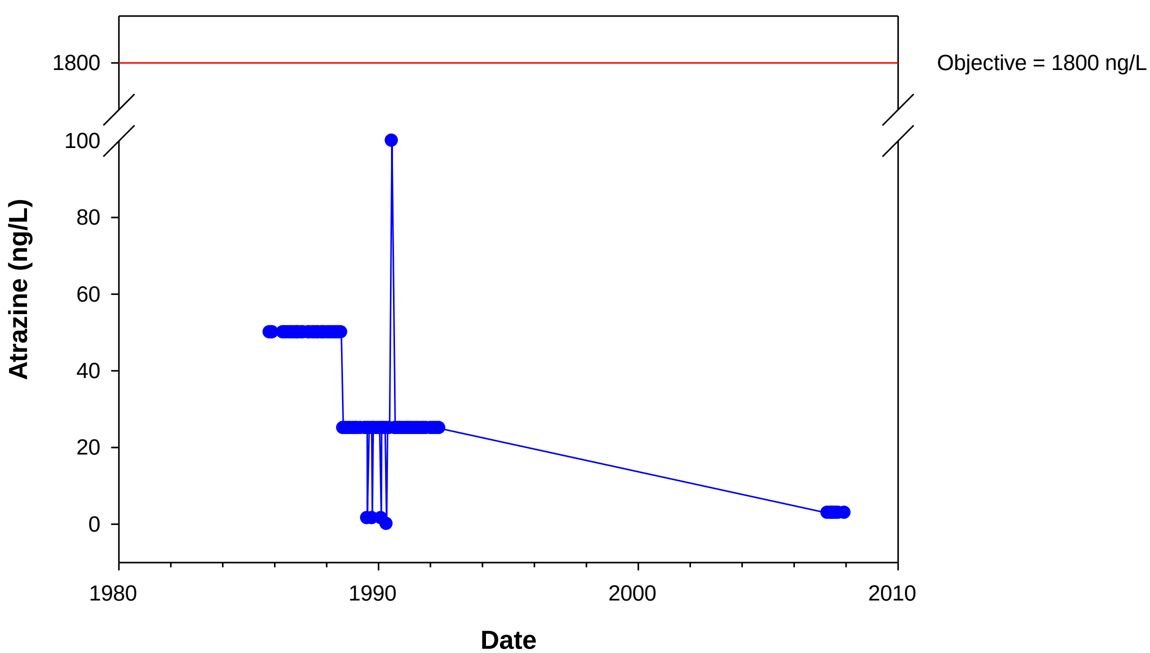

Figure 6-a28: Battle River Atrazine

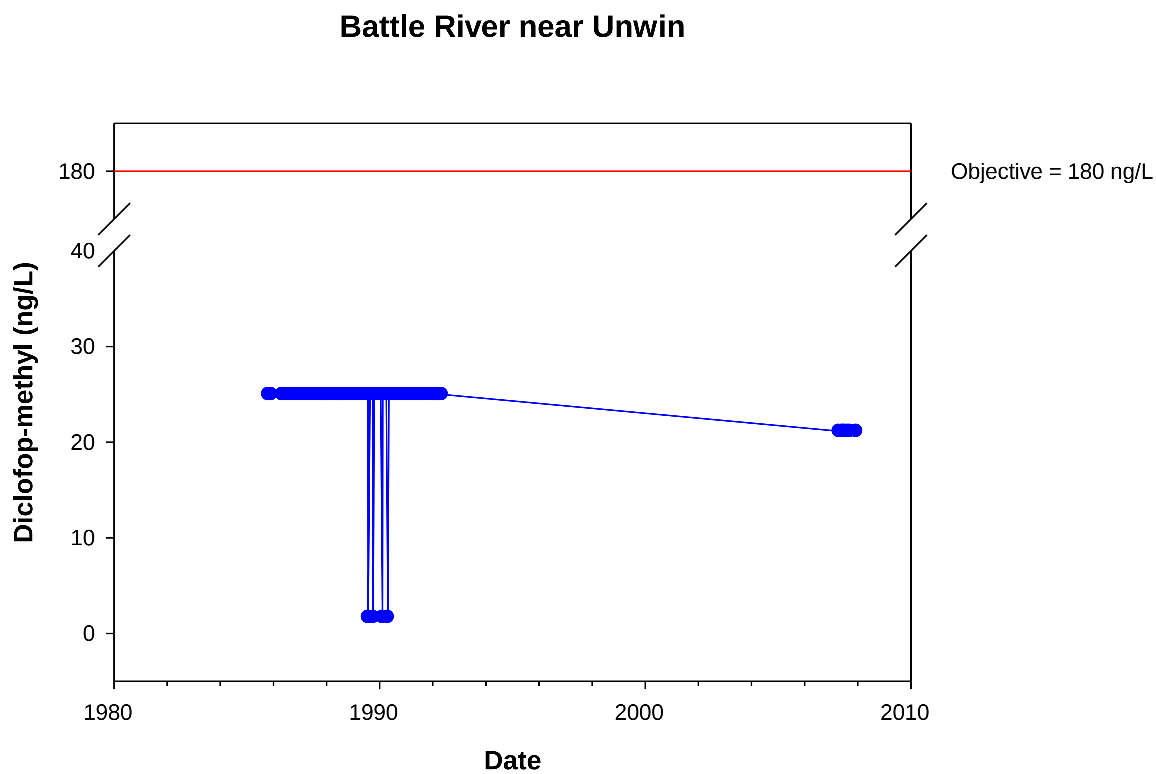

Figure 6-a29: Battle River Diclofop-methyl

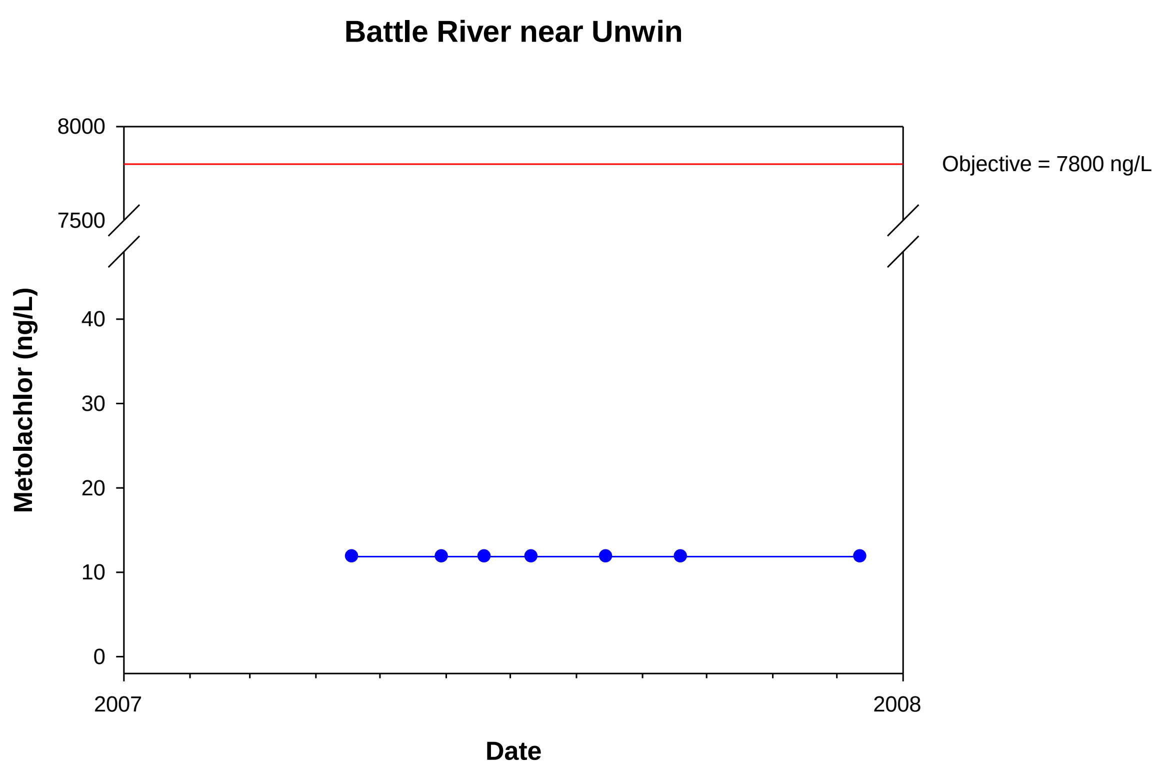

Figure 6-a30: Battle River Metolachlor

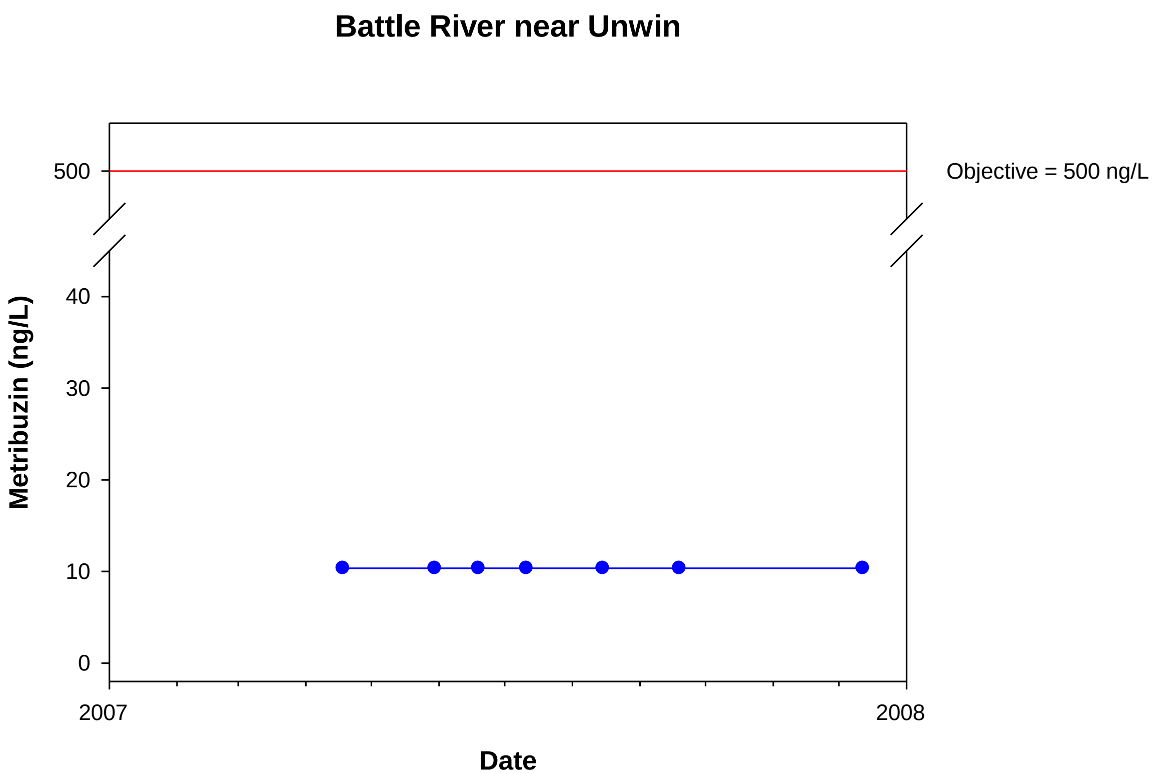

Figure 6-a31: Battle River Metribuzin

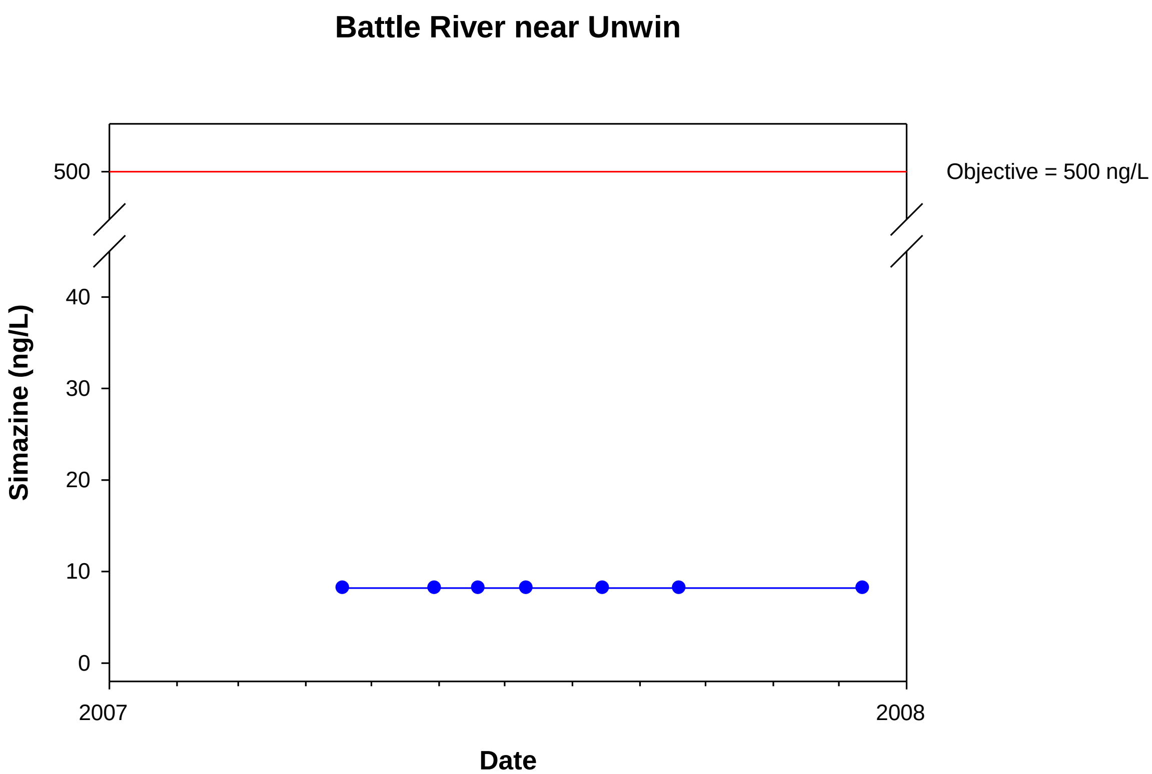

Figure 6-a32: Battle River Simazine

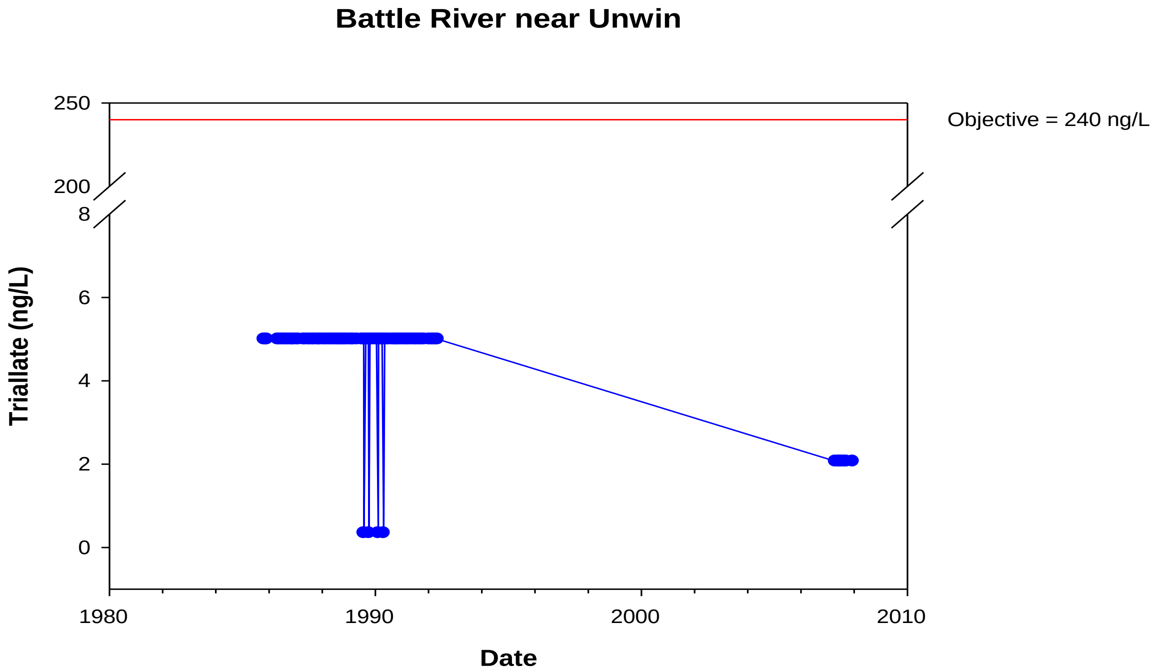

Figure 6-a33: Battle River Triallate

Appendix 6-b: Beaver River

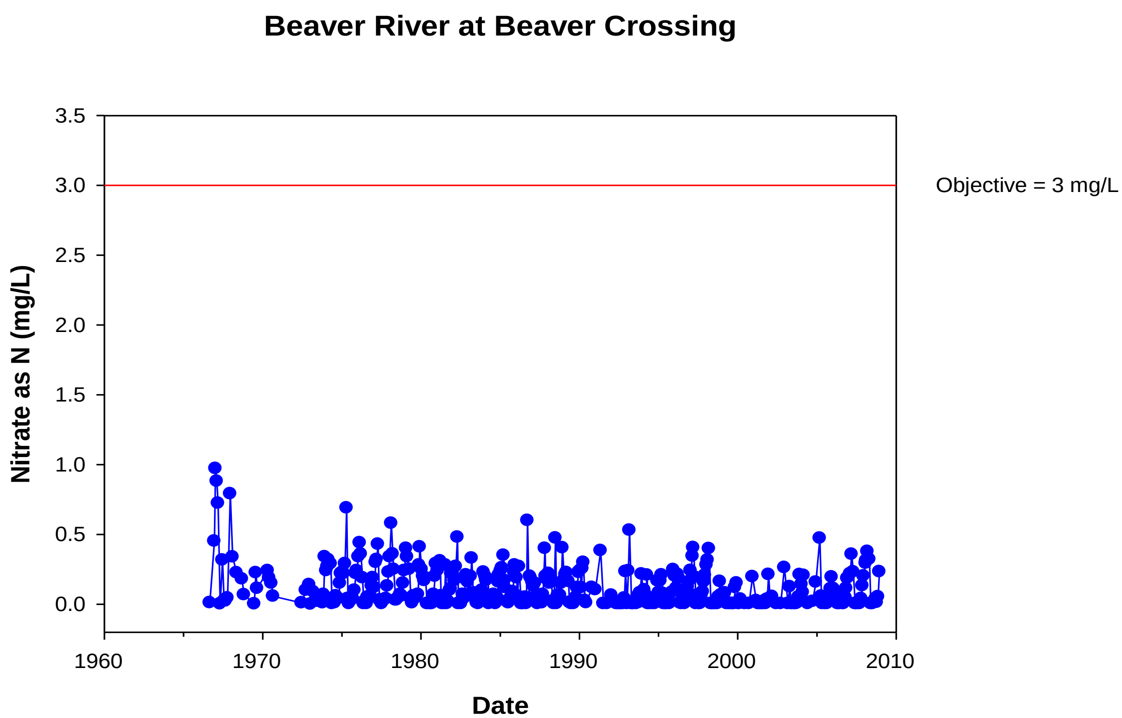

Figure 6-b1: Beaver River Nitrate at N

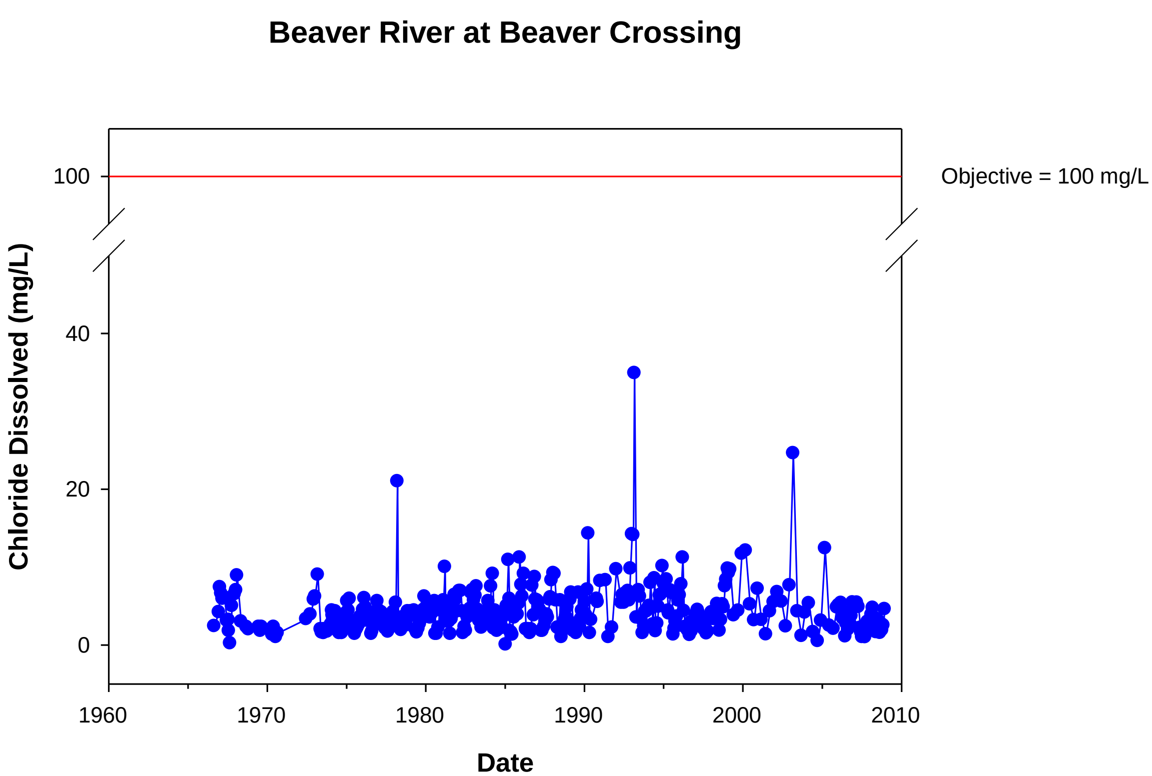

Figure 6-b2: Beaver River Chloride Dissolved

Beaver River at Beaver Crossing

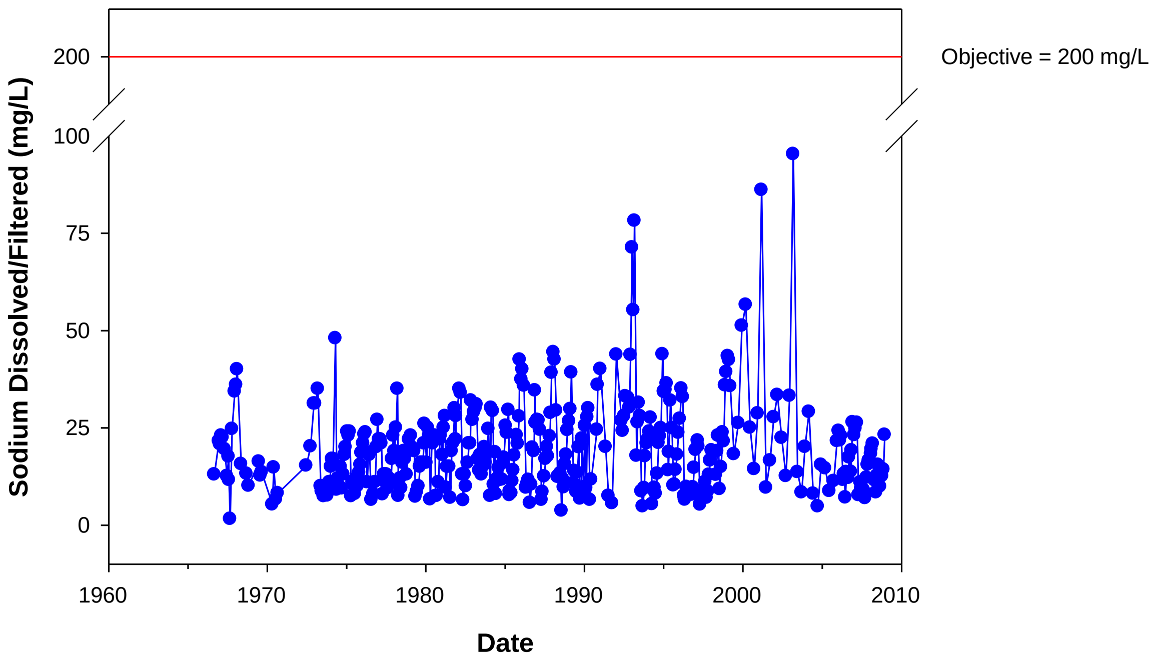

Figure 6-b3: Beaver River Sodium Dissolved/Filtered

Beaver River at Beaver Crossing

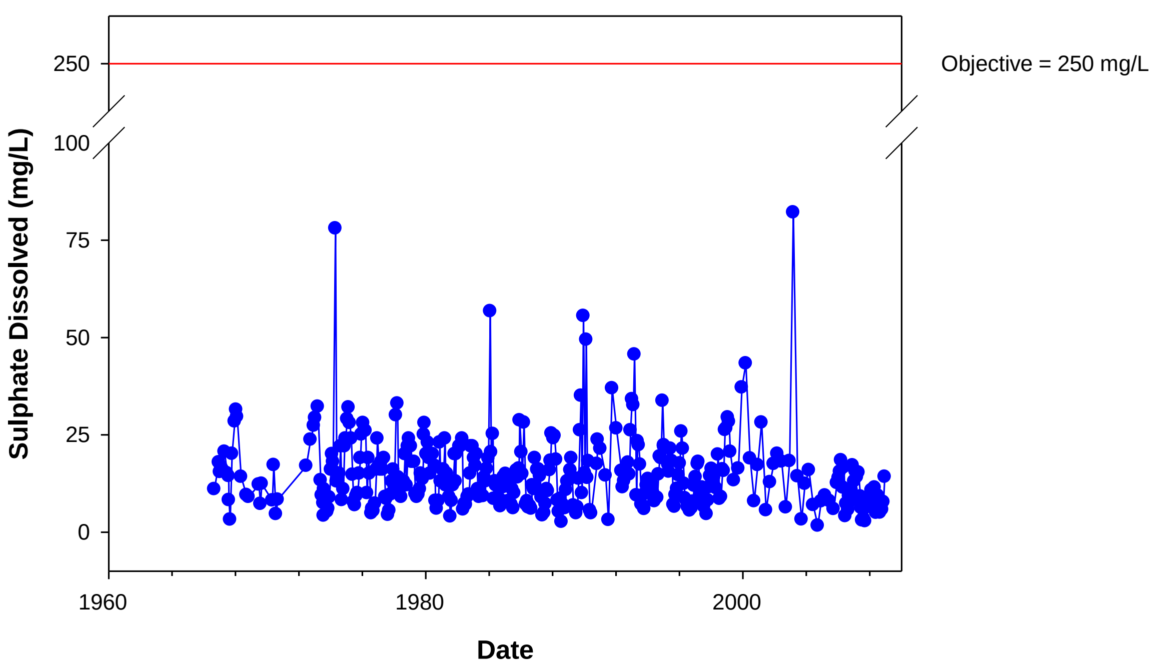

Figure 6-b4: Beaver River Sulphate Dissolved

Beaver River at Beaver Crossing

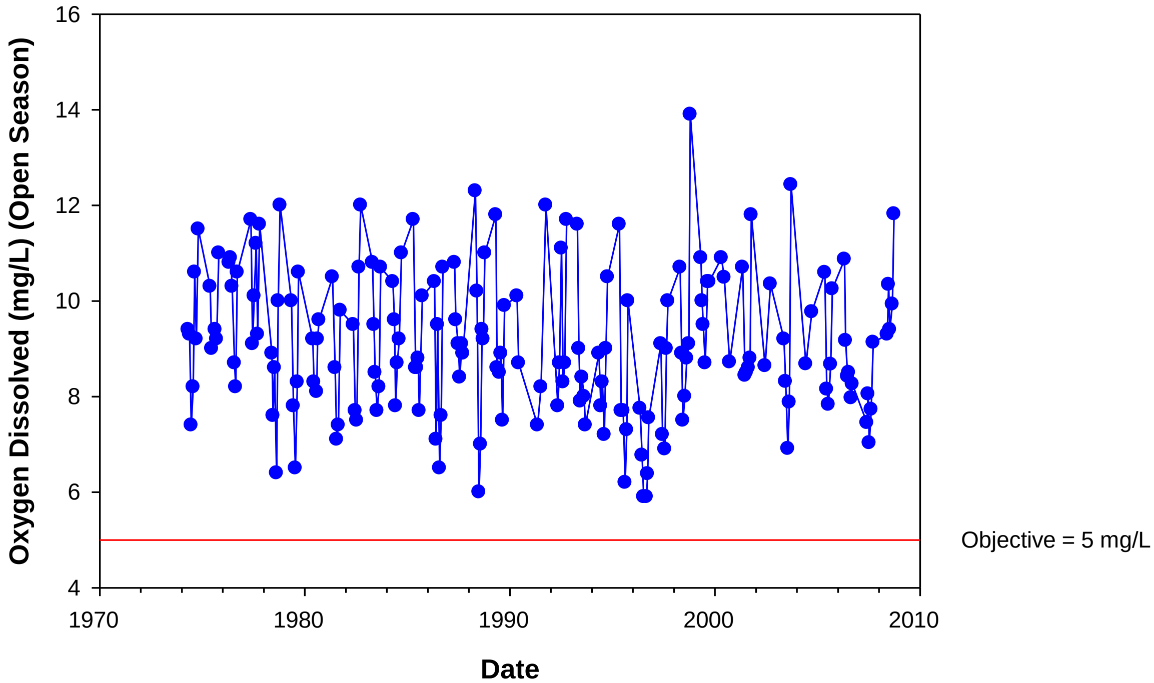

Figure 6-b5: Beaver River Oxygen Dissolved (Open Season)

Beaver River at Beaver Crossing

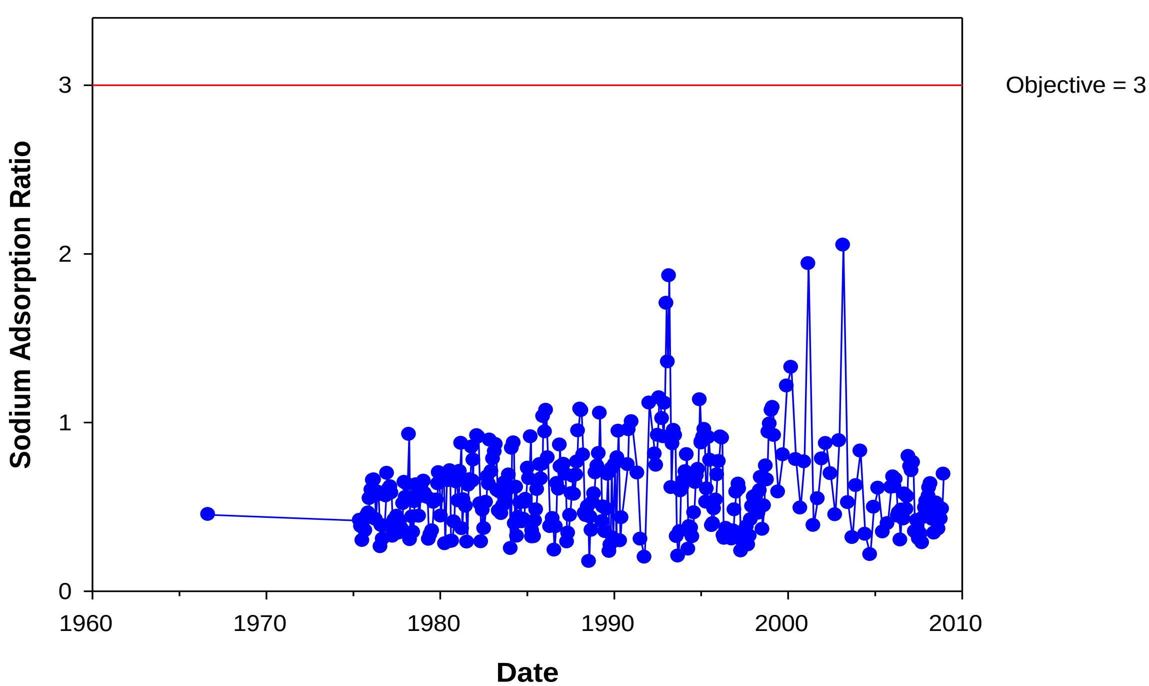

Figure 6-b6: Beaver River Sodium Adsorption Ratio

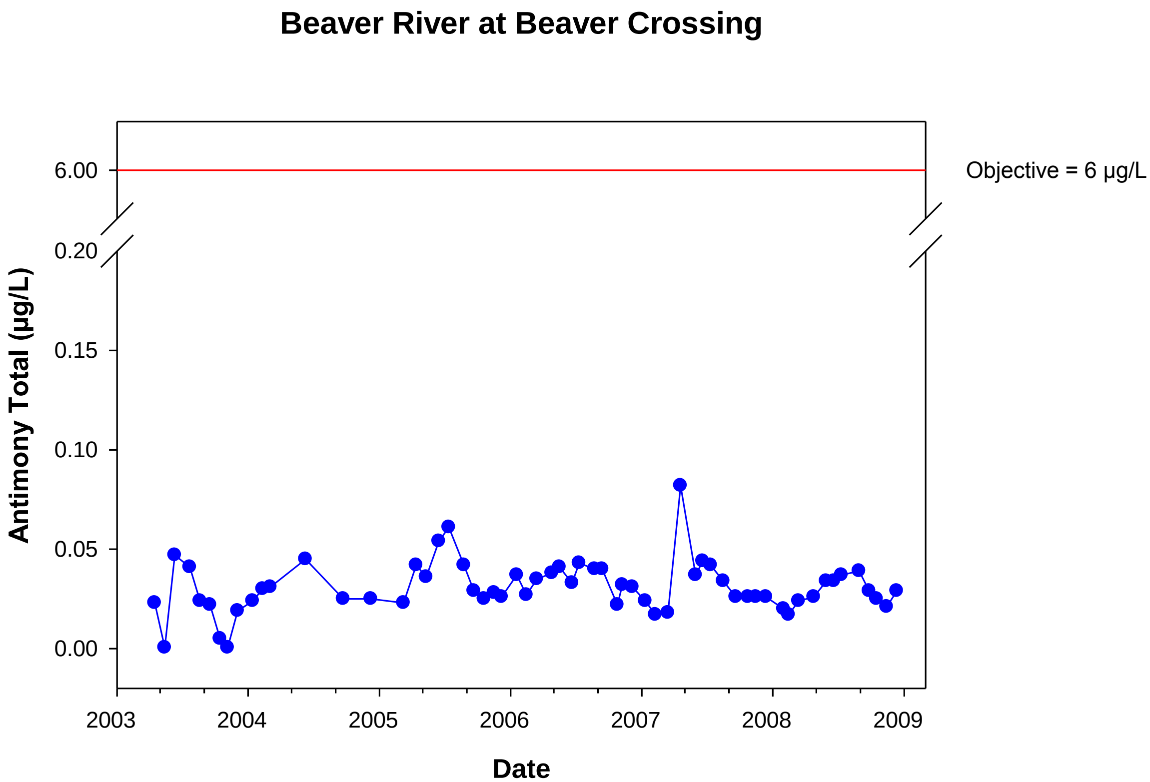

Figure 6-b7: Beaver River Antimony Total

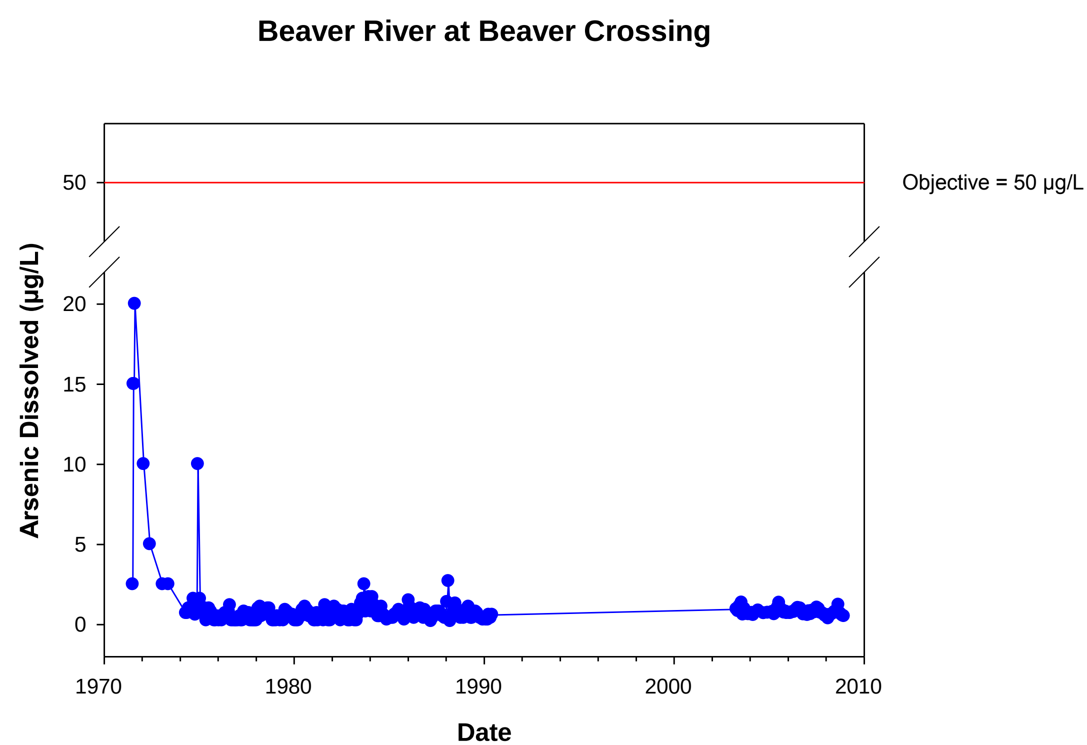

Figure 6-b8: Beaver River Arsenic Dissolved

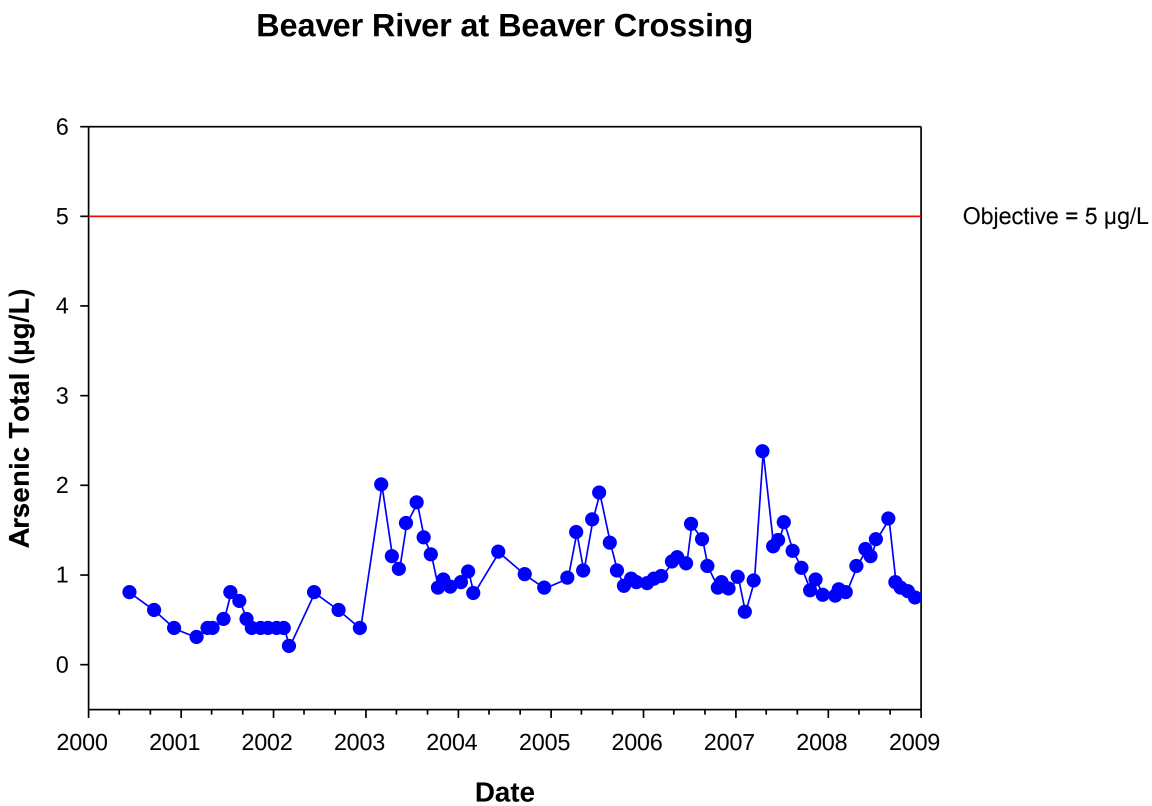

Figure 6-b9: Beaver River Arsenic Total

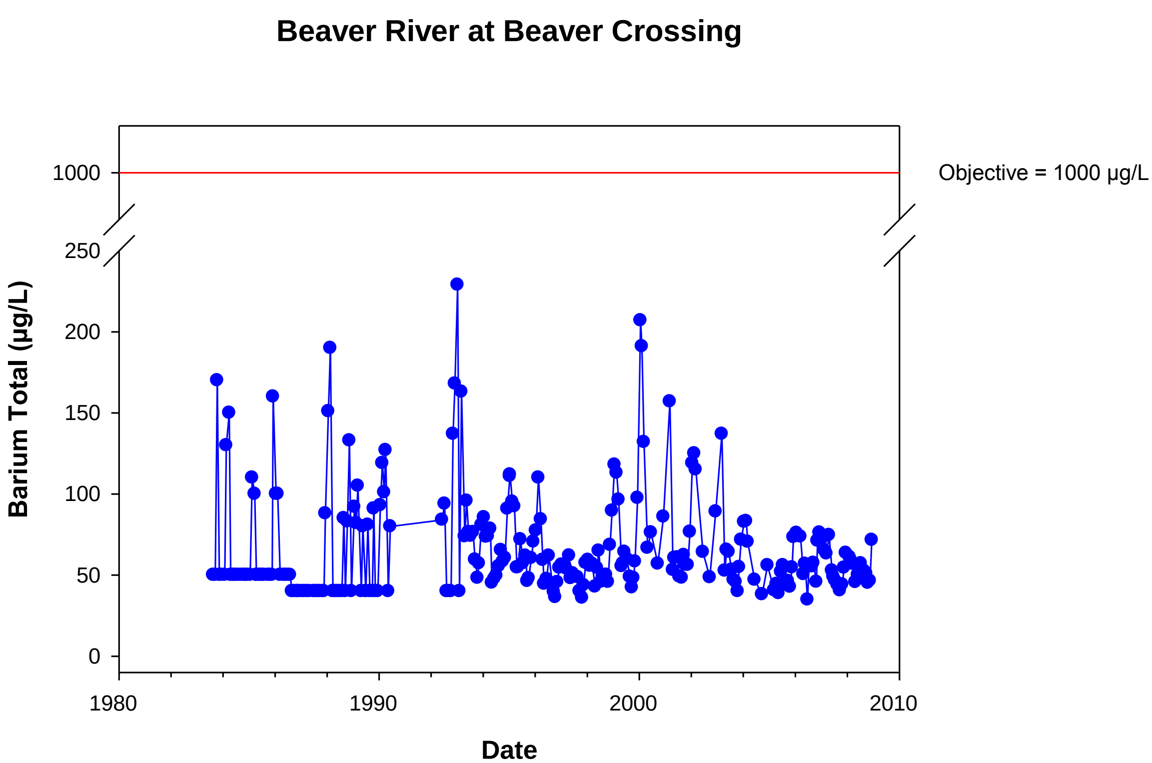

Figure 6-b10: Beaver River Barium Total

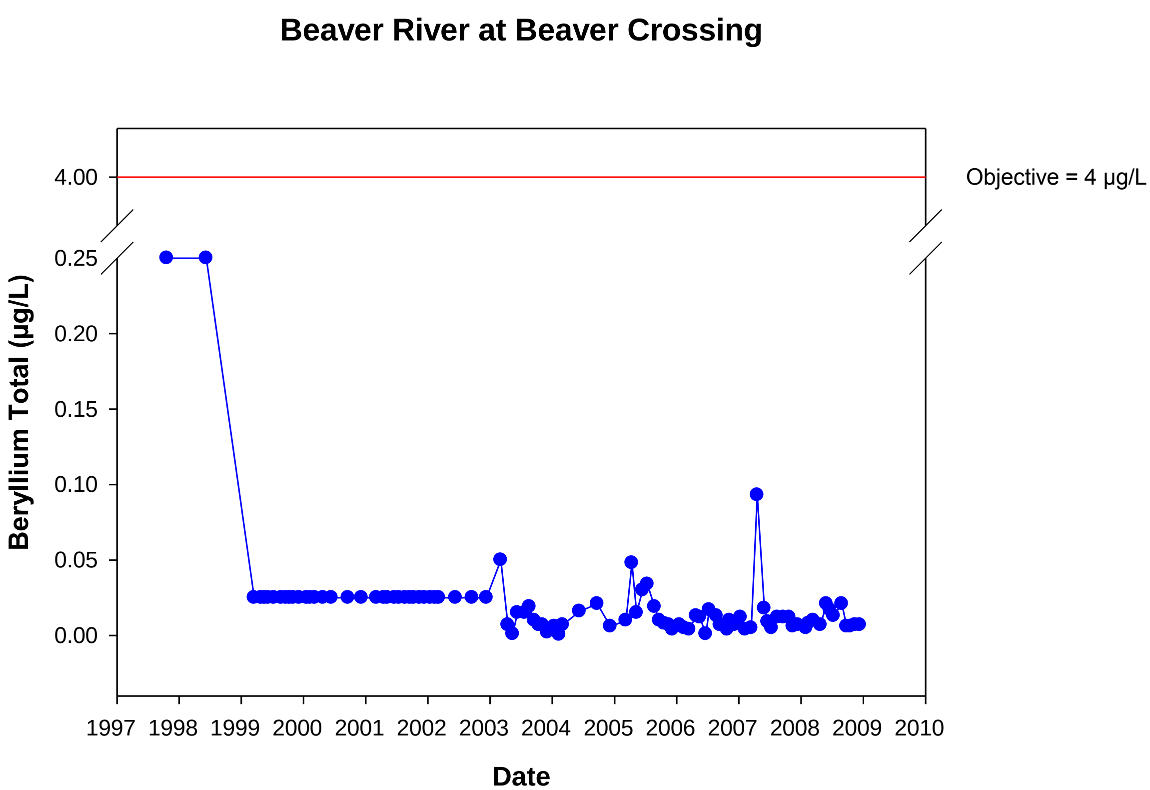

Figure 6-b11: Beaver River Beryllium Total

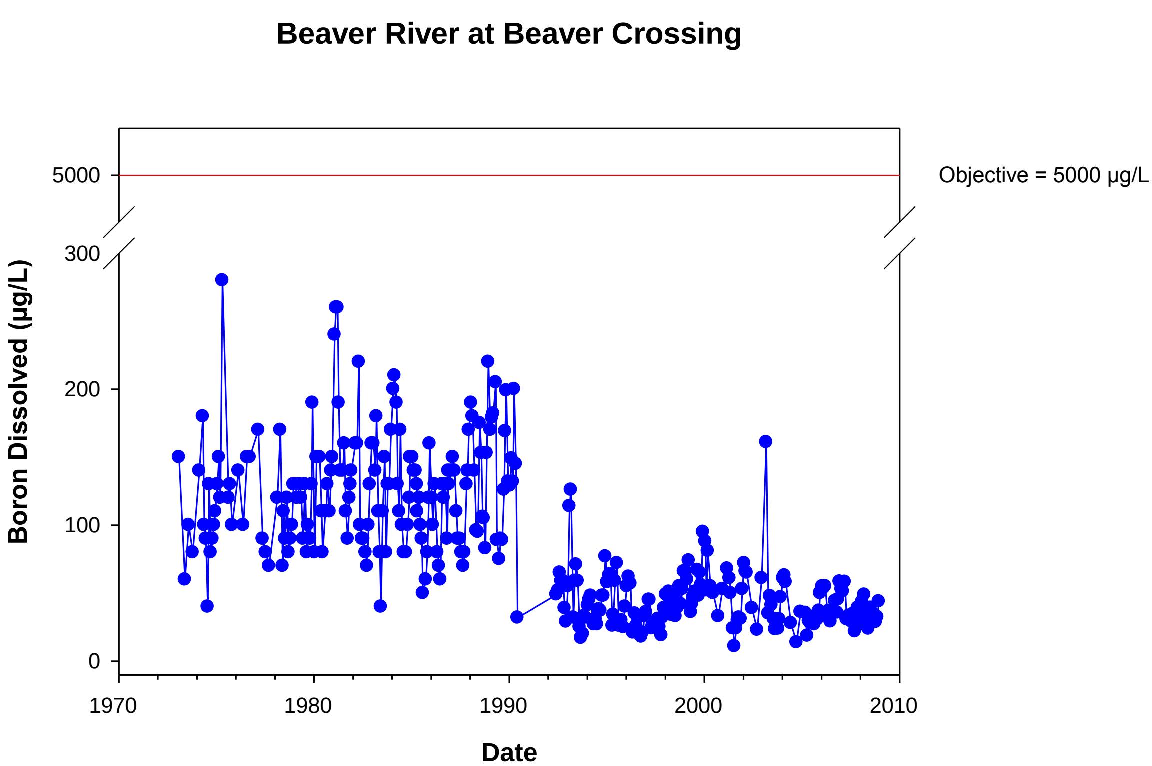

Figure 6-b12: Beaver River Boron Dissolved

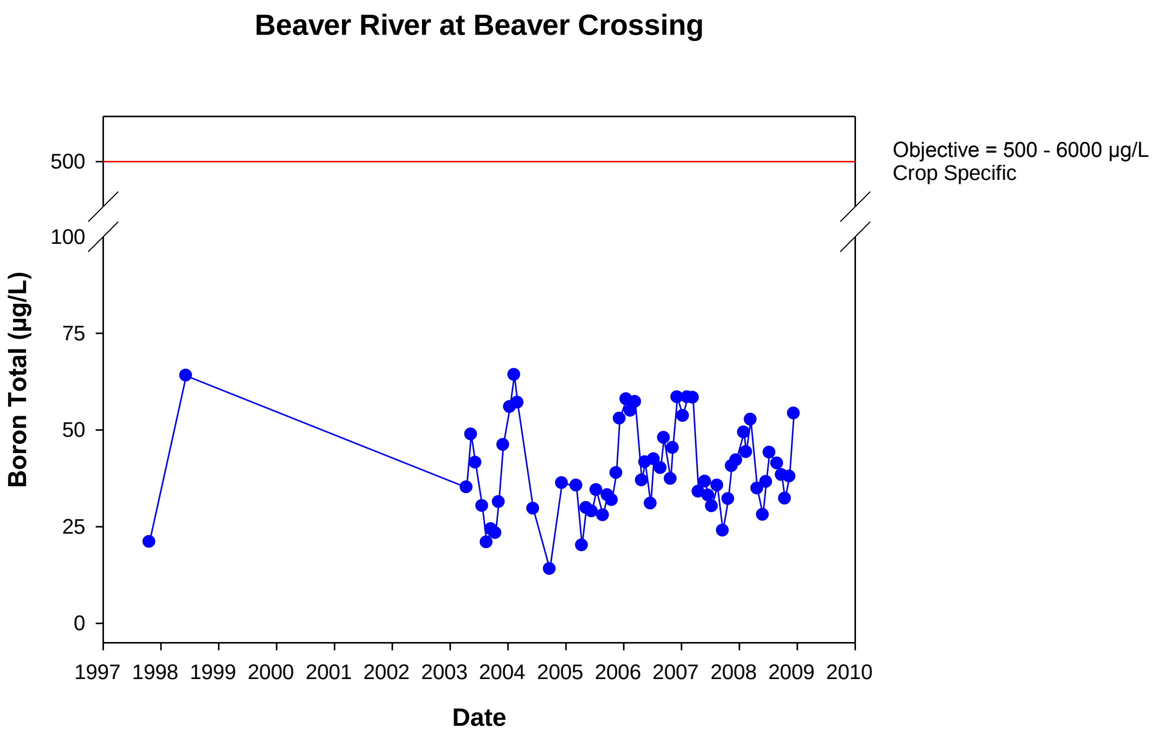

Figure 6-b13: Beaver River Boron Total

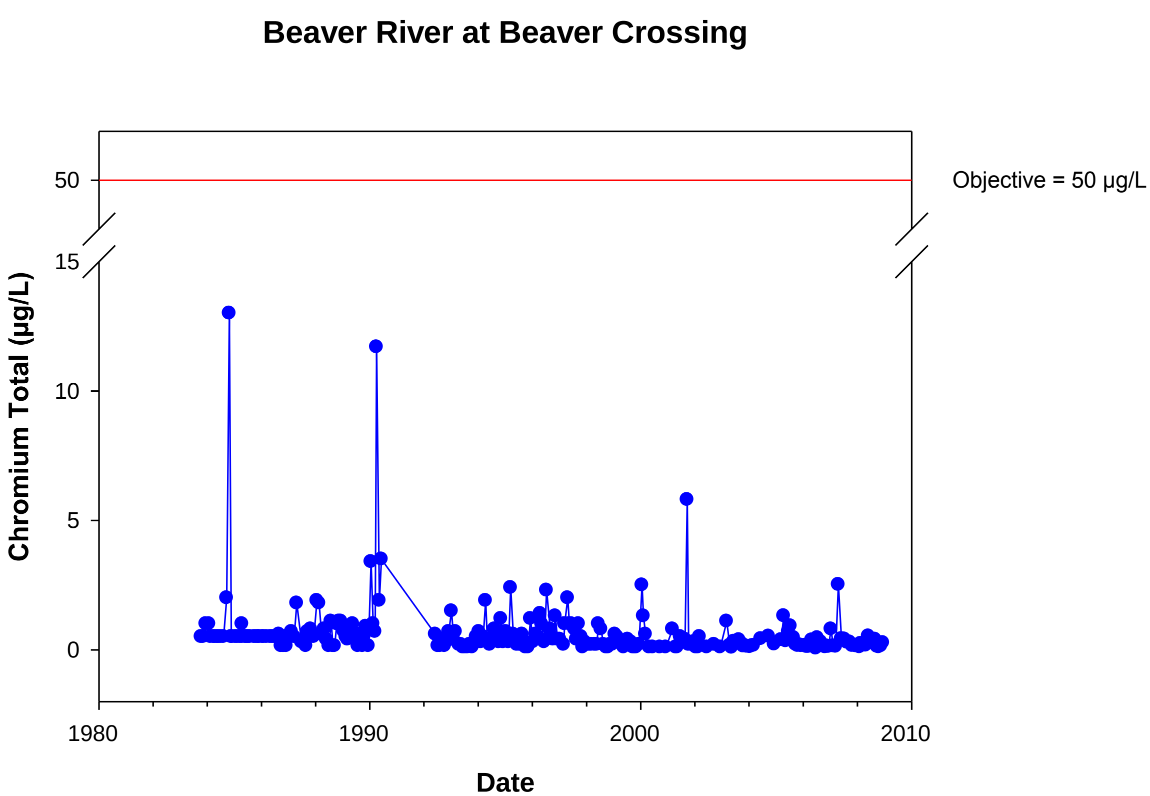

Figure 6-b14: Beaver River Chromium Total

Beaver River at Beaver Crossing

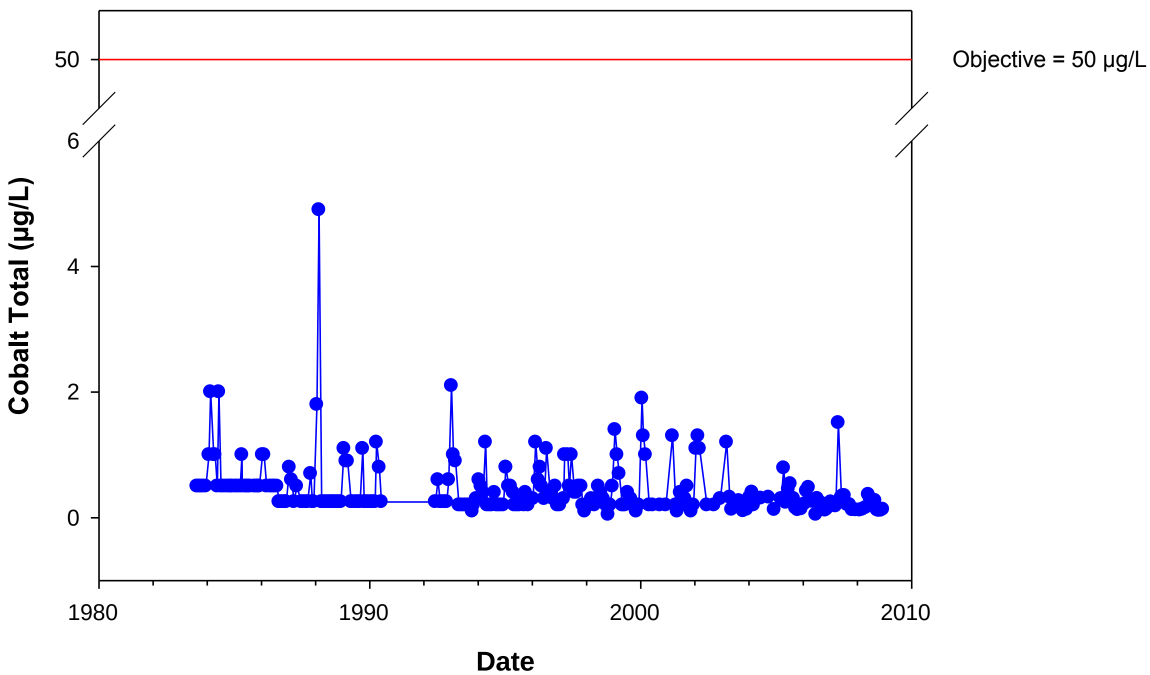

Figure 6-b15: Beaver River Cobalt Total

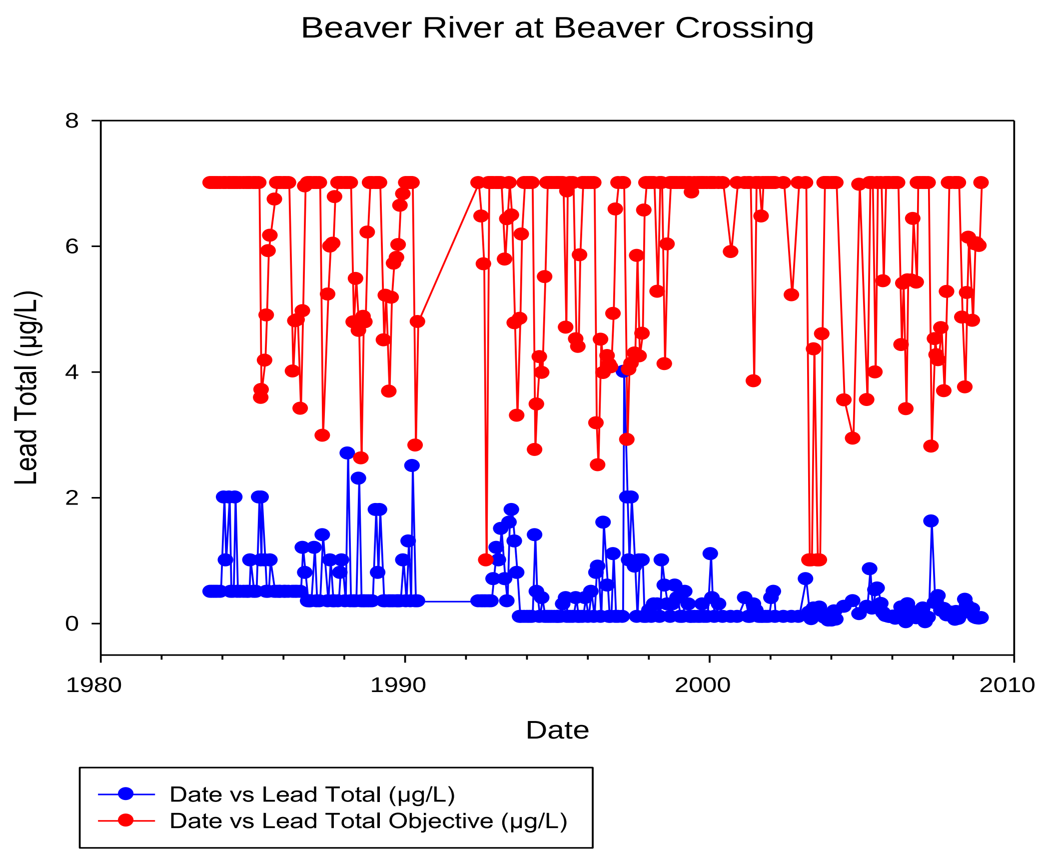

Figure 6-b16: Beaver River Lead Total

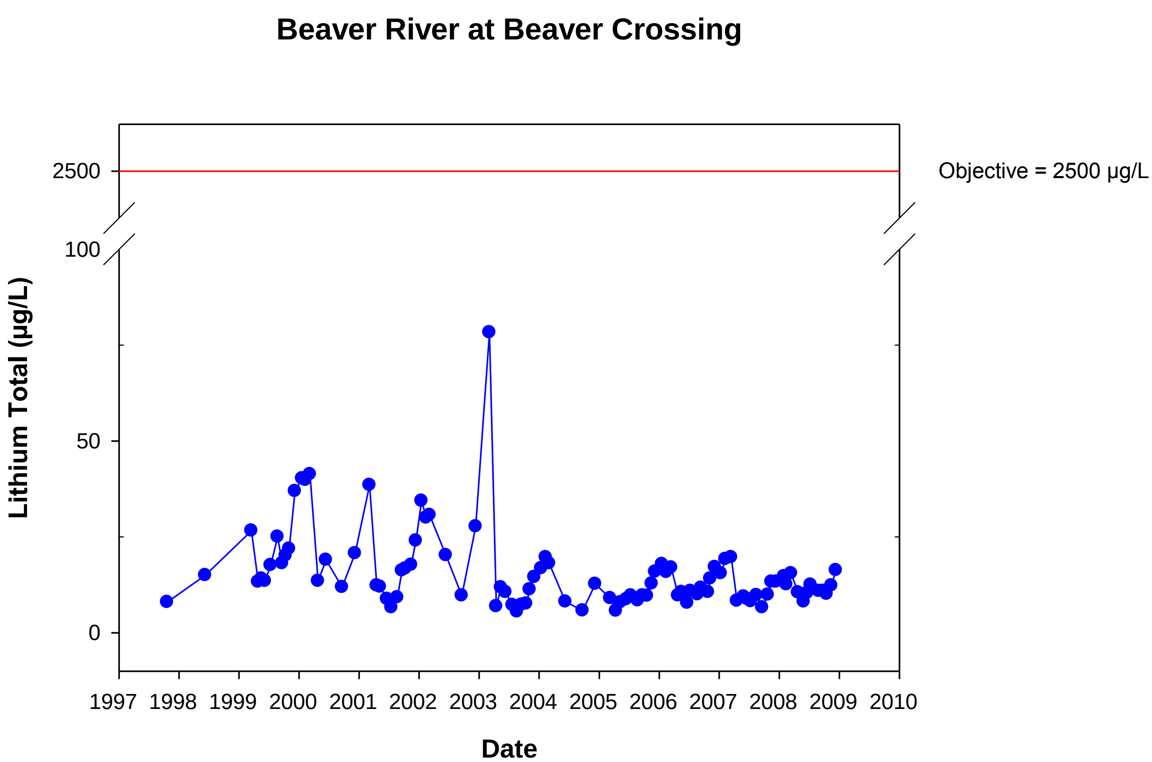

Figure 6-b17: Beaver River Lithium Total

Beaver River at Beaver Crossing

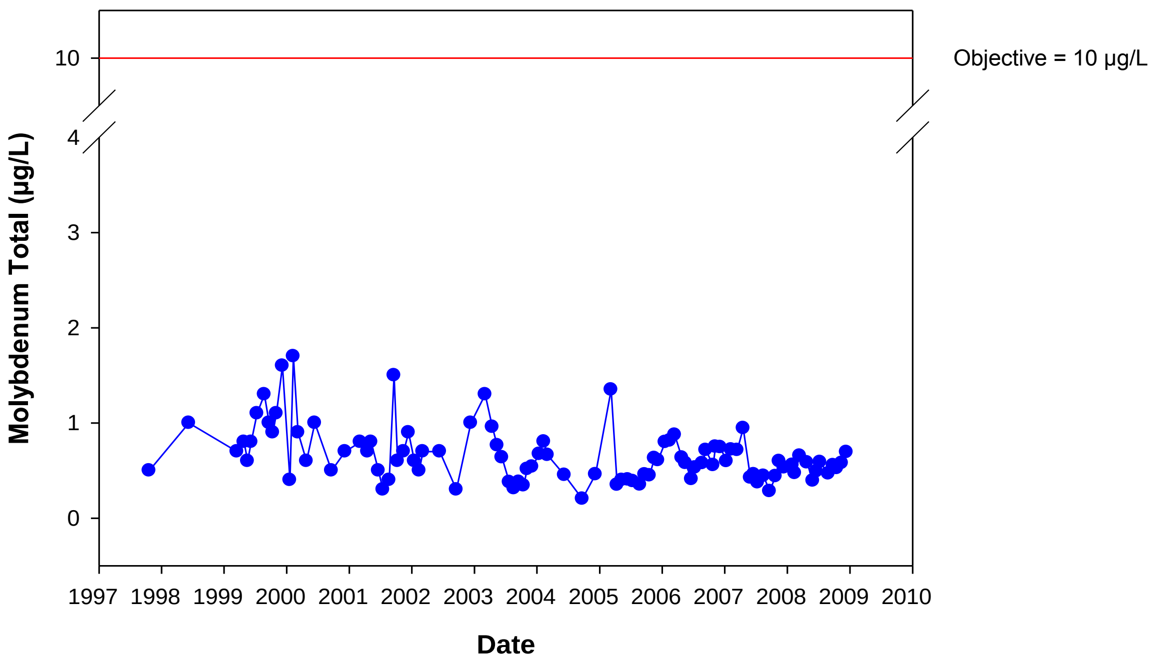

Figure 6-b18: Beaver River Molybdenum Total

Beaver River at Beaver Crossing

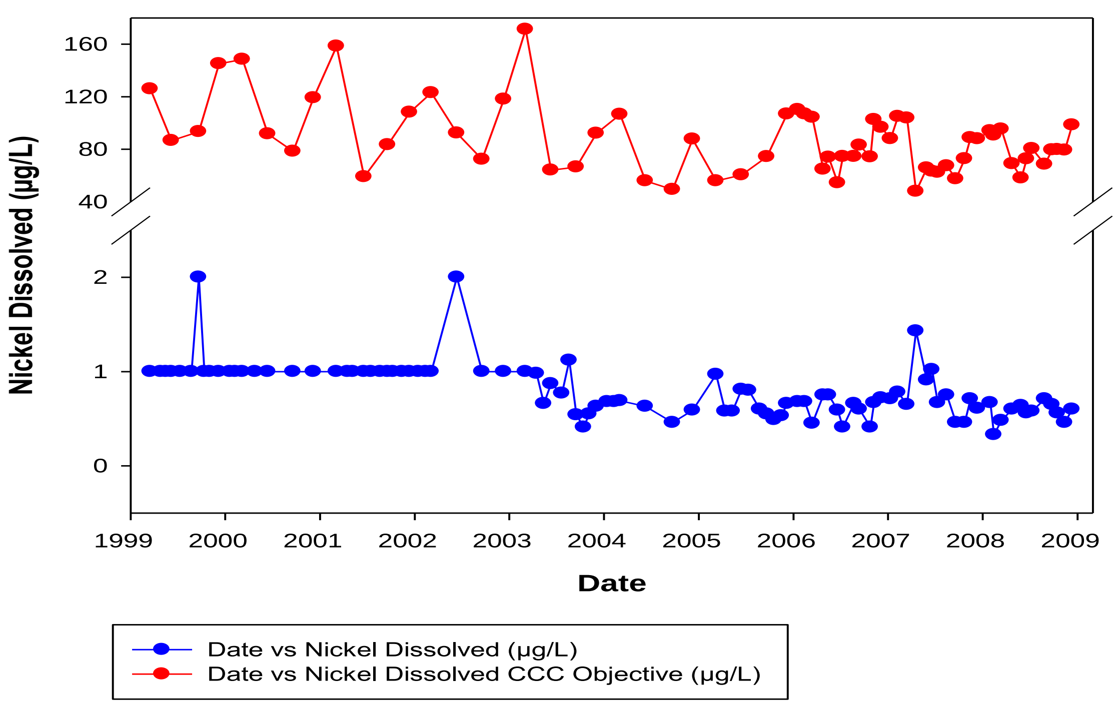

Figure 6-b19: Beaver River Nickel Dissolved

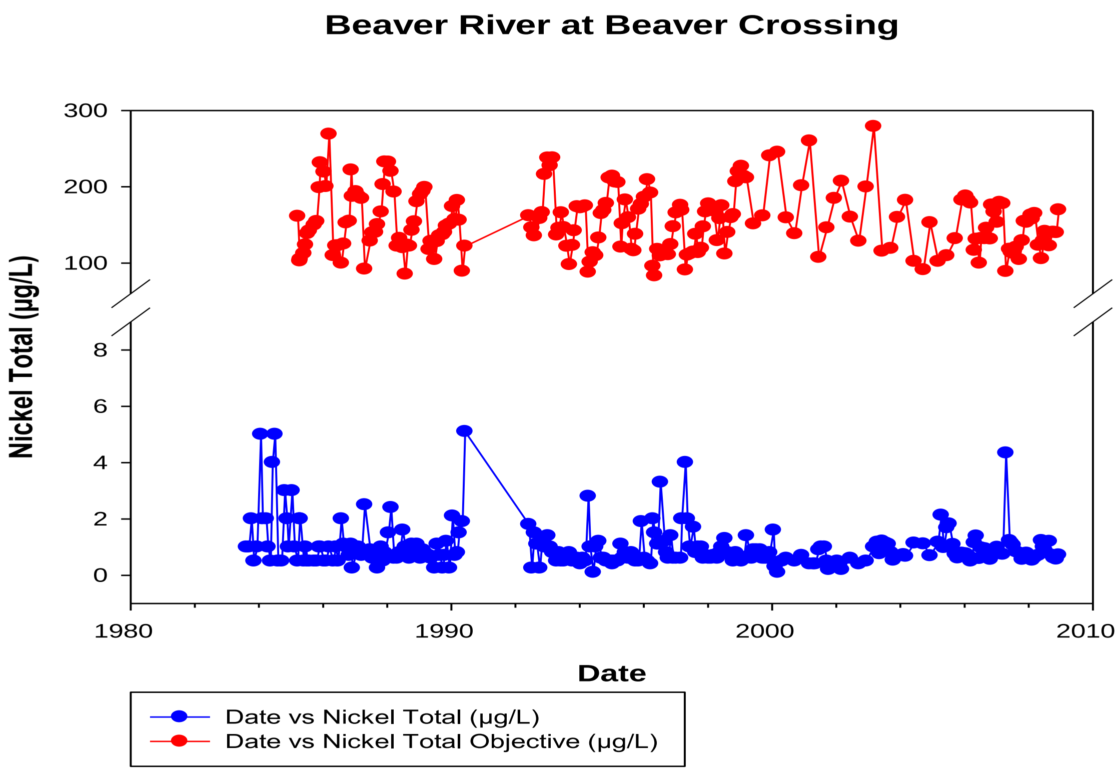

Figure 6-b20: Beaver River Nickel Total

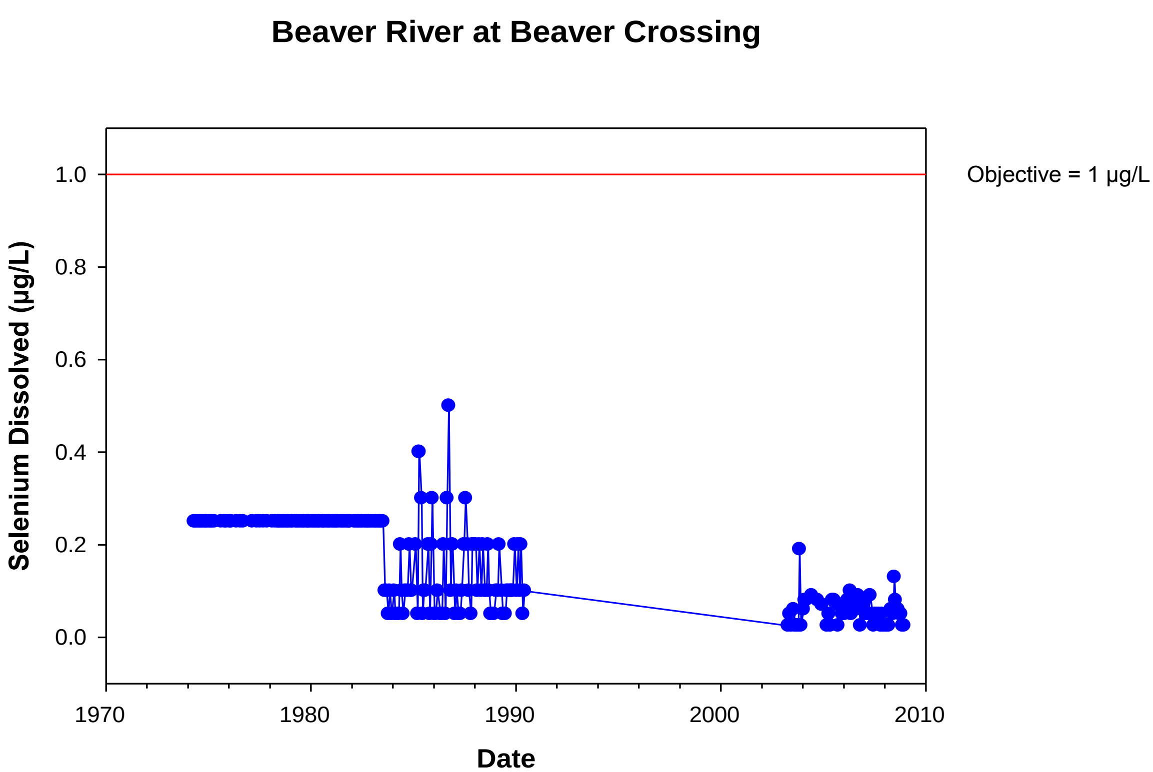

Figure 6-b21: Beaver River Selenium Dissolved

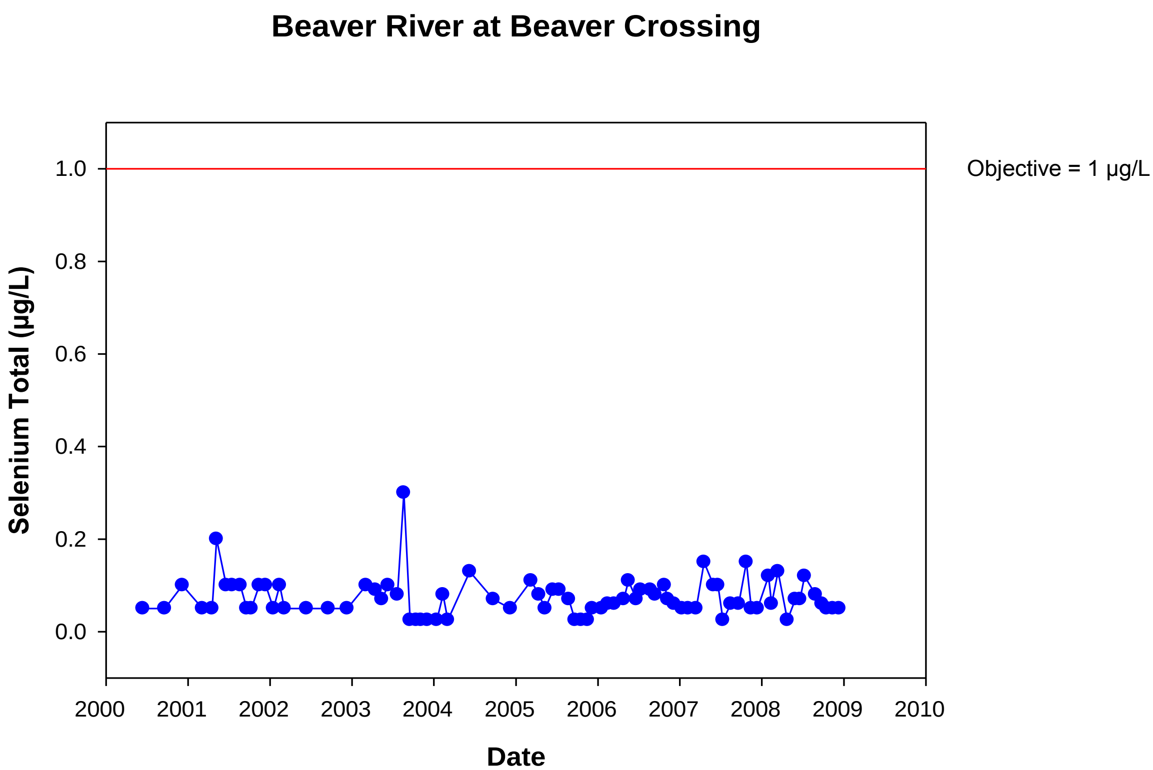

Figure 6-b22: Beaver River Selenium Total

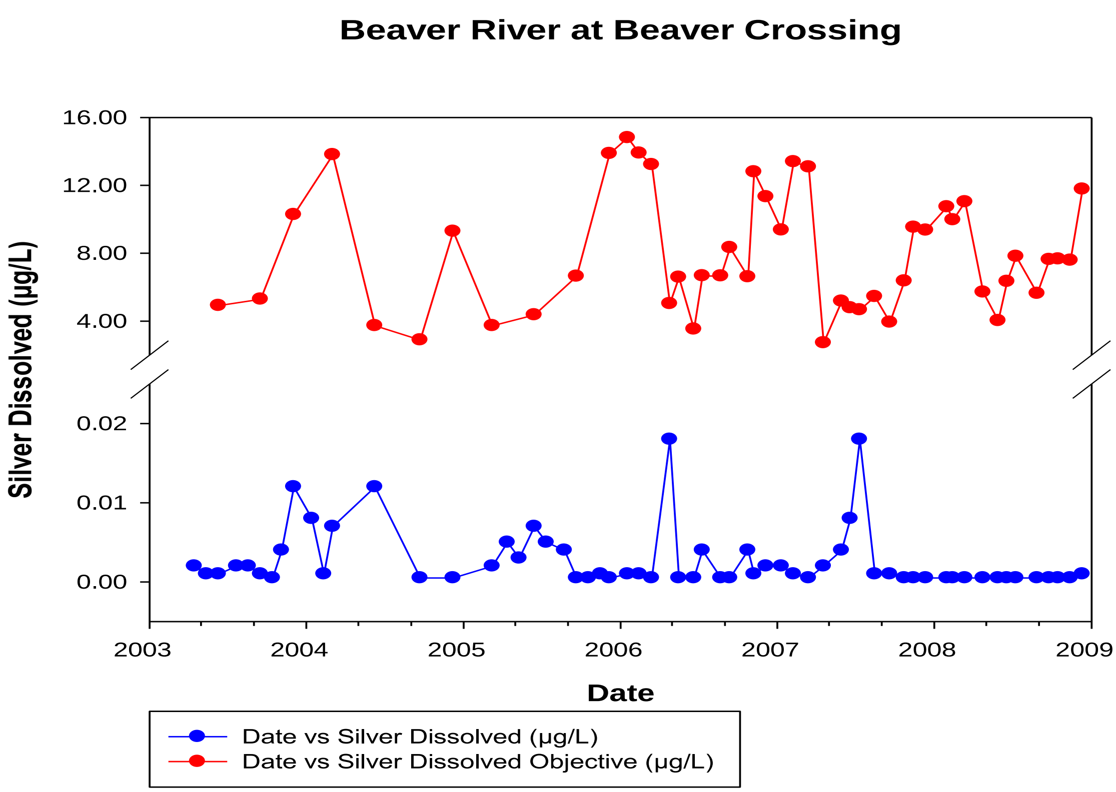

Figure 6-b23: Beaver River Silver Dissolved

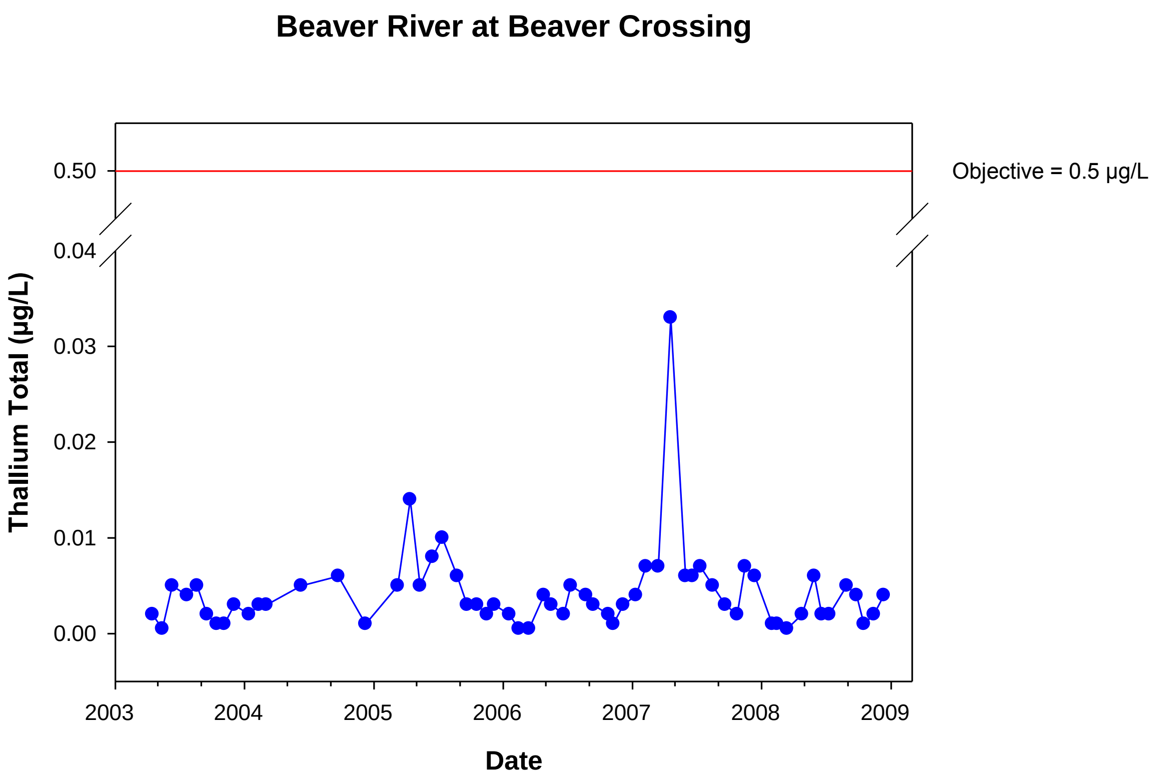

Figure 6-b24: Beaver River Thallium Total

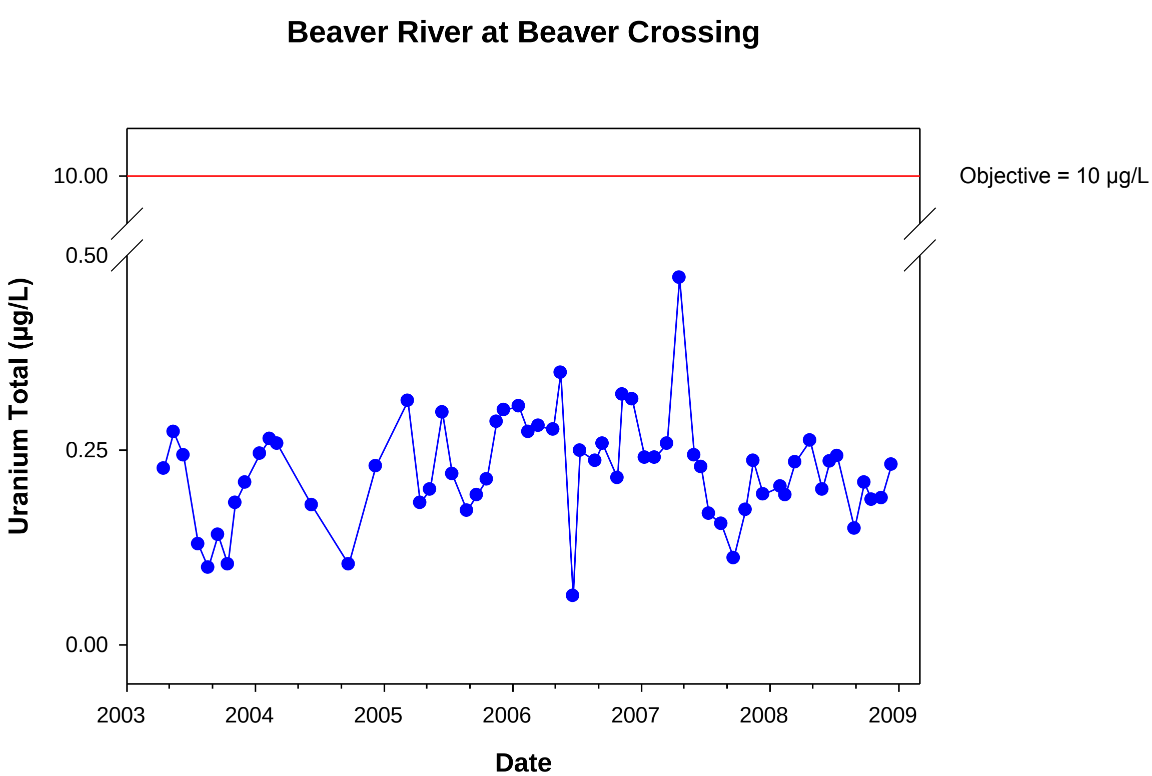

Figure 6-b25: Beaver River Uranium Total

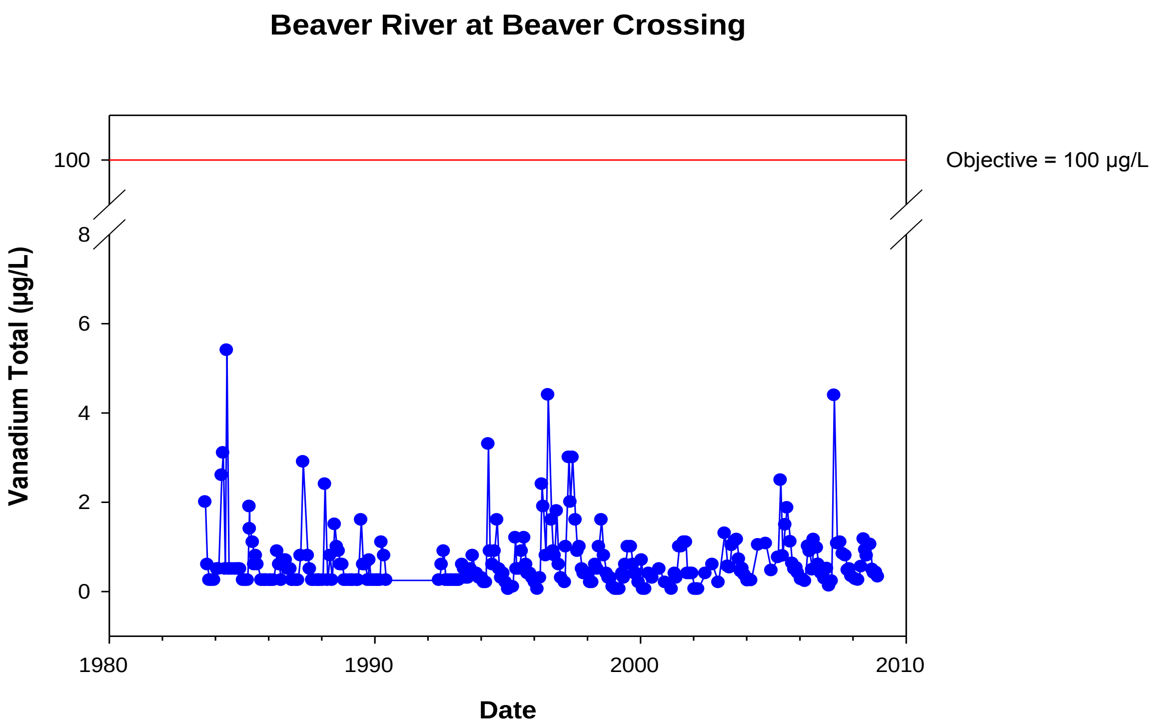

Figure 6-b26: Beaver River Vanadium Total

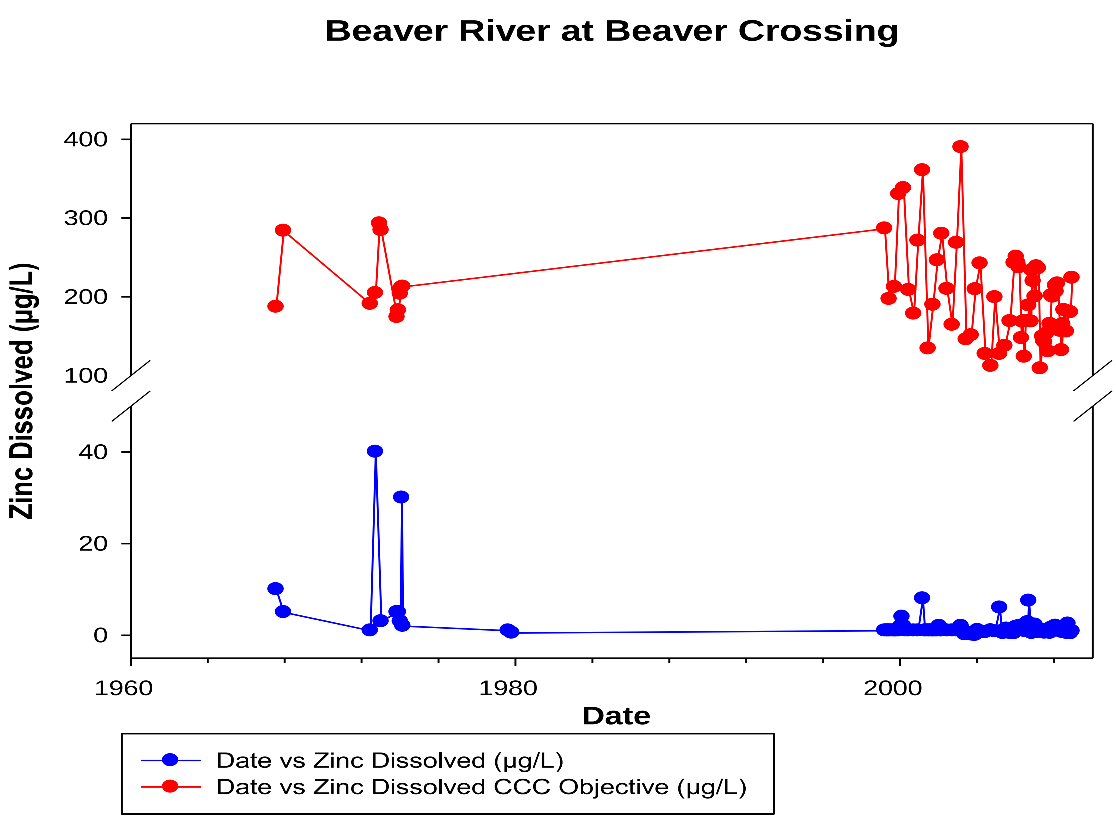

Figure 6-b27: Beaver River Zinc Dissolved

Beaver River at Beaver Crossing

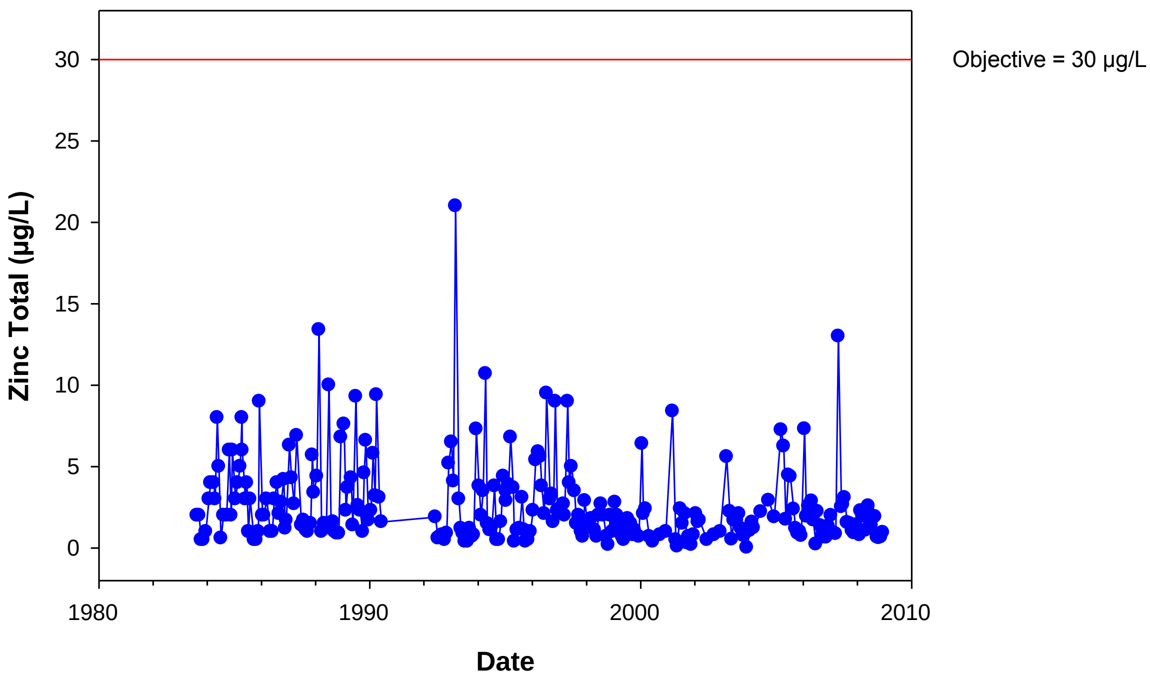

Figure 6-b28: Beaver River Zinc Total

Beaver River at Beaver Crossing

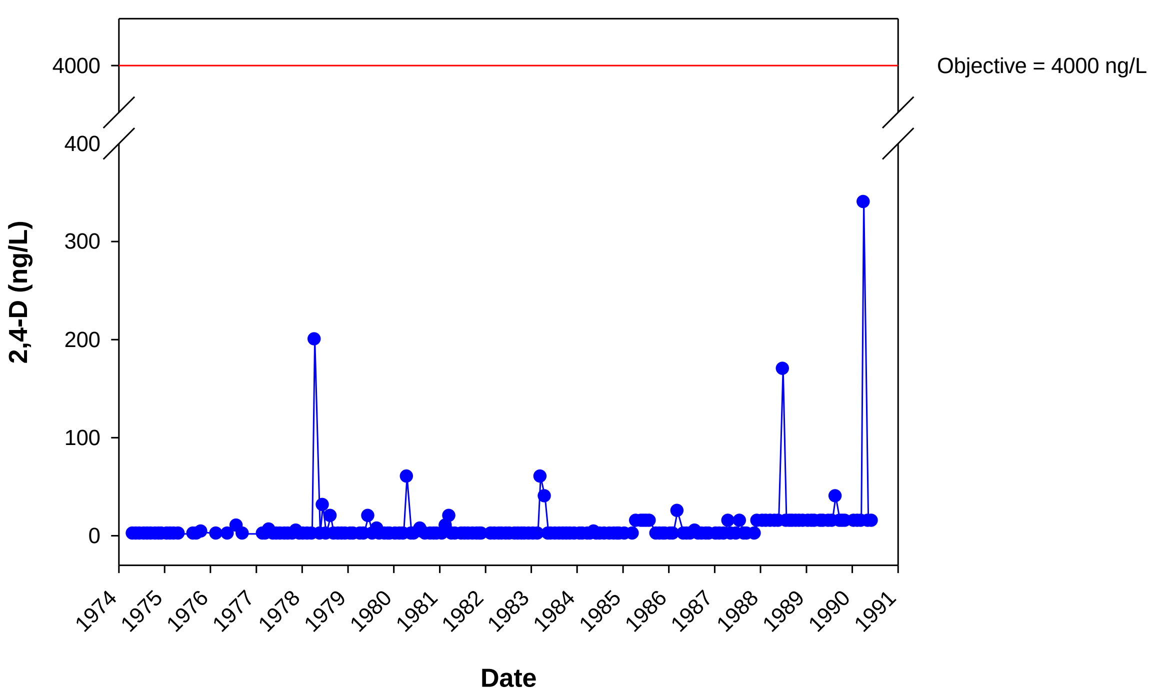

Figure 6-b29: Beaver River 2,4-D

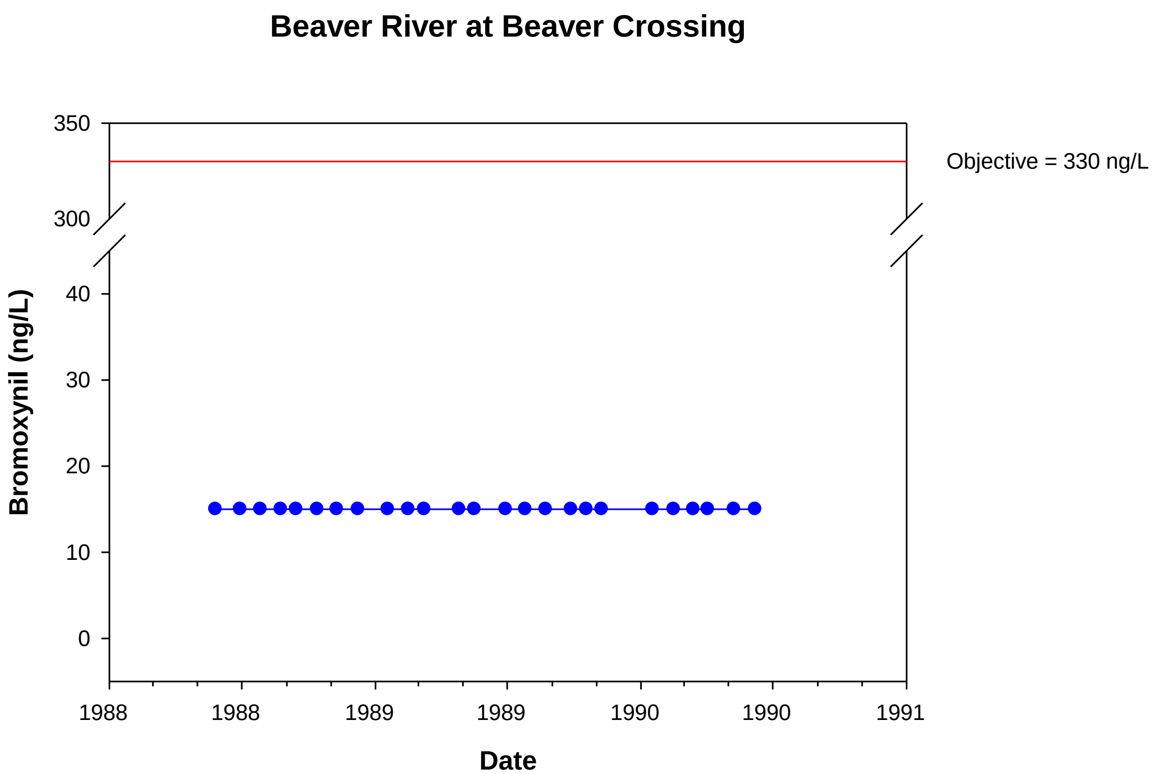

Figure 6-b30: Beaver River Bromoxynil

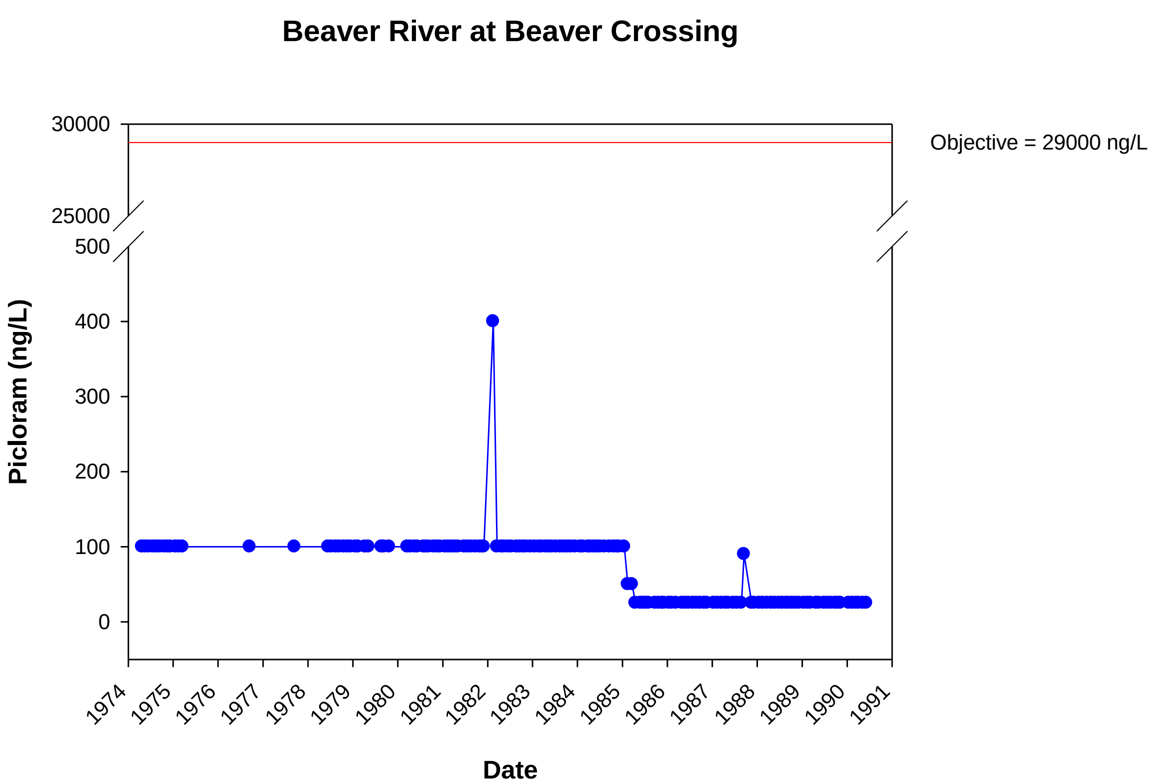

Figure 6-b31: Beaver River Picloram

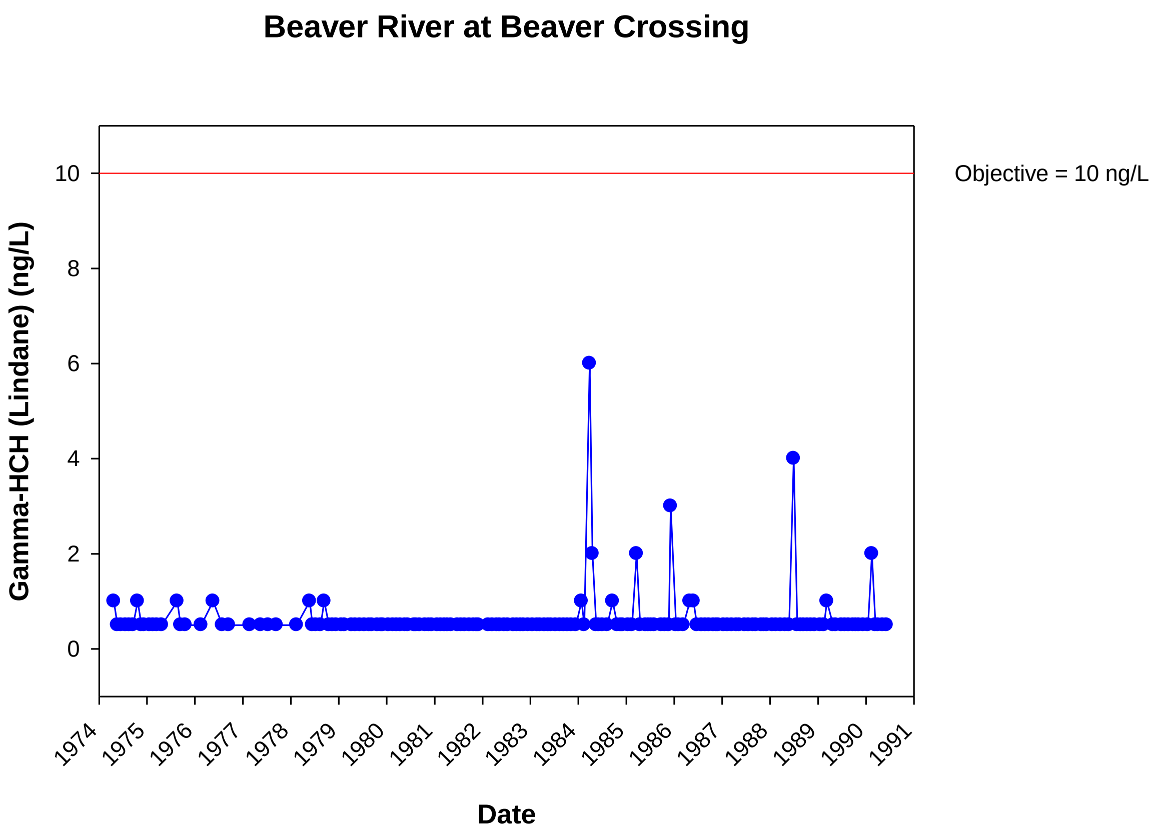

Figure 6-b32: Beaver River Lindane

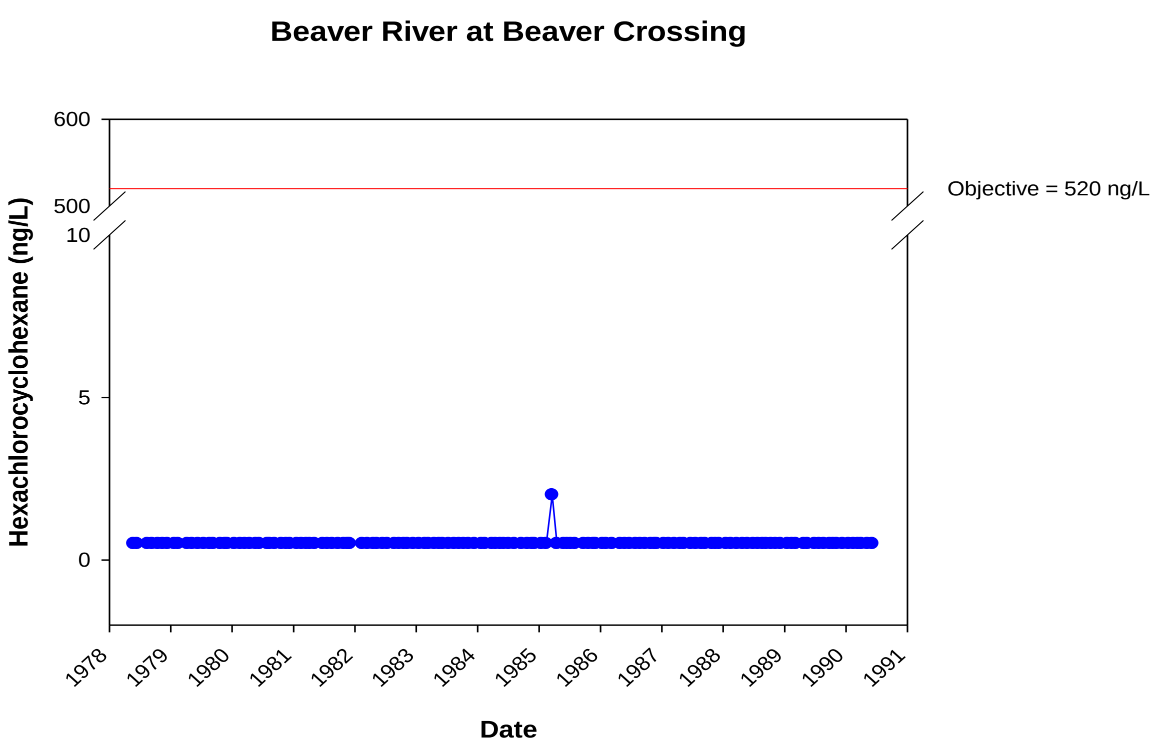

Figure 6-b33: Beaver River Hexachlorocyclohexane

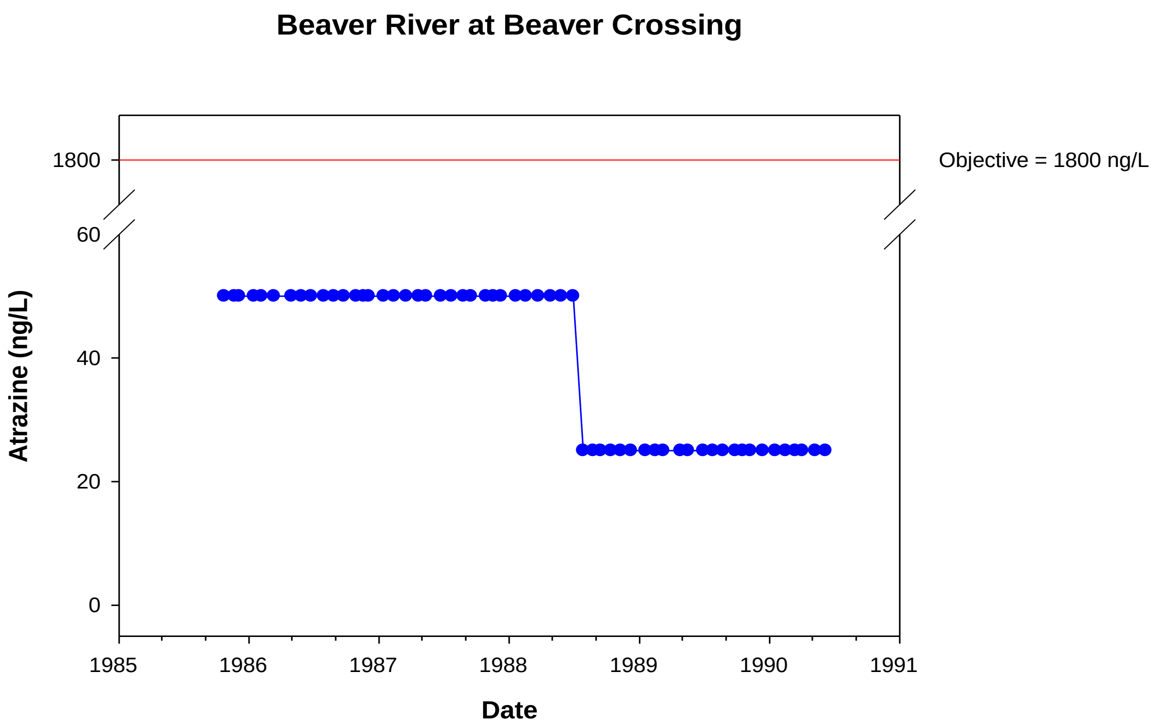

Figure 6-b34: Beaver River Atrazine

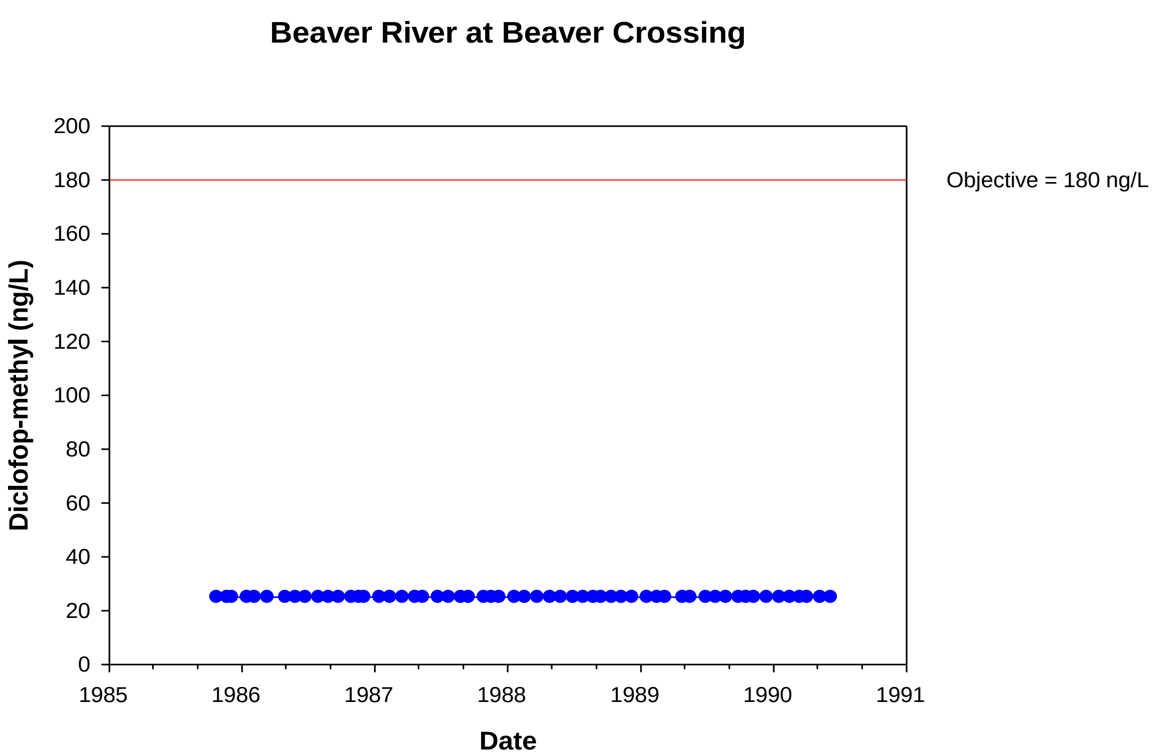

Figure 6-b35: Beaver River Diclofop-methyl

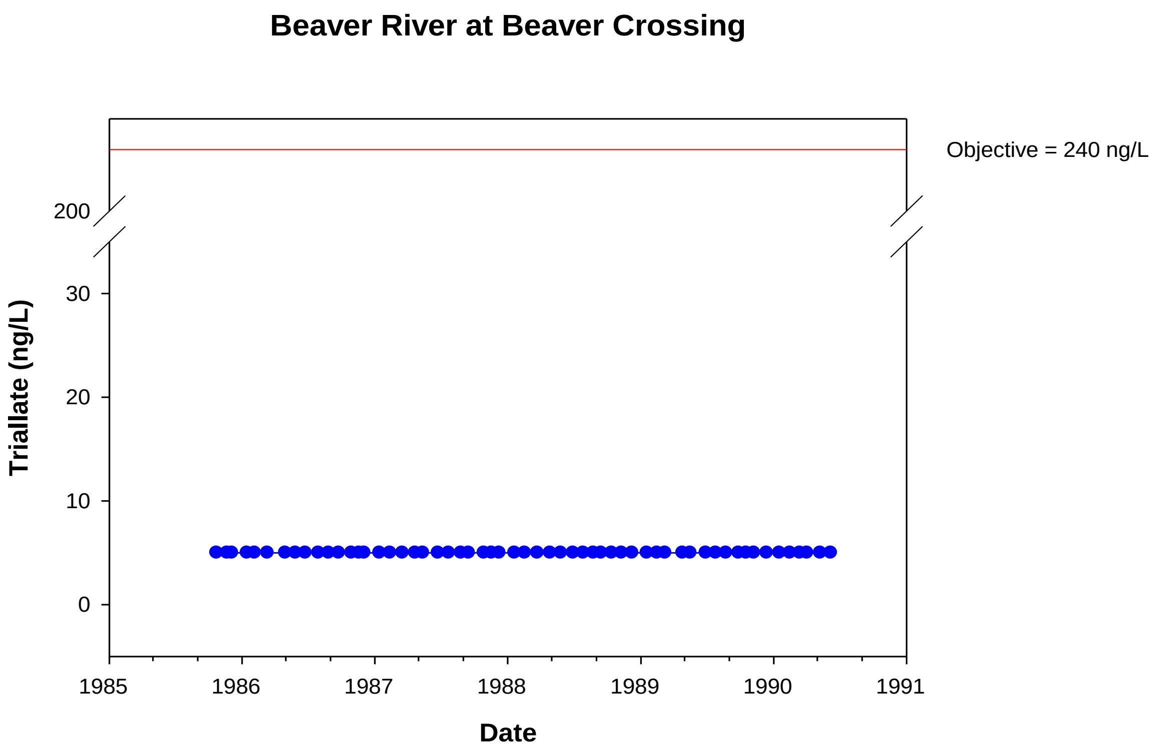

Figure 6-b36: Beaver River Triallate

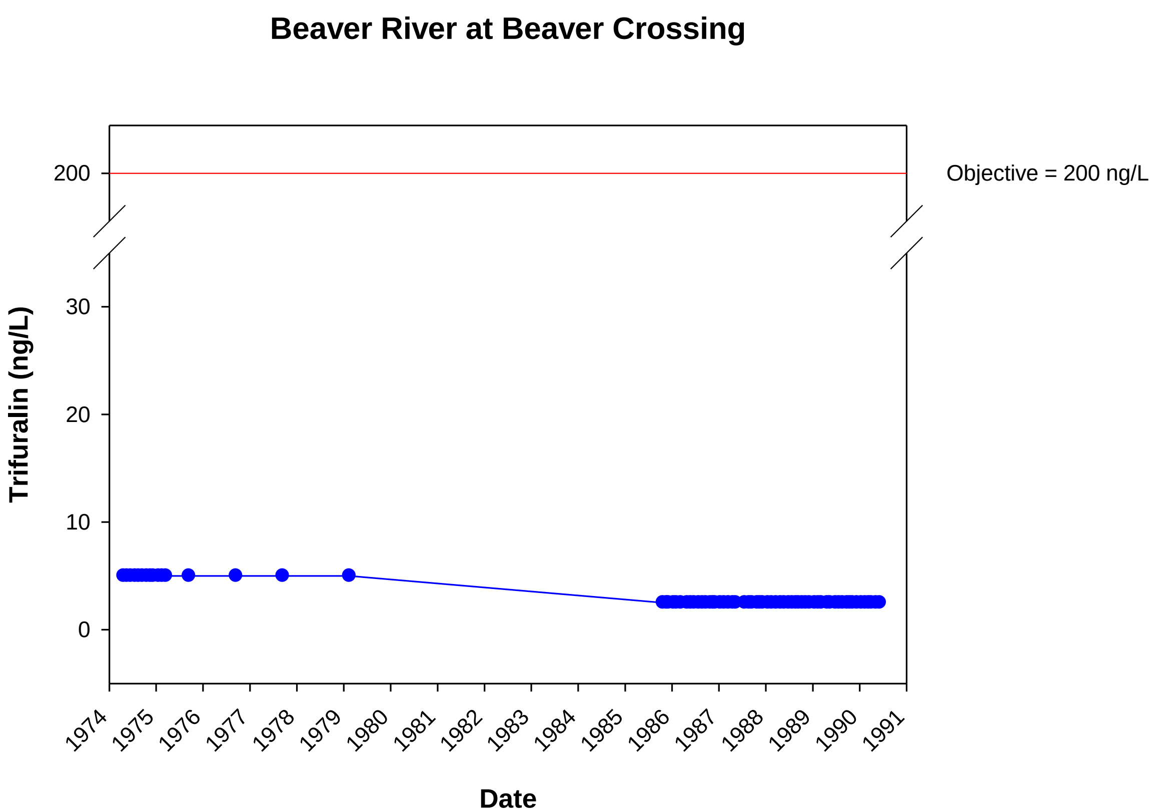

Figure 6-b37: Beaver River Trifluralin

Appendix 6-c: Cold River

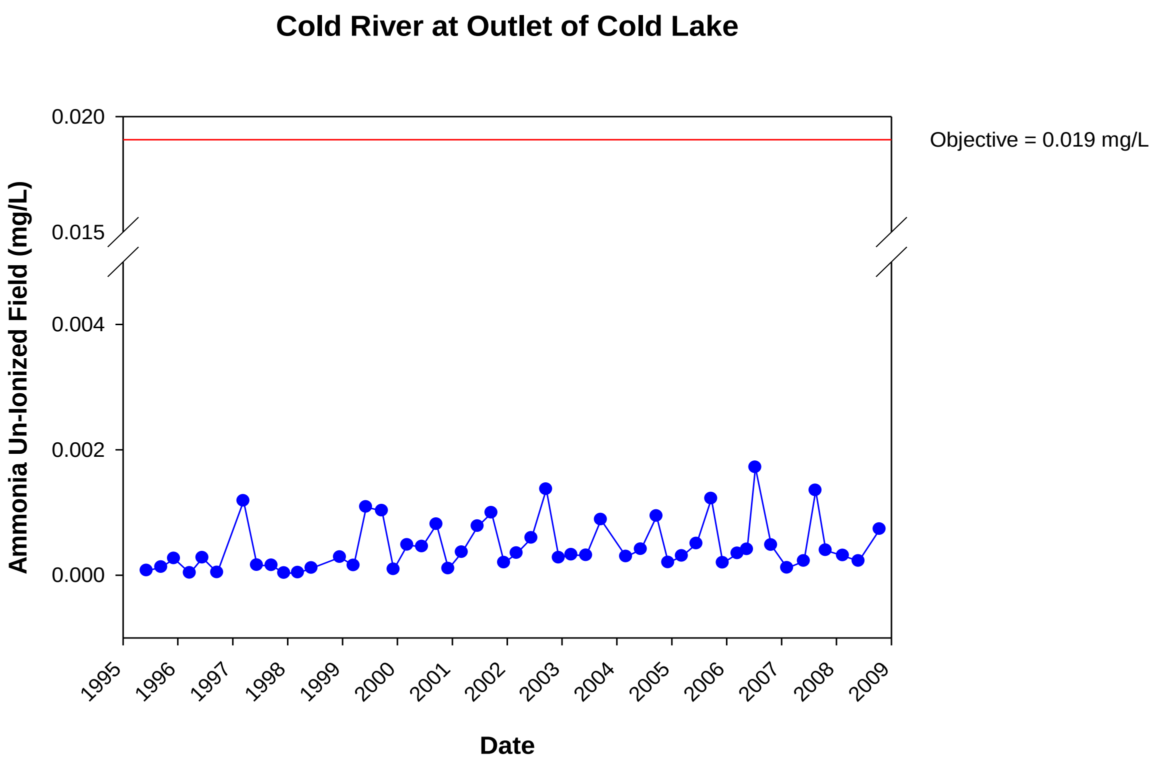

Figure 6-c1: Cold River Ammonia Un-Ionized Field

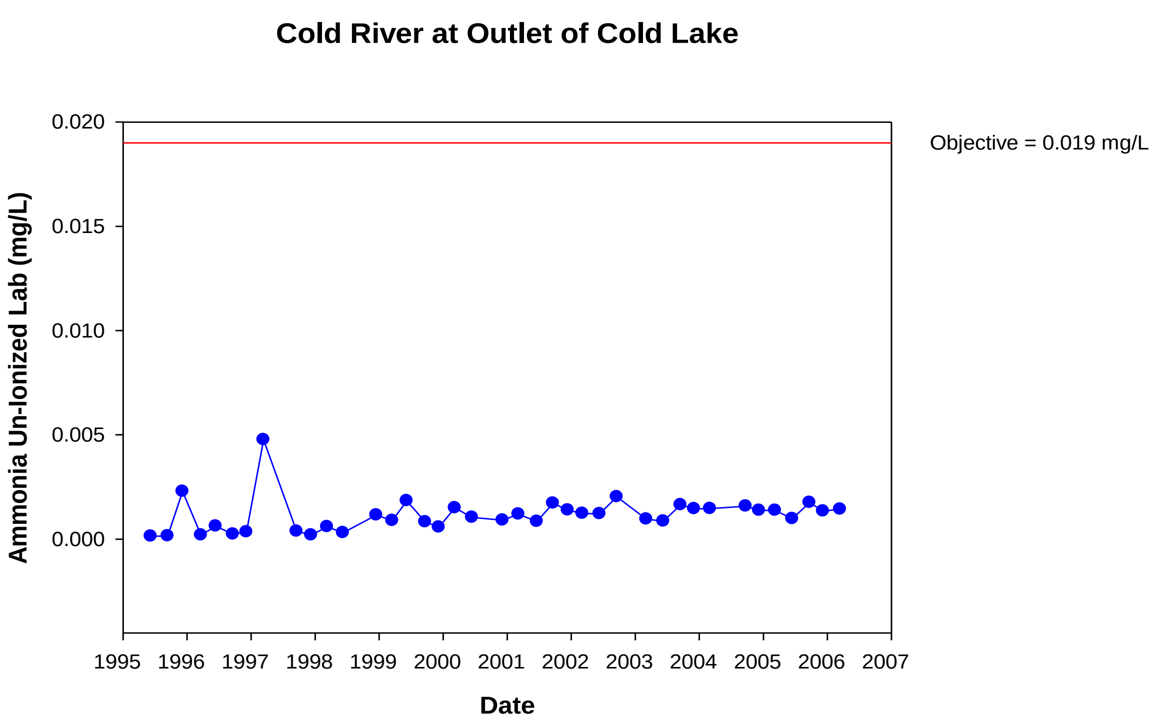

Figure 6-c2: Cold River Ammonia Un-Ionized Lab

Cold River at Outlet of Cold Lake

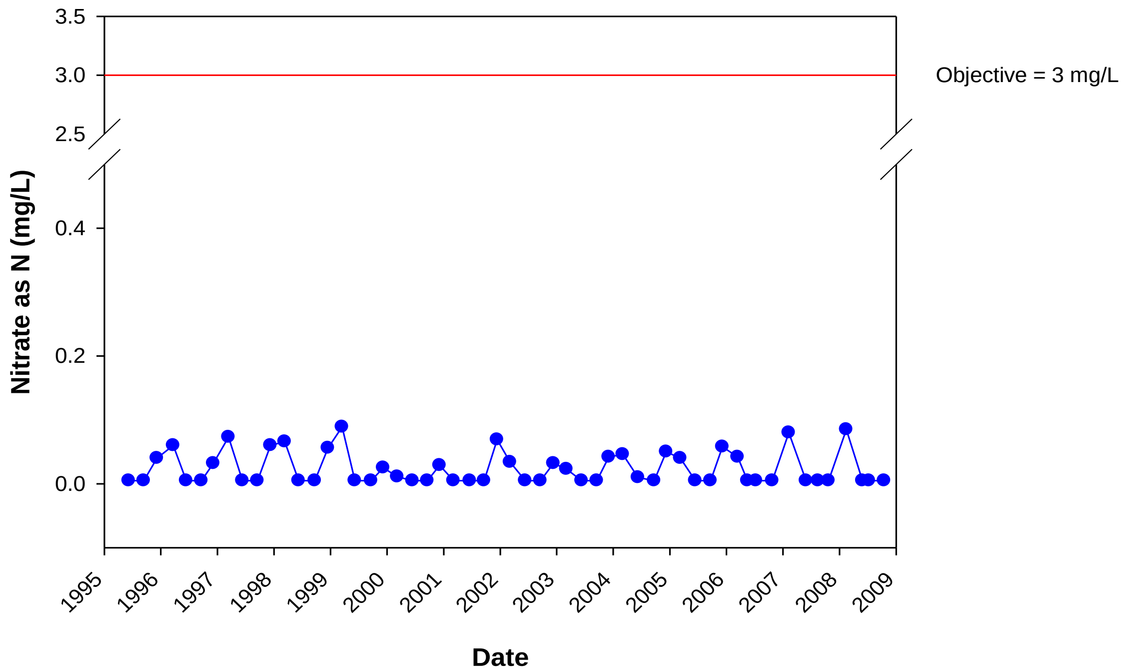

Figure 6-c3: Cold River Nitrate as N

Cold River at Outlet of Cold Lake

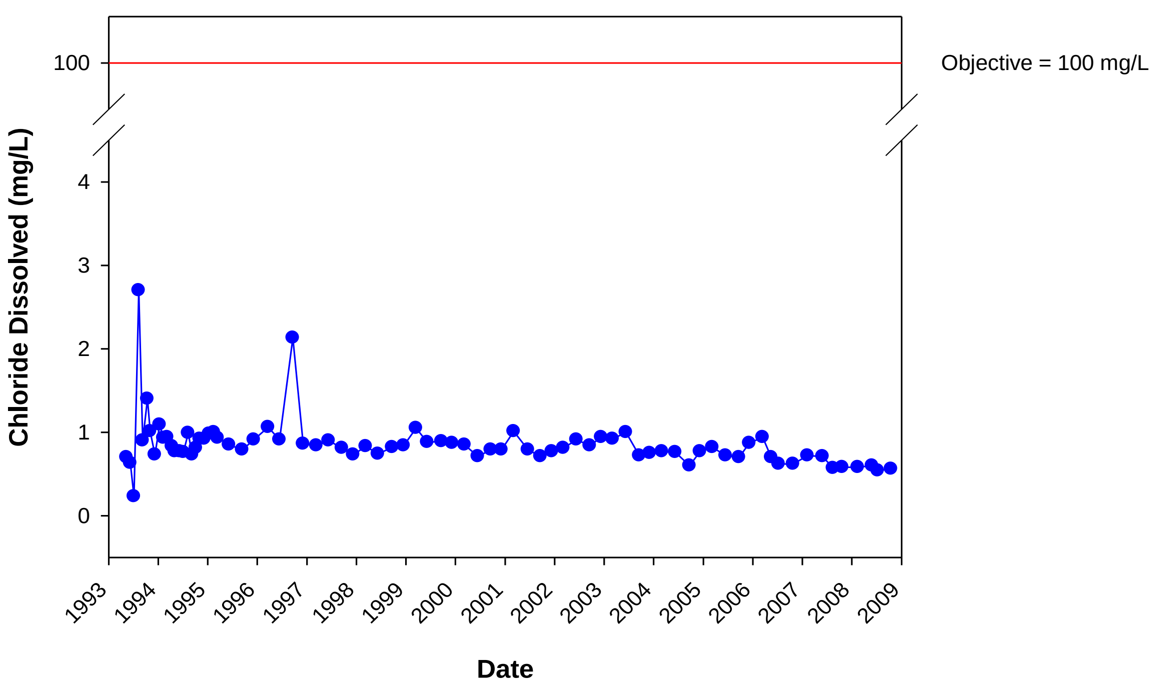

Figure 6-c4: Cold River Chloride Dissolved

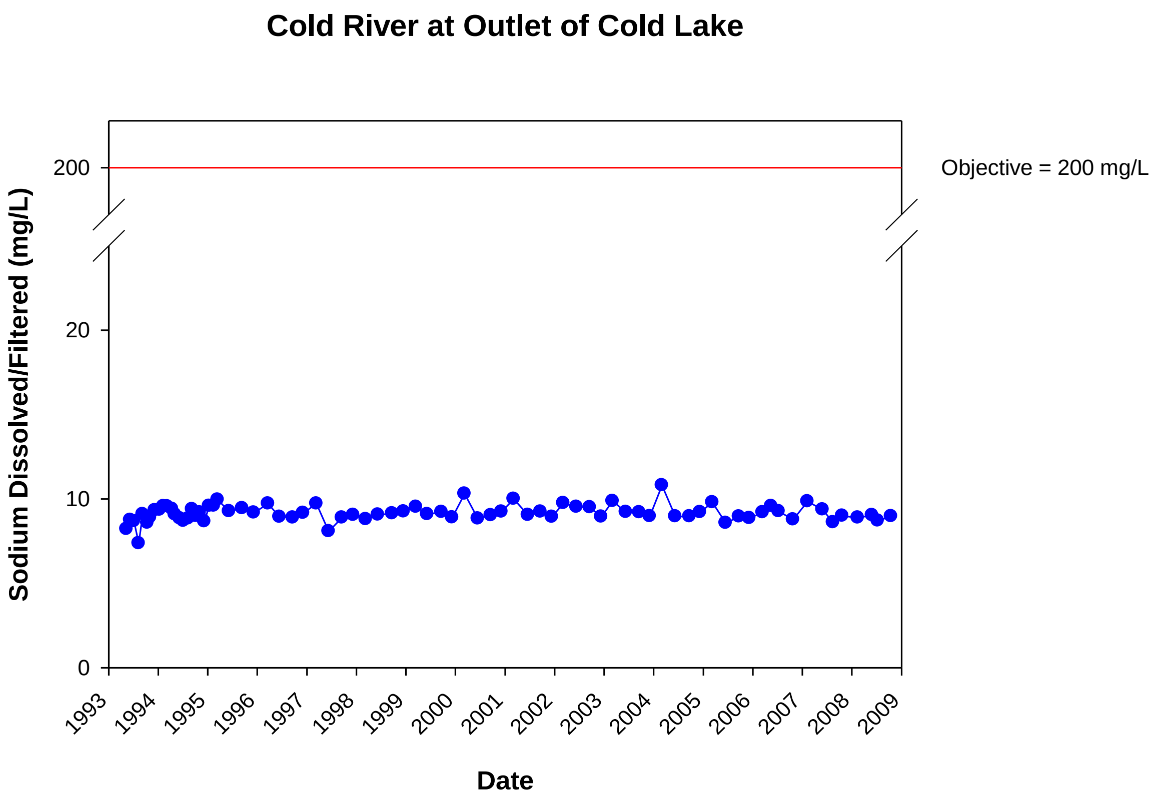

Figure 6-c5: Cold River Sodium Dissolved/Filtered

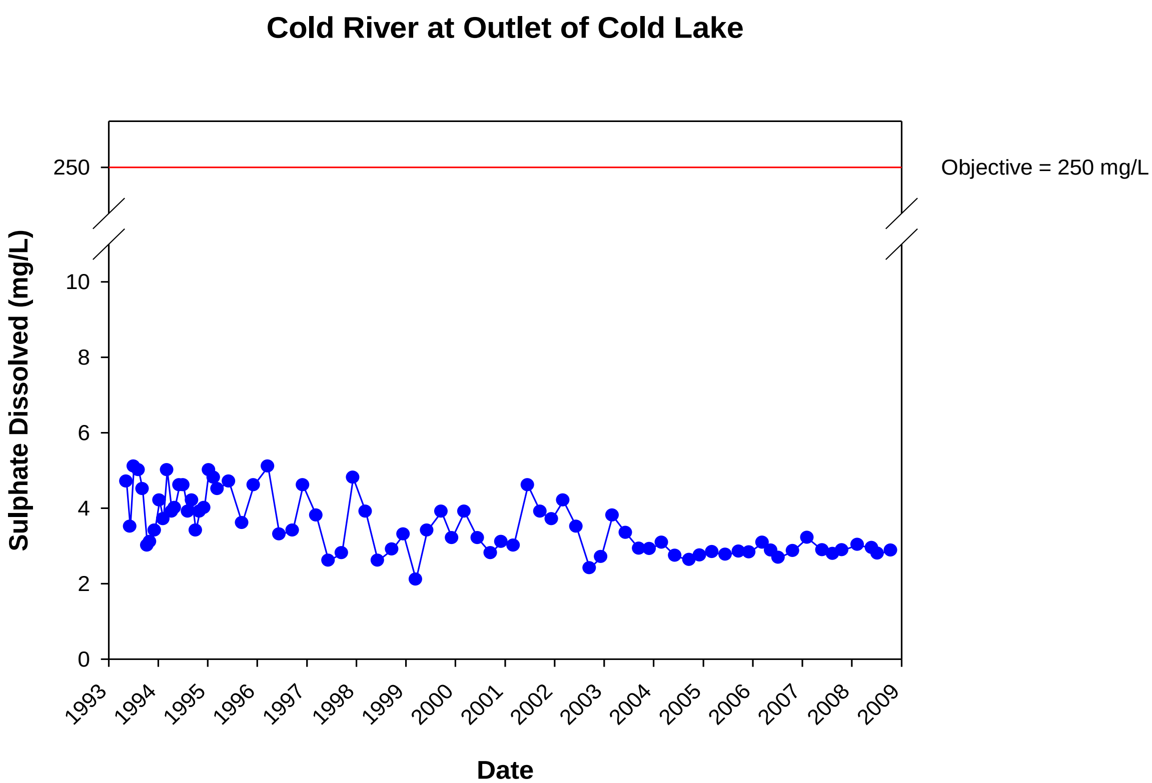

Figure 6-c6: Cold River Sulphate Dissolved

Cold River at Outlet of Cold Lake

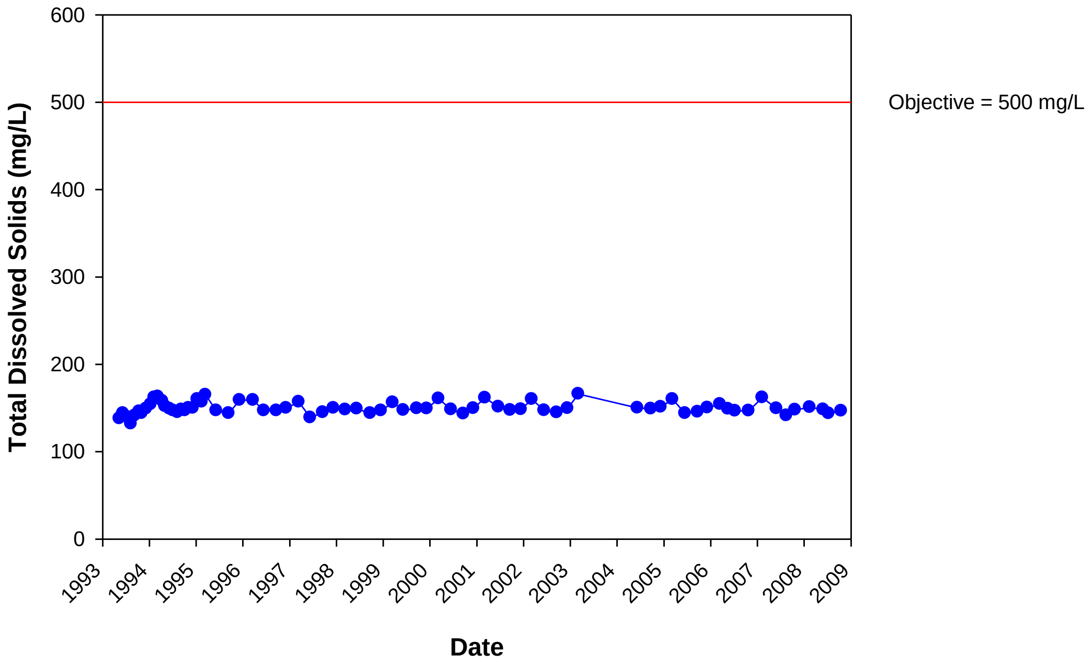

Figure 6-c7: Cold River Total Dissolved Solids

Cold River at Outlet of Cold Lake

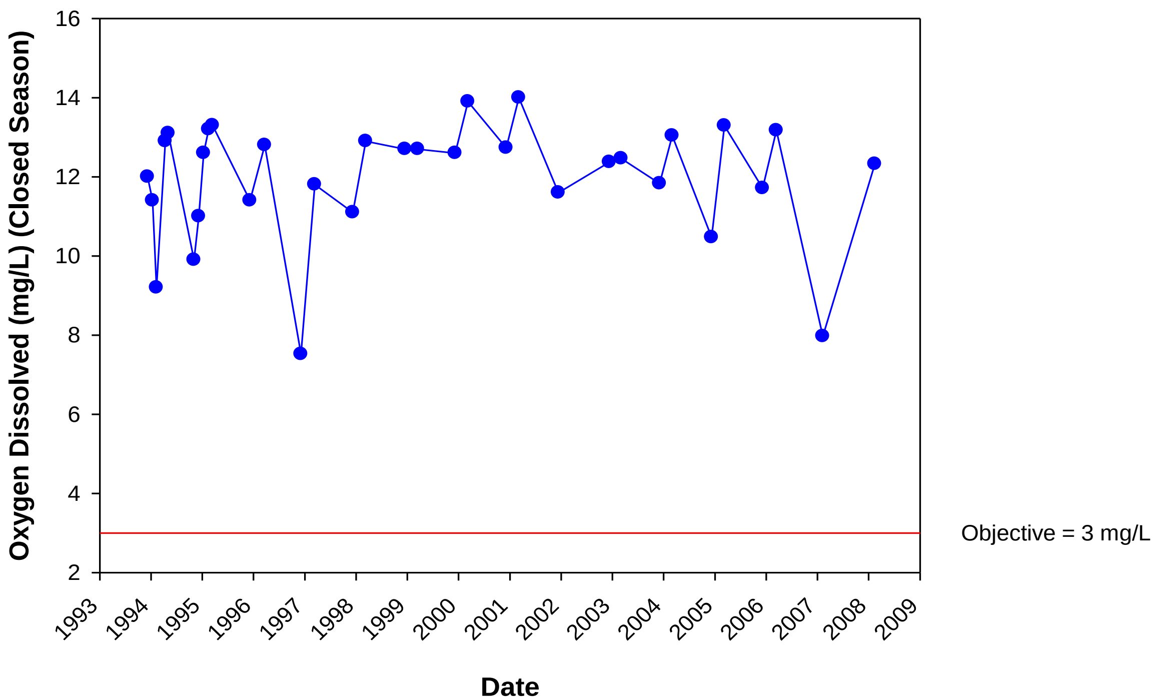

Figure 6-c8: Cold River Oxygen Dissolved (Closed Season)

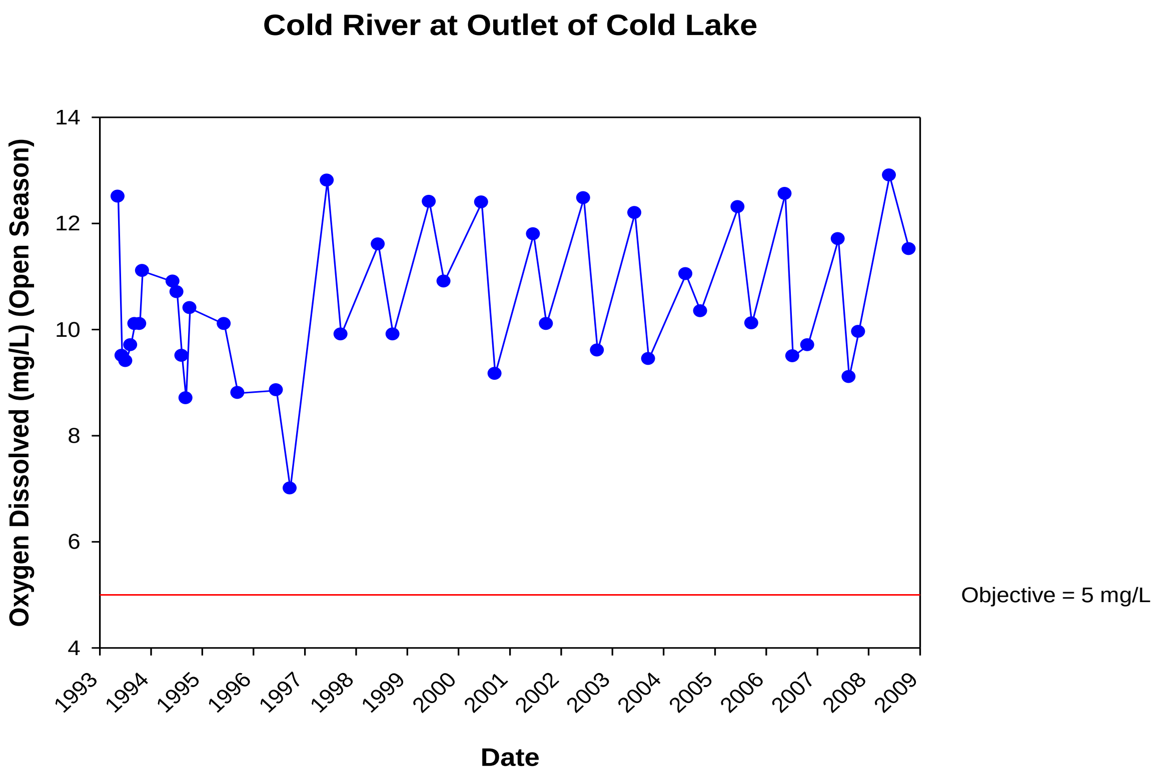

Figure 6-c9: Cold River Oxygen Dissolved (Open Season)

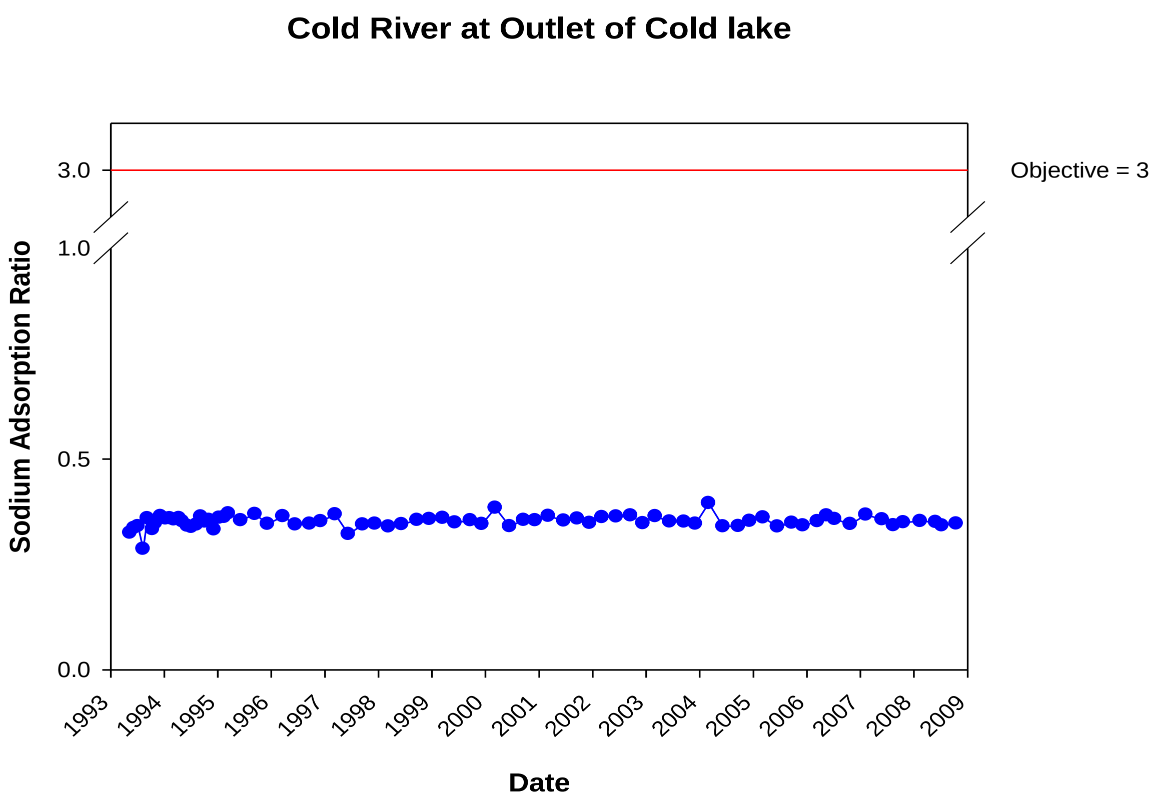

Figure 6-c10: Cold River Sodium Adsorption Ratio

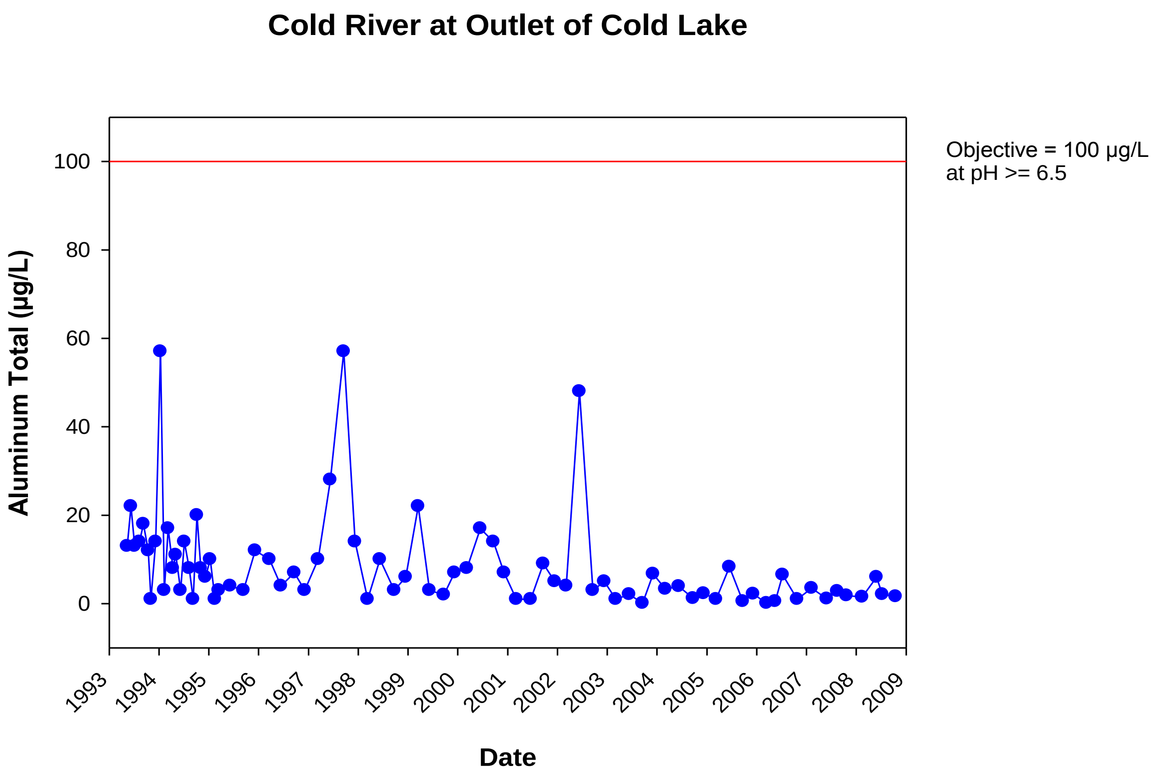

Figure 6-c11: Cold River Aluminum Total

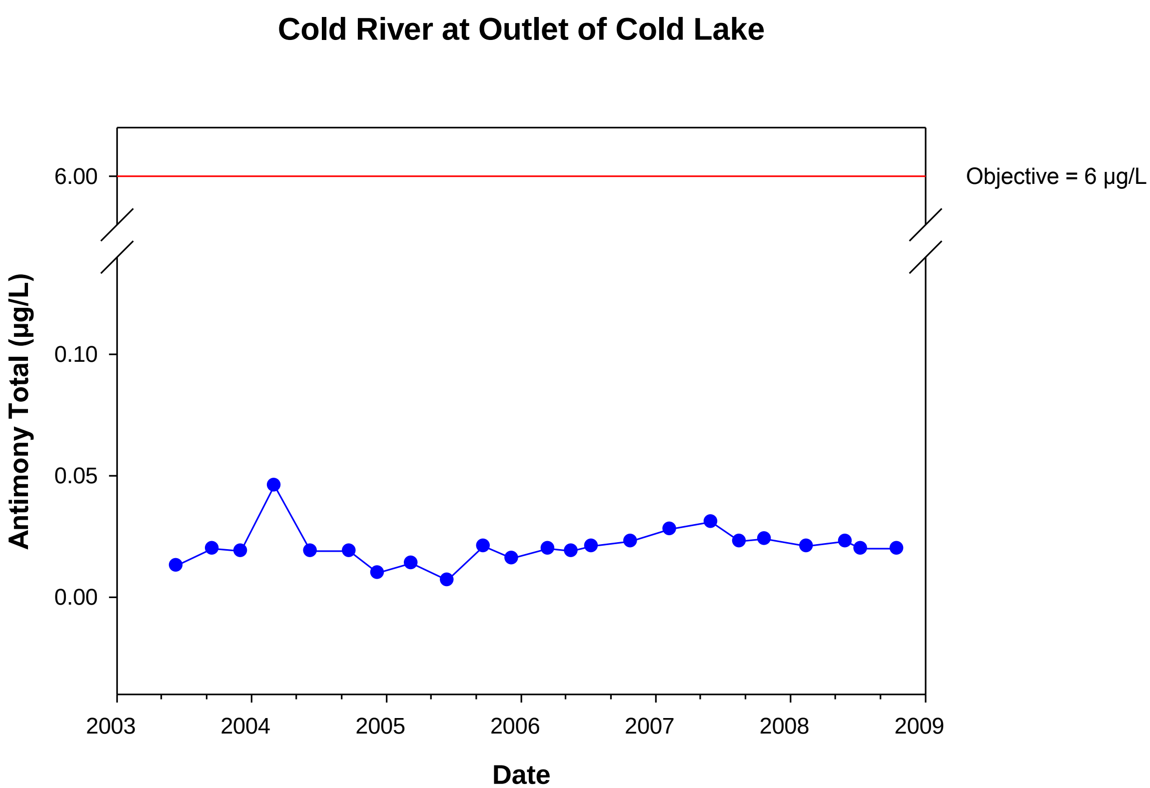

Figure 6-c12: Cold River Antimony Total

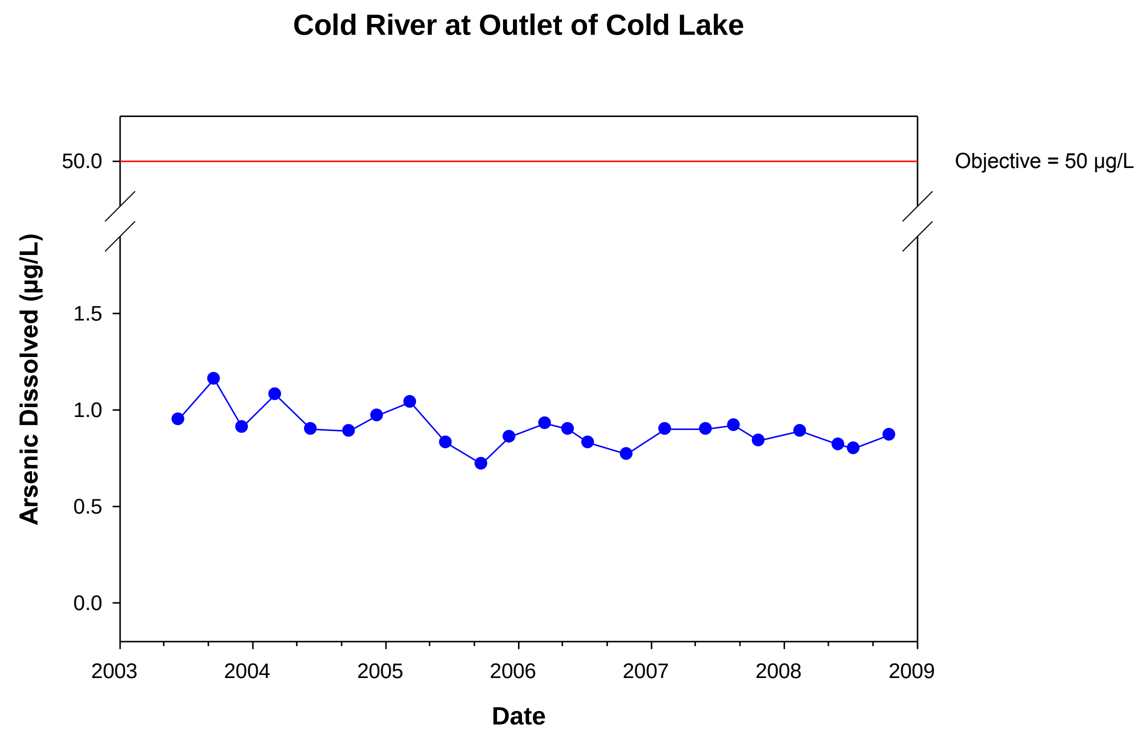

Figure 6-c13: Cold River Arsenic Dissolved

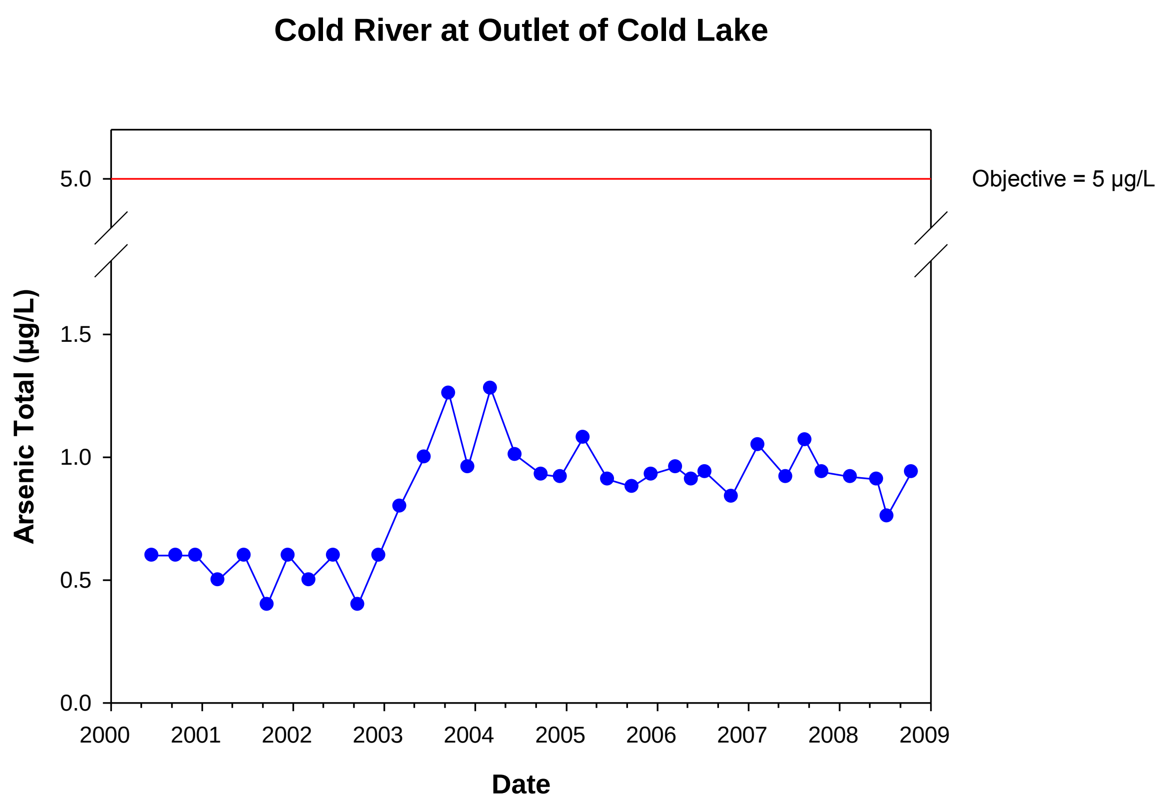

Figure 6-c14: Cold River Arsenic Total

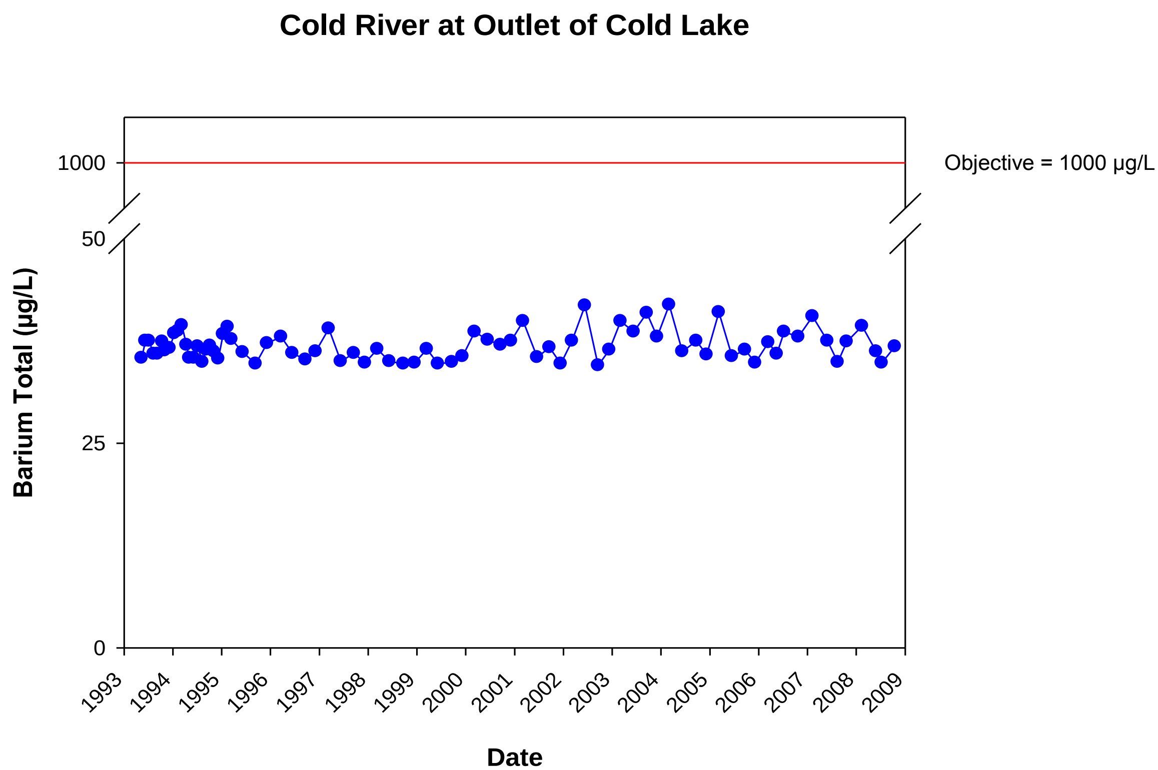

Figure 6-c15: Cold River Barium Total

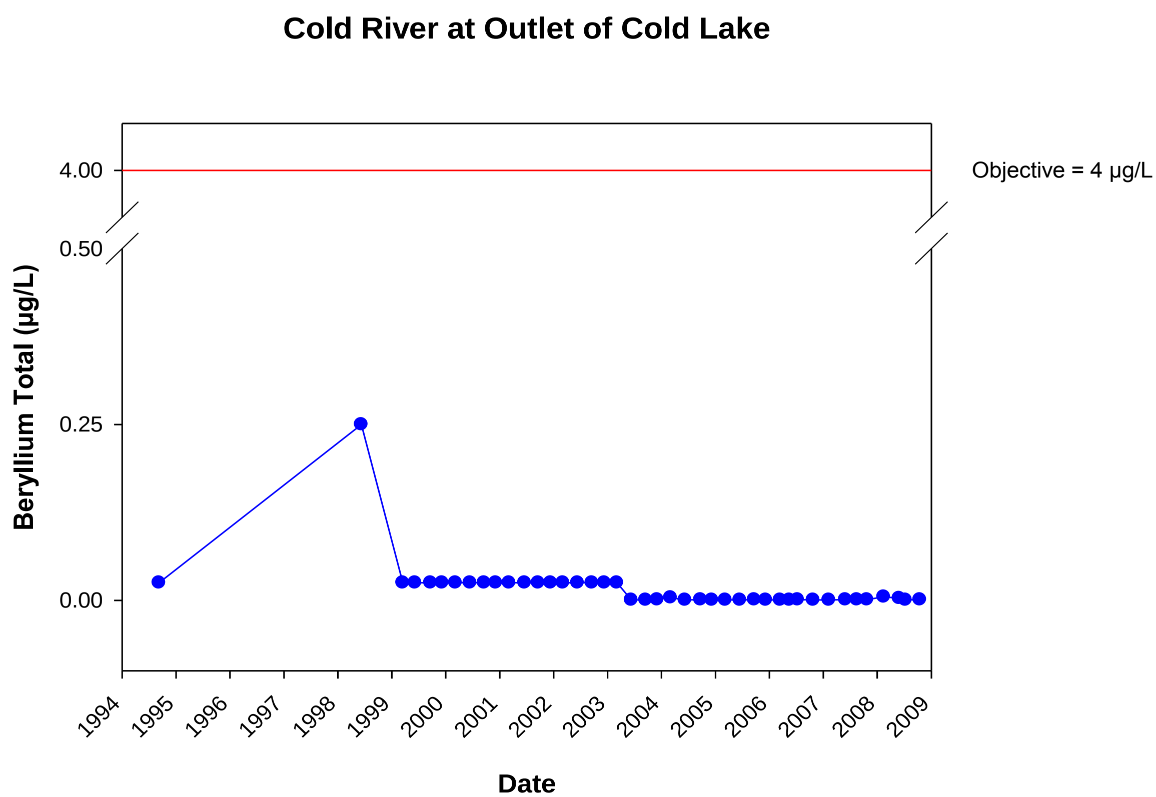

Figure 6-c16: Cold River Beryllium Total

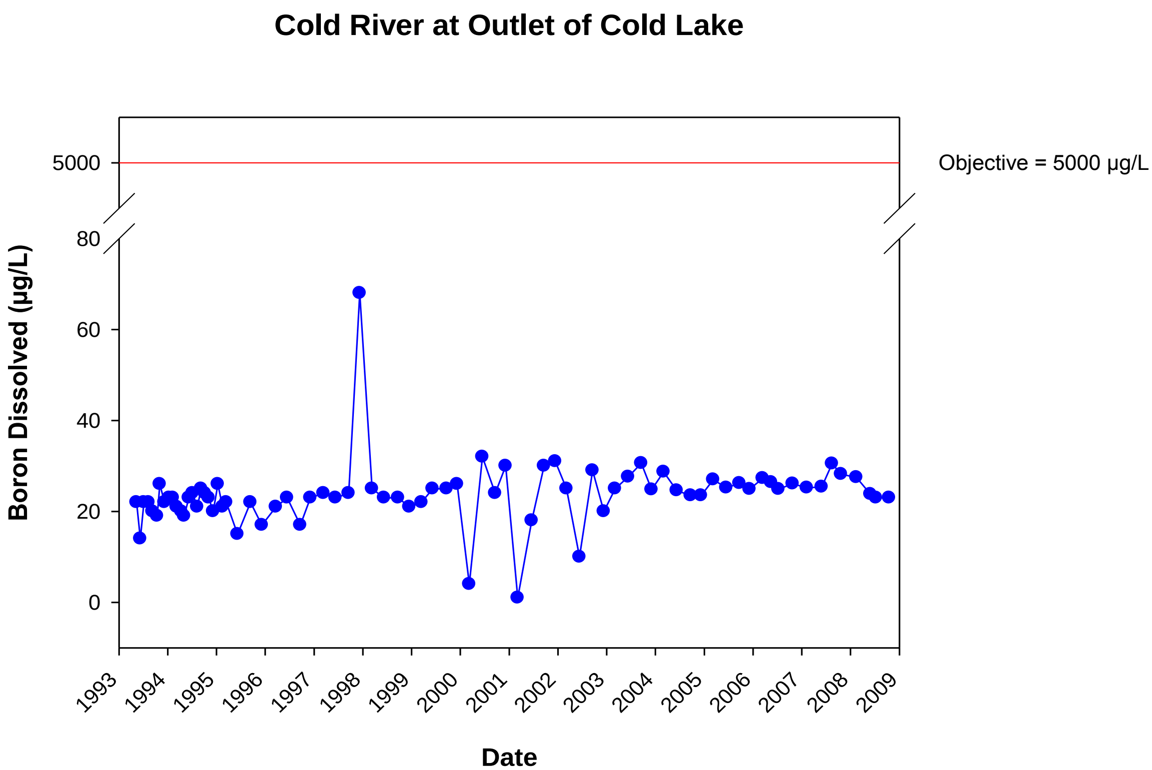

Figure 6-c17: Cold River Boron Dissolved

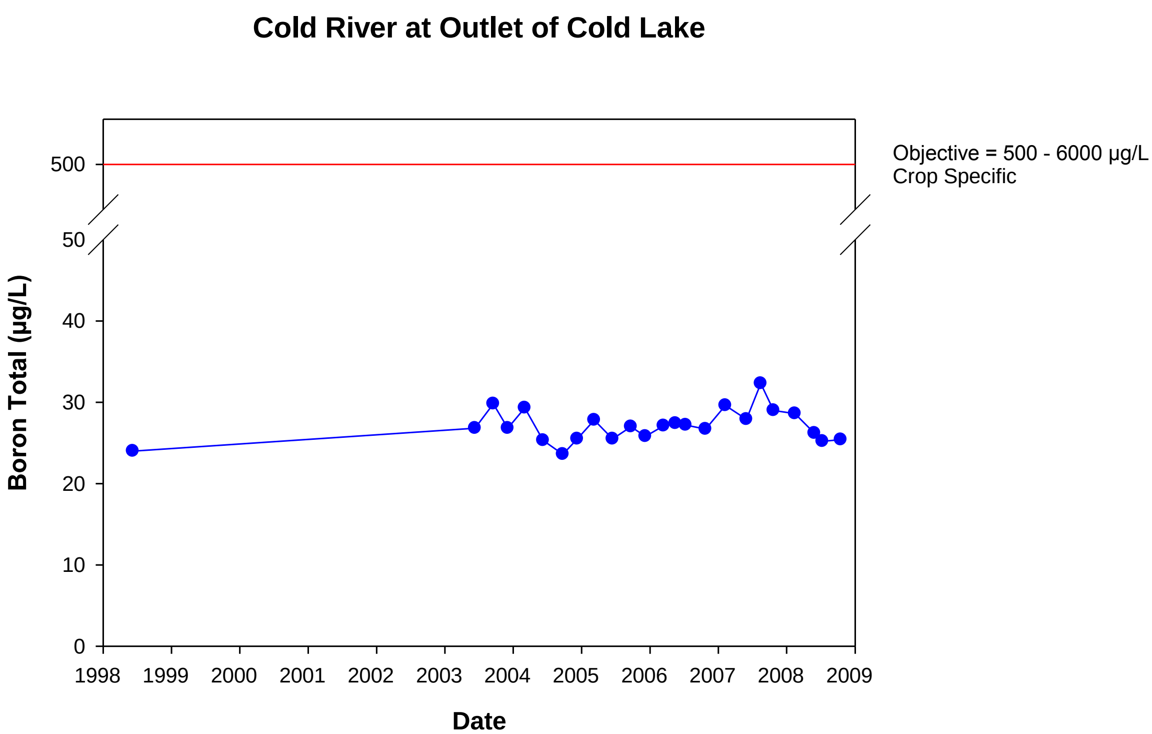

Figure 6-c18: Cold River Boron Total

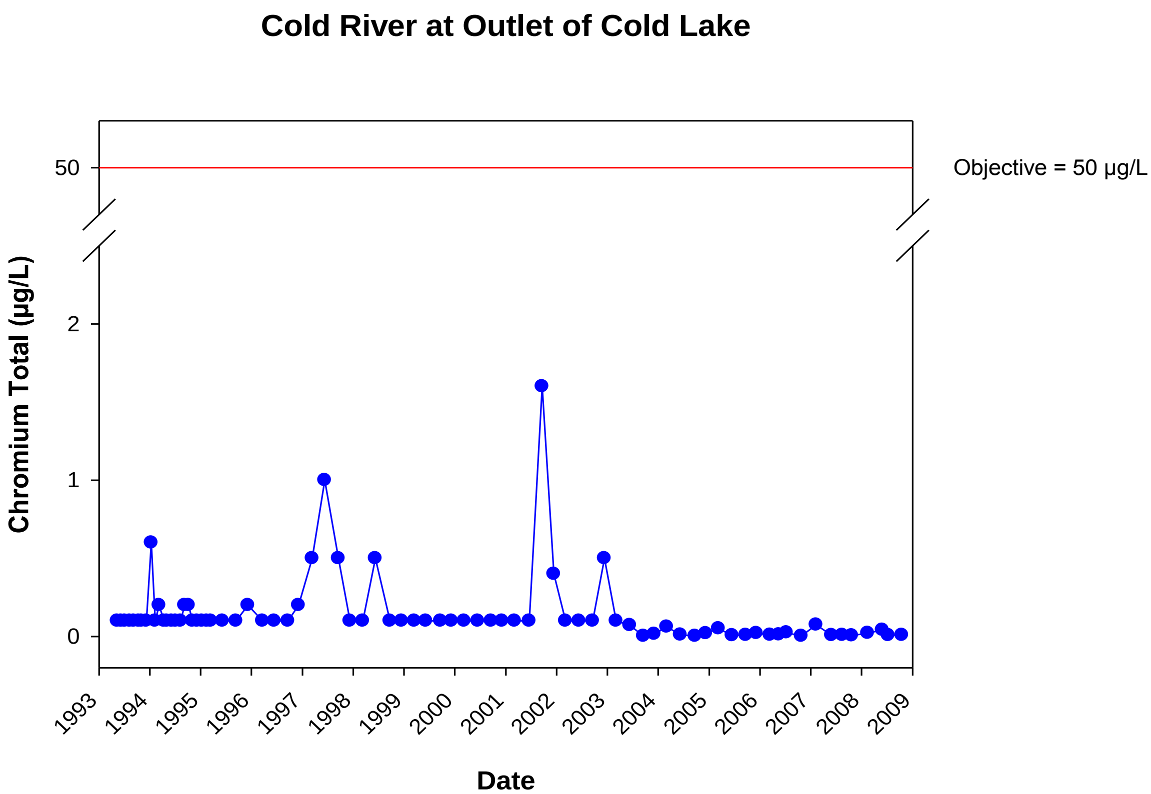

Figure 6-c19: Cold River Chromium Total

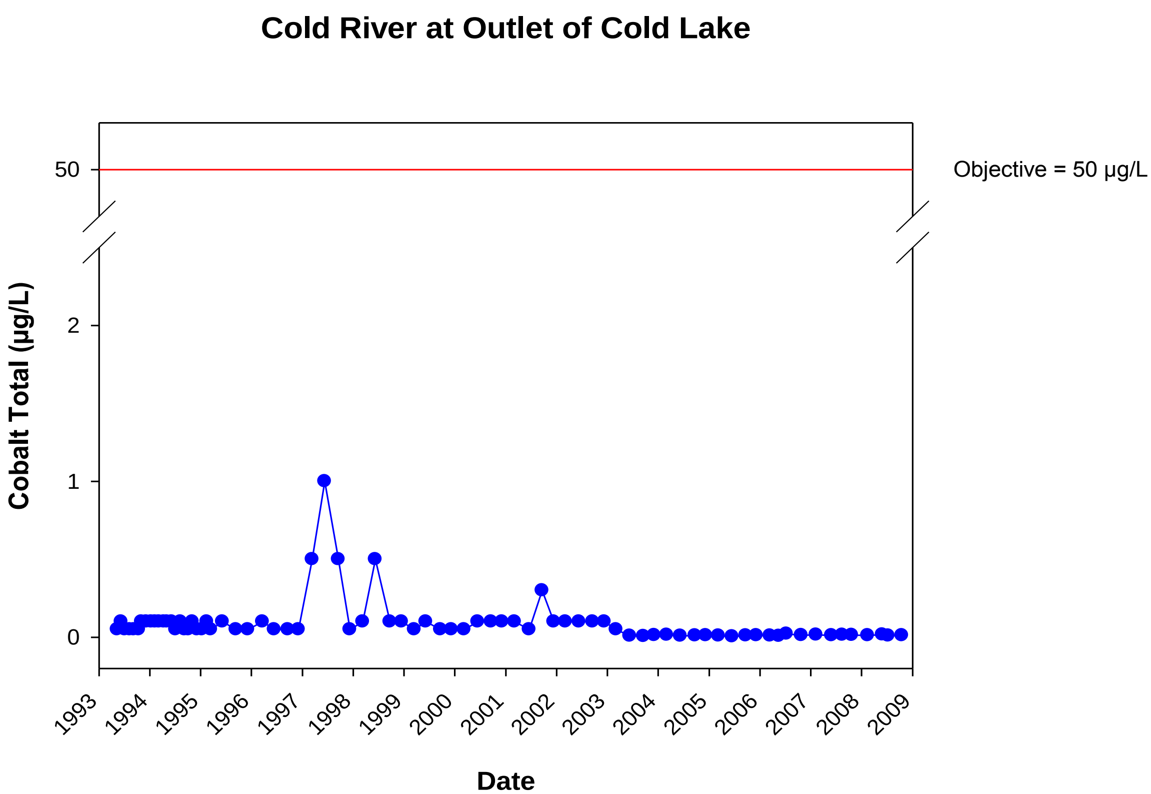

Figure 6-c20: Cold River Cobalt Total

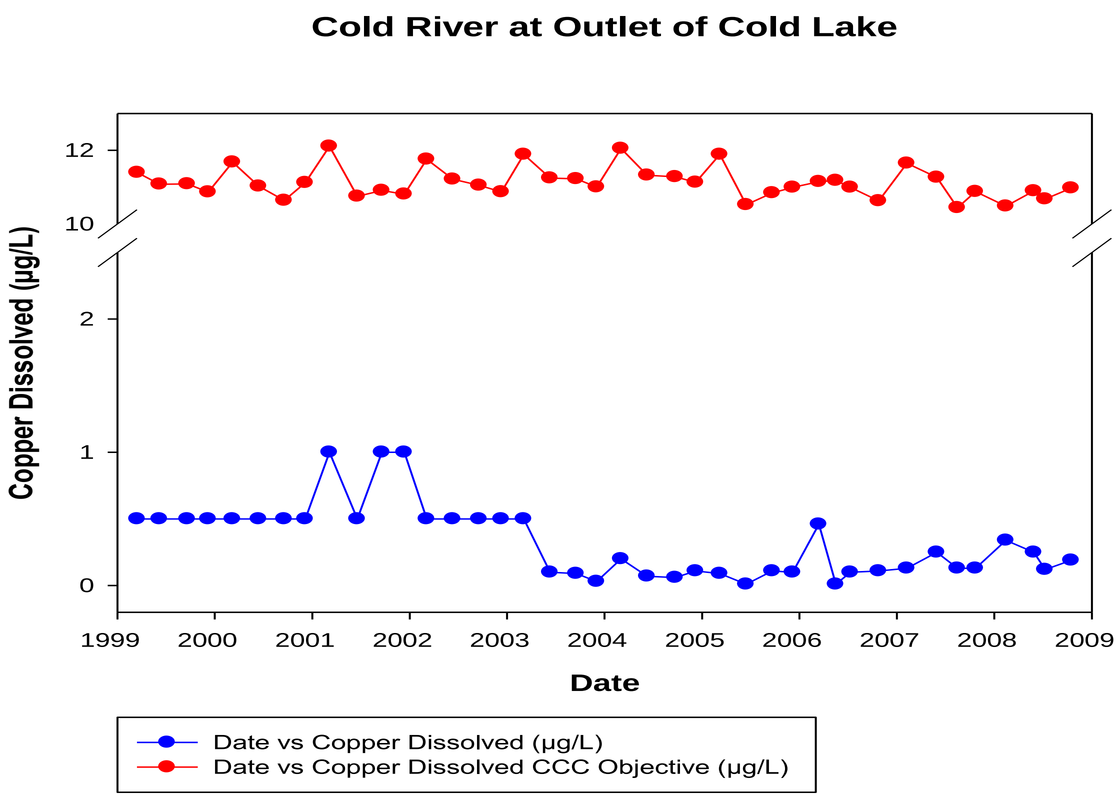

Figure 6-c21: Cold River Copper Dissolved

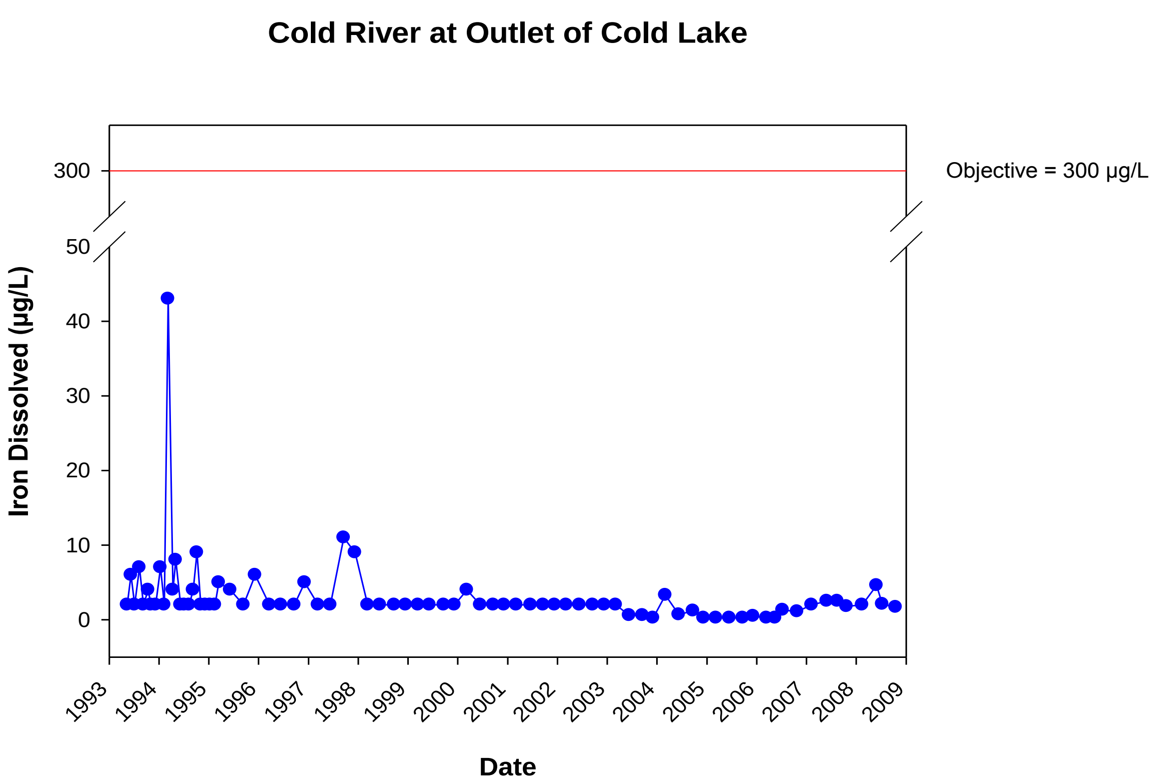

Figure 6-c22: Cold River Iron Dissolved

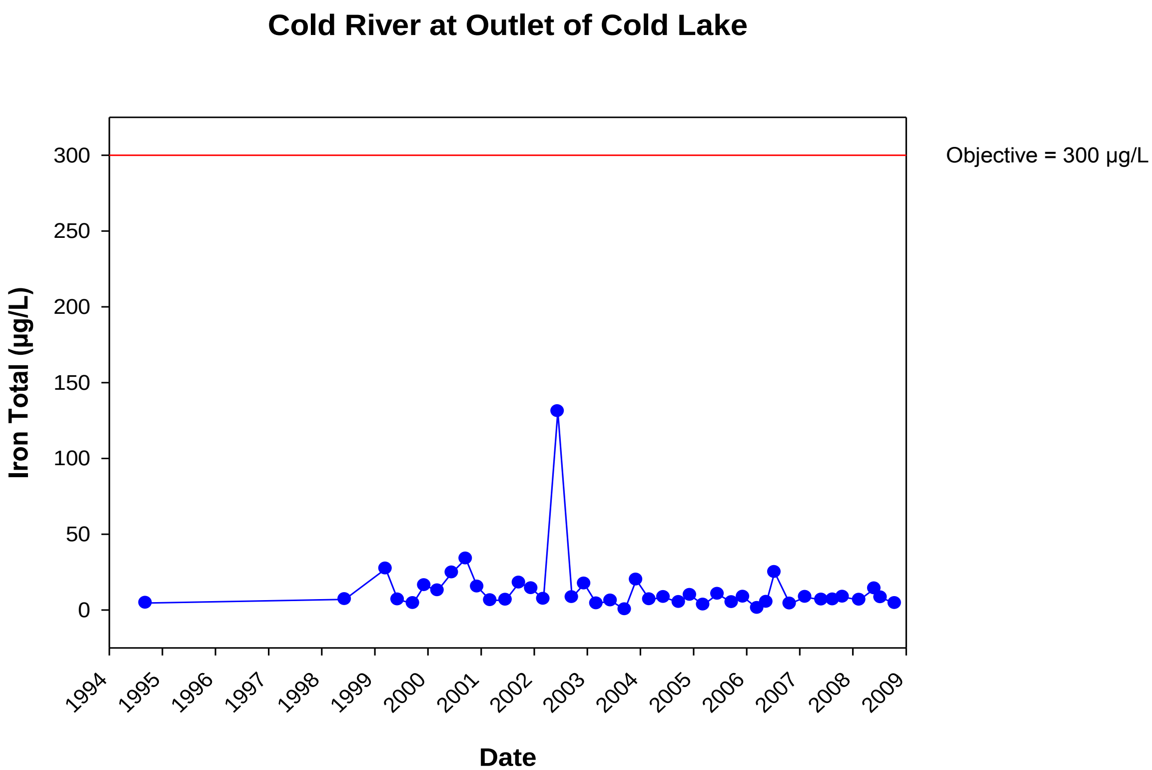

Figure 6-c23: Cold River Iron Total

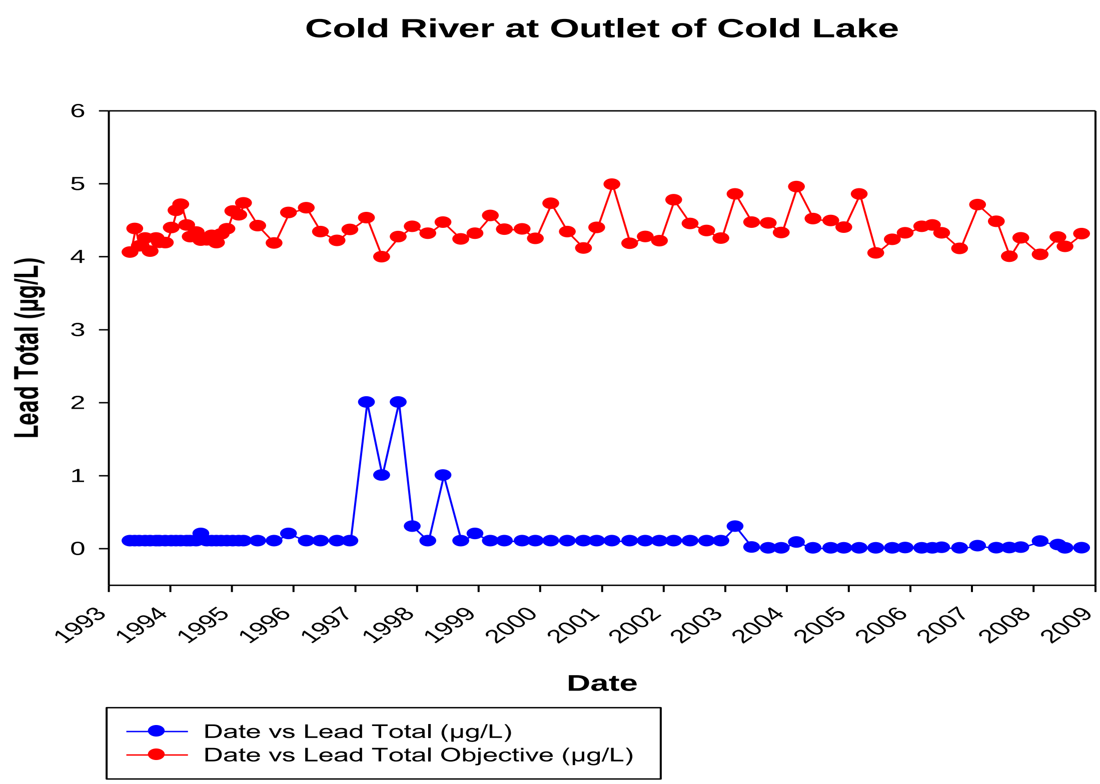

Figure 6-c24: Cold River Lead Total

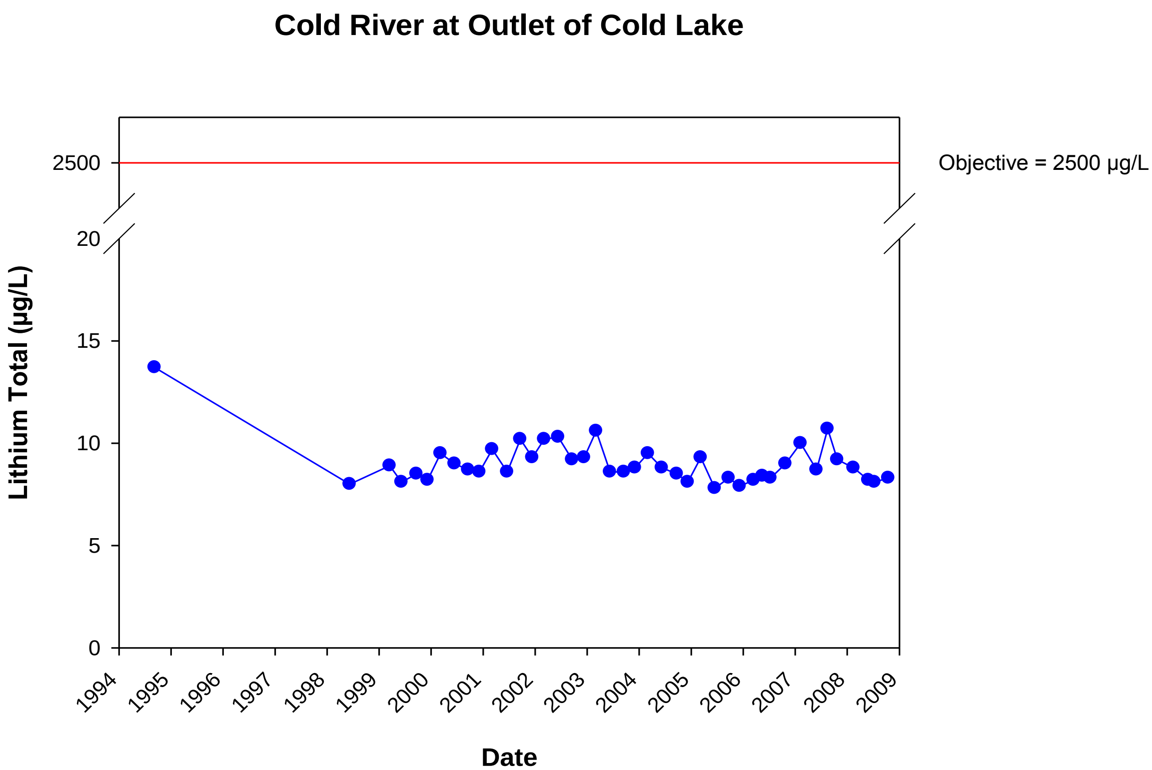

Figure 6-c25: Cold River Lithium Total

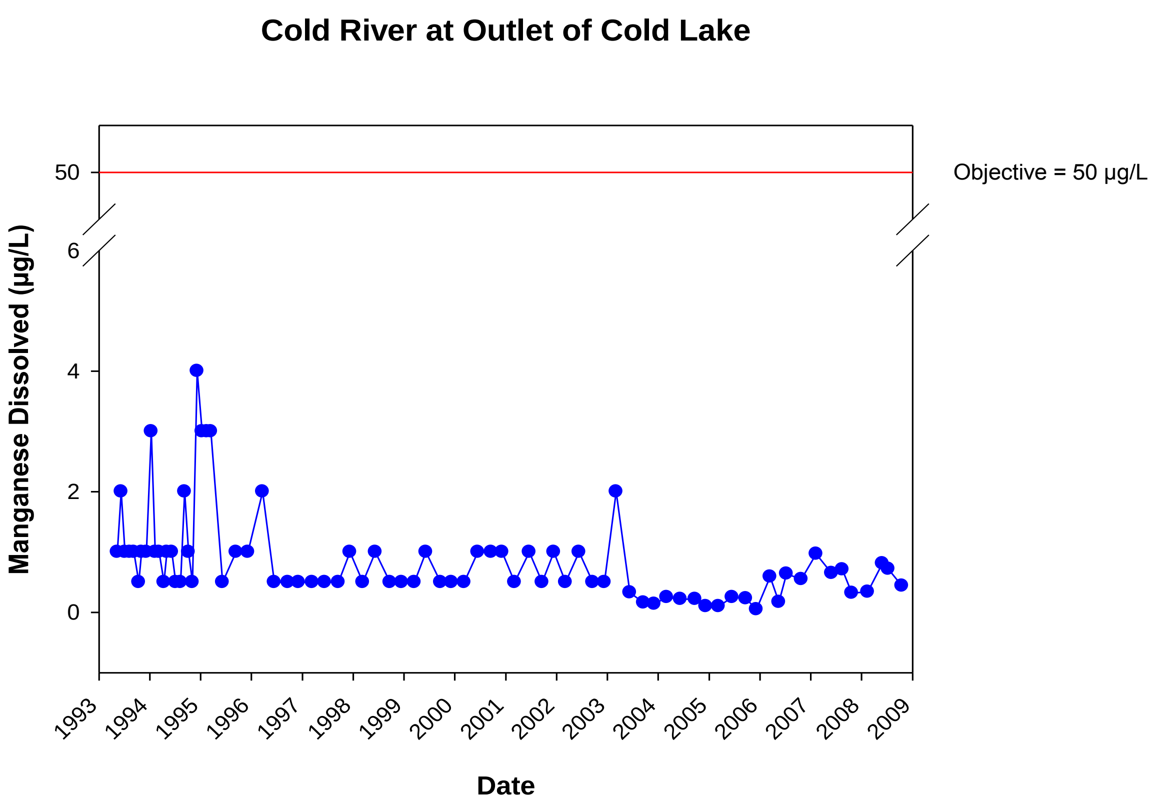

Figure 6-c26: Cold River Manganese Dissolved

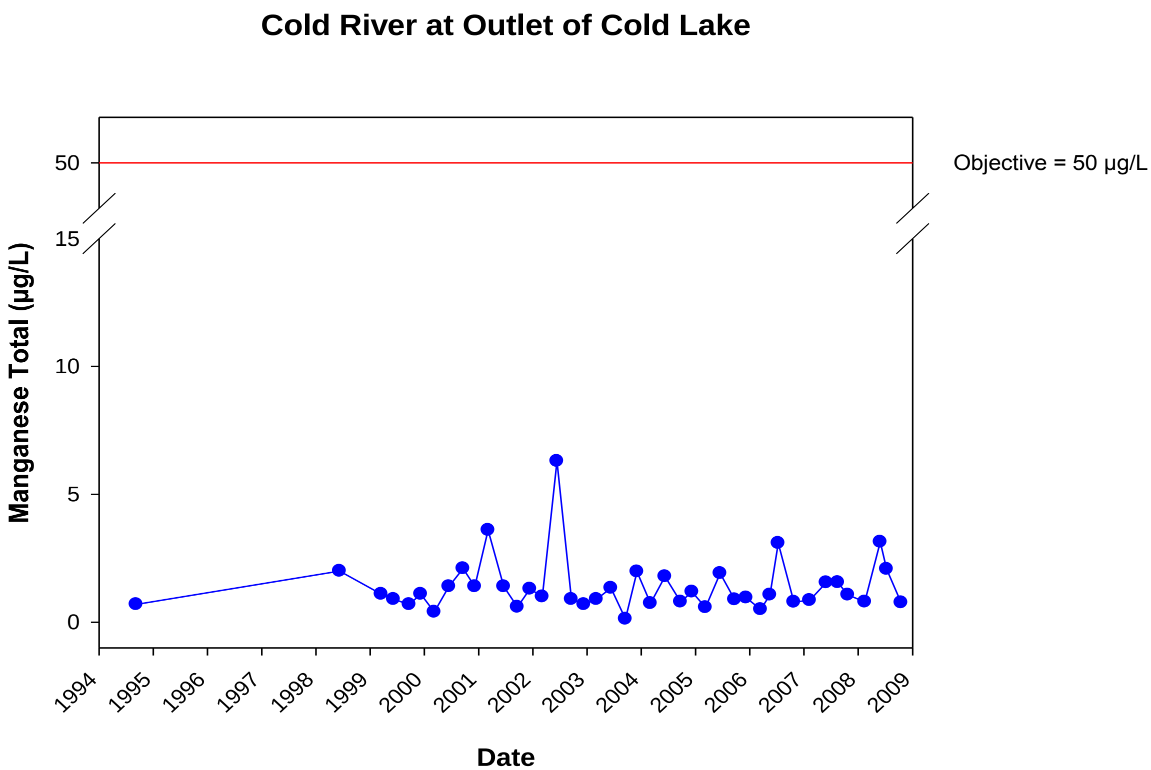

Figure 6-c27: Cold River Manganese Total

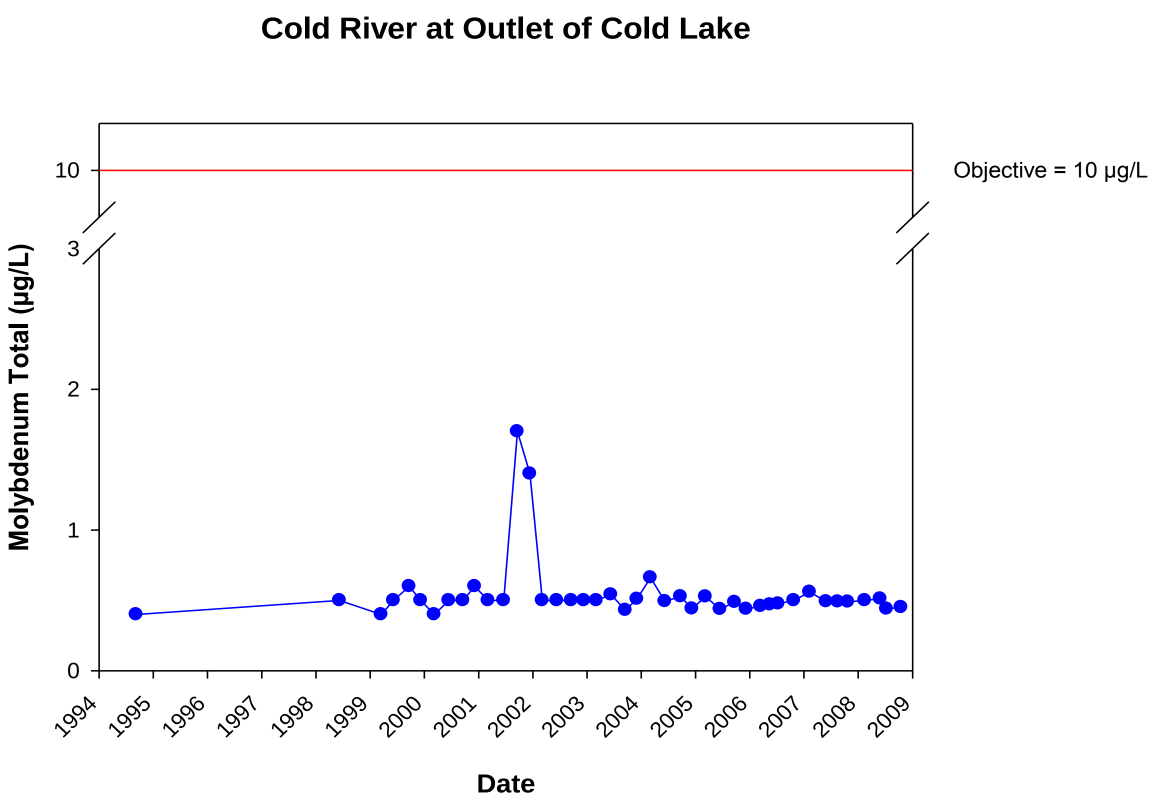

Figure 6-c28: Cold River Molybdenum Total

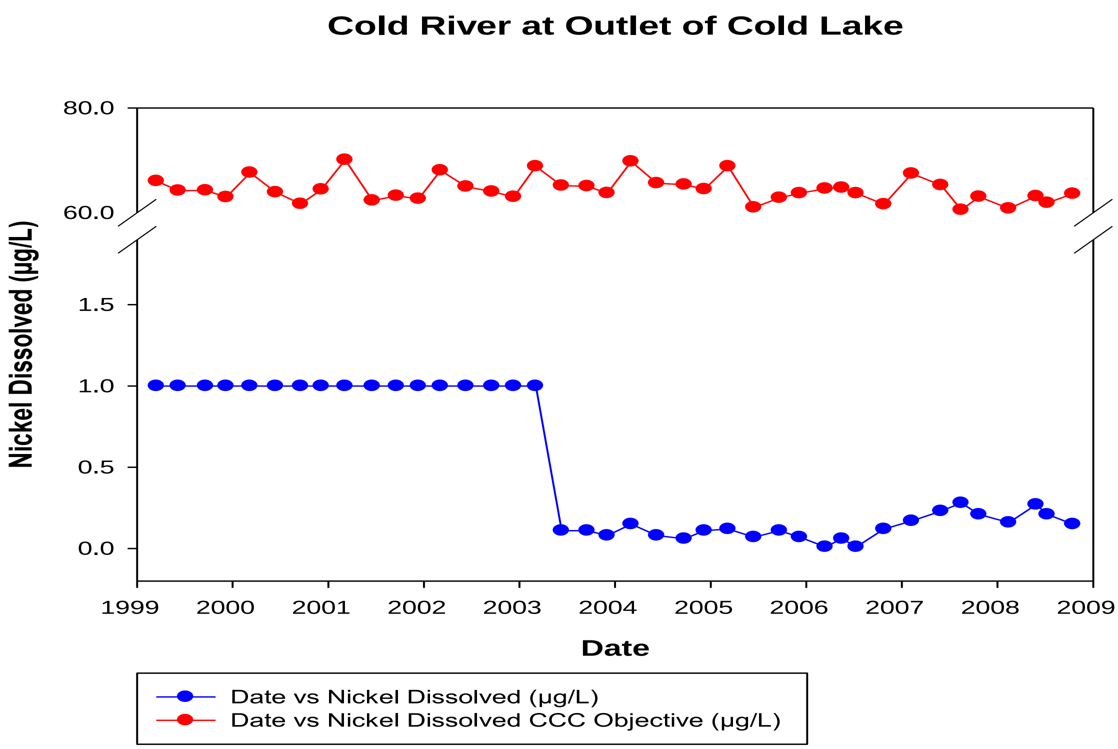

Figure 6-c29: Cold River Nickel Dissolved

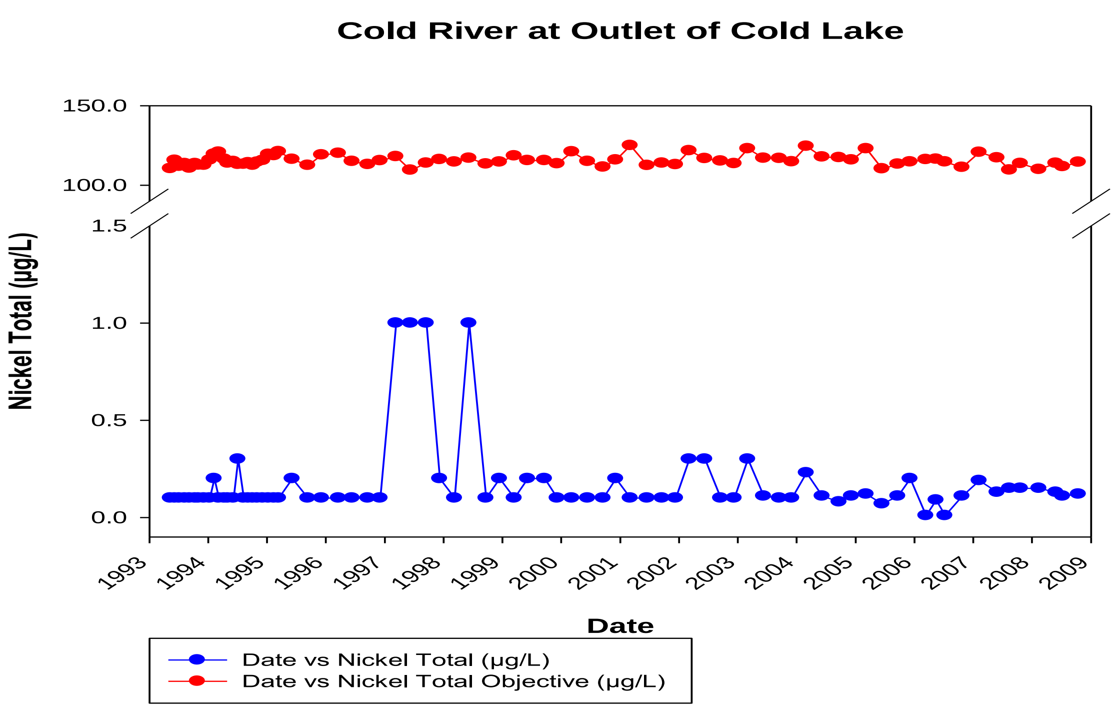

Figure 6-c30: Cold River Nickel Total

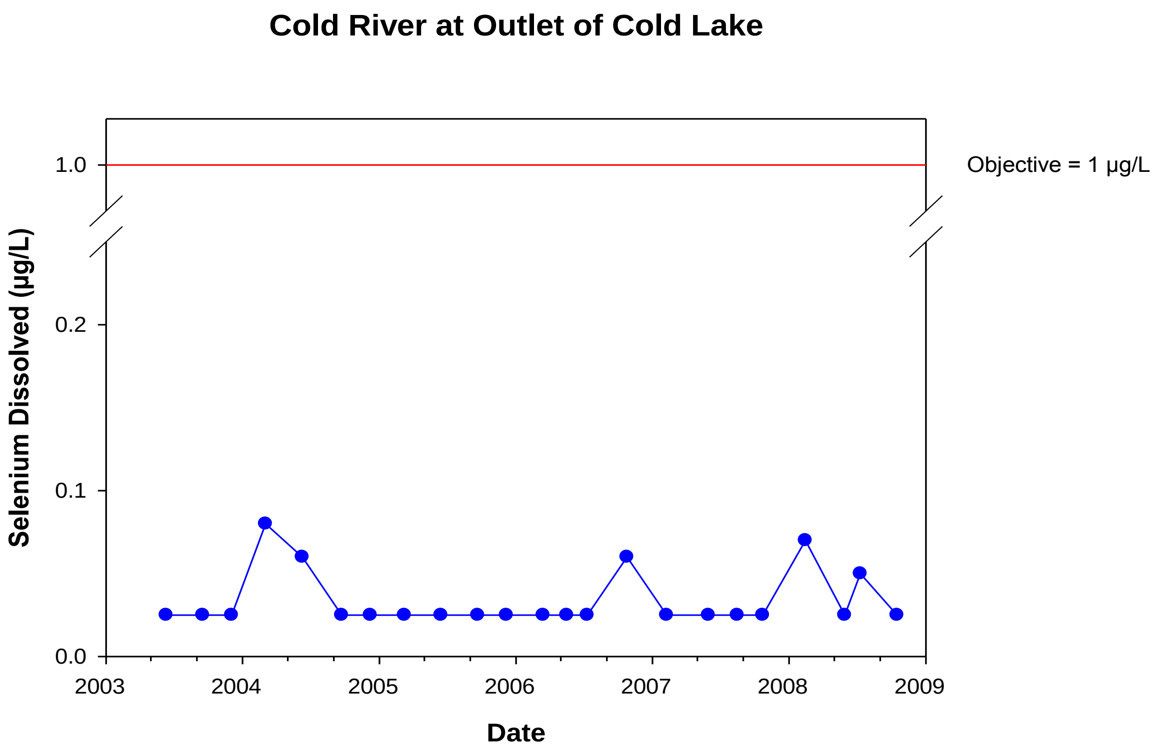

Figure 6-c31: Cold River Selenium Dissolved

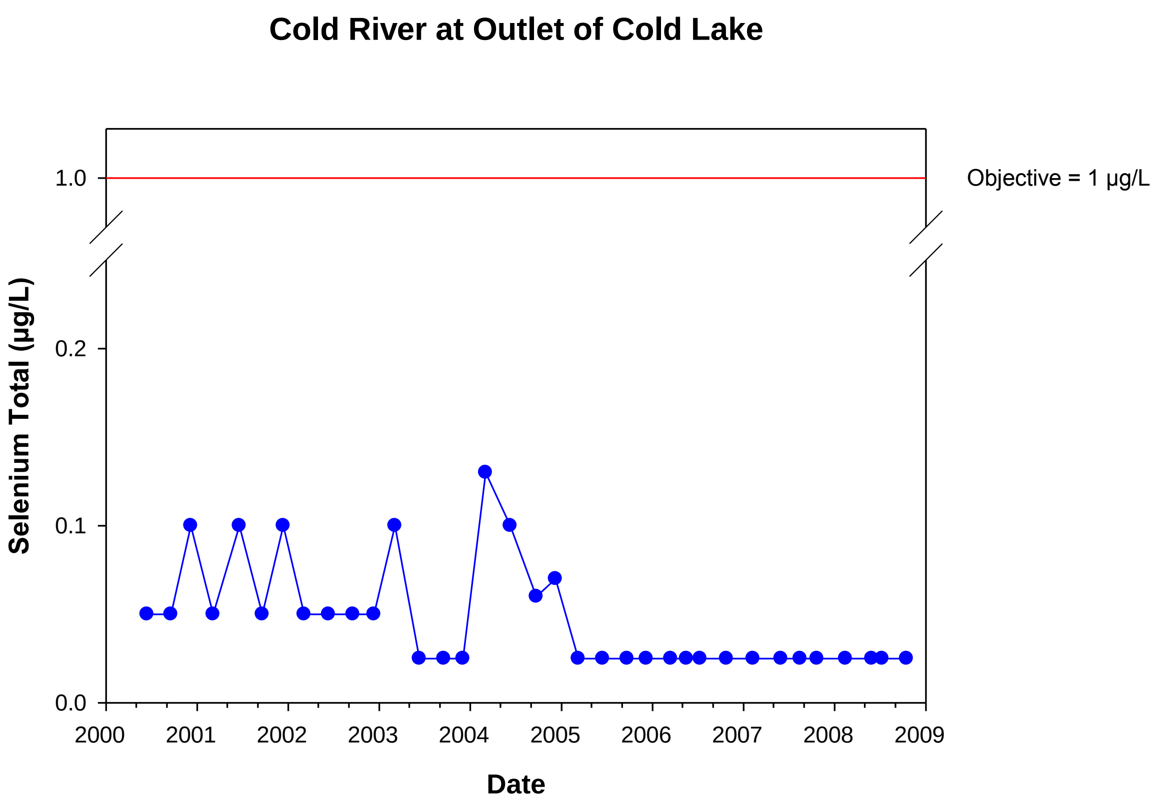

Figure 6-c32: Cold River Selenium Total

Cold River at Outlet of Cold Lake

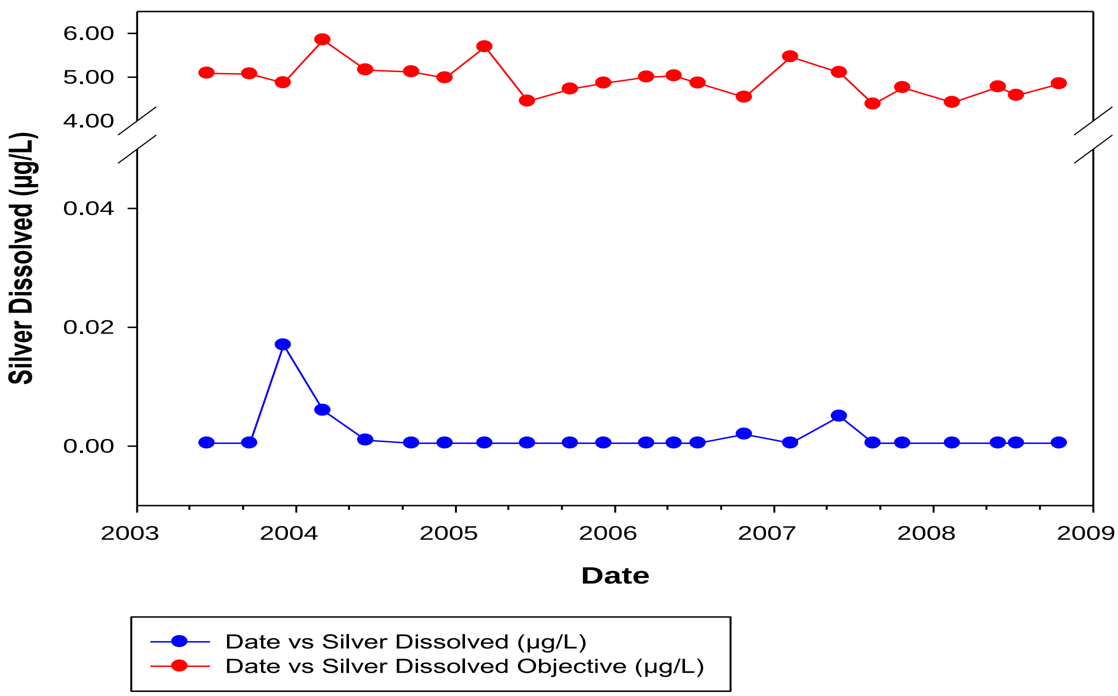

Figure 6-c33: Cold River Silver Dissolved

Cold River at Outlet of Cold Lake

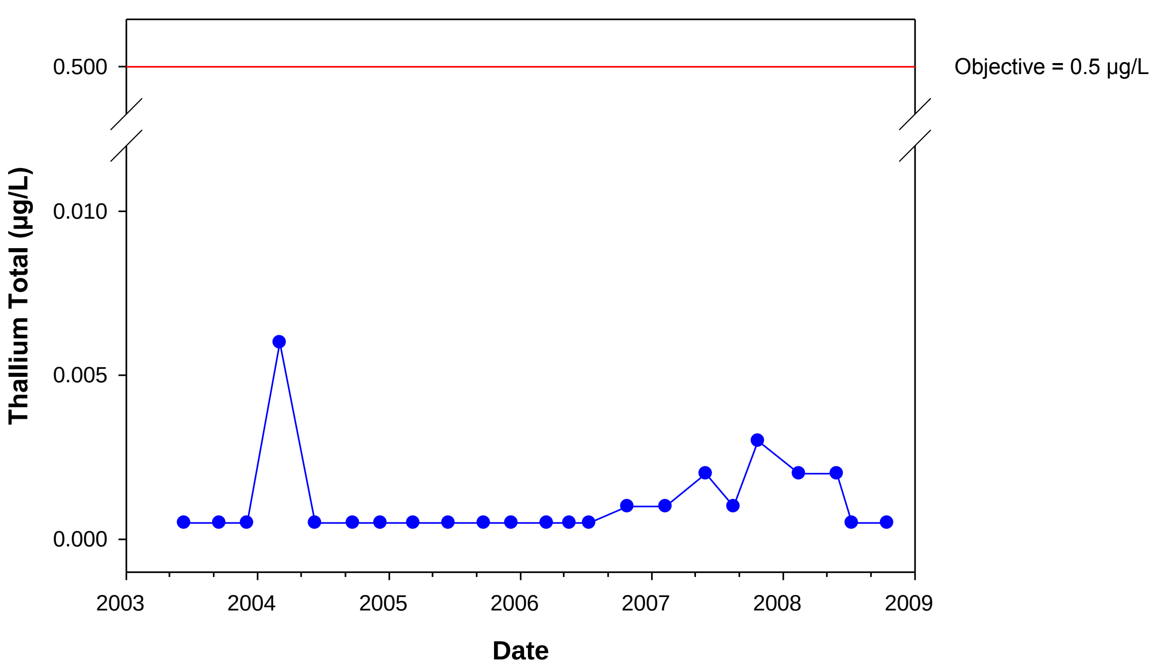

Figure 6-c34: Cold River Thallium Total

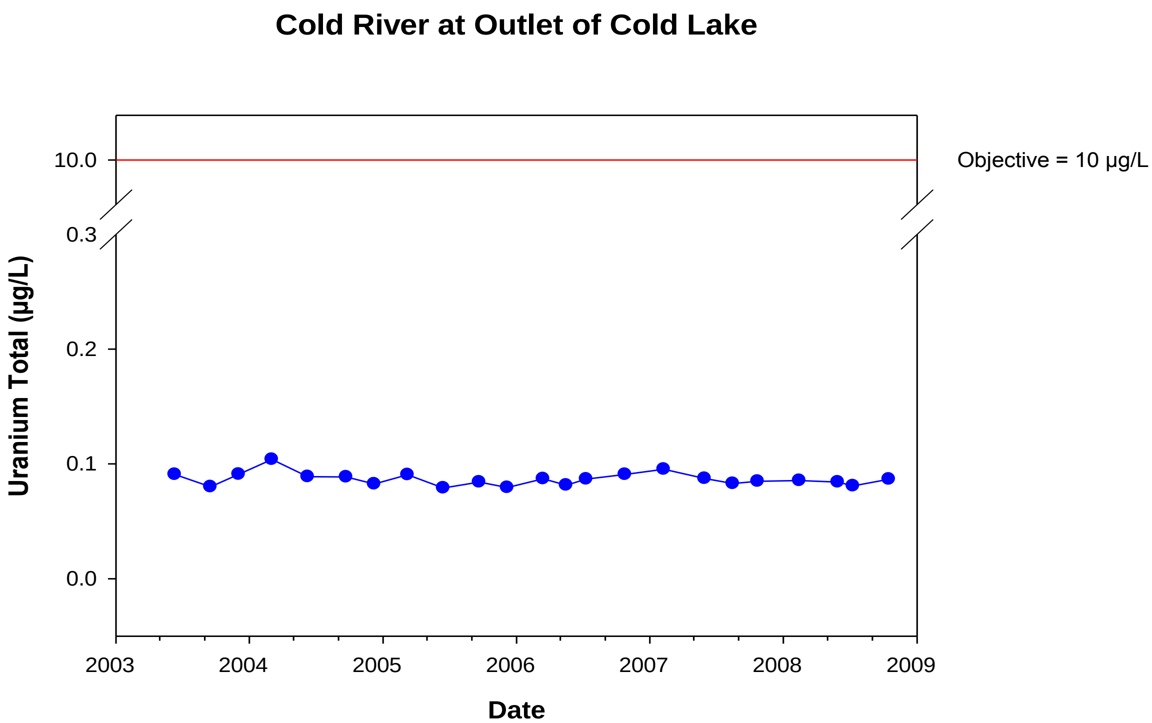

Figure 6-c35: Cold River Uranium Total

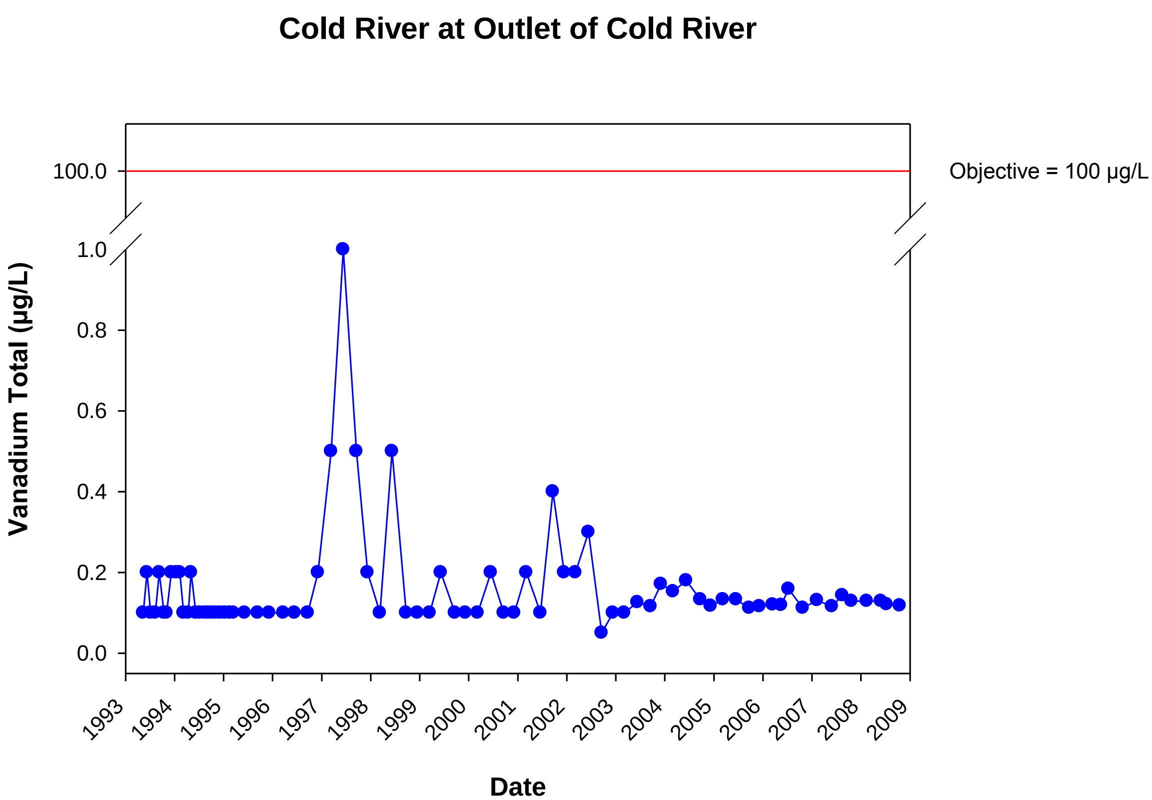

Figure 6-c36: Cold River Vanadium Total

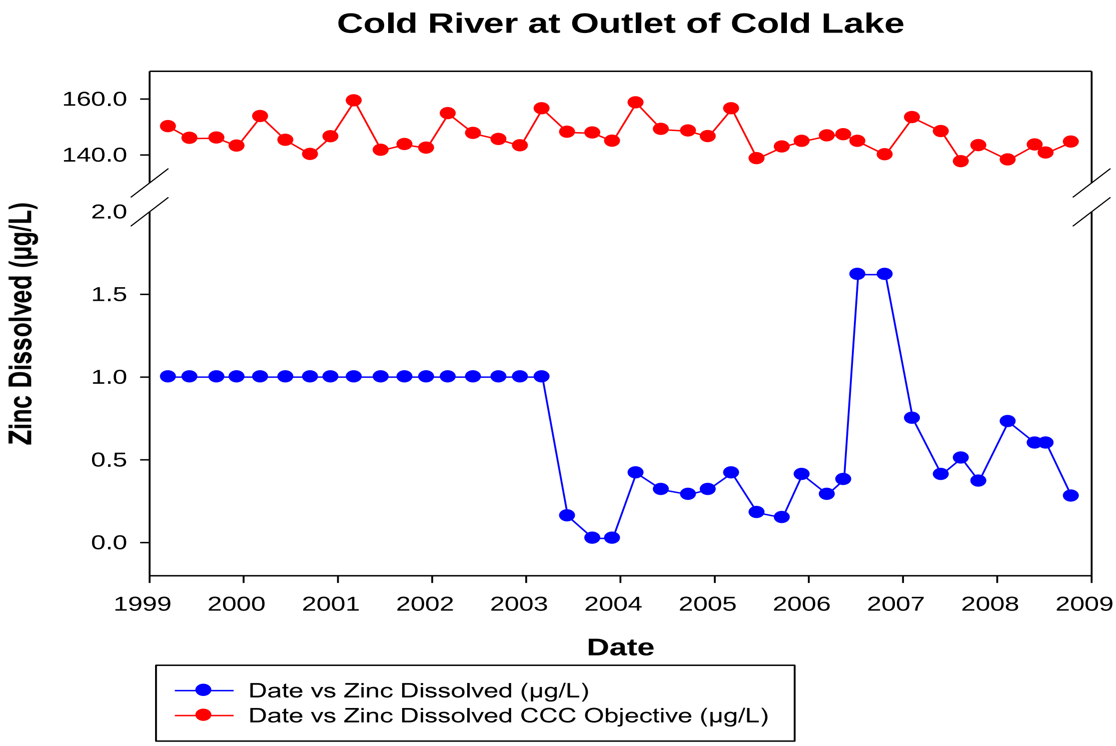

Figure 6-c37: Cold River Zinc Dissolved

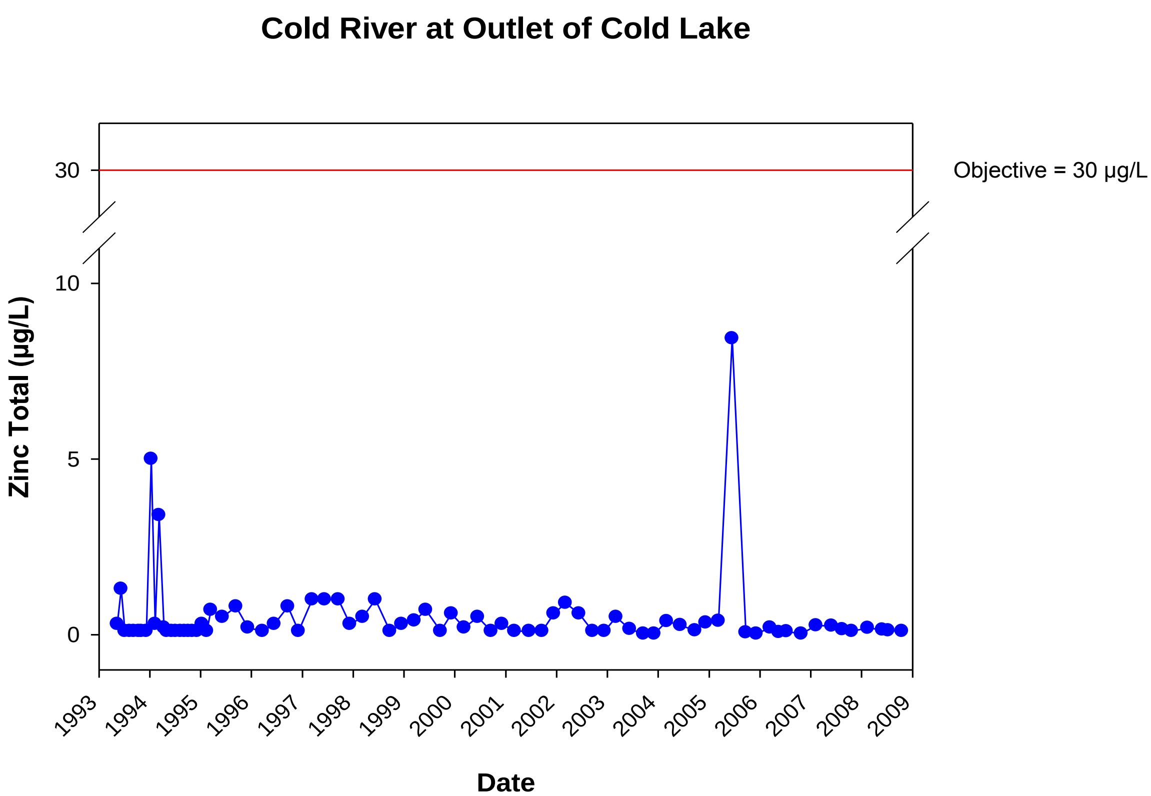

Figure 6-c38: Cold River Zinc Total

Appendix 6-d: North Saskatchewan River

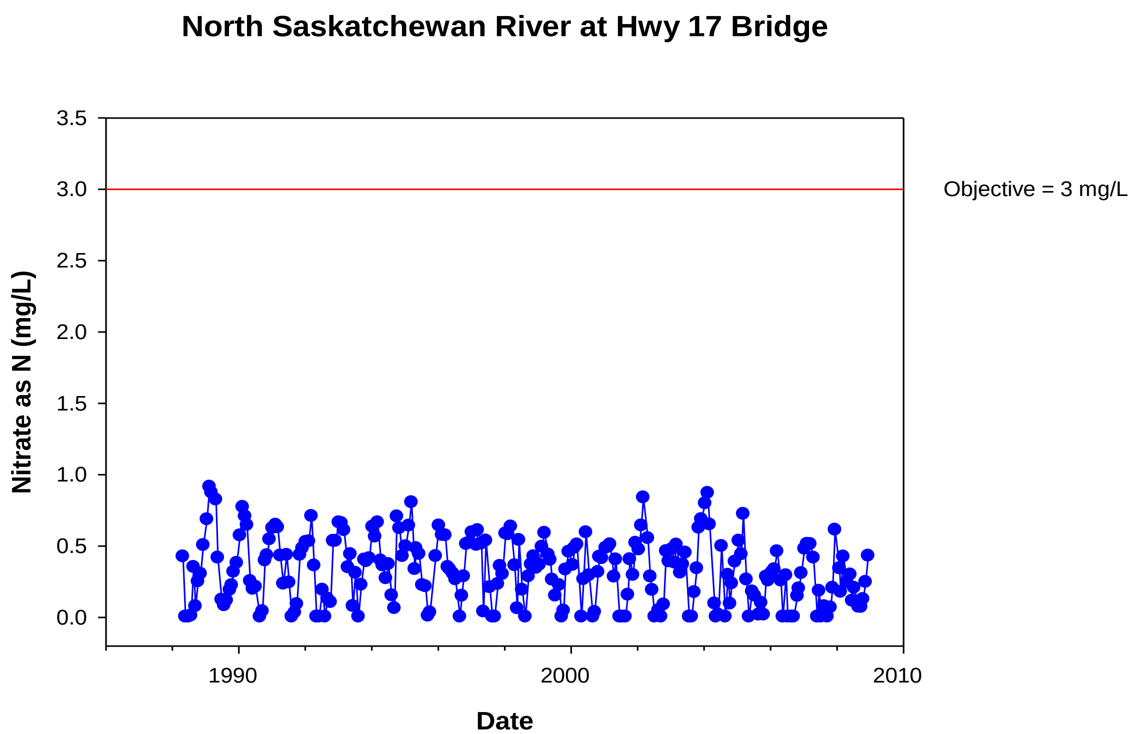

Figure 6-d1: North Saskatchewan River Nitrate as N

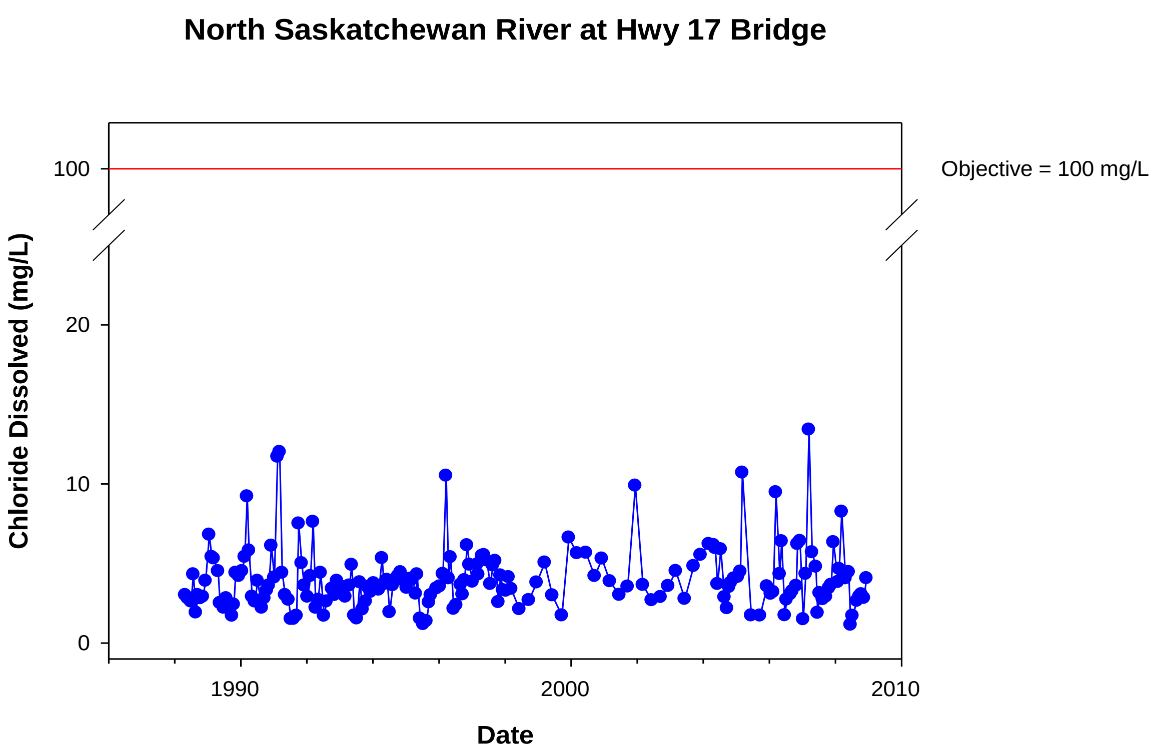

Figure 6-d2: North Saskatchewan River Chloride Dissolved

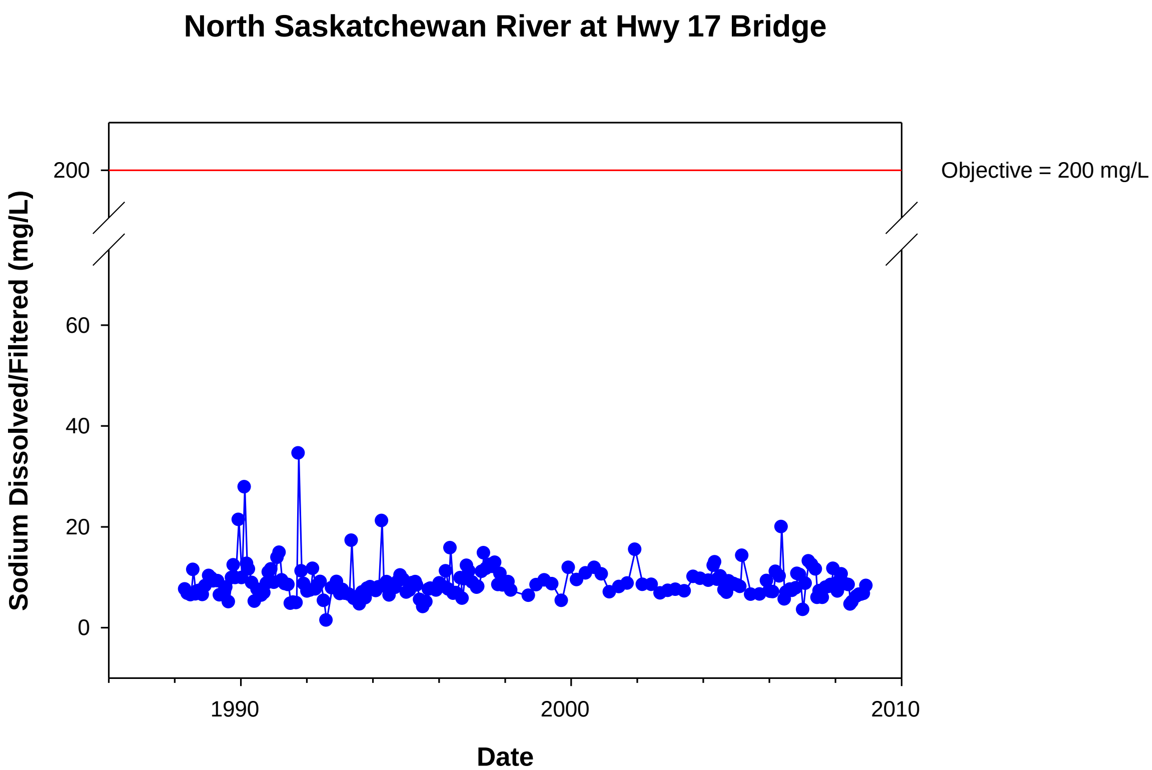

Figure 6-d3: North Saskatchewan River Sodium Dissolved/Filtered

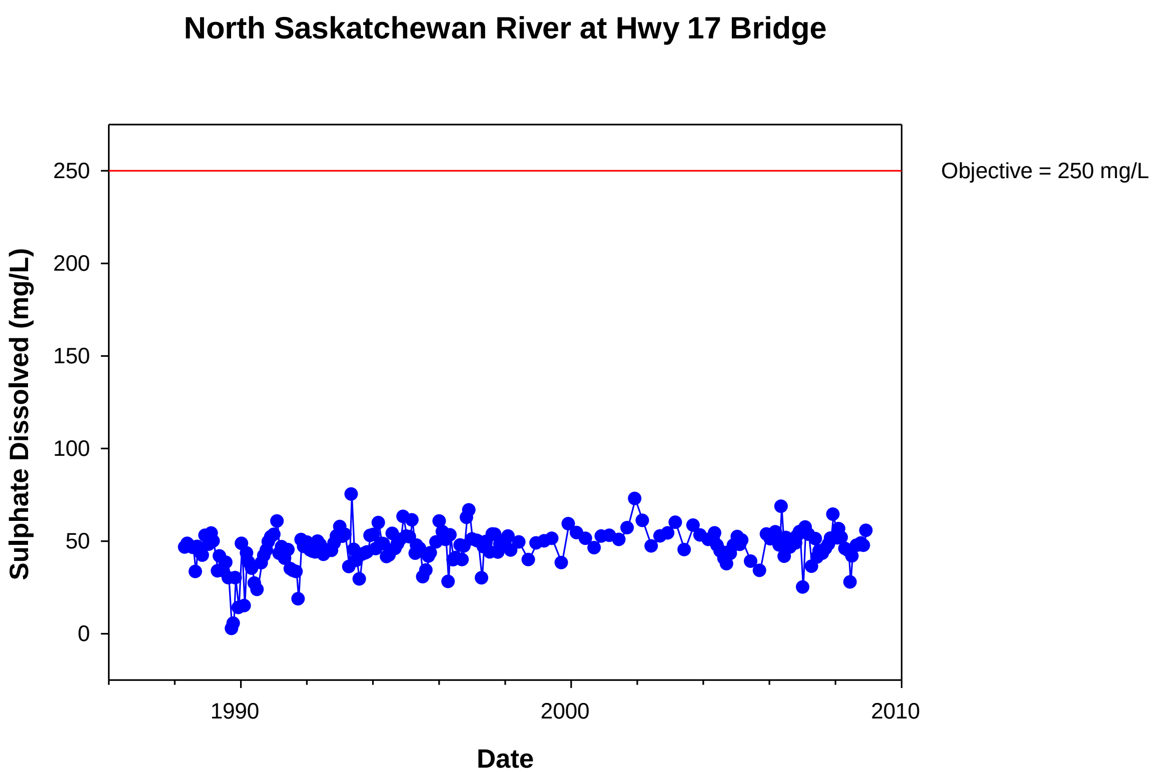

Figure 6-d4: North Saskatchewan River Sulphate Dissolved

North Saskatchewan River at Hwy 17 Bridge

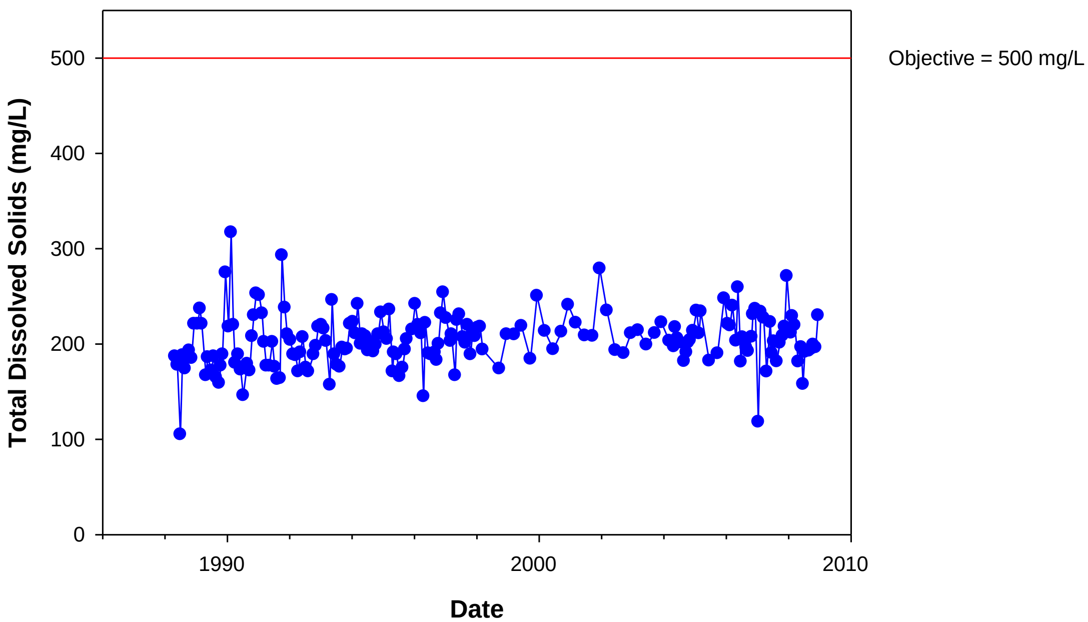

Figure 6-d5: North Saskatchewan River Total Dissolved Solids

North Saskatchewan River at Hwy 17 Bridge

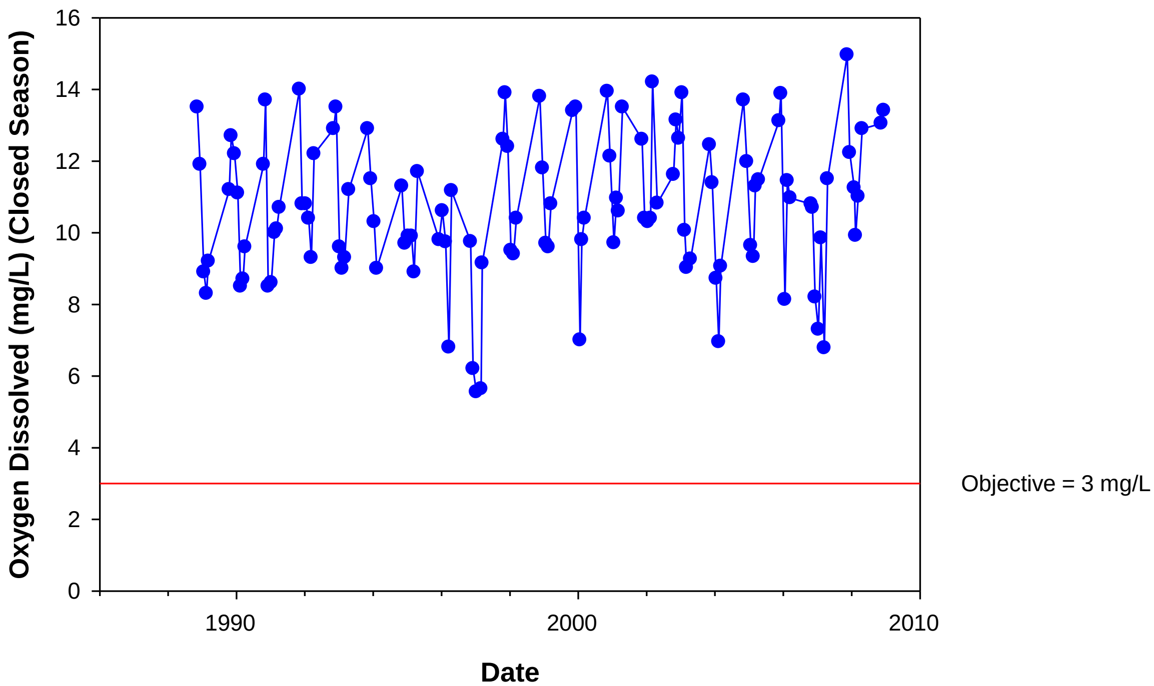

Figure 6-d6: North Saskatchewan River Oxygen Dissolved (Closed Season)

North Saskatchewan River at Hwy 17 Bridge

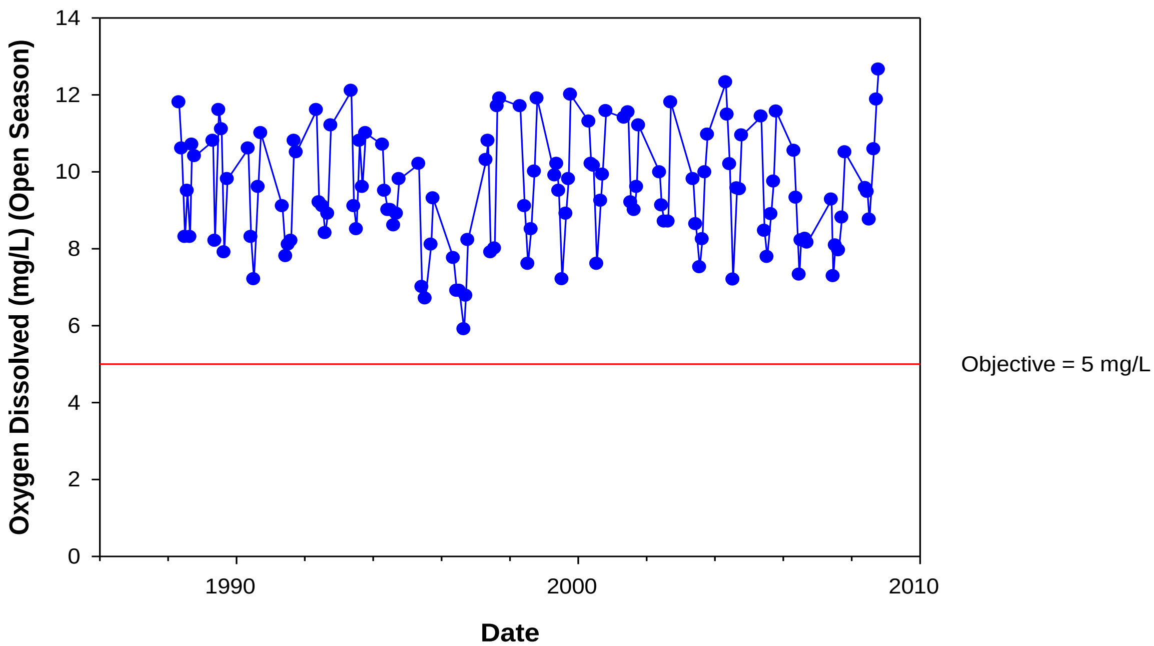

Figure 6-d7: North Saskatchewan River Oxygen Dissolved (Open Season)

North Saskatchewan River at Hwy 17 Bridge

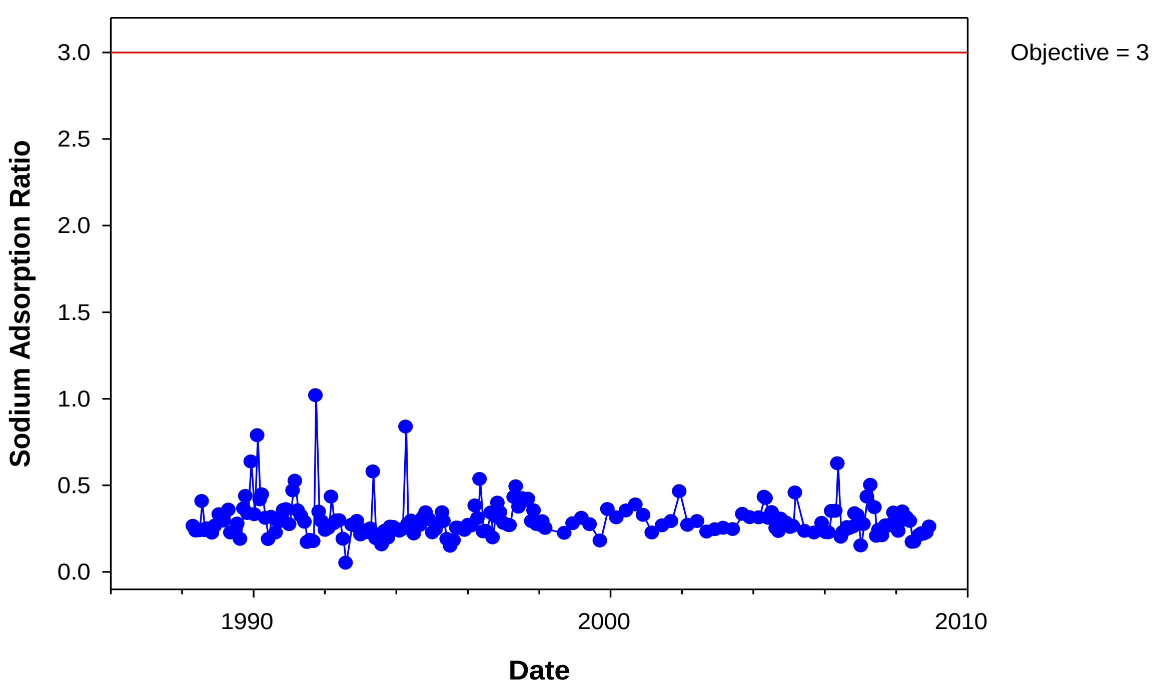

Figure 6-d8: North Saskatchewan River Sodium Adsorption Ratio

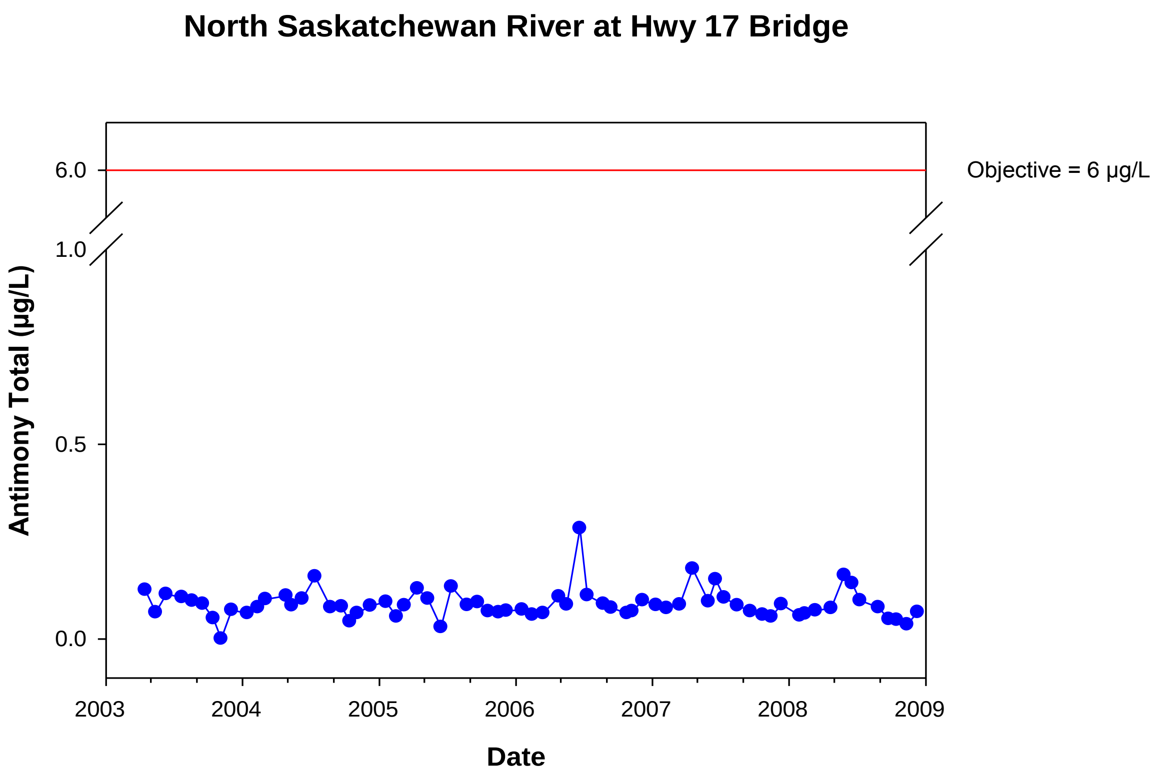

Figure 6-d9: North Saskatchewan River Antimony Total

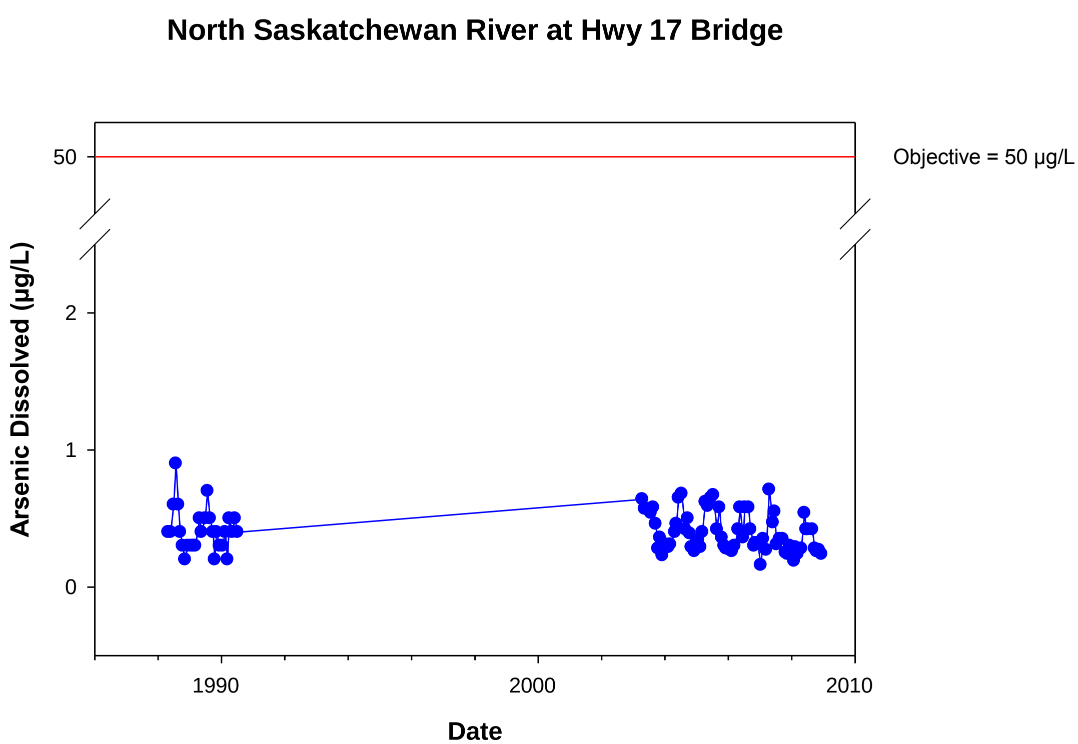

Figure 6-d10: North Saskatchewan River Arsenic Dissolved

North Saskatchewan River at Hwy 17 Bridge

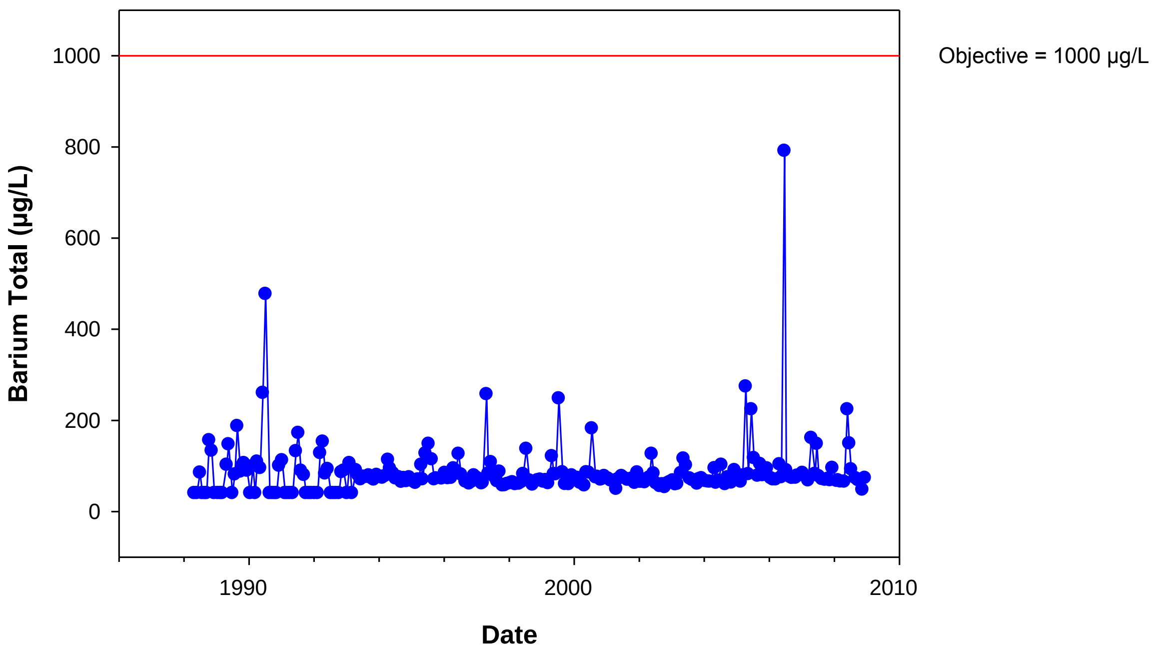

Figure 6-d11: North Saskatchewan River Barium Total

North Saskatchewan River at Hwy 17 Bridge

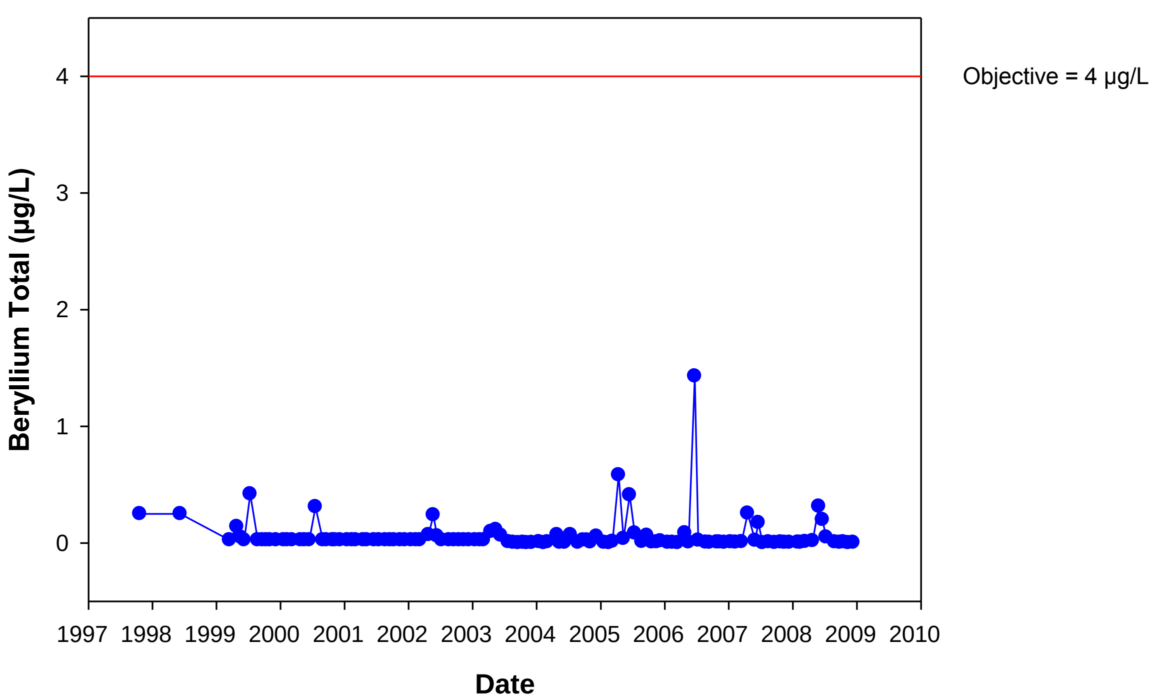

Figure 6-d12: North Saskatchewan River Beryllium Total

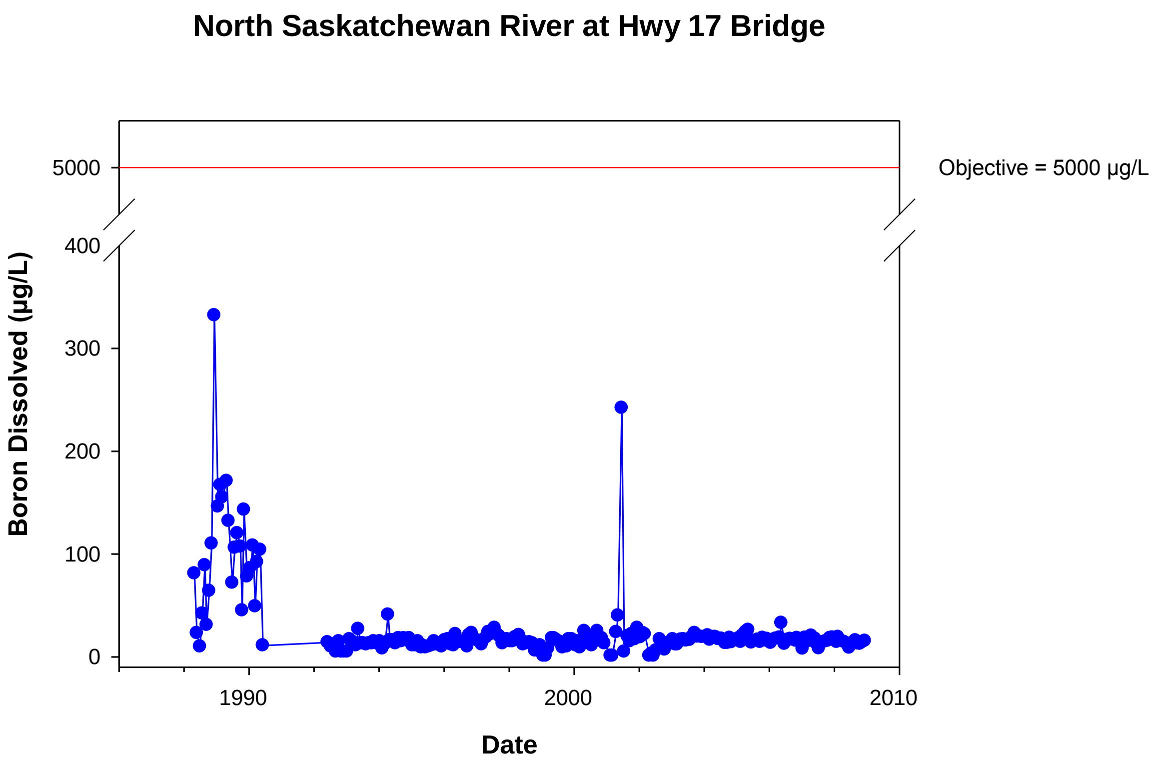

Figure 6-d13: North Saskatchewan River Boron Dissolved

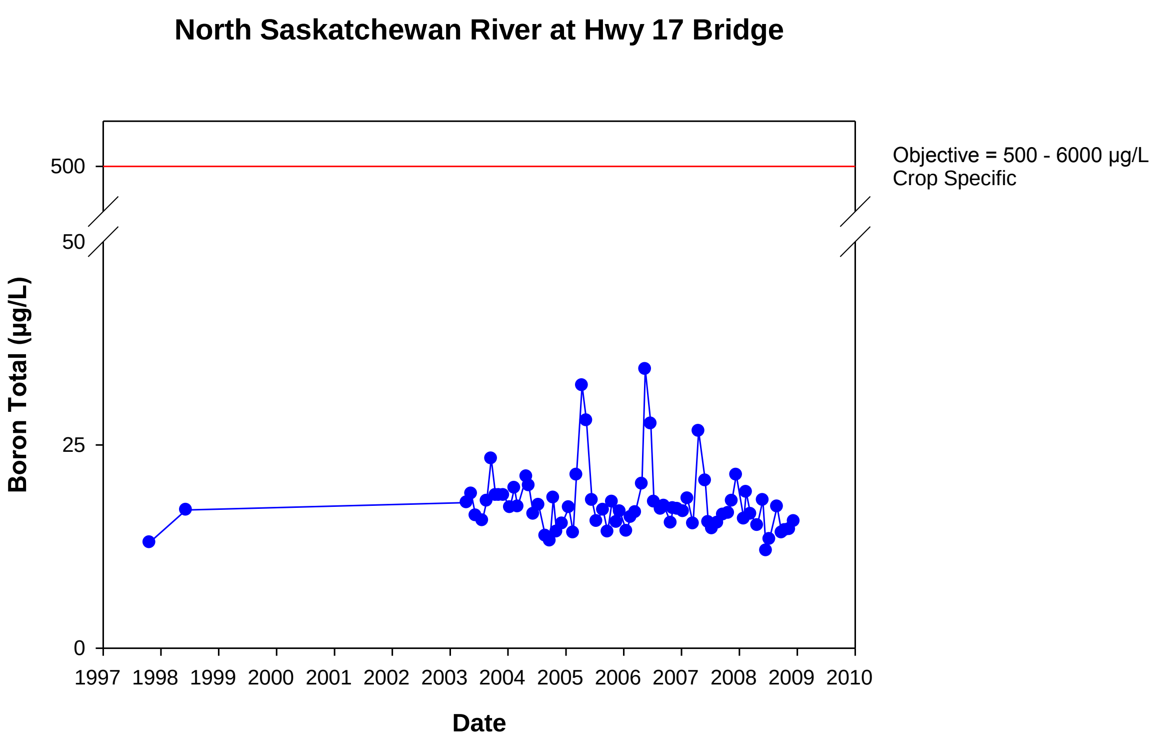

Figure 6-d14: North Saskatchewan River Boron Total

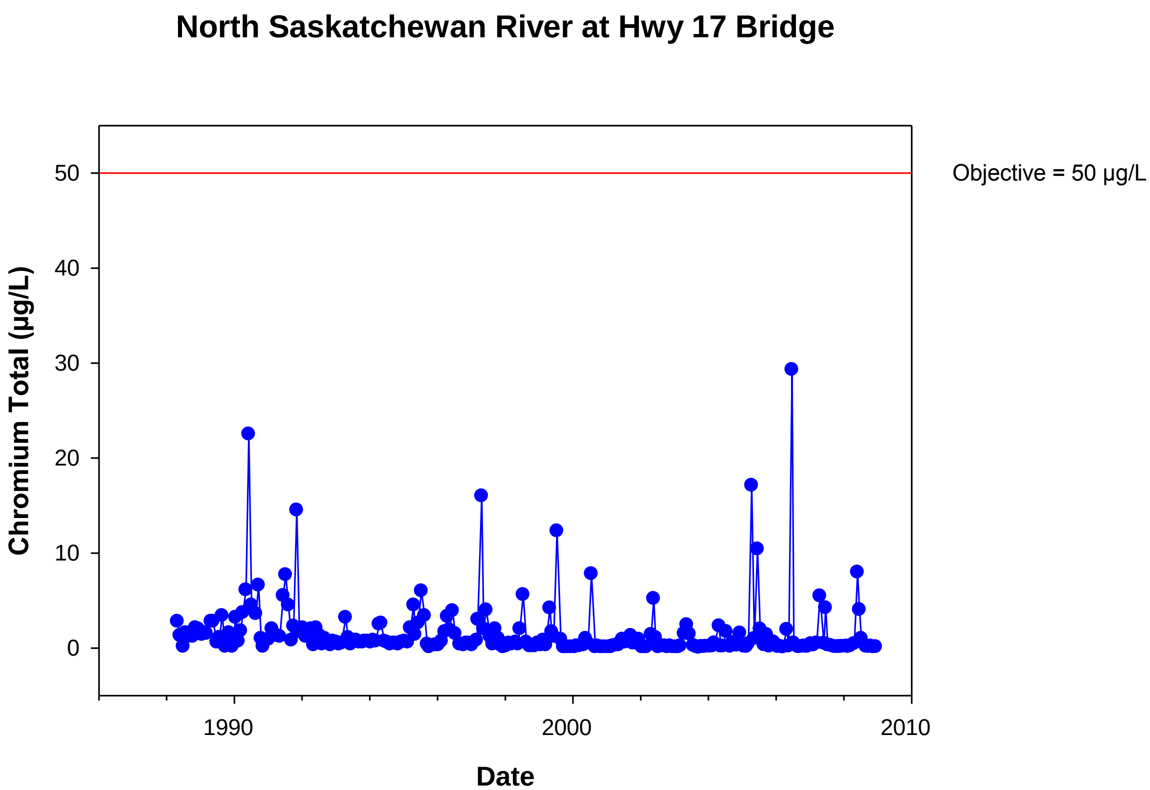

Figure 6-d15: North Saskatchewan River Chromium Total

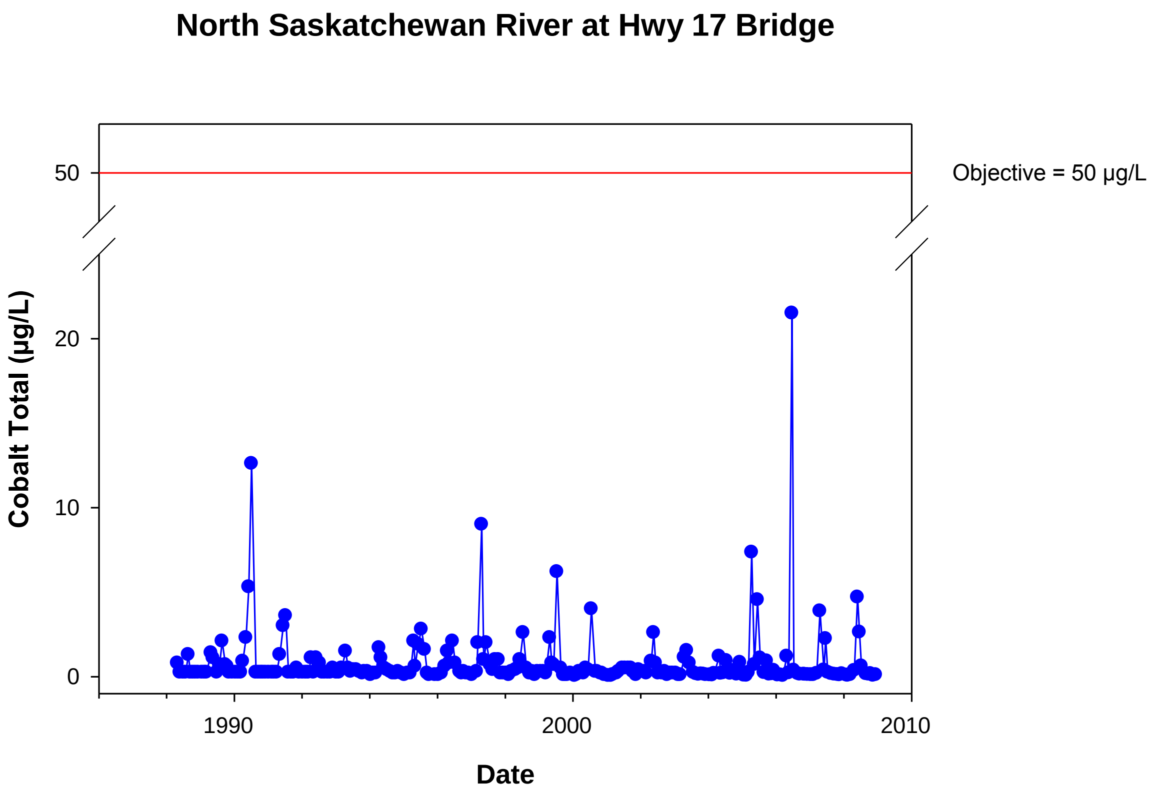

Figure 6-d16: North Saskatchewan River Cobalt Total

North Saskatchewan River at Hwy 17 Bridge

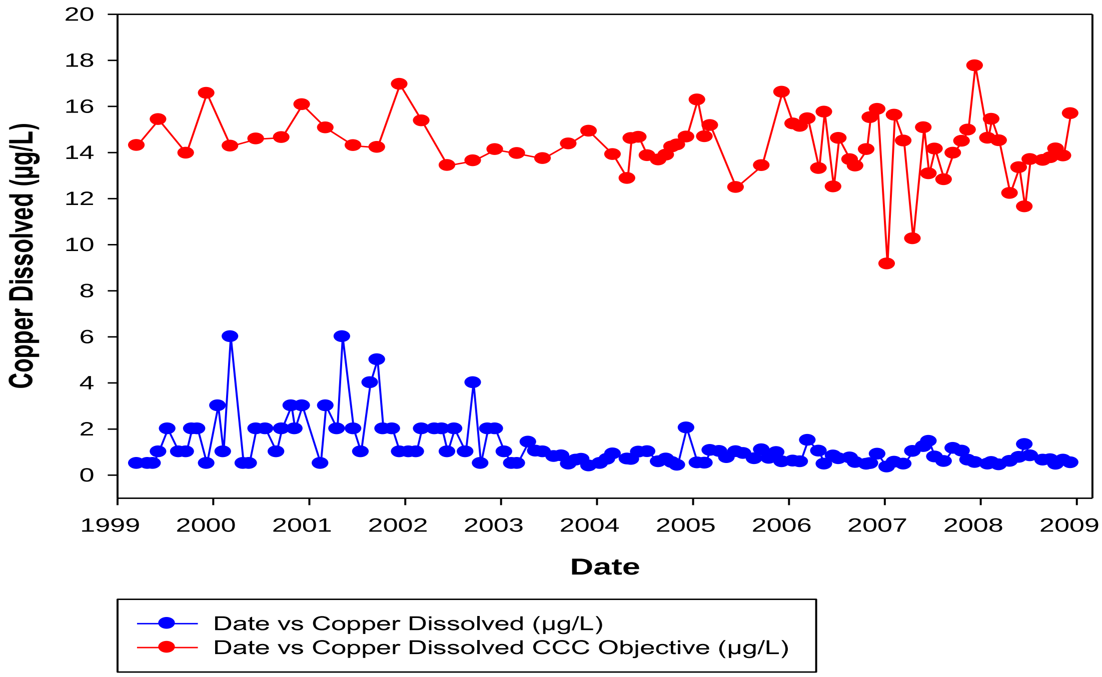

Figure 6-d17: North Saskatchewan River Copper Dissolved

North Saskatchewan River at Hwy 17 Bridge

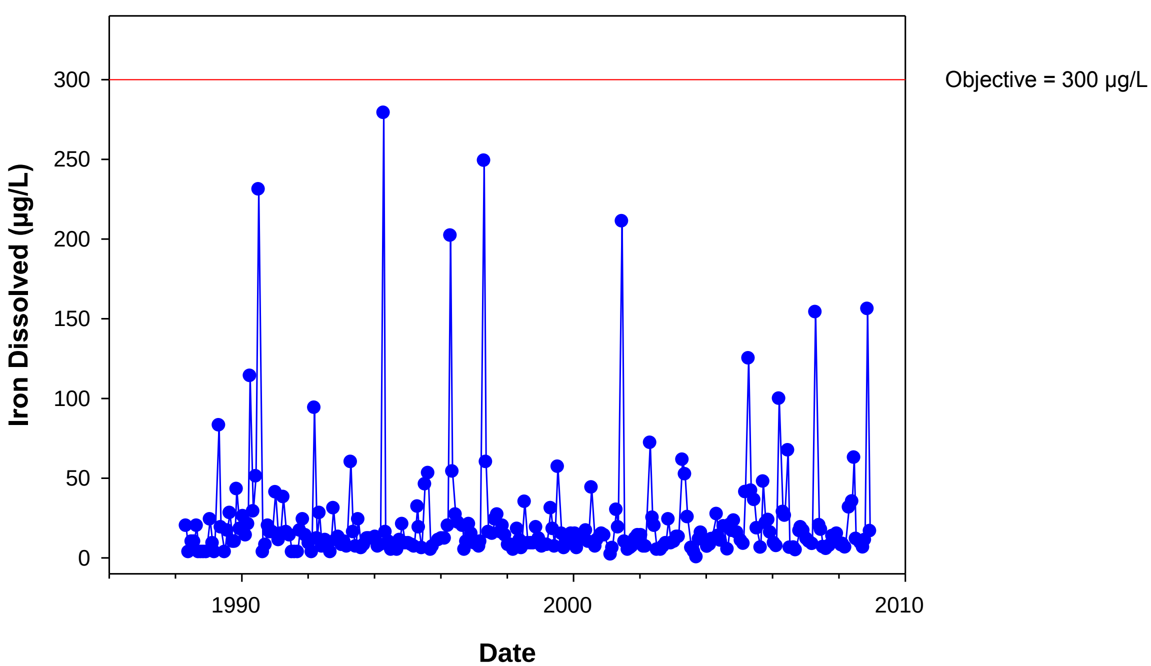

Figure 6-d18: North Saskatchewan River Iron Dissolved

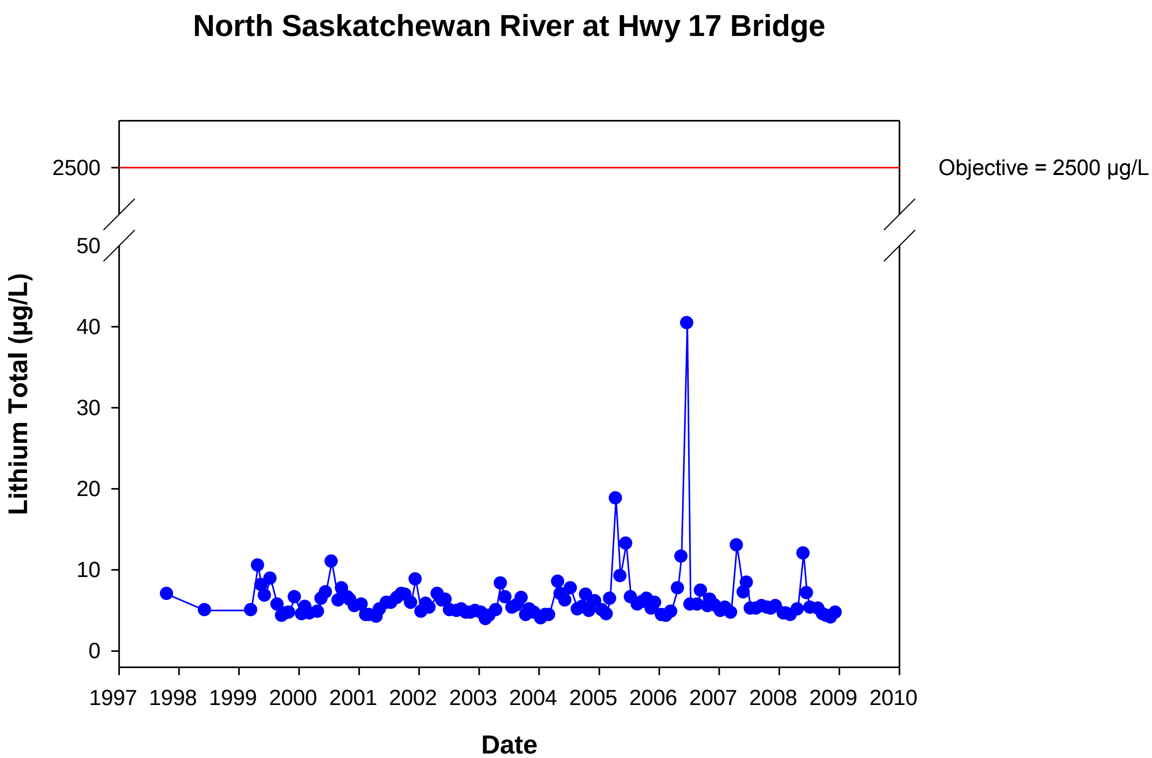

Figure 6-d19: North Saskatchewan River Lithium Total

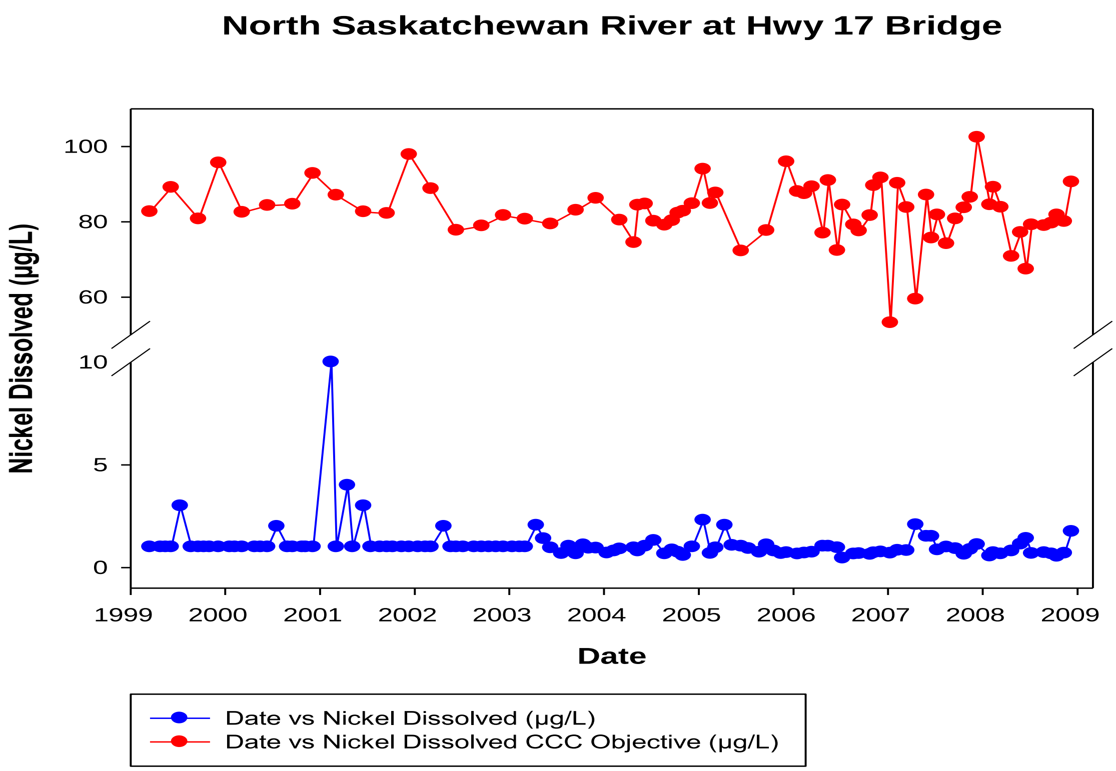

Figure 6-d20: North Saskatchewan River Nickel Dissolved

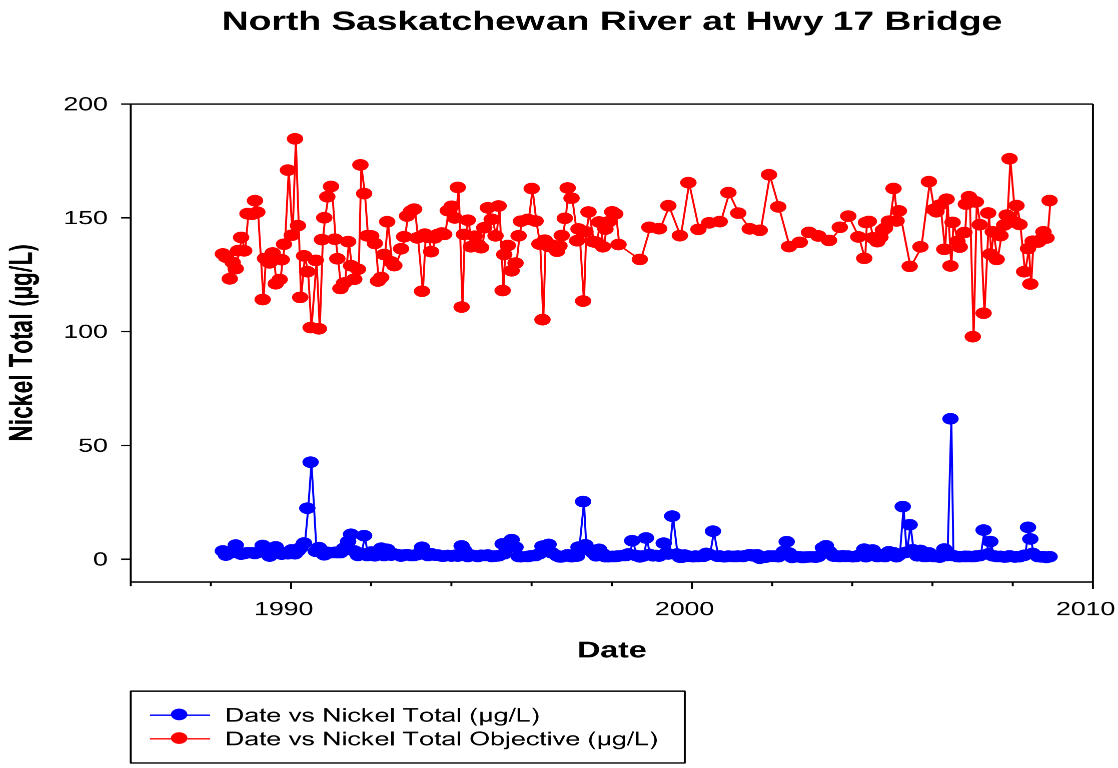

Figure 6-d21: North Saskatchewan River Nickel Total

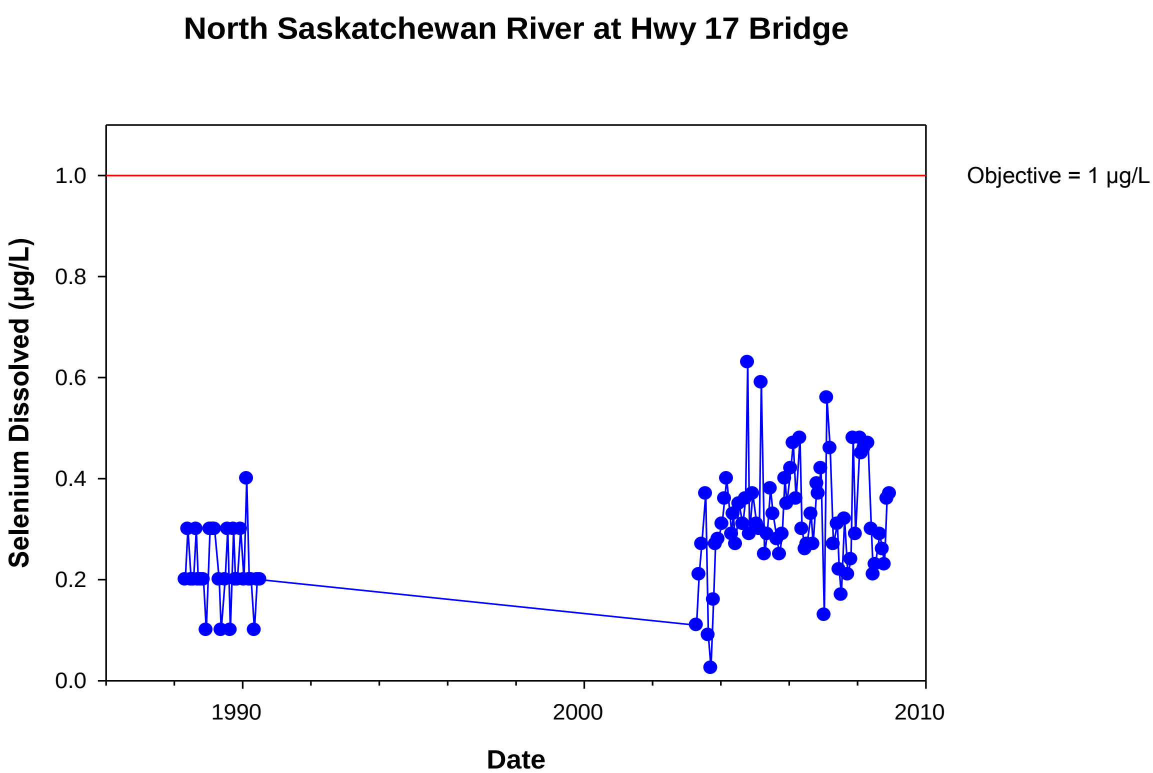

Figure 6-d22: North Saskatchewan River Selenium Dissolved

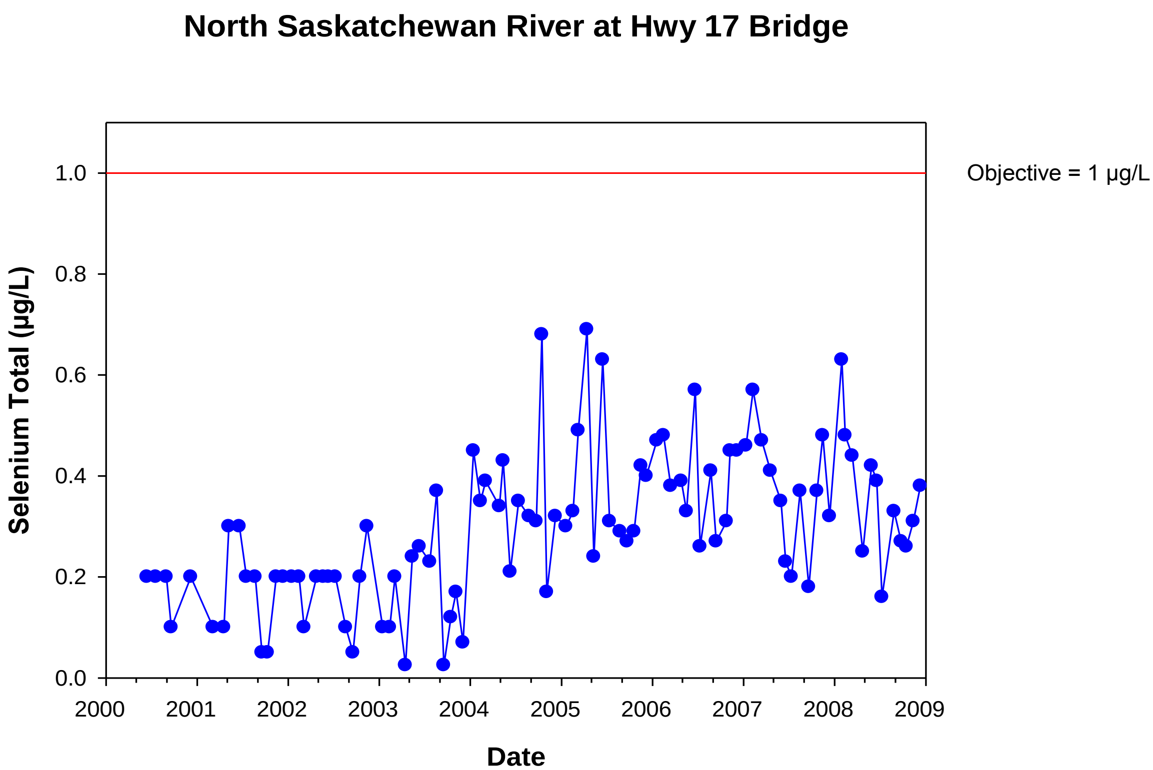

Figure 6-d23: North Saskatchewan River Selenium Total

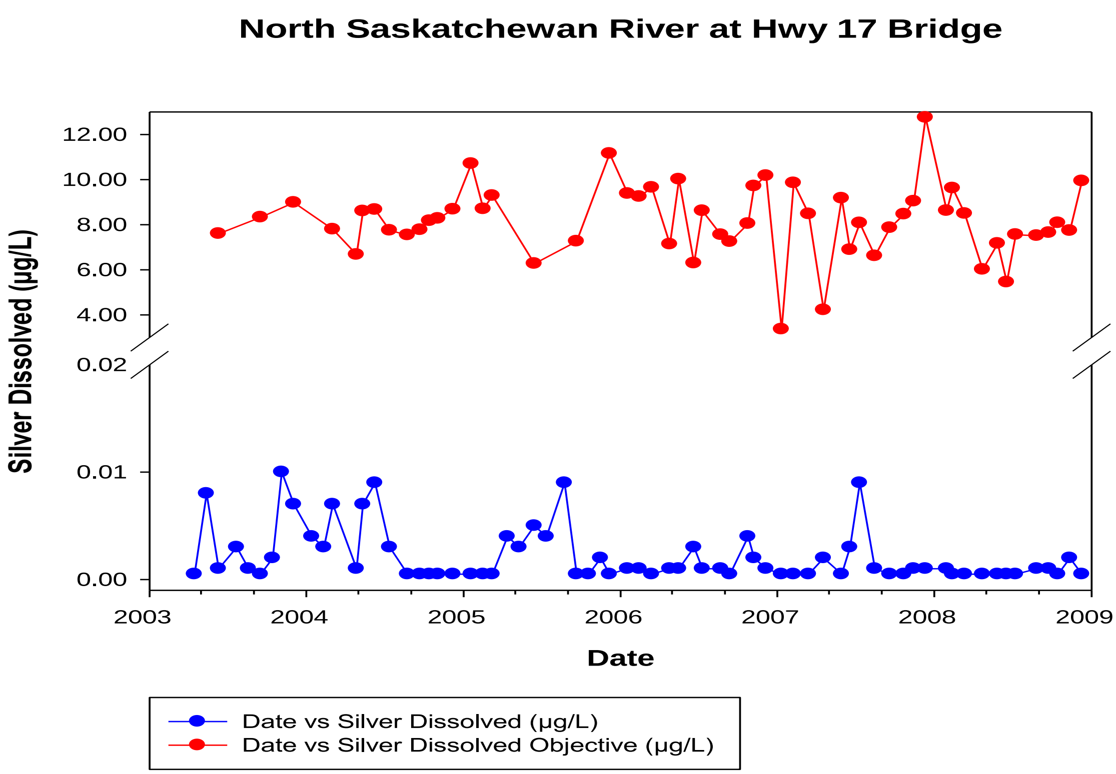

Figure 6-d24: North Saskatchewan River Silver Dissolved

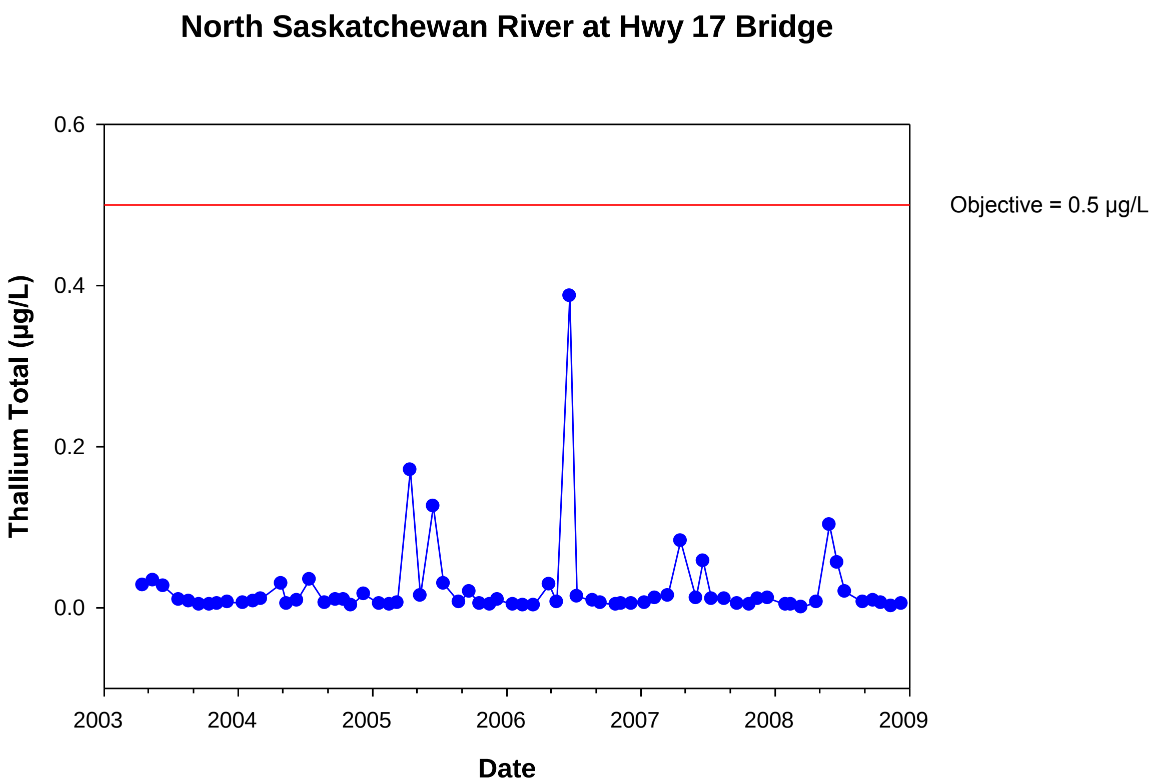

Figure 6-d25: North Saskatchewan River Thallium Total

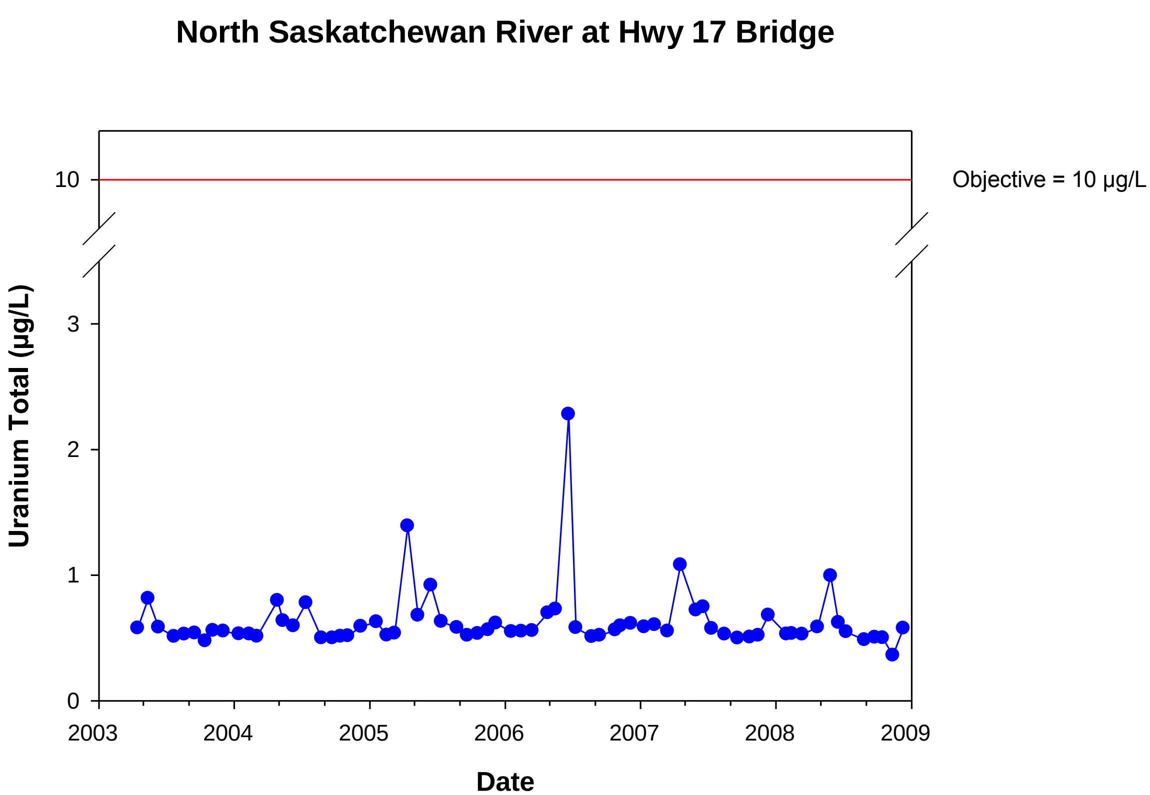

Figure 6-d26: North Saskatchewan River Uranium Total

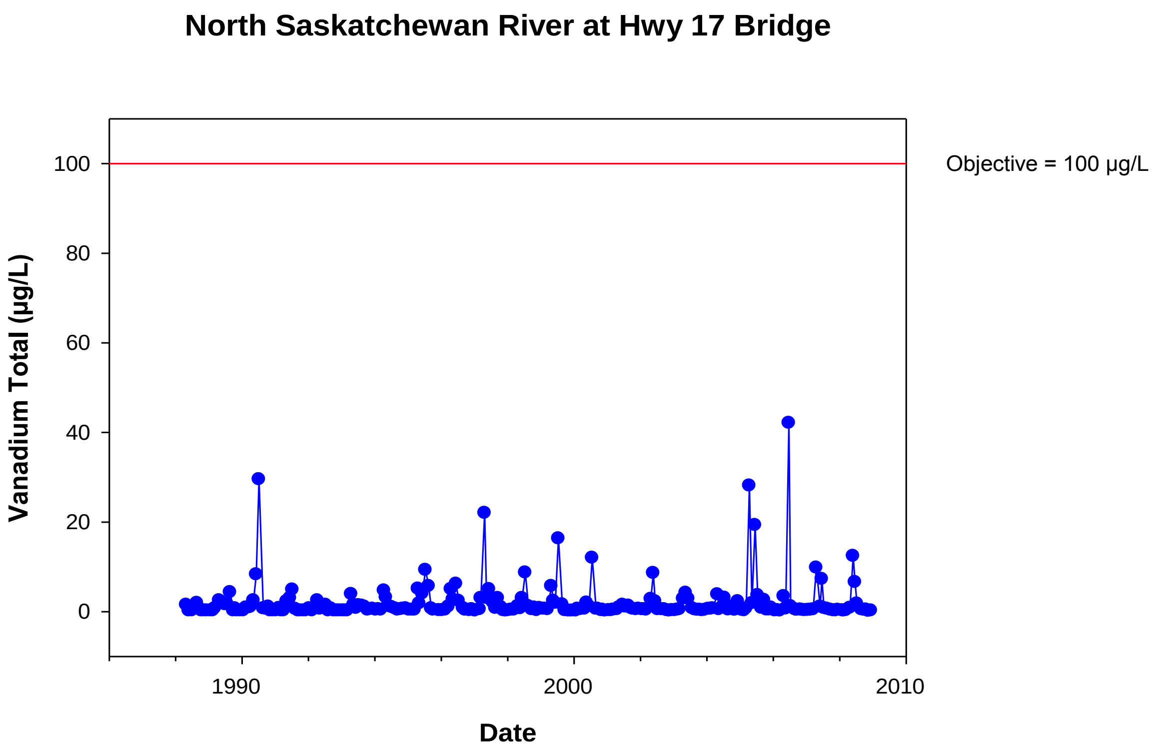

Figure 6-d27: North Saskatchewan River Vanadium Total

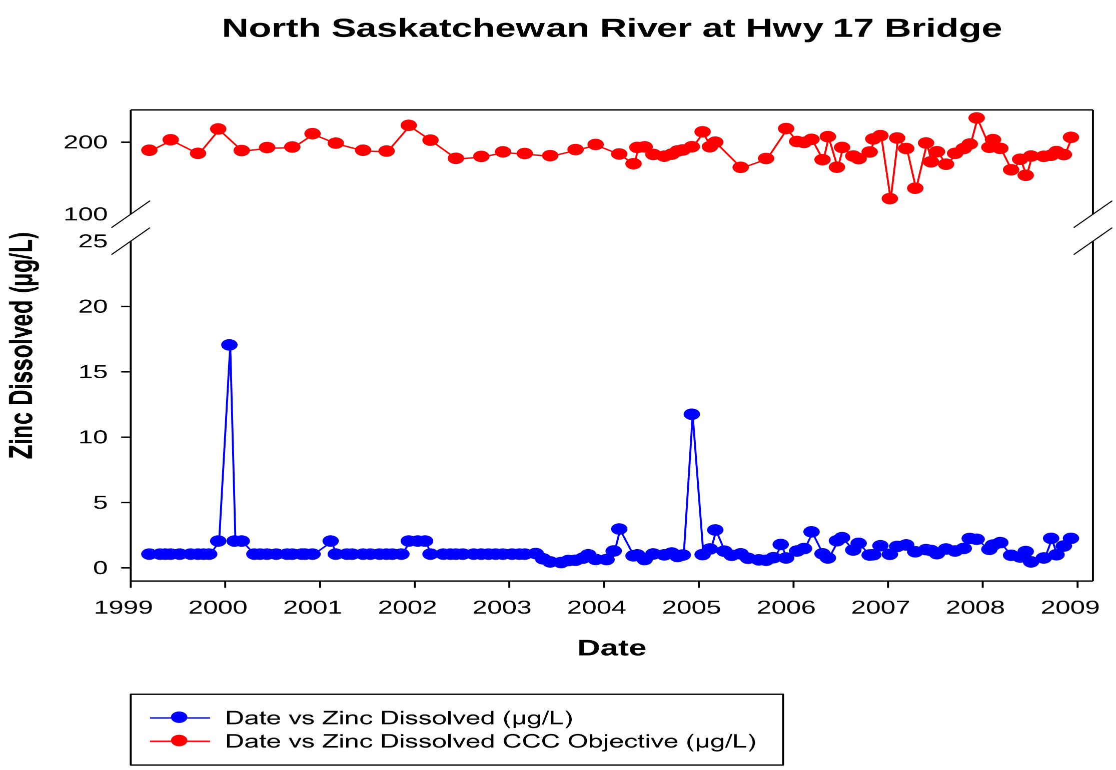

Figure 6-d28: North Saskatchewan River Zinc Dissolved

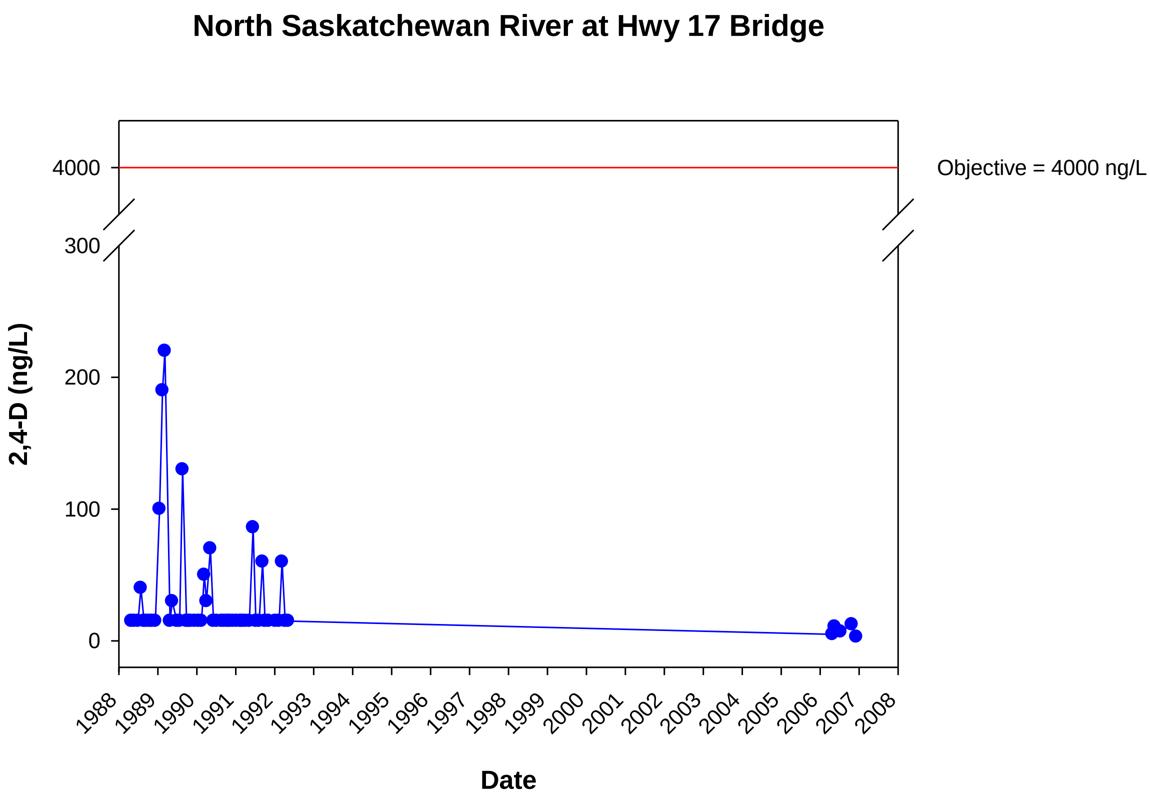

Figure 6-d29: North Saskatchewan River 2,4-D

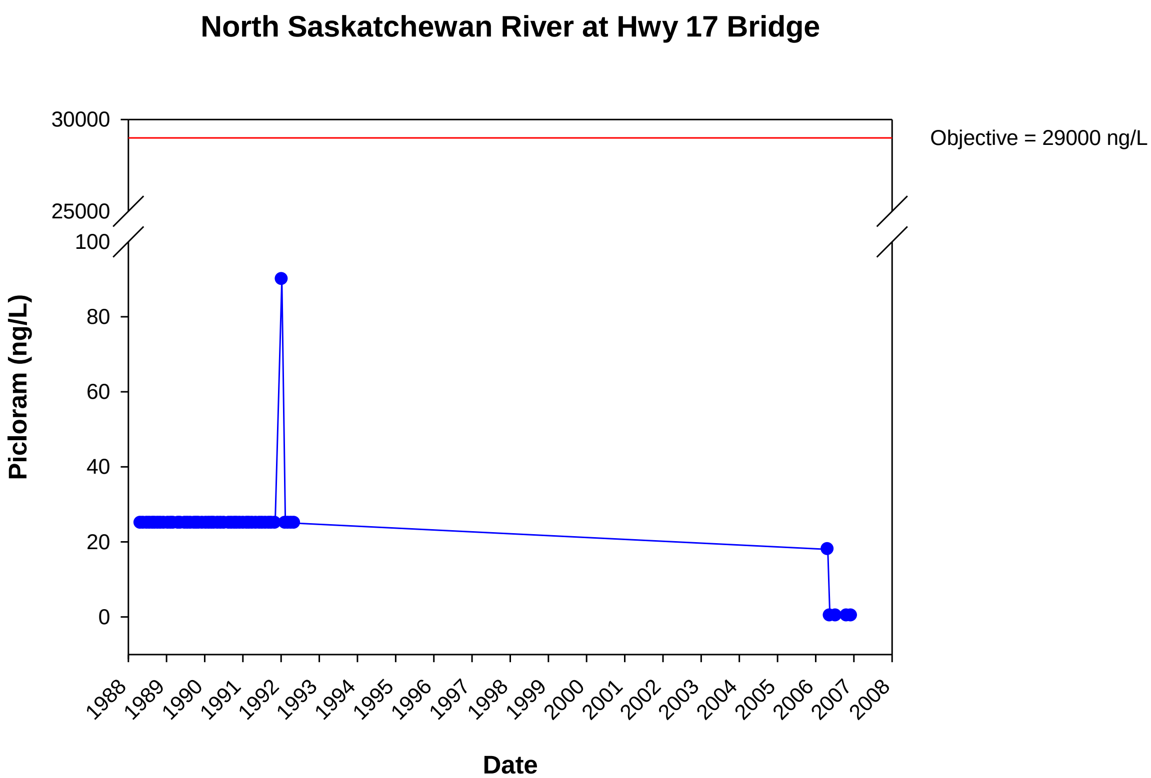

Figure 6-d30: North Saskatchewan River Picloram

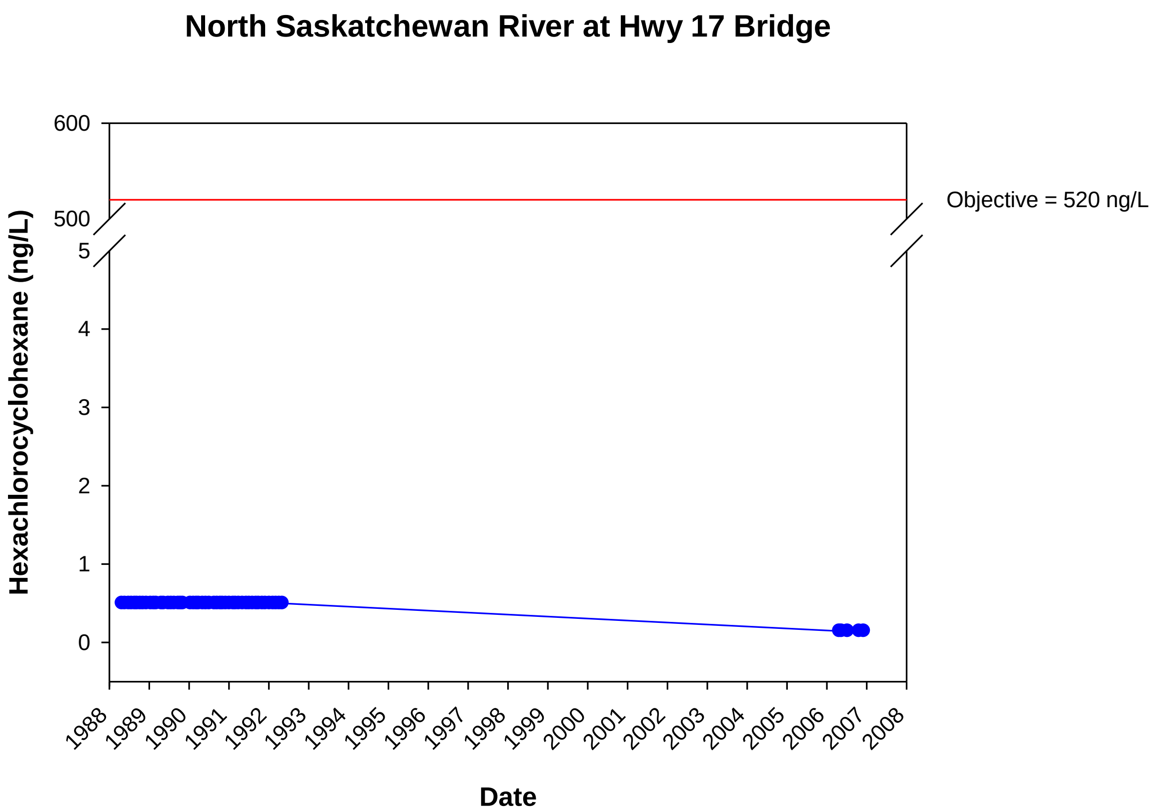

Figure 6-d31: North Saskatchewan River Hexachlorocyclohexane

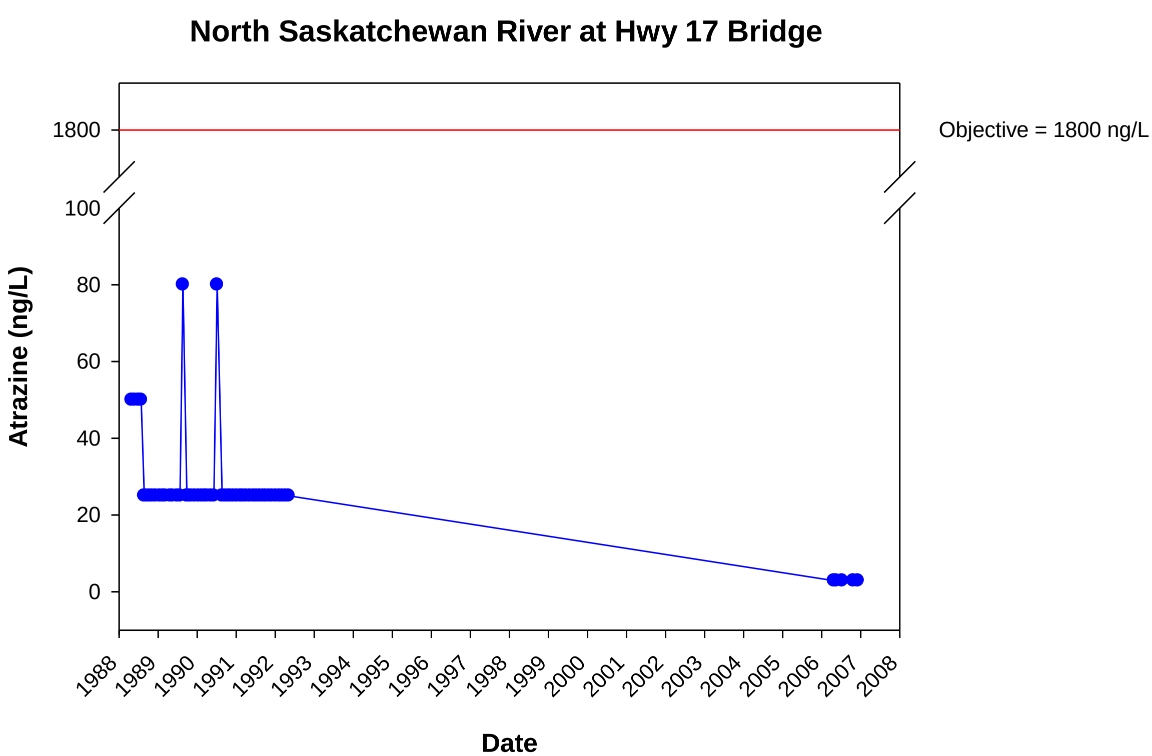

Figure 6-d32: North Saskatchewan River Atrazine

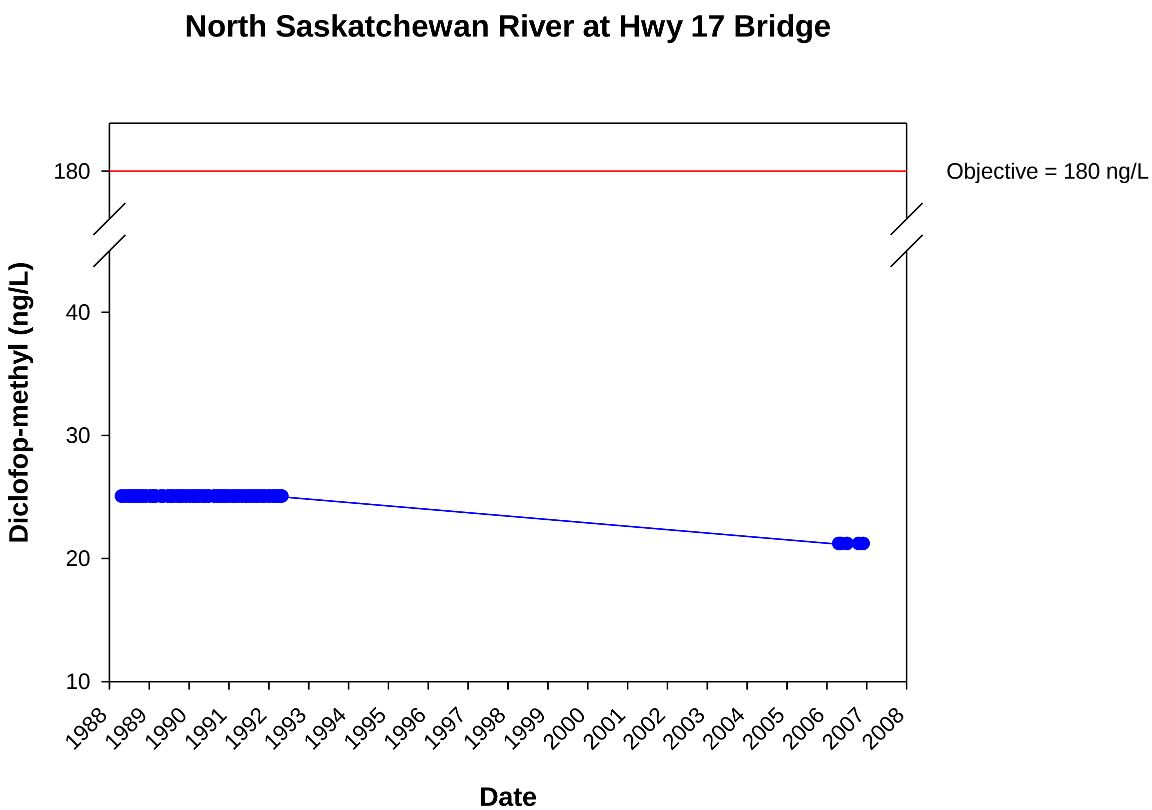

Figure 6-d33: North Saskatchewan River Diclofop-methyl

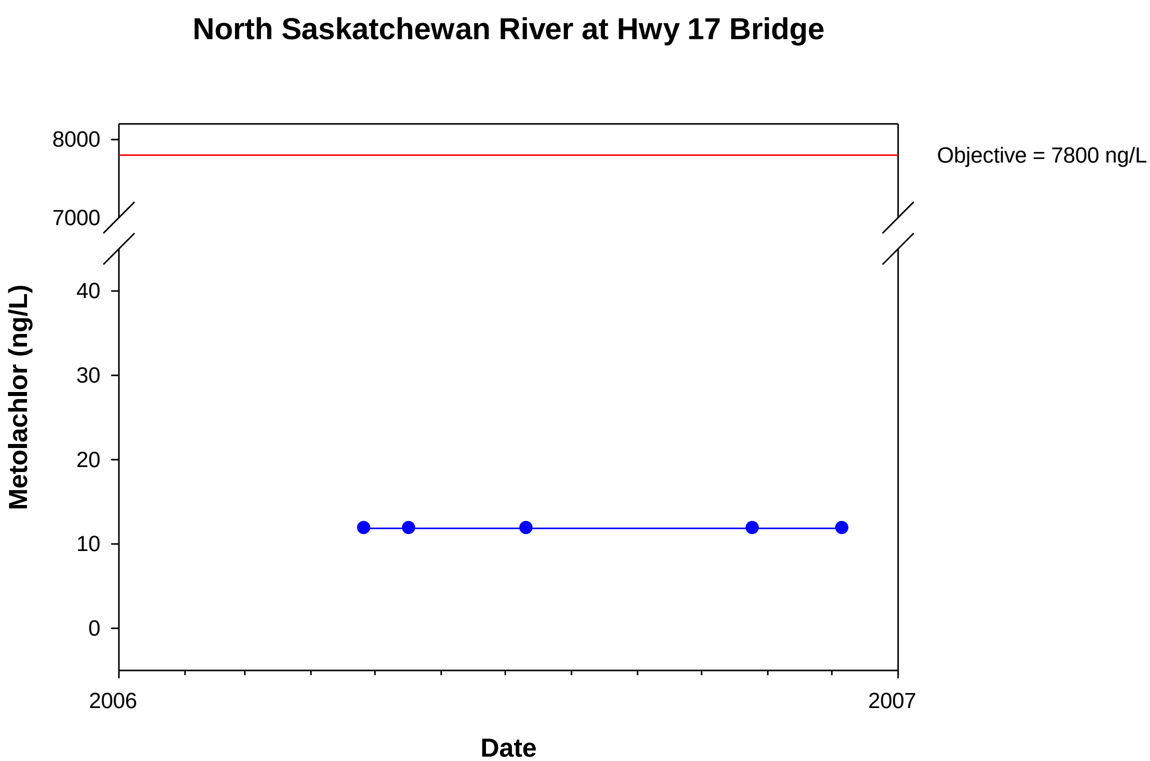

Figure 6-d34: North Saskatchewan River Metolachlor

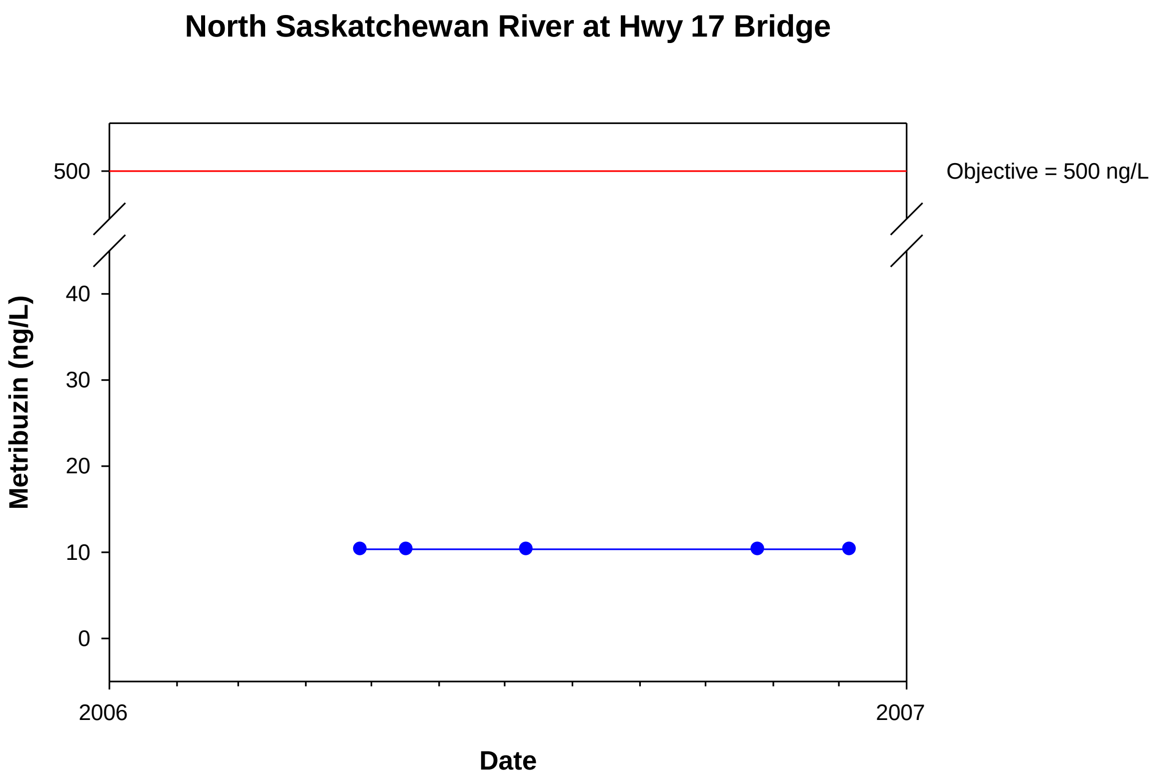

Figure 6-d35: North Saskatchewan River Metribuzin

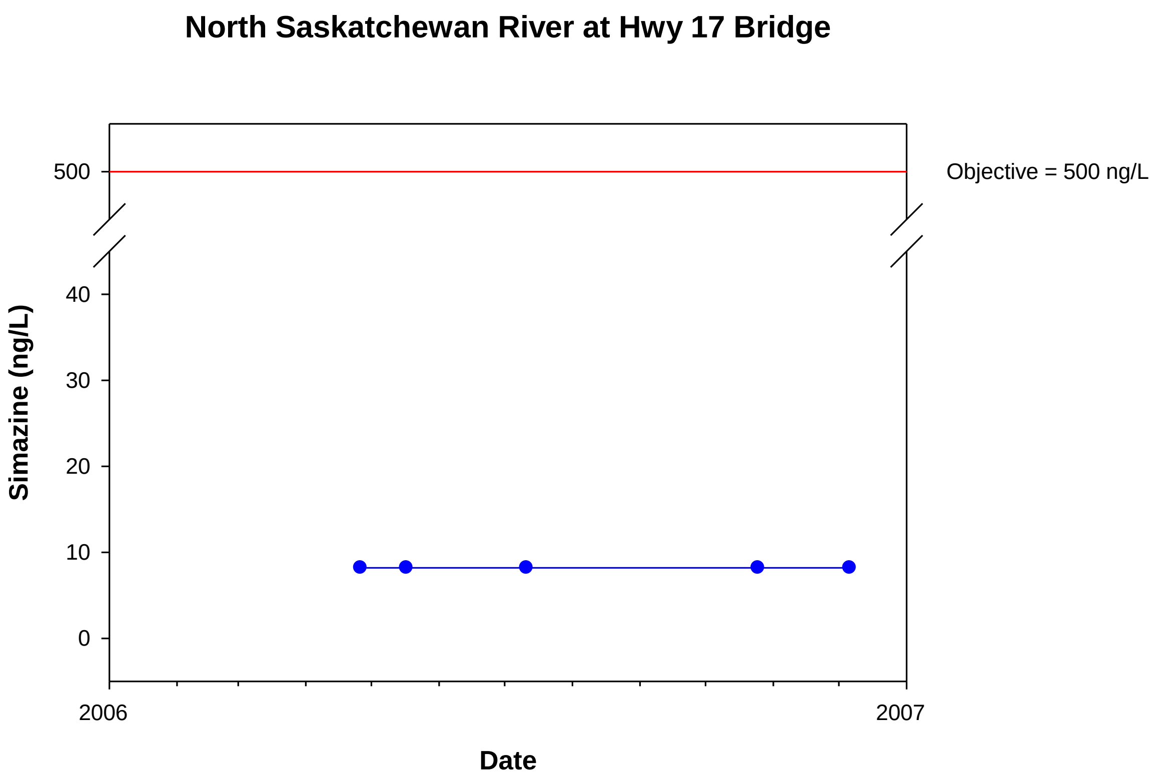

Figure 6-d36: North Saskatchewan River Simazine

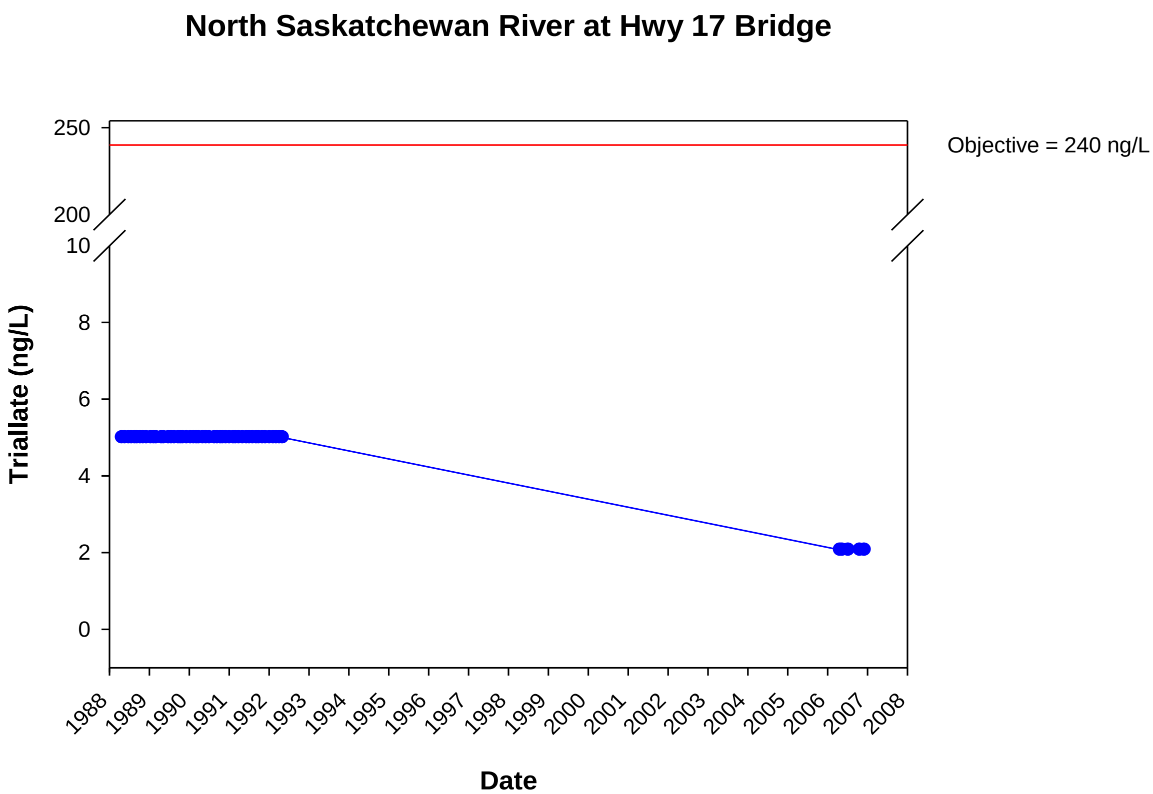

Figure 6-d37: North Saskatchewan River Triallate

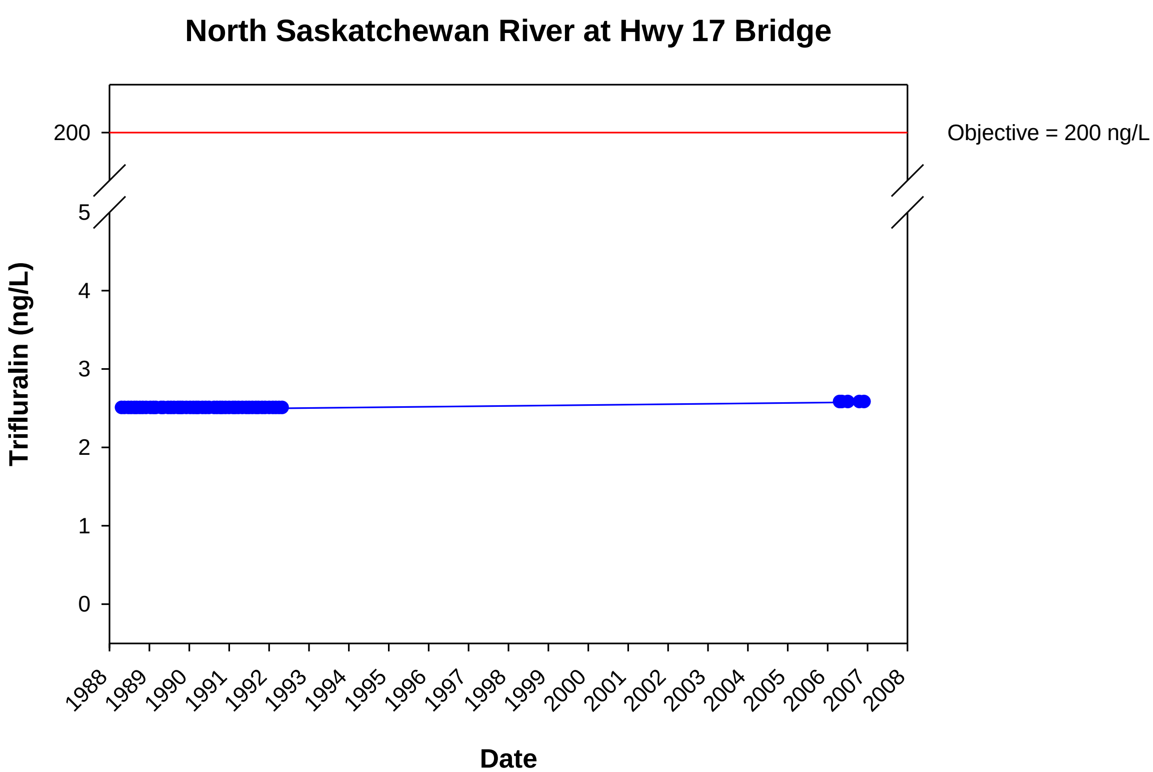

Figure 6-d38: North Saskatchewan River Trifluralin

Appendix 6-e: Red Deer River (AB-SK)

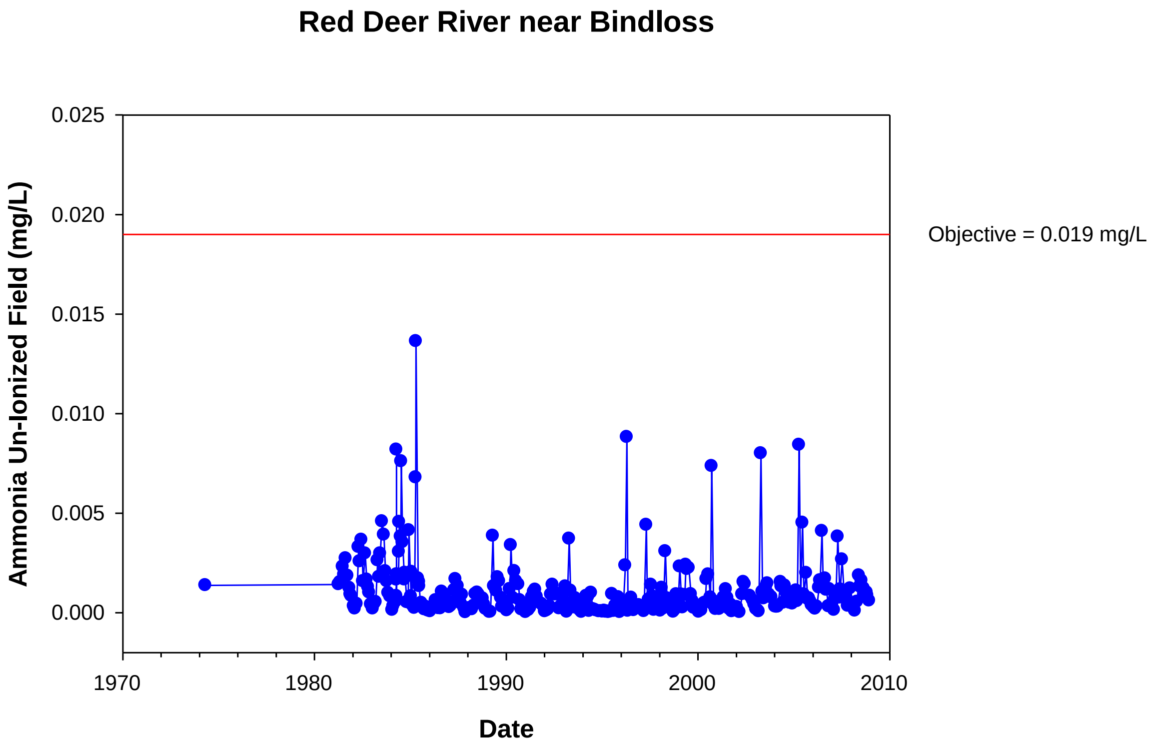

Figure 6-e1: Red Deer River (AB-SK) Ammonia Un-Ionized Field

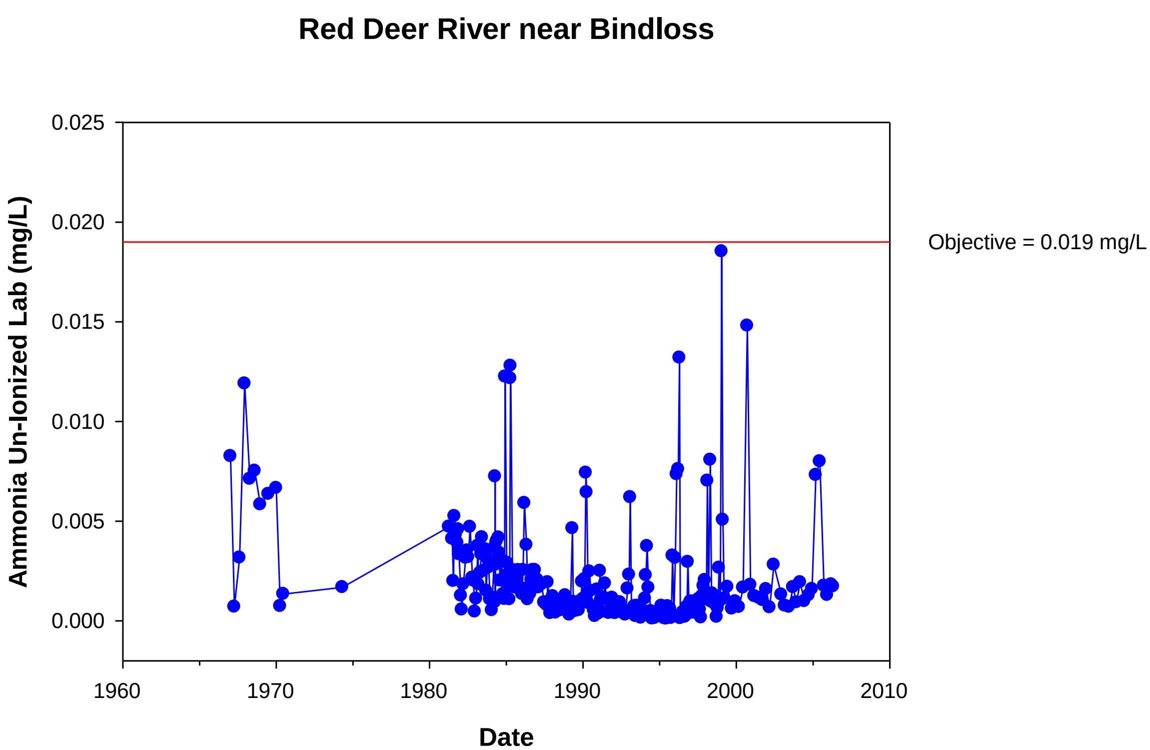

Figure 6-e2: Red Deer River (AB-SK) Ammonia Un-Ionized Lab

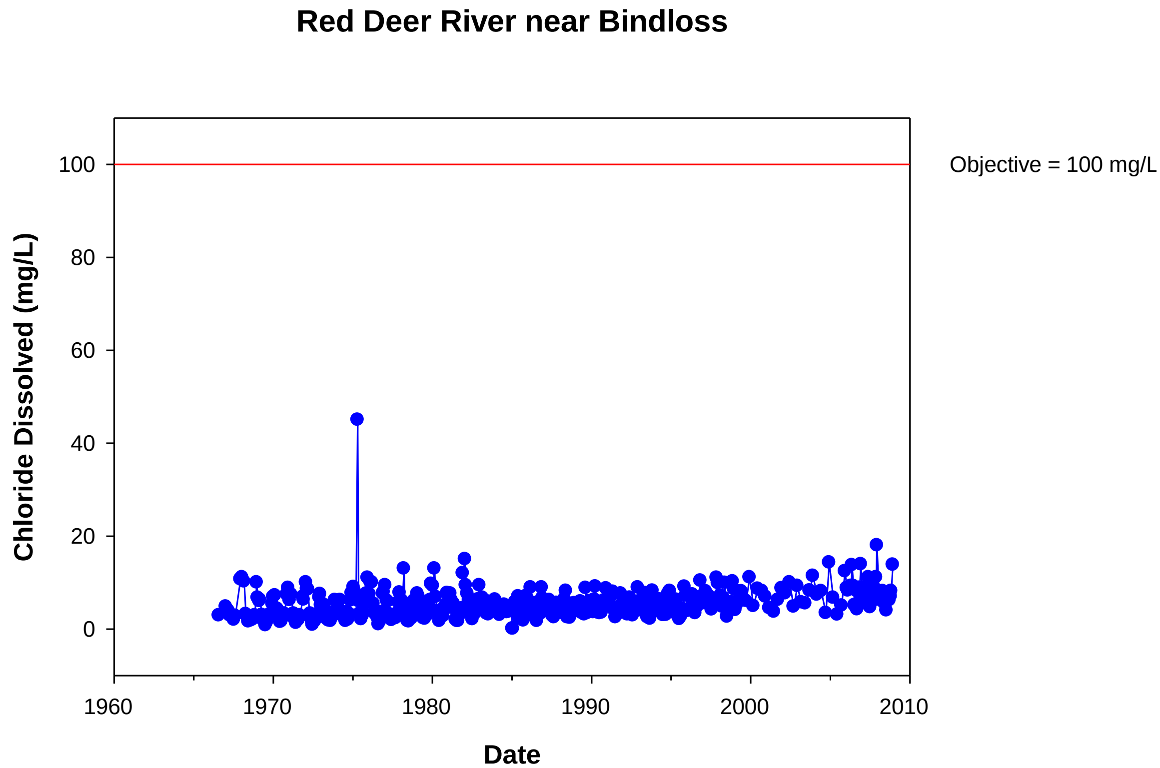

Figure 6-e3: Red Deer River (AB-SK) Chloride Dissolved

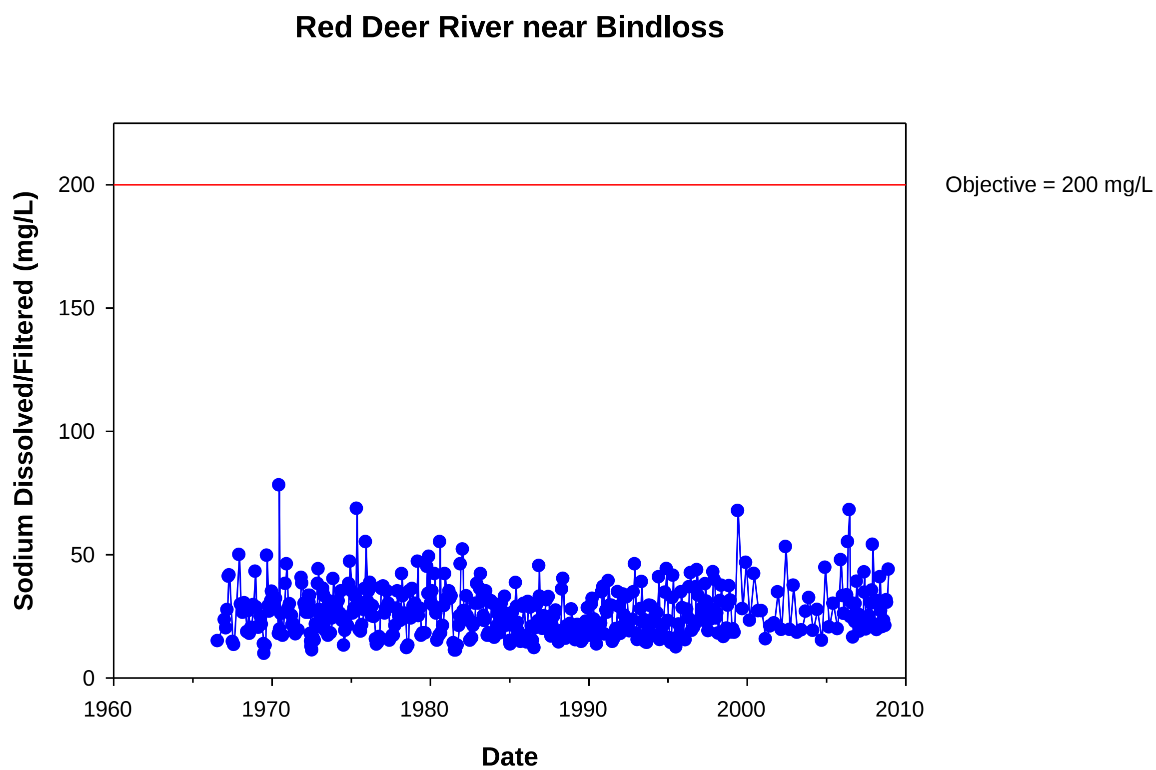

Figure 6-e4: Red Deer River (AB-SK) Sodium Dissolved/Filtered

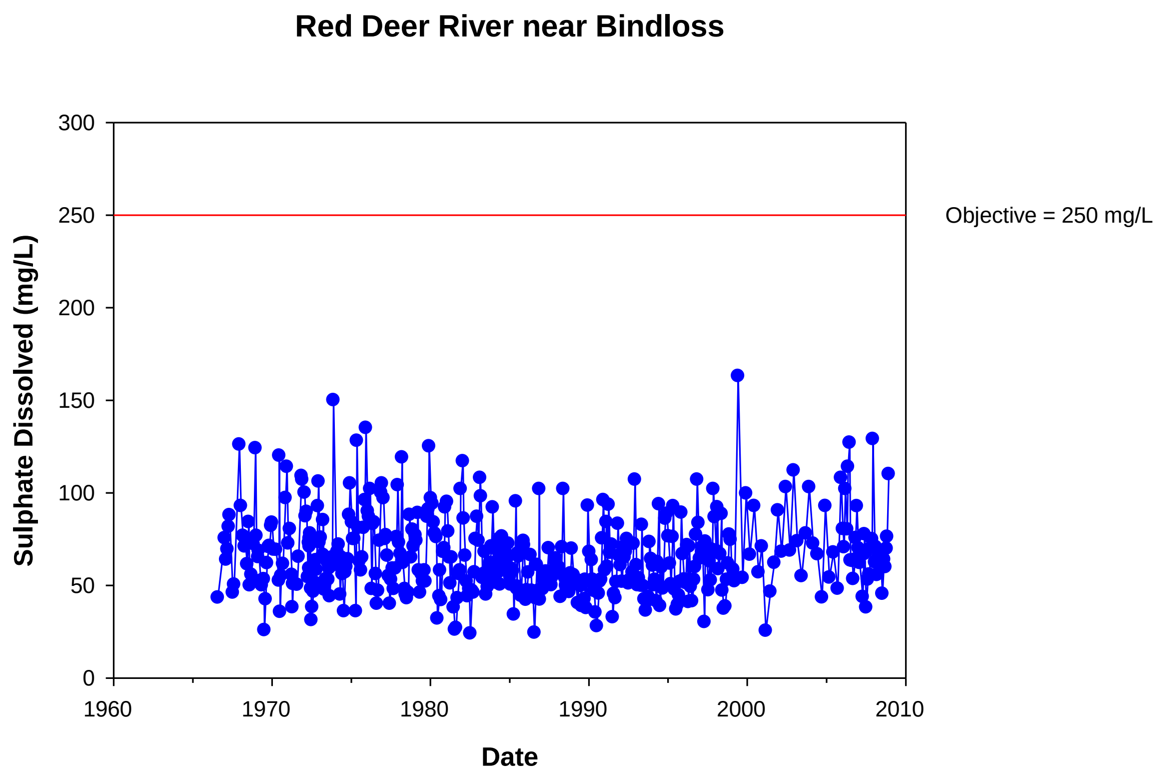

Figure 6-e5: Red Deer River (AB-SK) Sulphate Dissolved

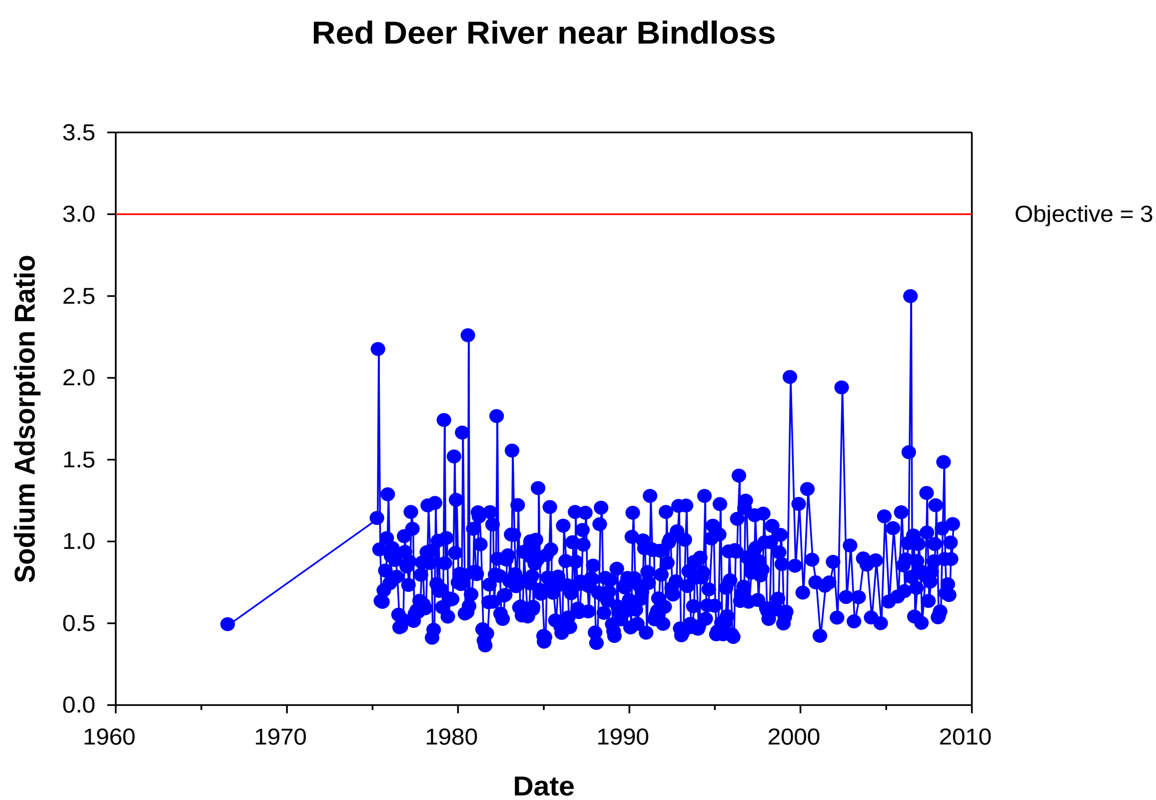

Figure 6-e6: Red Deer River (AB-SK) Sodium Adsorption Ratio

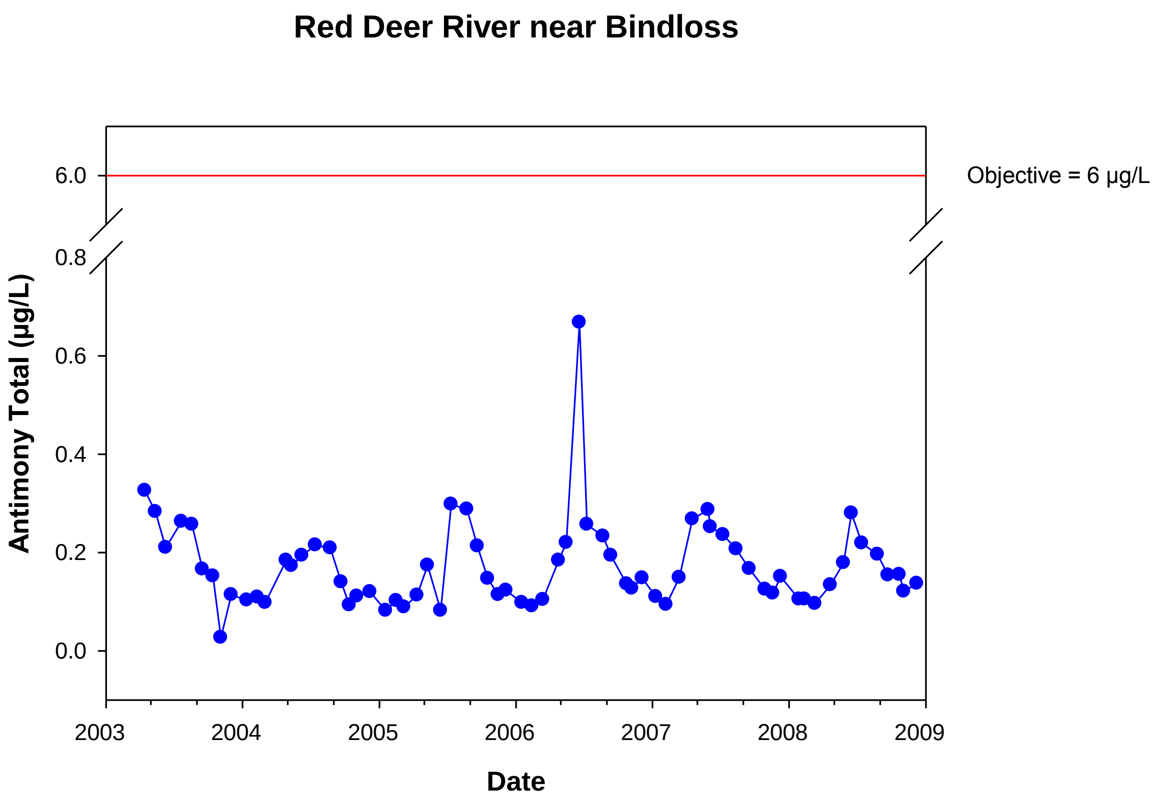

Figure 6-e7: Red Deer River (AB-SK) Antimony Total

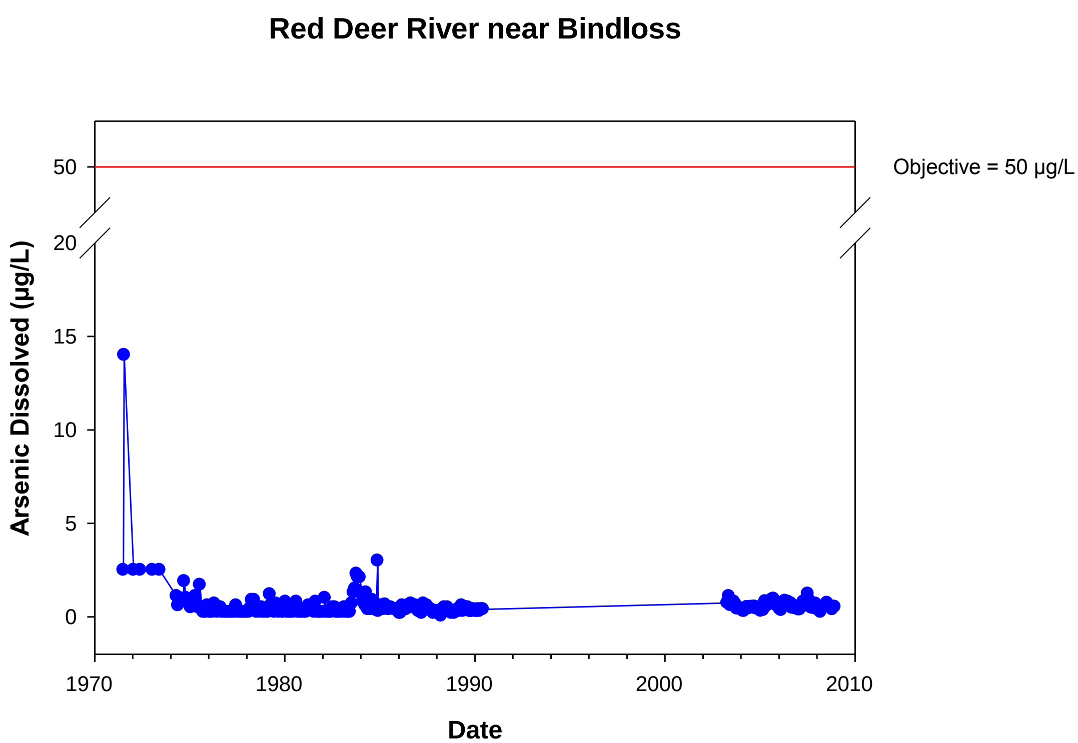

Figure 6-e8: Red Deer River (AB-SK) Arsenic Dissolved

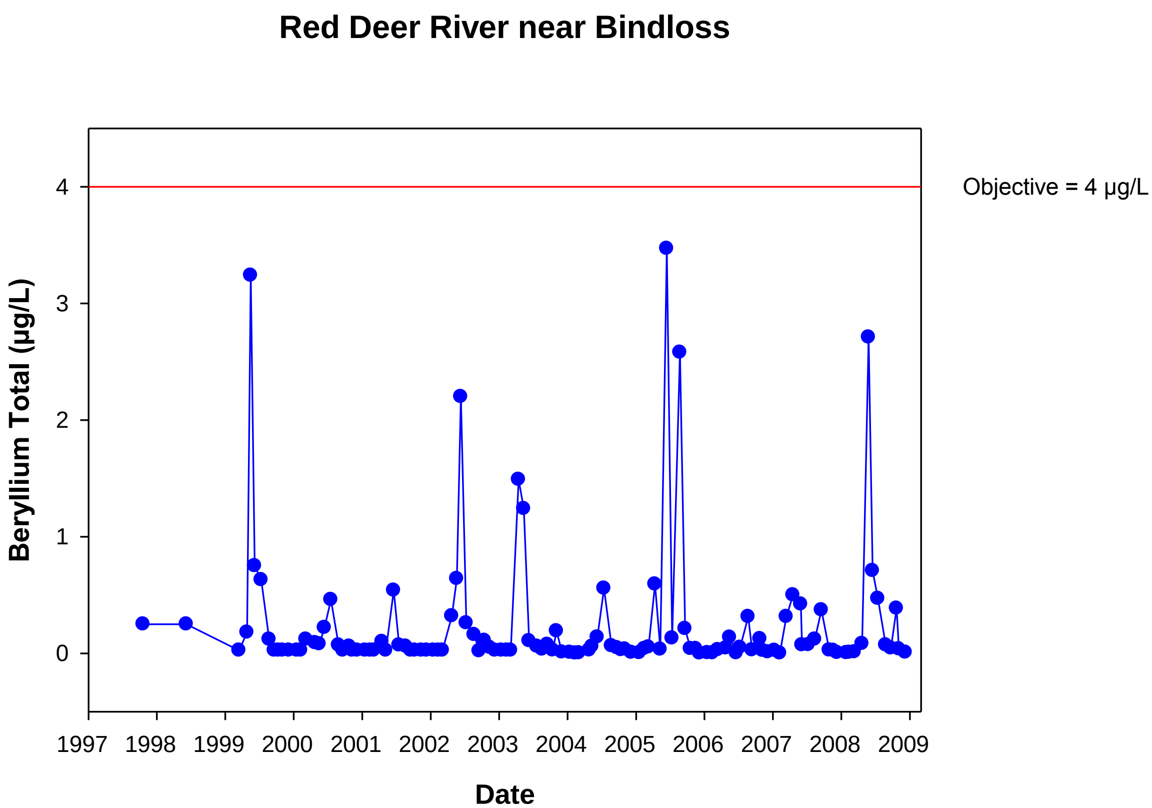

Figure 6-e9: Red Deer River (AB-SK) Beryllium Total

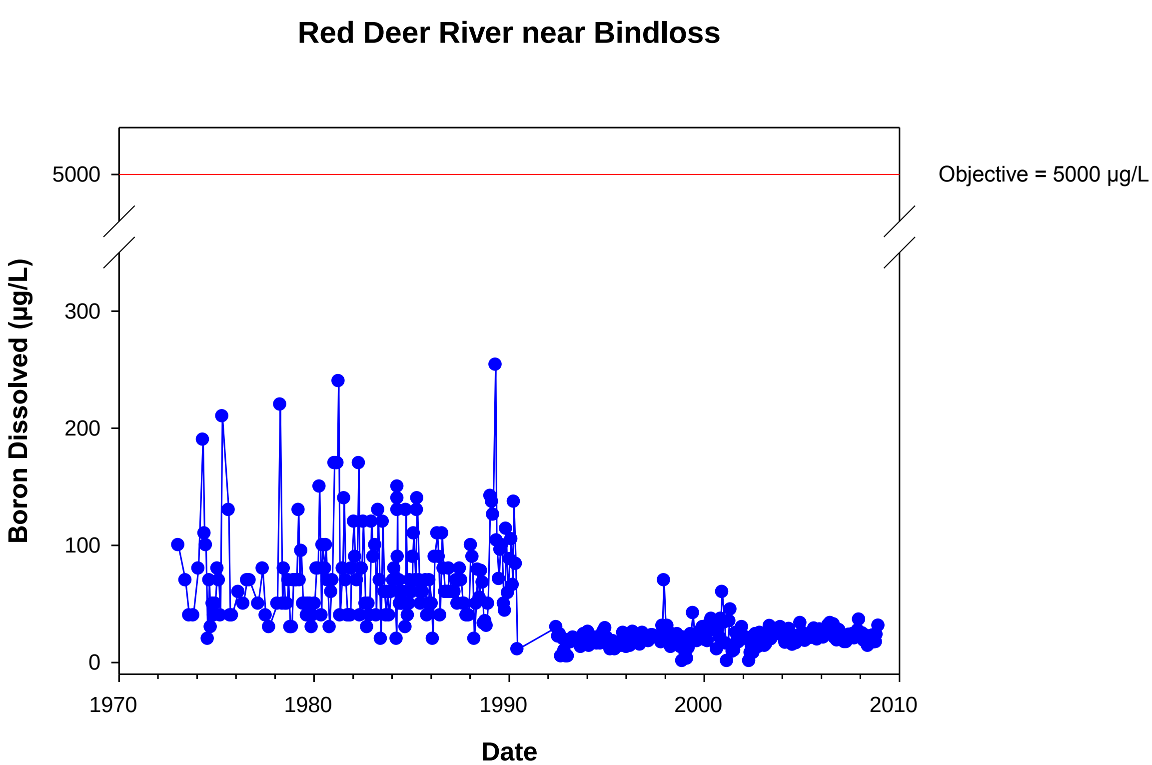

Figure 6-e10: Red Deer River (AB-SK) Boron Dissolved

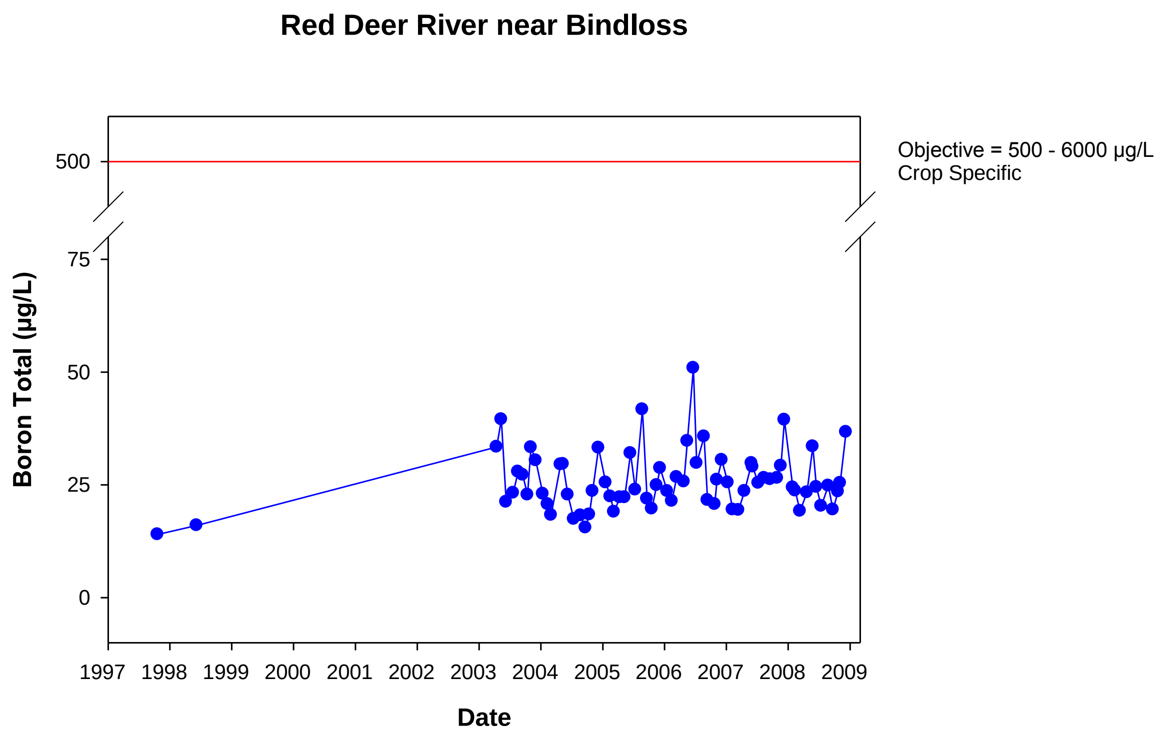

Figure 6-e11: Red Deer River (AB-SK) Boron Total

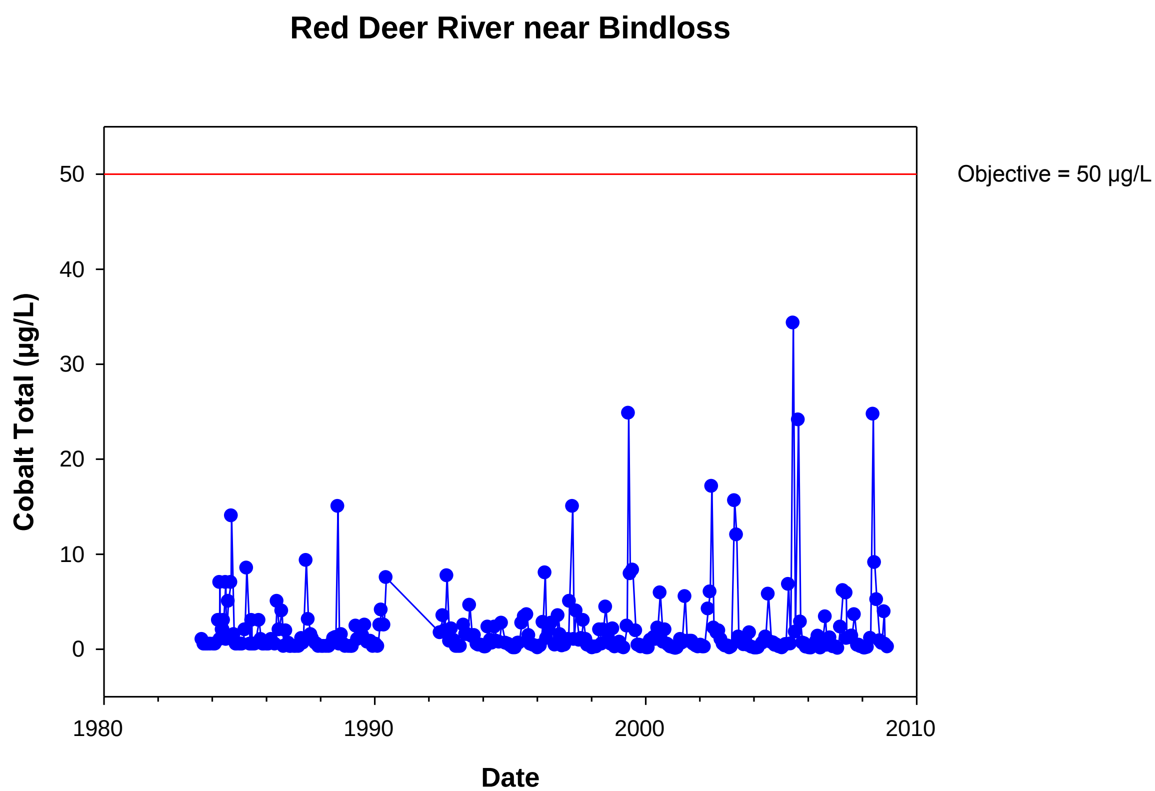

Figure 6-e12: Red Deer River (AB-SK) Cobalt Total

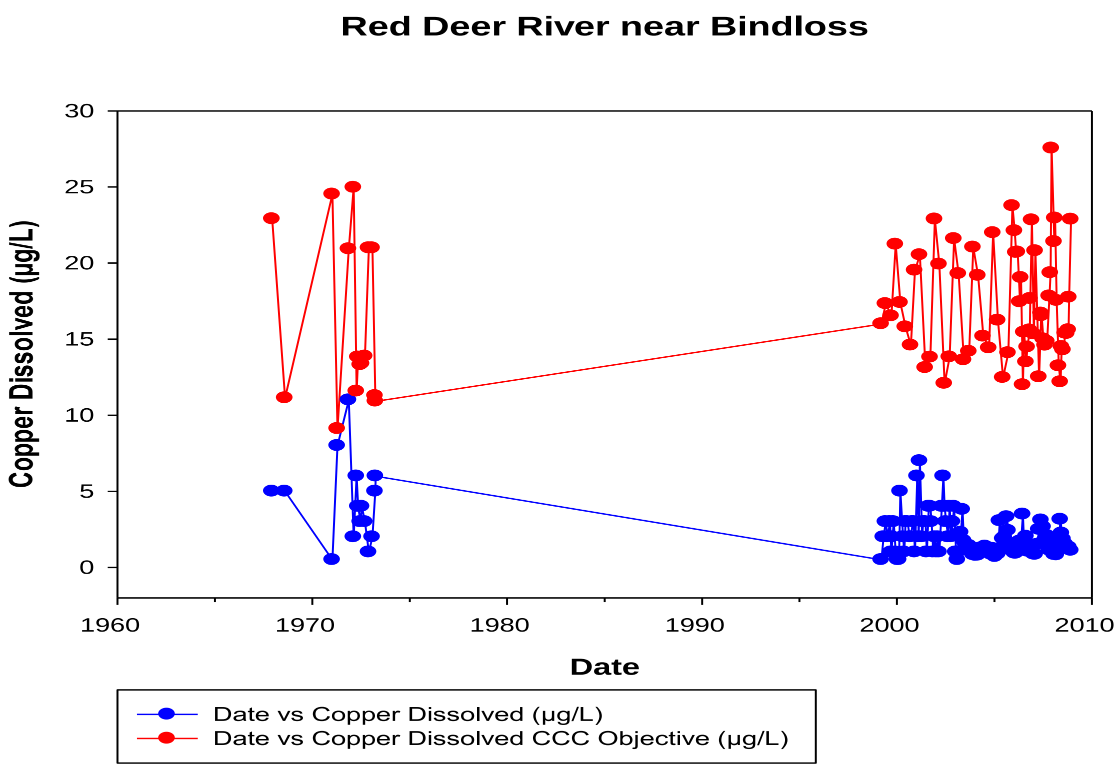

Figure 6-e13: Red Deer River (AB-SK) Copper Dissolved

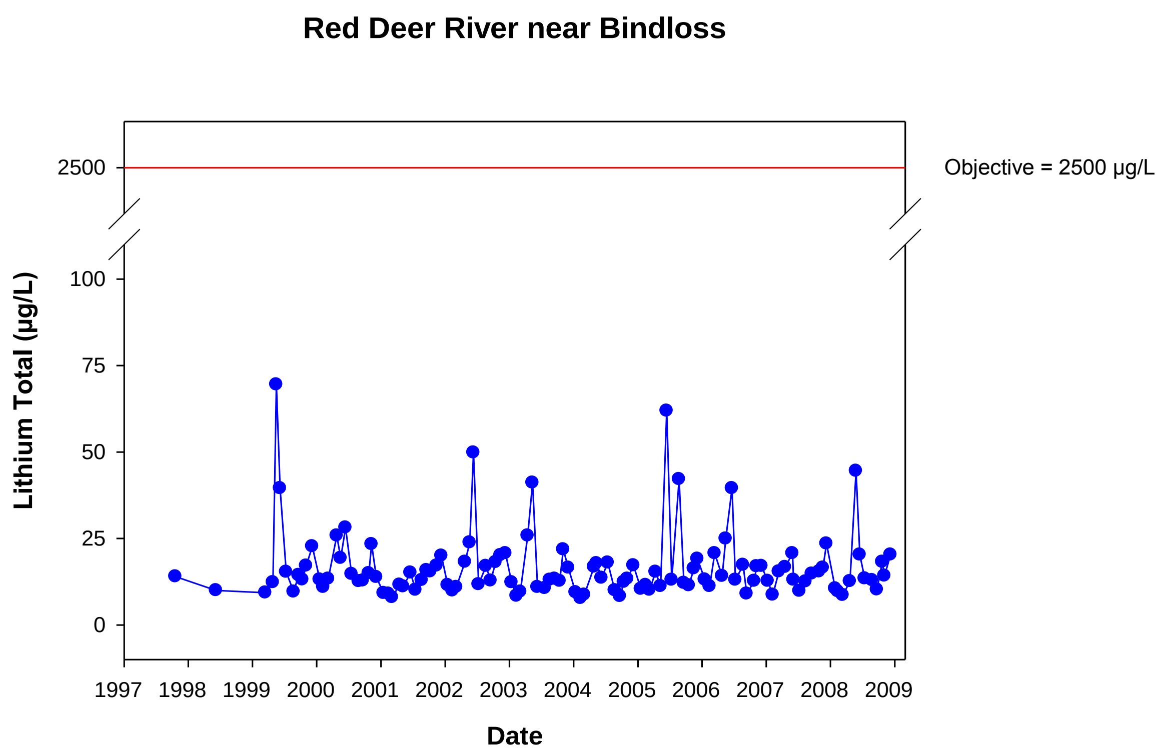

Figure 6-e14: Red Deer River (AB-SK) Lithium Total

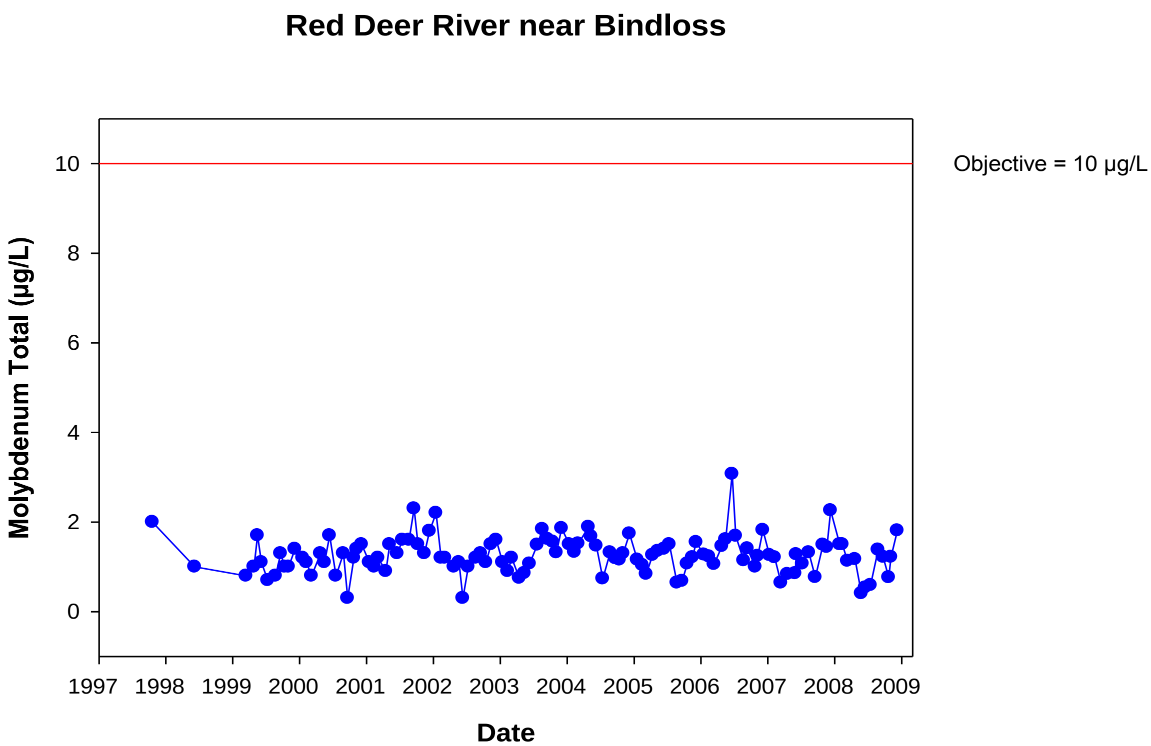

Figure 6-e15: Red Deer River (AB-SK) Molybdenum Total

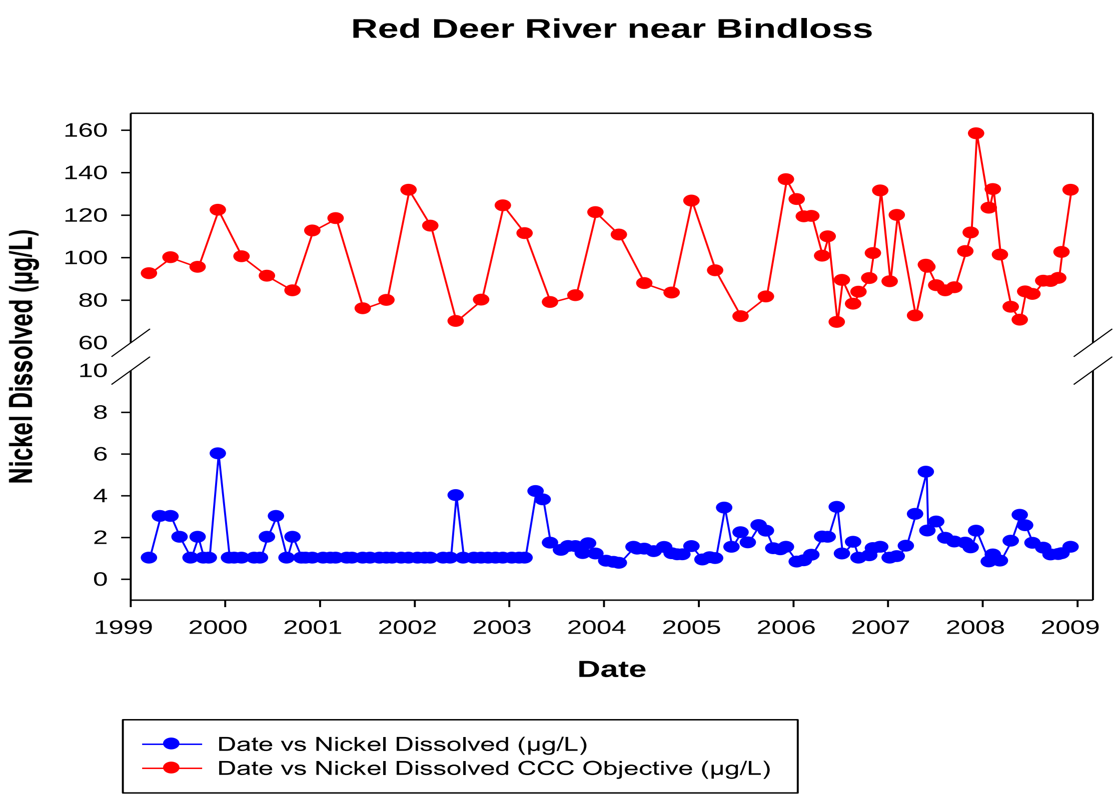

Figure 6-e16: Red Deer River (AB-SK) Nickel Dissolved

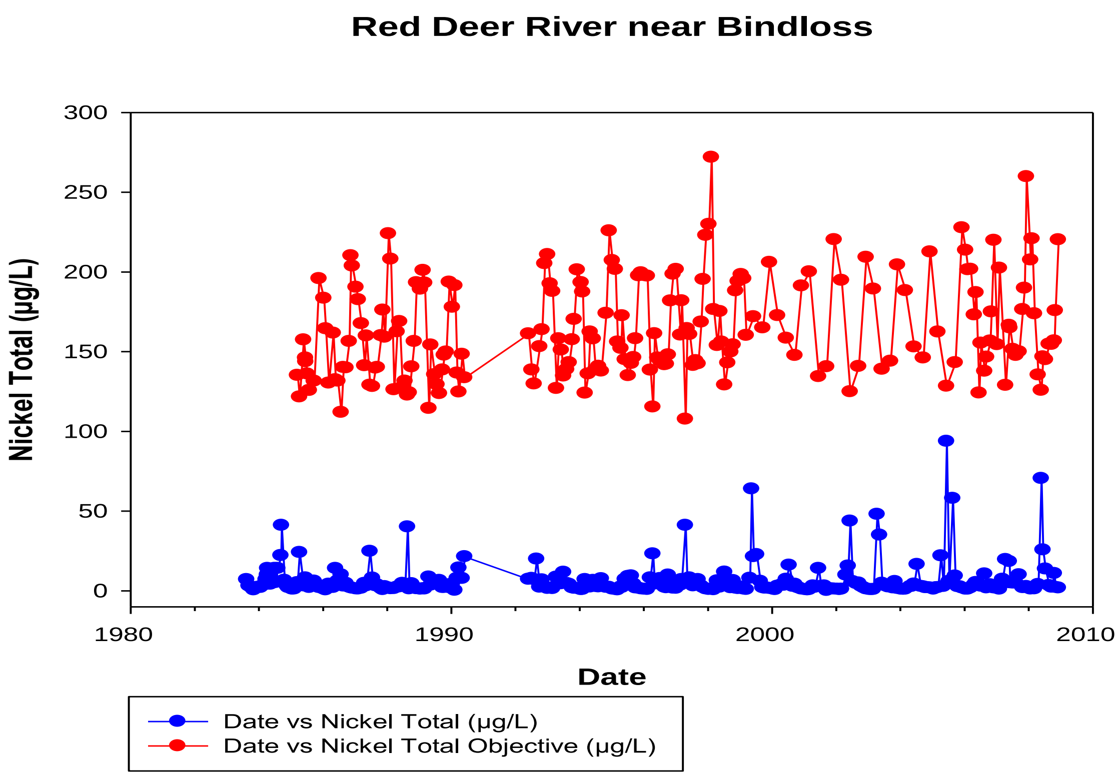

Figure 6-e17: Red Deer River (AB-SK) Nickel Total

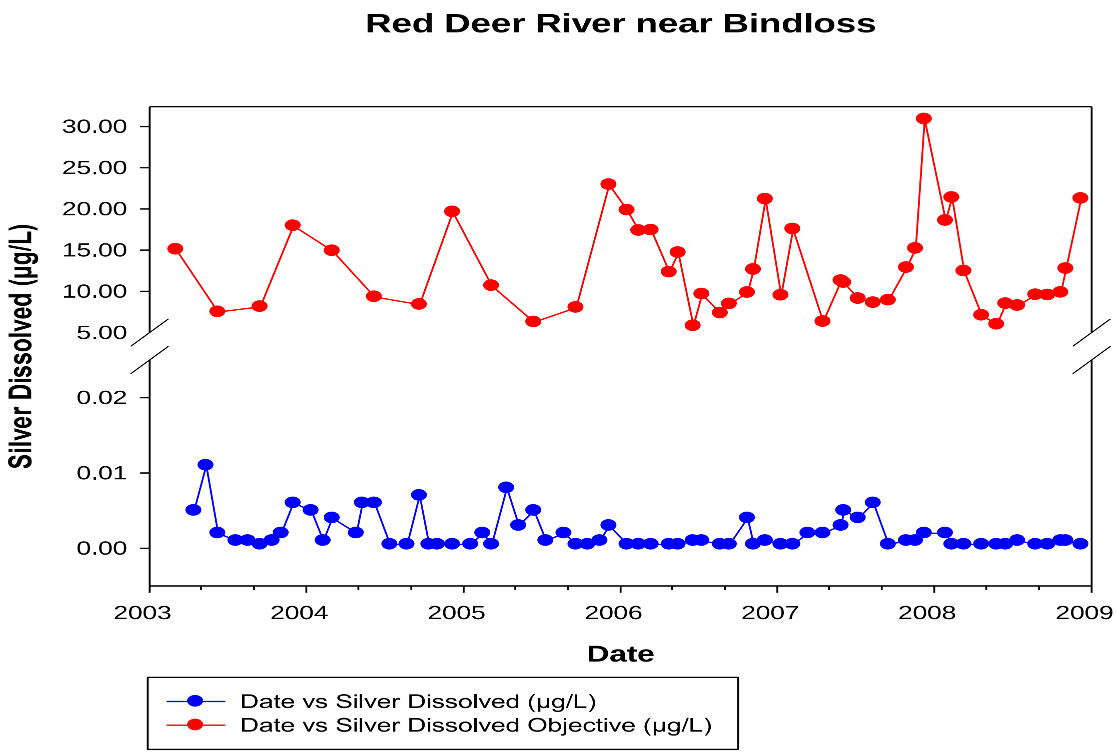

Figure 6-e18: Red Deer River (AB-SK) Silver Dissolved

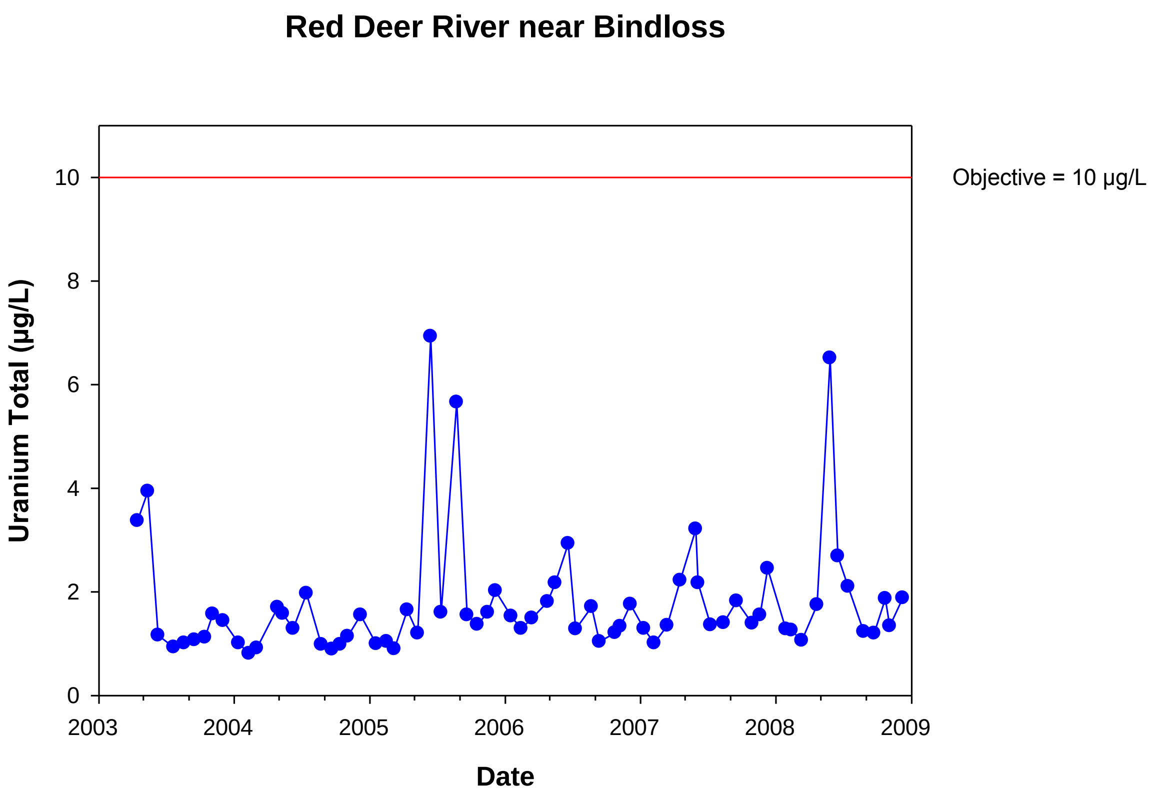

Figure 6-e19: Red Deer River (AB-SK) Uranium Total

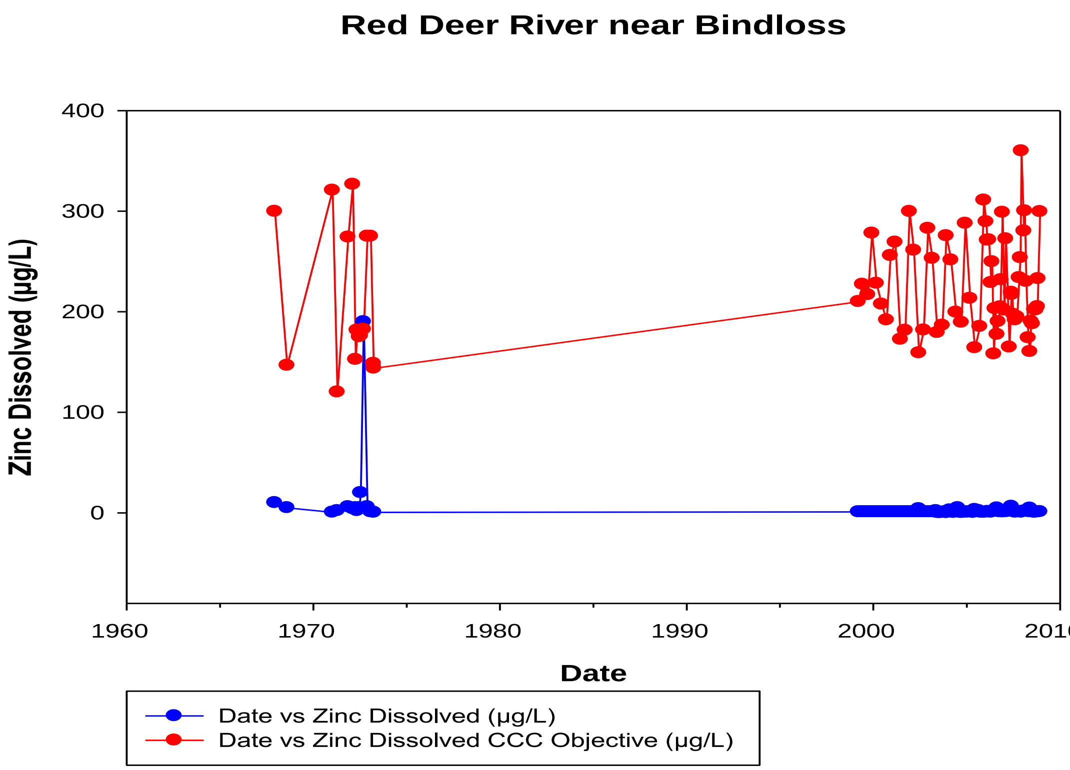

Figure 6-e20: Red Deer River (AB-SK) Zinc Dissolved

Red Deer River near Bindloss

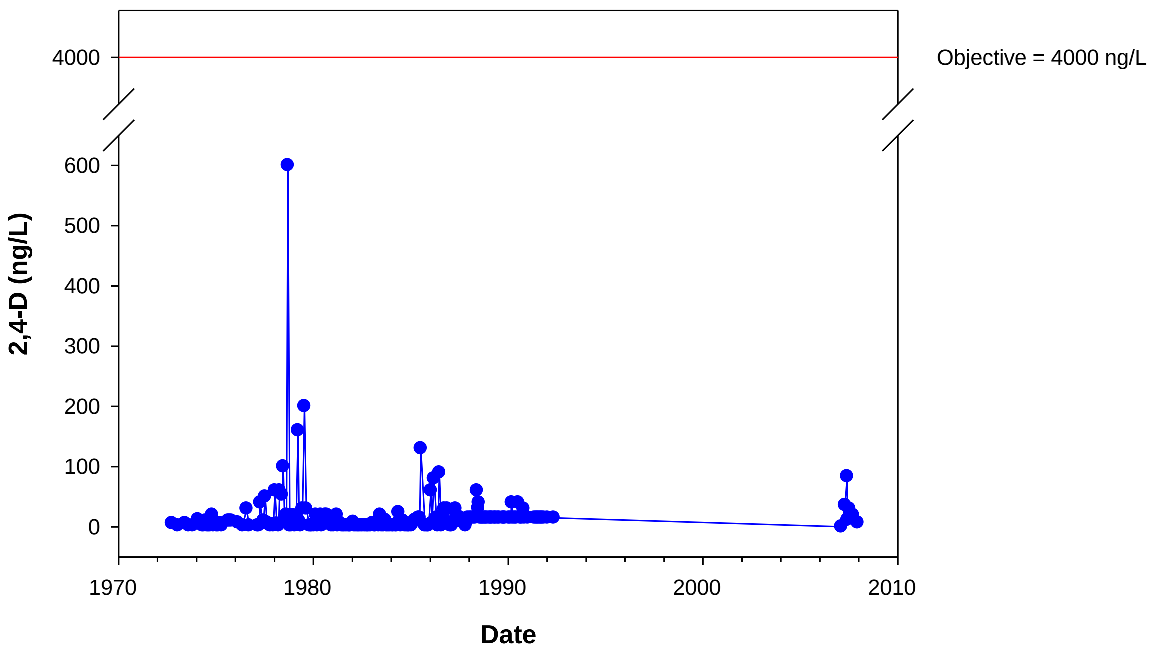

Figure 6-e21: Red Deer River (AB-SK) 2,4-D

Red Deer River near Bindloss

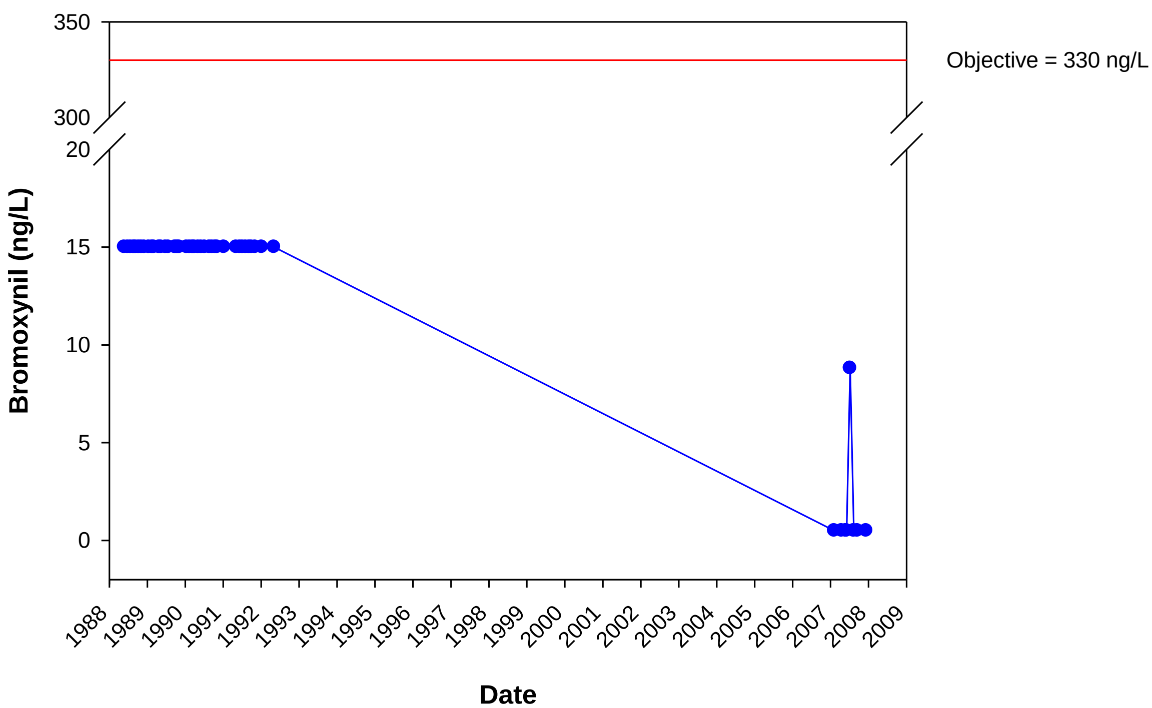

Figure 6-e22: Red Deer River (AB-SK) Bromoxynil

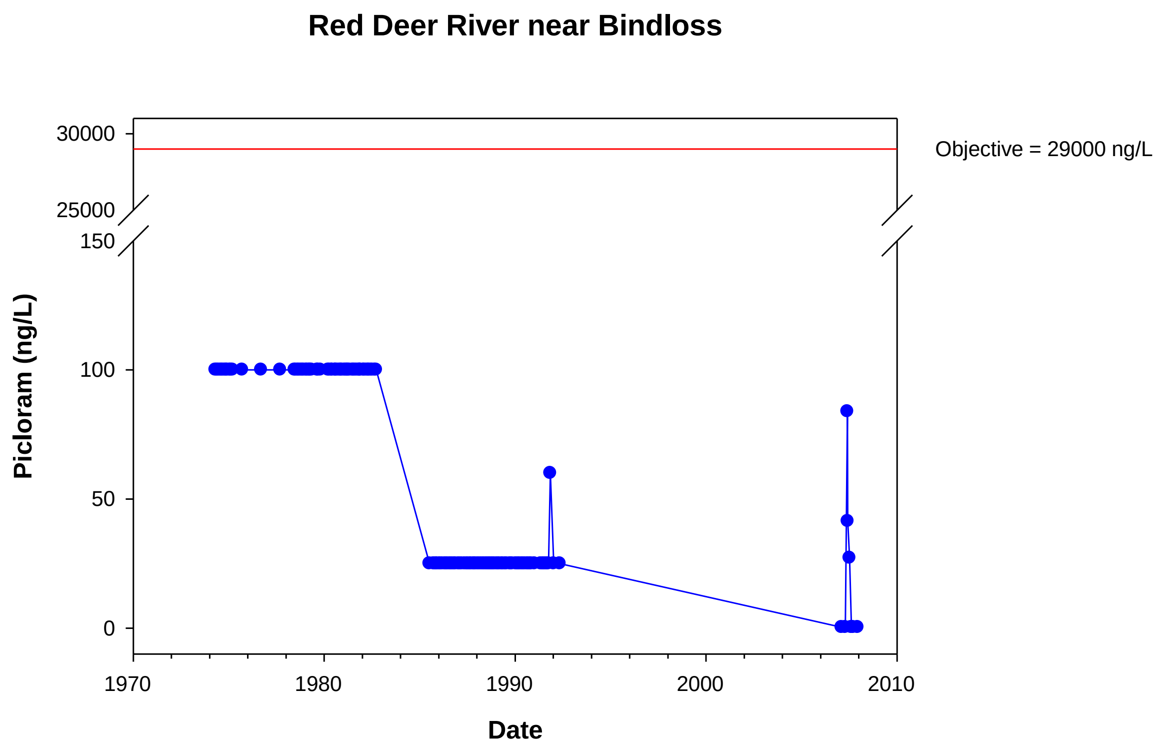

Figure 6-e23: Red Deer River (AB-SK) Picloram

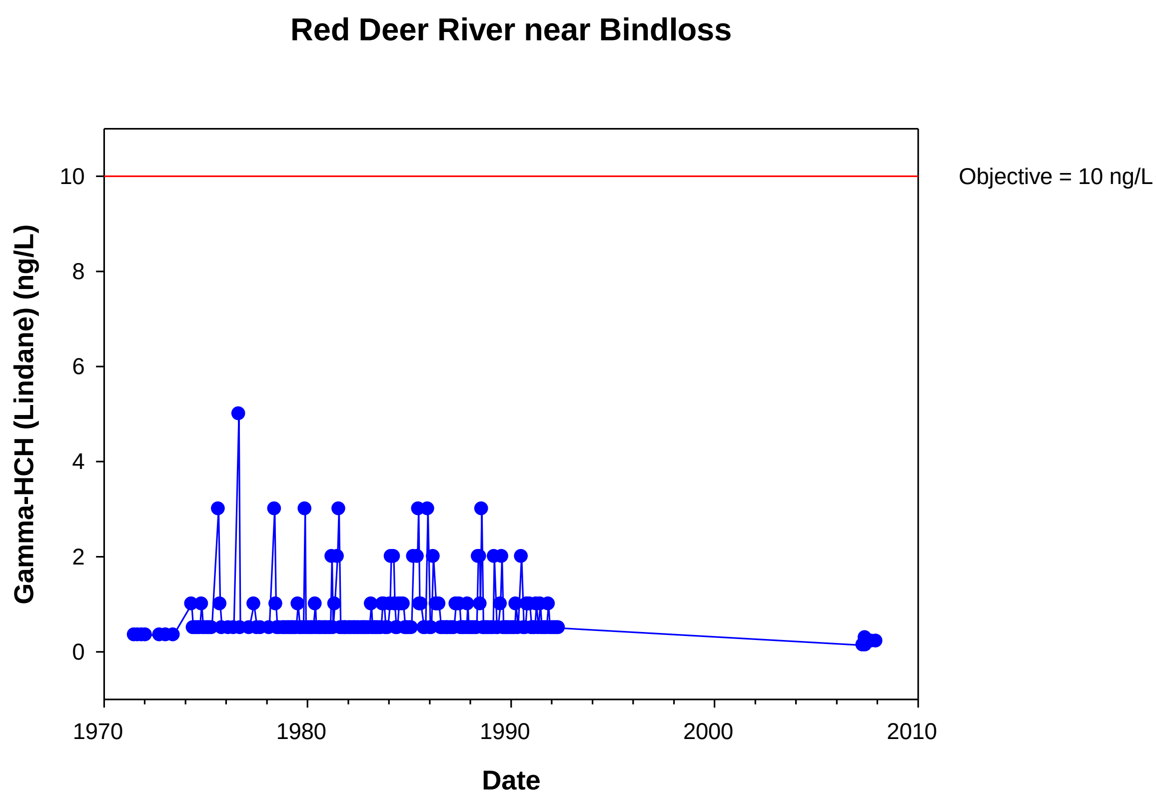

Figure 6-e24: Red Deer River (AB-SK) Lindane

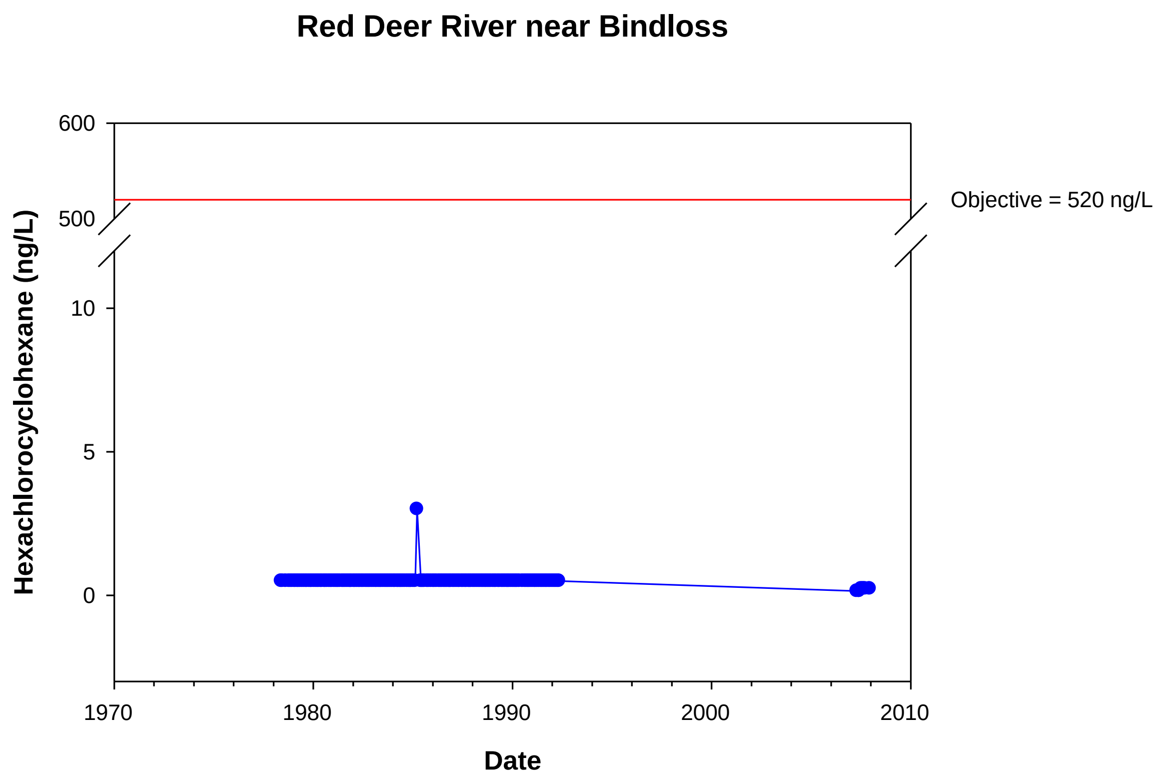

Figure 6-e25: Red Deer River (AB-SK) Hexachlorocyclohexane

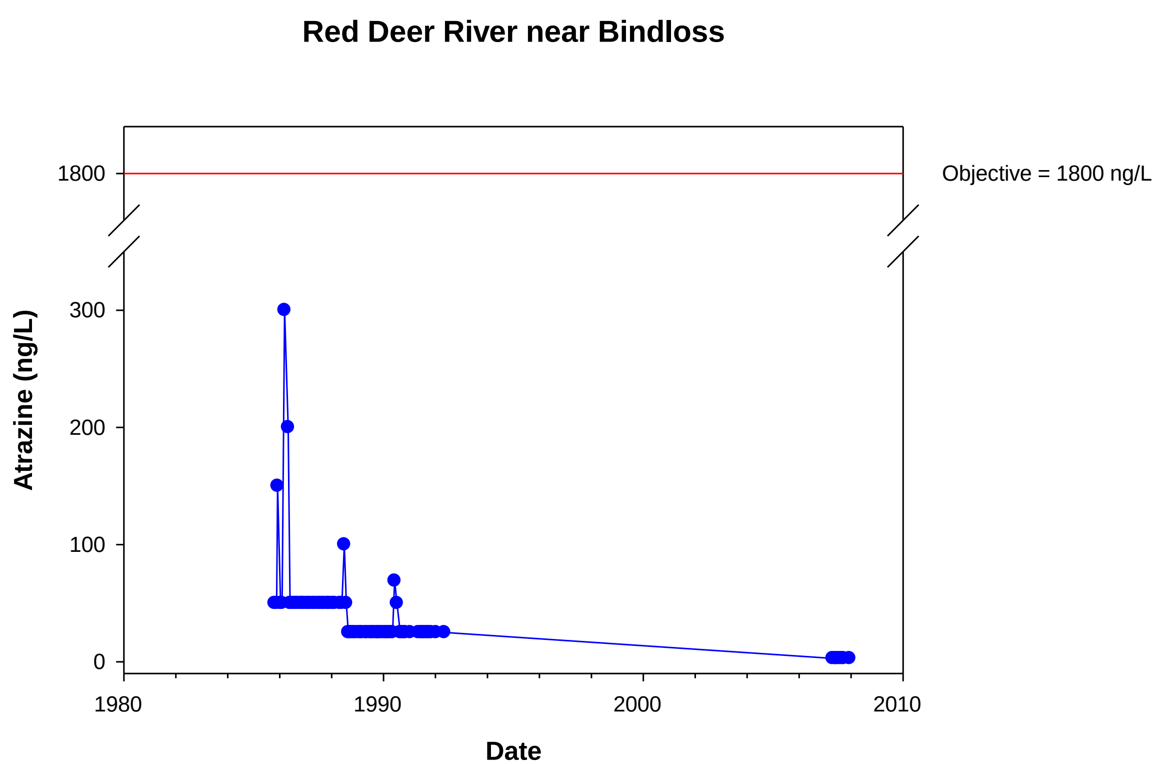

Figure 6-e26: Red Deer River (AB-SK) Atrazine

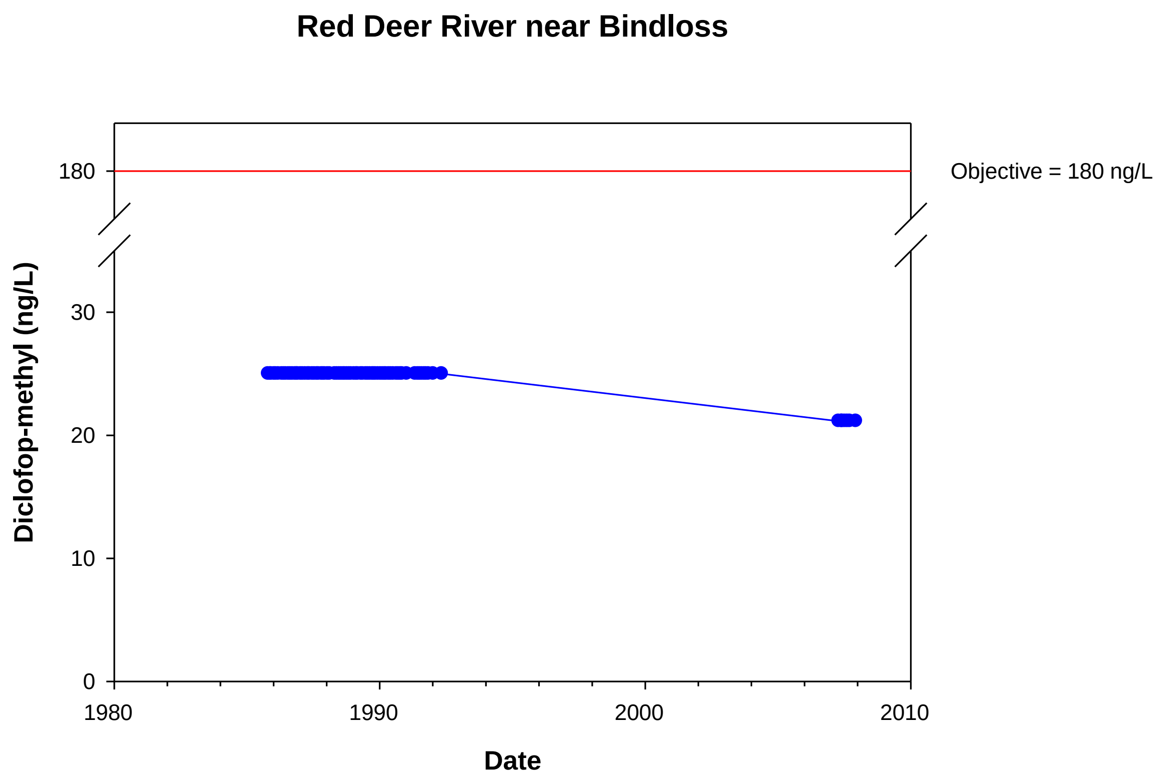

Figure 6-e27: Red Deer River (AB-SK) Diclofop-methyl

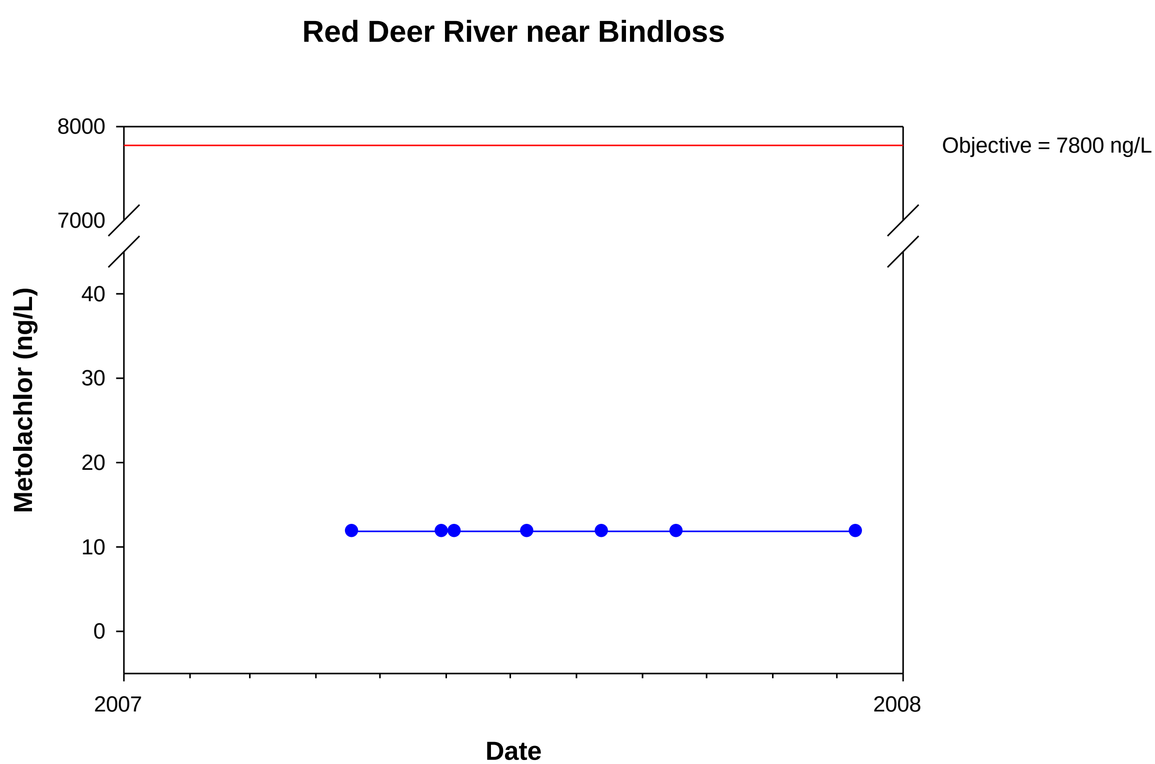

Figure 6-e28: Red Deer River (AB-SK) Metolachlor

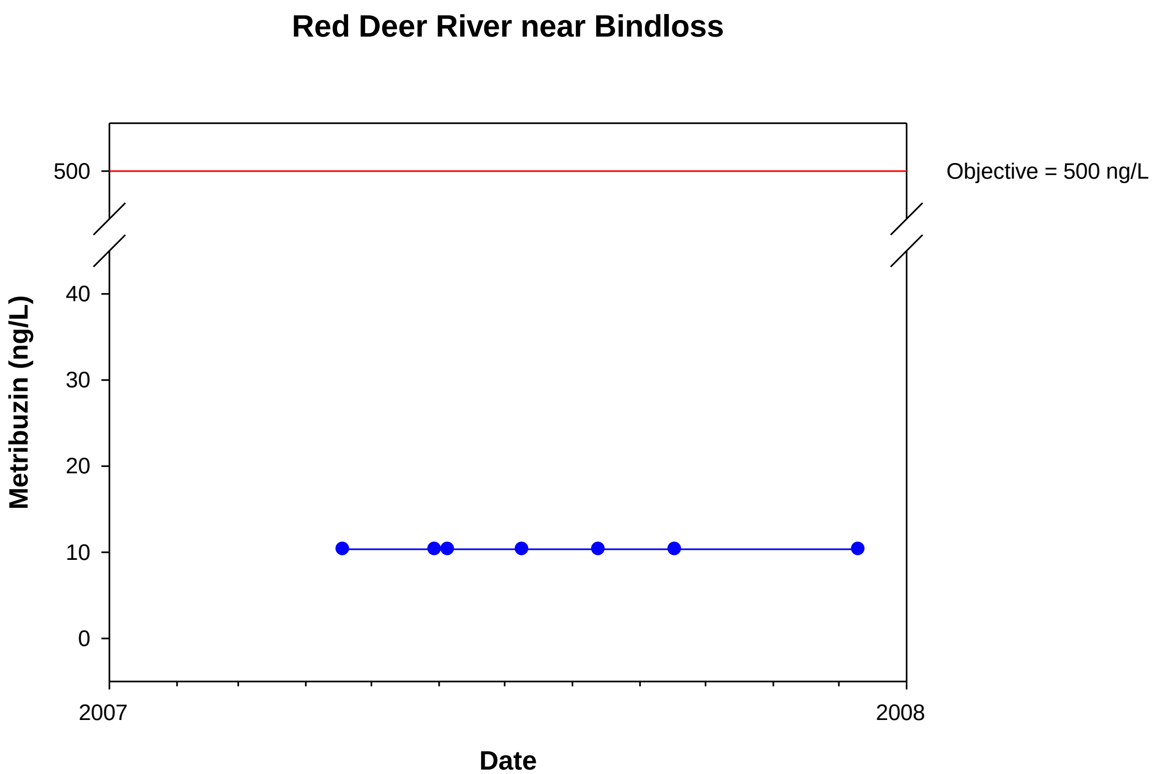

Figure 6-e29: Red Deer River (AB-SK) Metribuzin

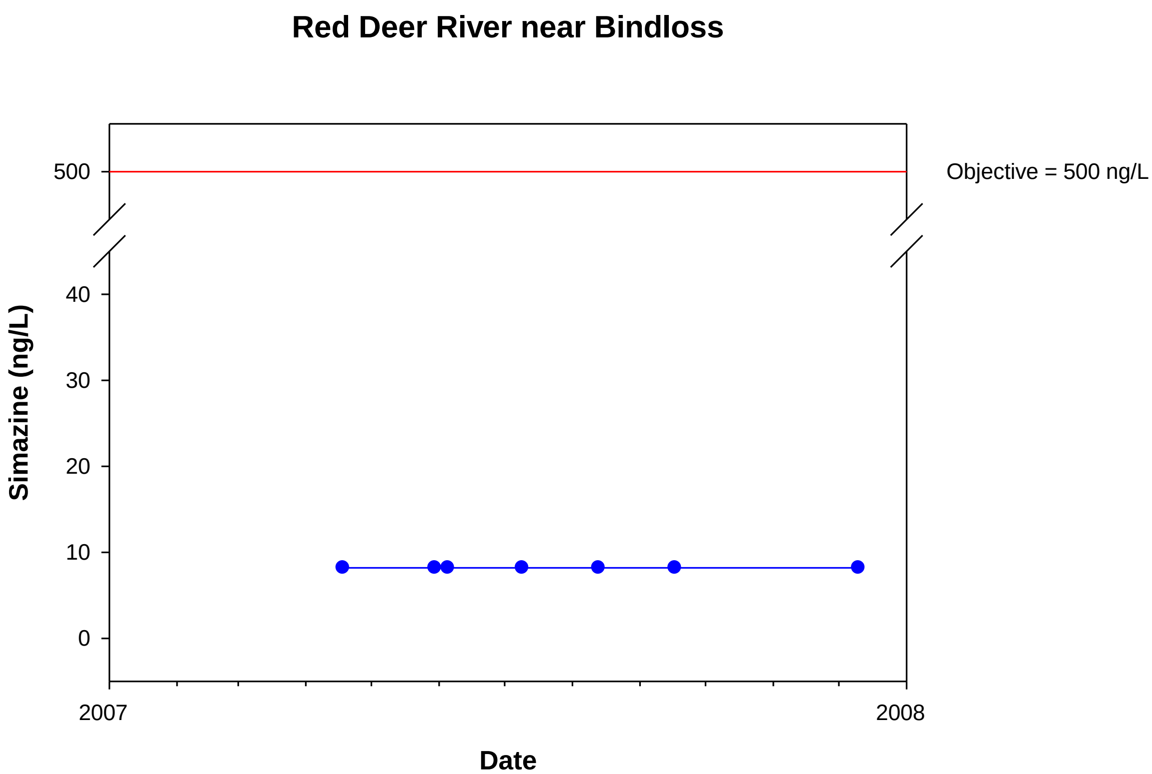

Figure 6-e30: Red Deer River (AB-SK) Simazine

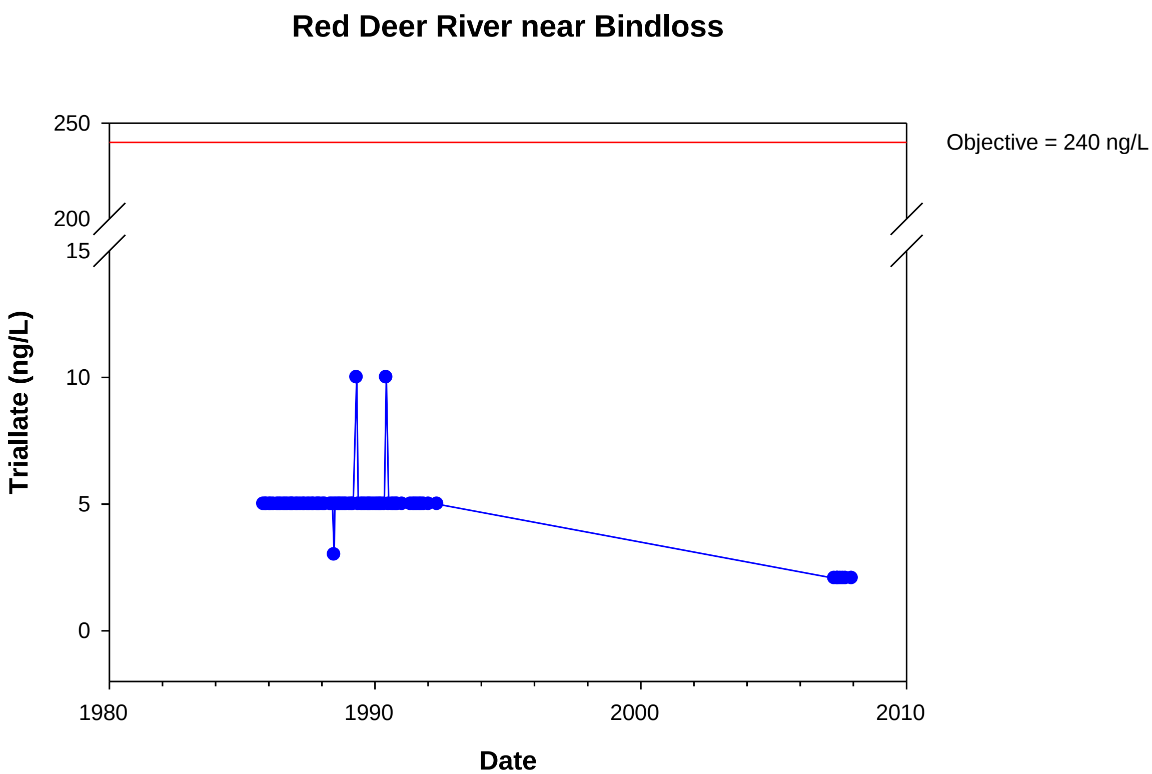

Figure 6-e31: Red Deer River (AB-SK) Triallate

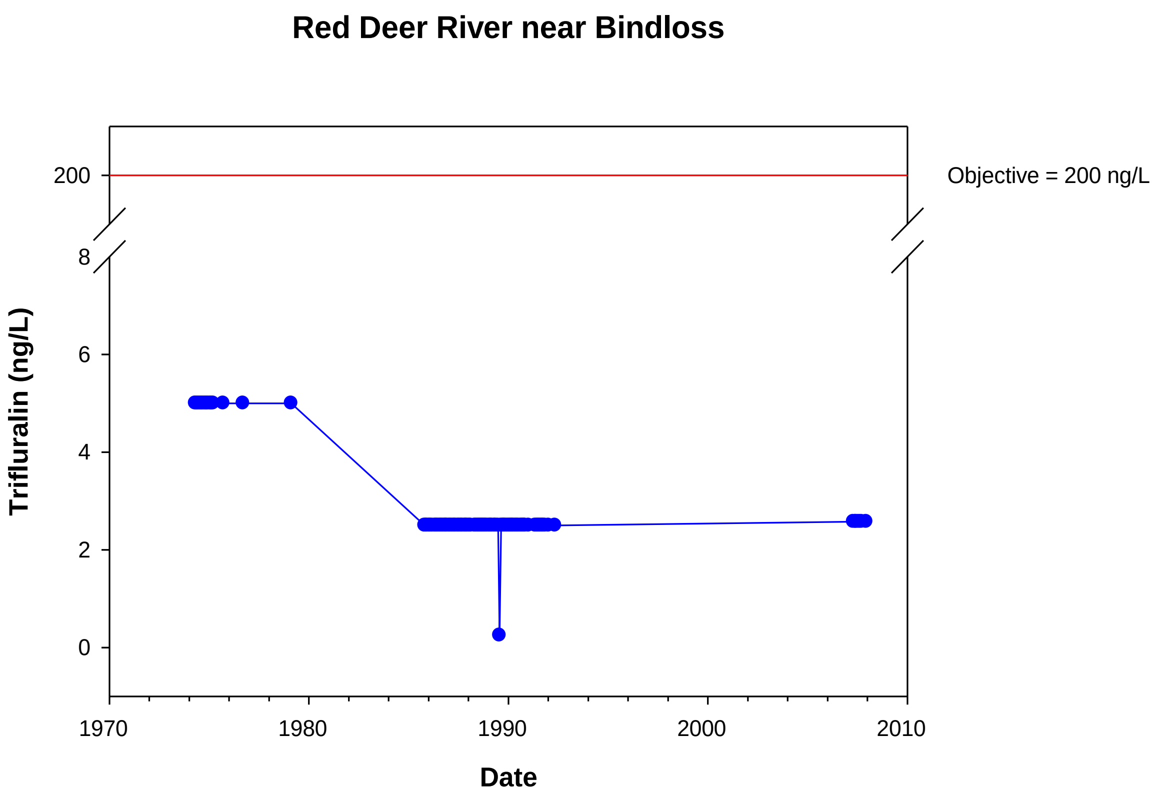

Figure 6-e32: Red Deer River (AB-SK) Trifluralin

Appendix 6-f: South Saskatchewan River

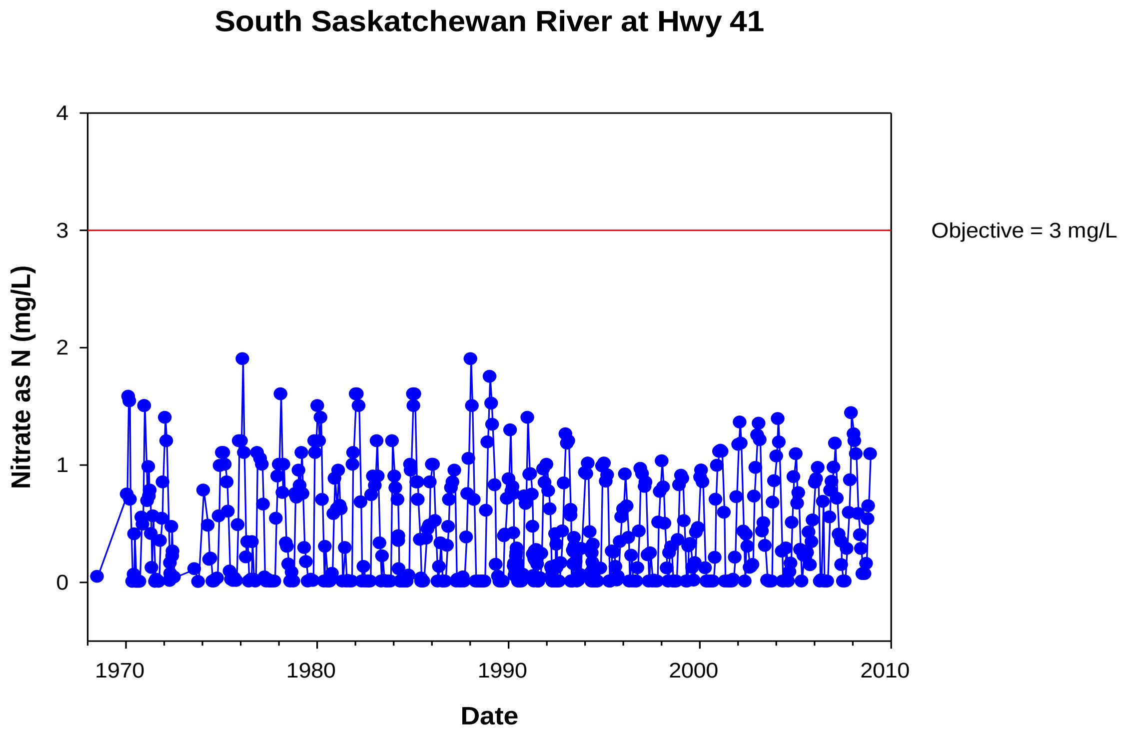

Figure 6-f1: South Saskatchewan River Nitrate as N

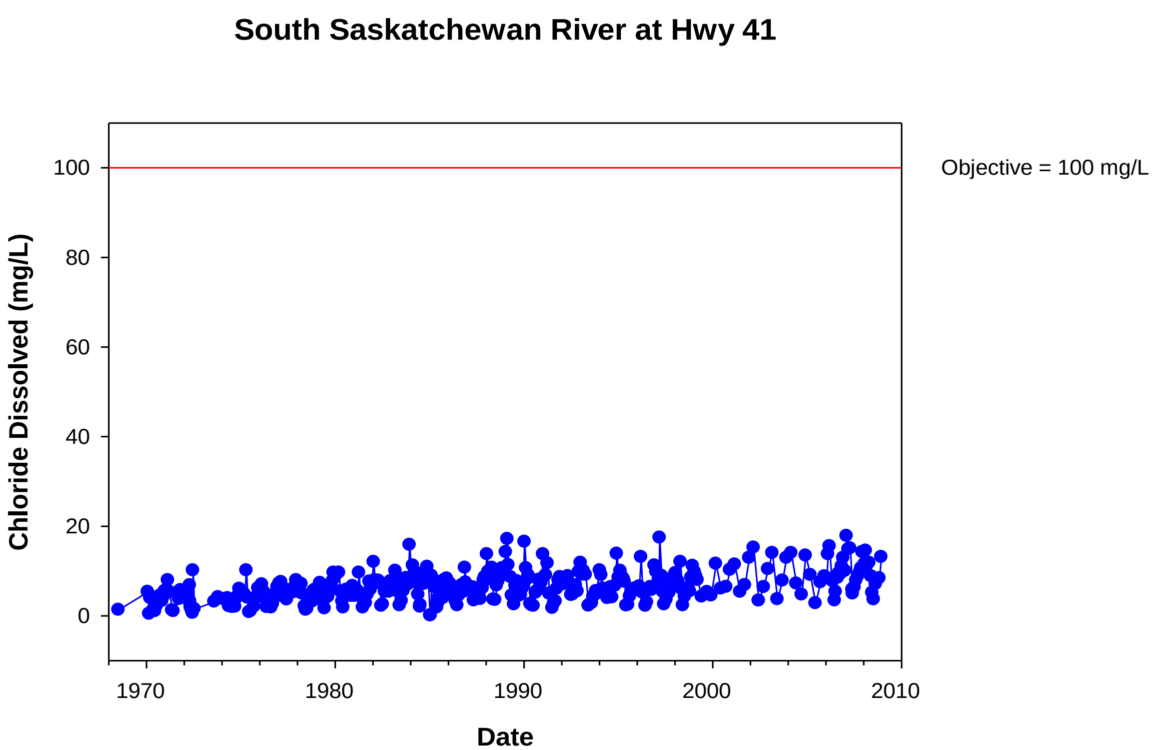

Figure 6-f2: South Saskatchewan River Chloride Dissolved

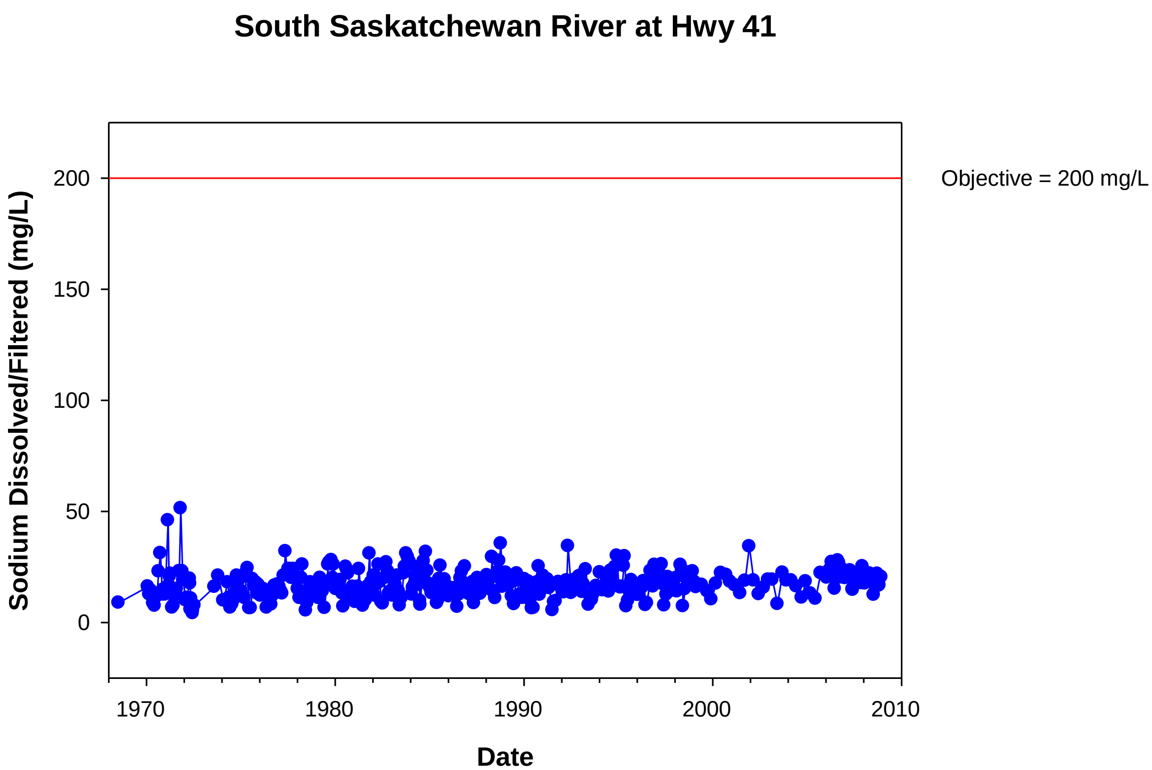

Figure 6-f3: South Saskatchewan River Sodium Dissolved/Filtered

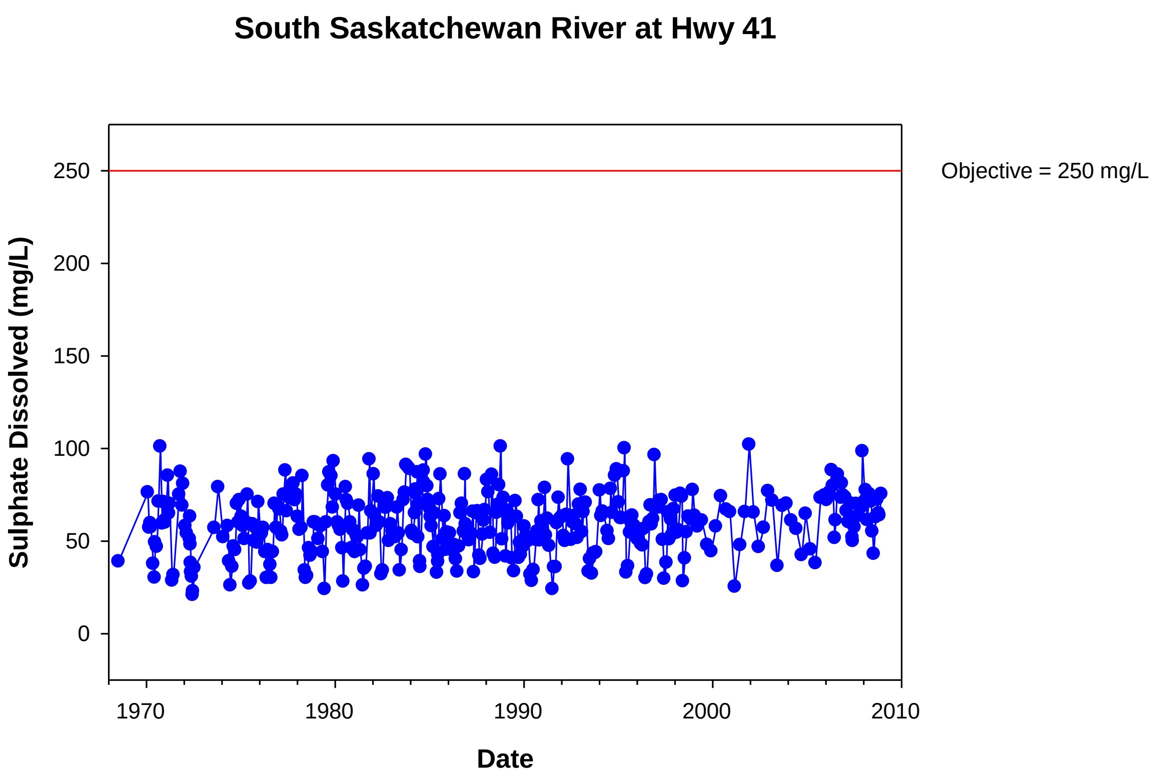

Figure 6-f4: South Saskatchewan River Sulphate Dissolved

South Saskatchewan River at Hwy 41

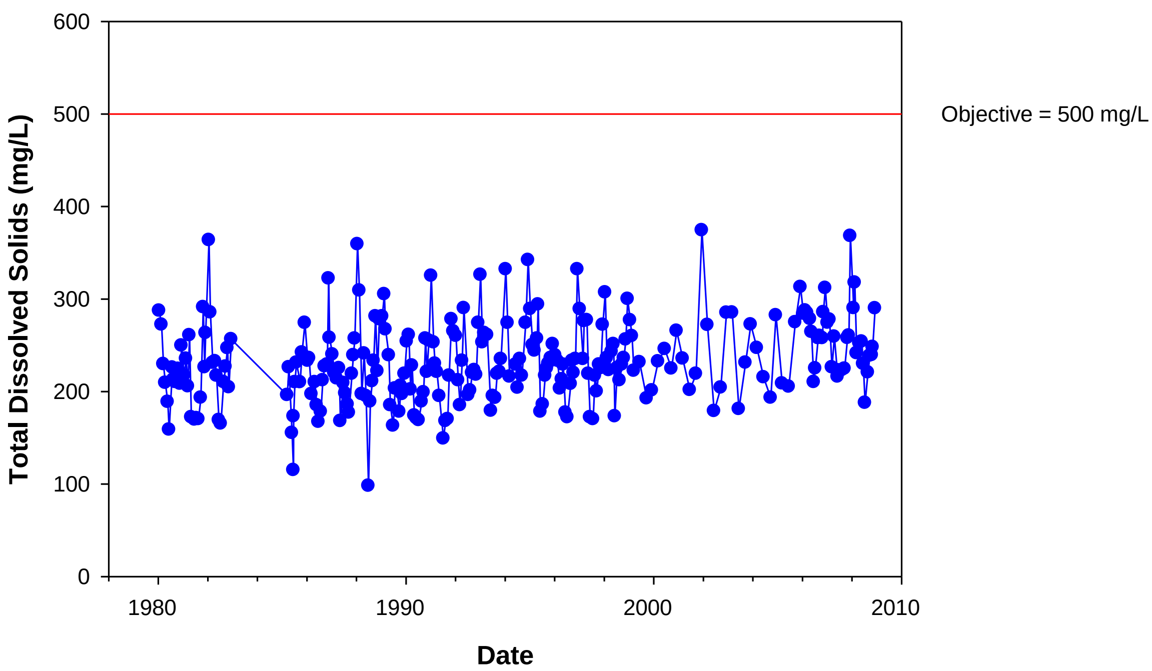

Figure 6-f5: South Saskatchewan River Total Dissolved Solids

South Saskatchewan River at Hwy 41

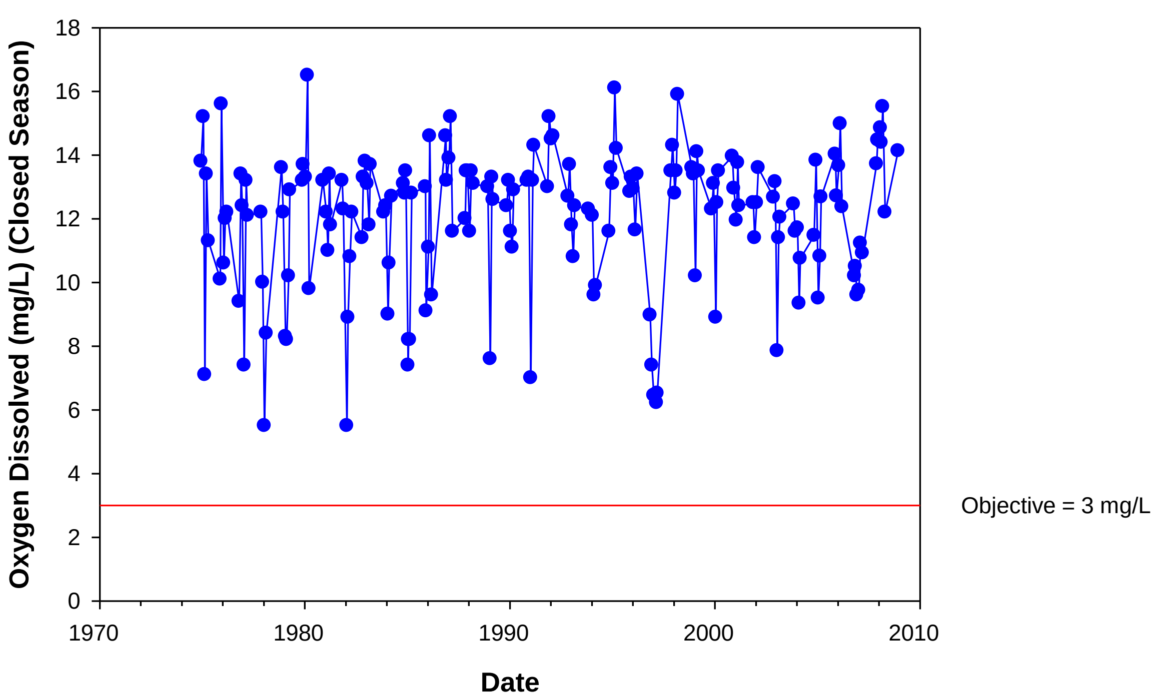

Figure 6-f6: South Saskatchewan River Oxygen Dissolved (Closed Season)

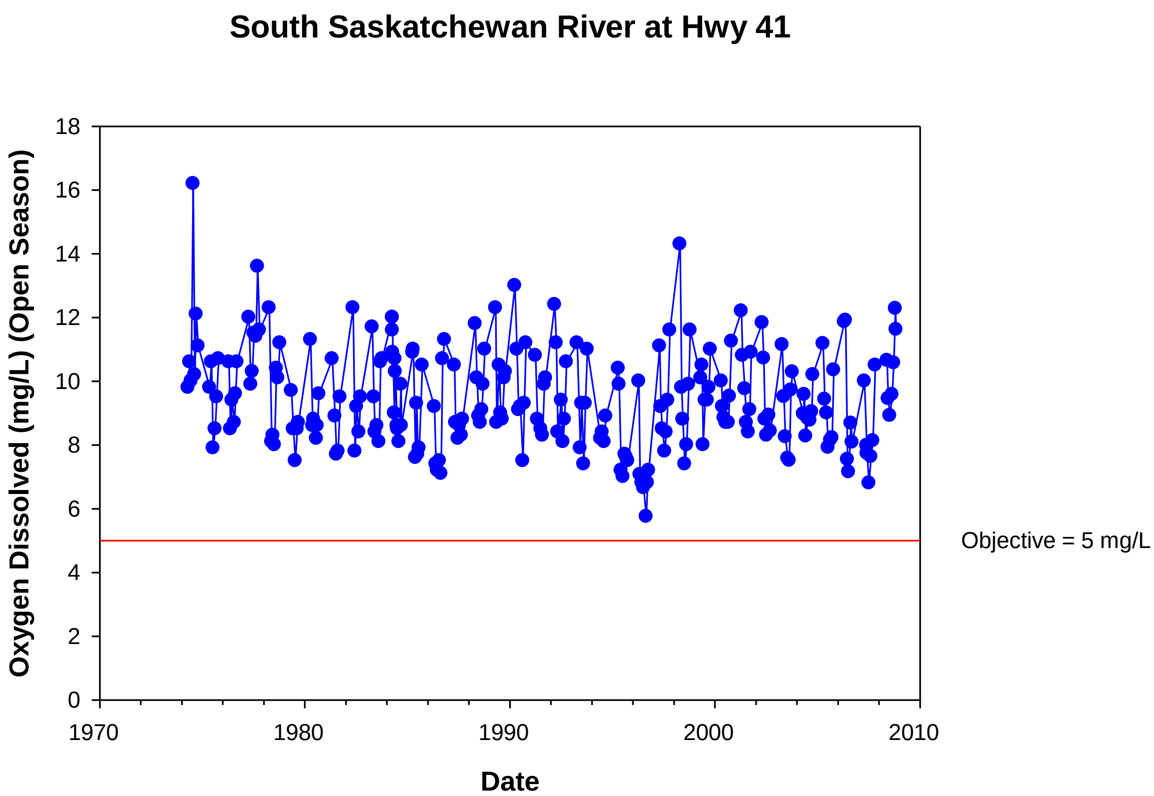

Figure 6-f7: South Saskatchewan River Oxygen Dissolved (Open Season)

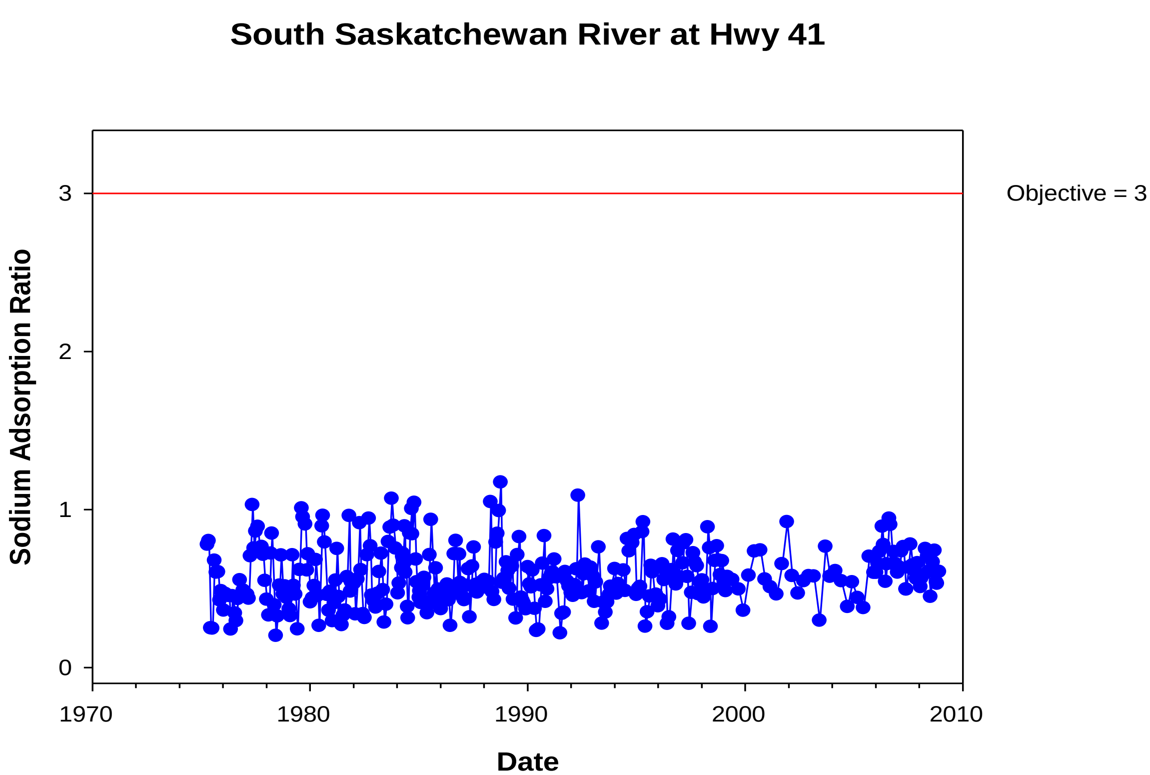

Figure 6-f8: South Saskatchewan River Sodium Adsorption Ratio

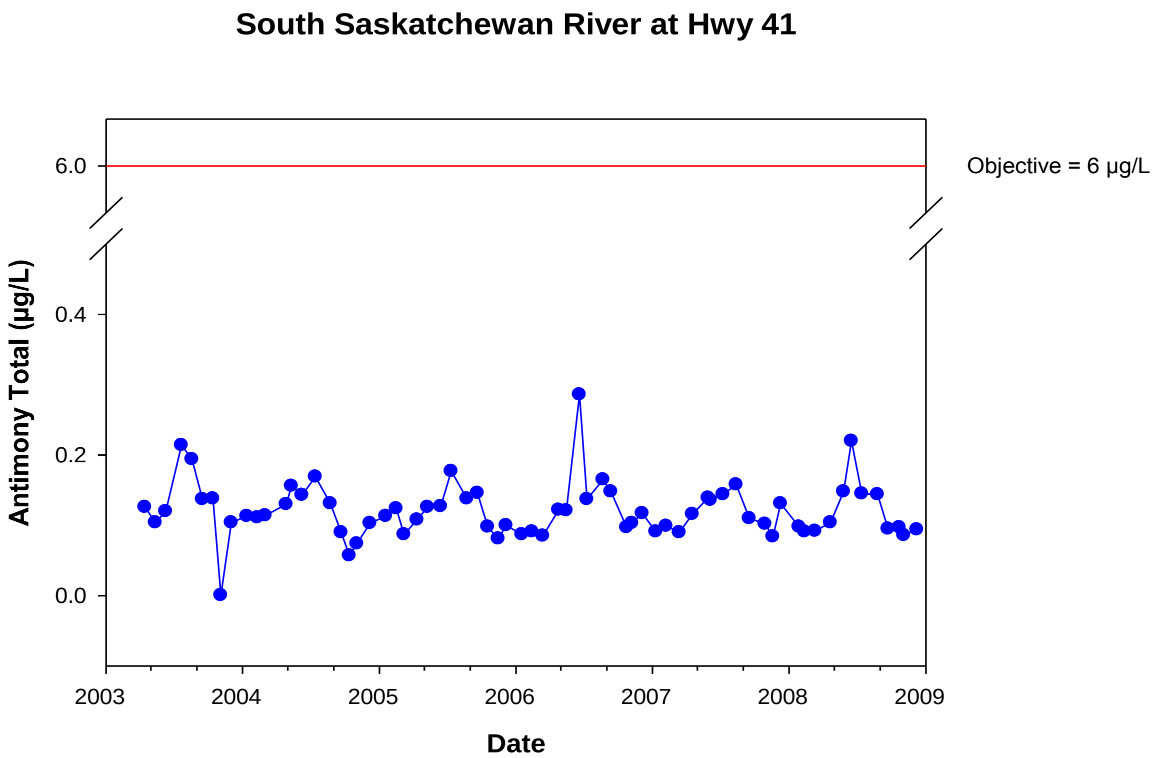

Figure 6-f9: South Saskatchewan River Antimony Total

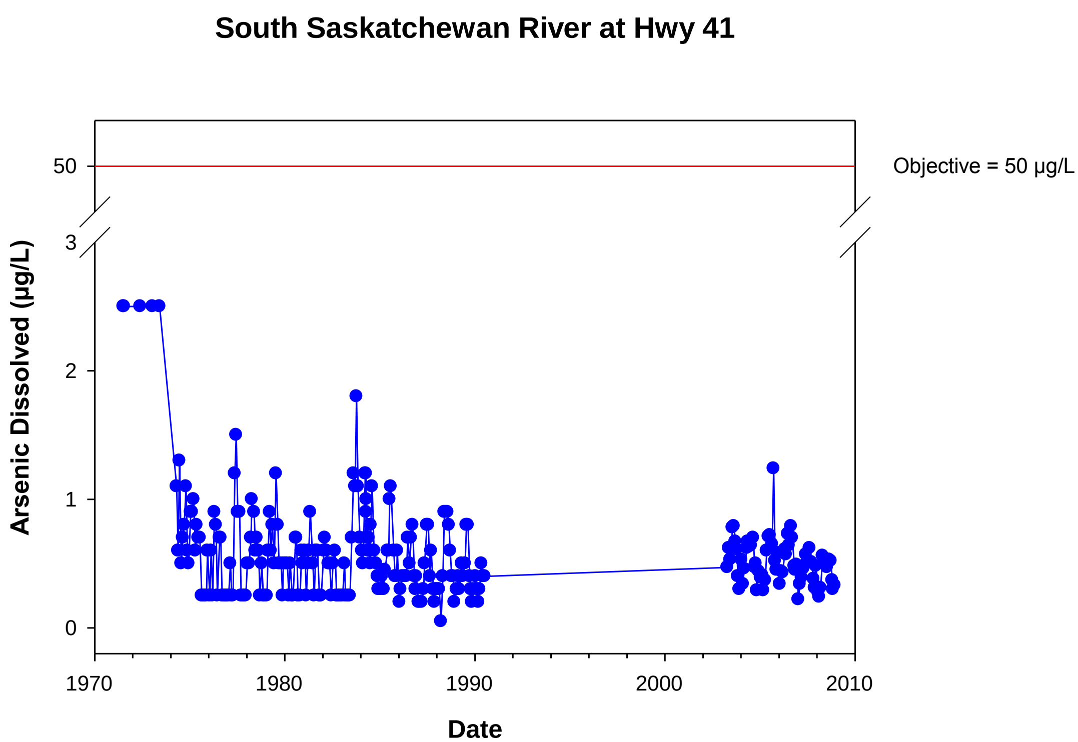

Figure 6-f10: South Saskatchewan River Arsenic Dissolved

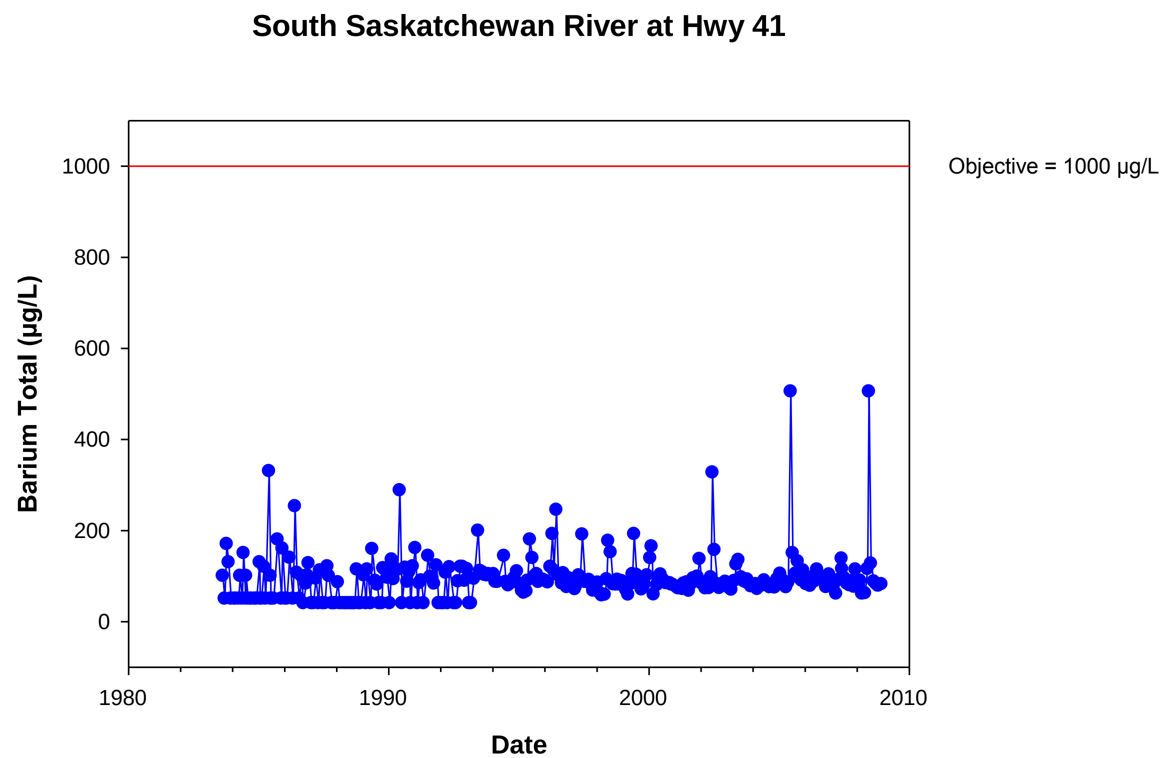

Figure 6-f11: South Saskatchewan River Barium Total

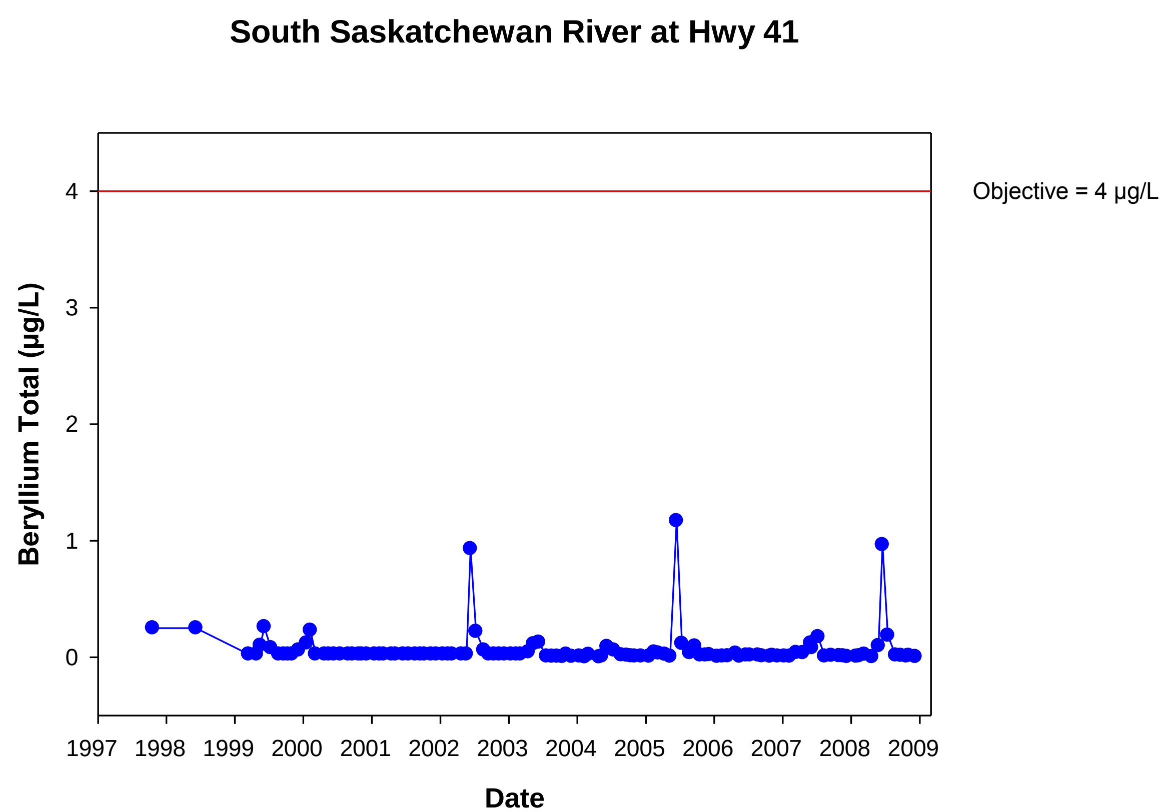

Figure 6-f12: South Saskatchewan River Beryllium Total

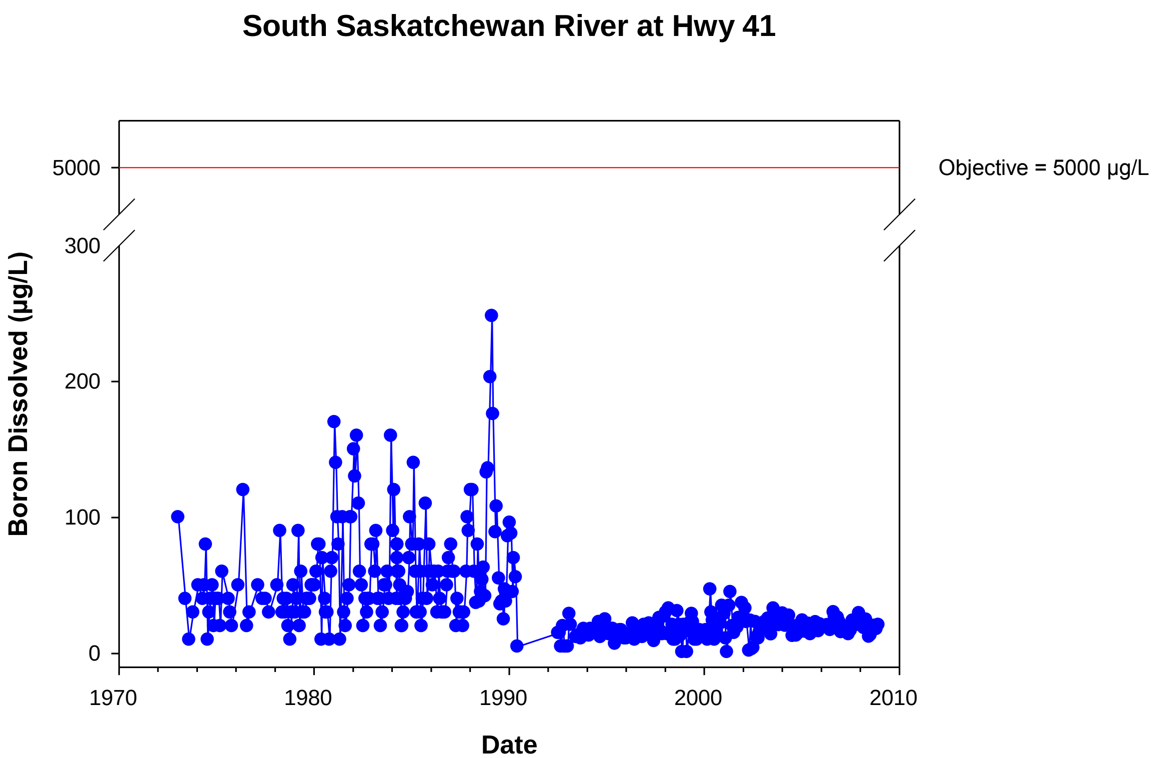

Figure 6-f13: South Saskatchewan River Boron Dissolved

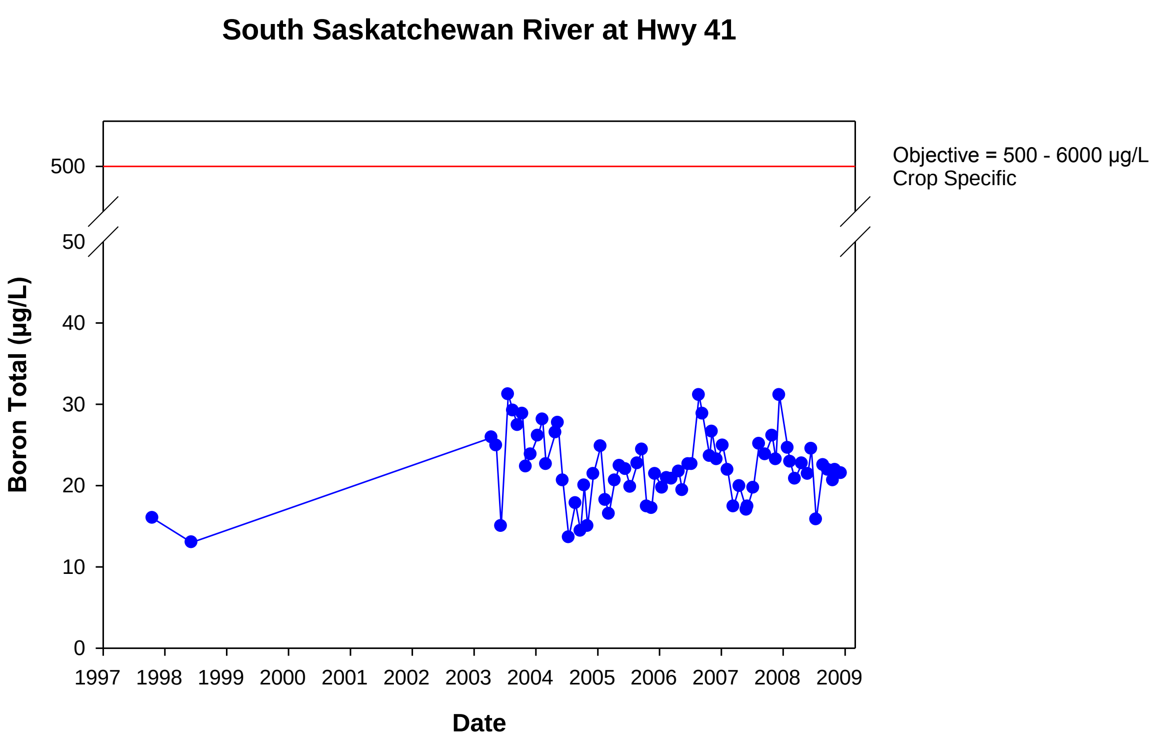

Figure 6-f14: South Saskatchewan River Boron Total

South Saskatchewan River at Hwy 41

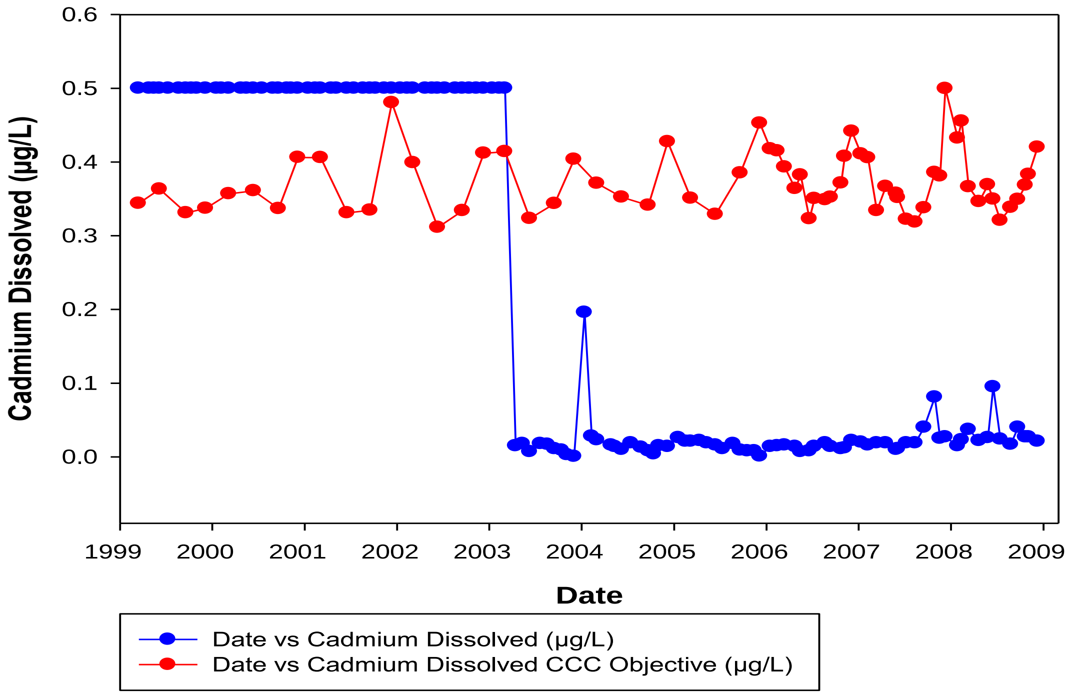

Figure 6-f15: South Saskatchewan River Cadmium Dissolved

South Saskatchewan River at Hwy 41

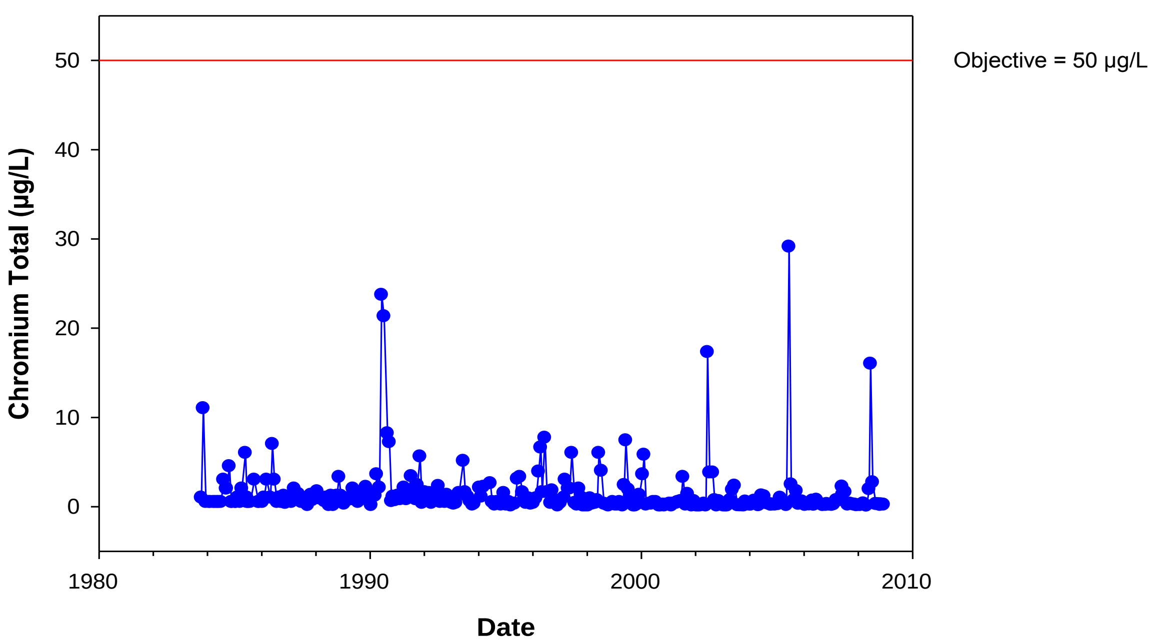

Figure 6-f16: South Saskatchewan River Chromium Total

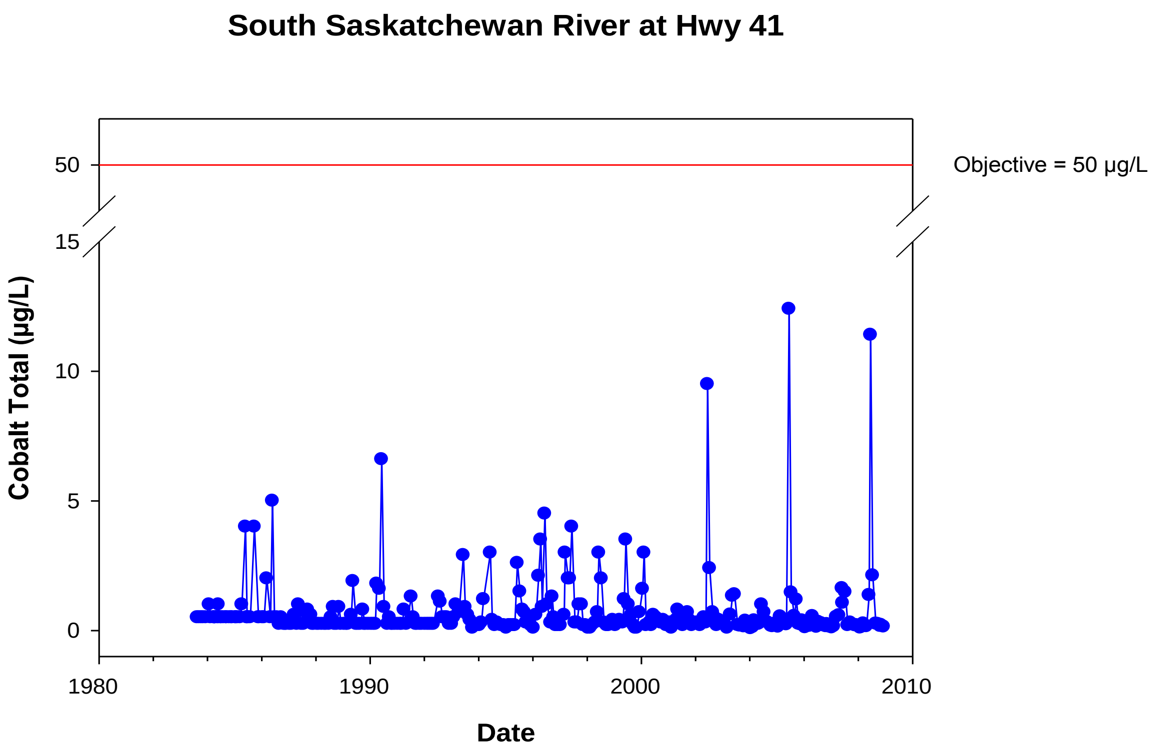

Figure 6-f17: South Saskatchewan River Cobalt Total

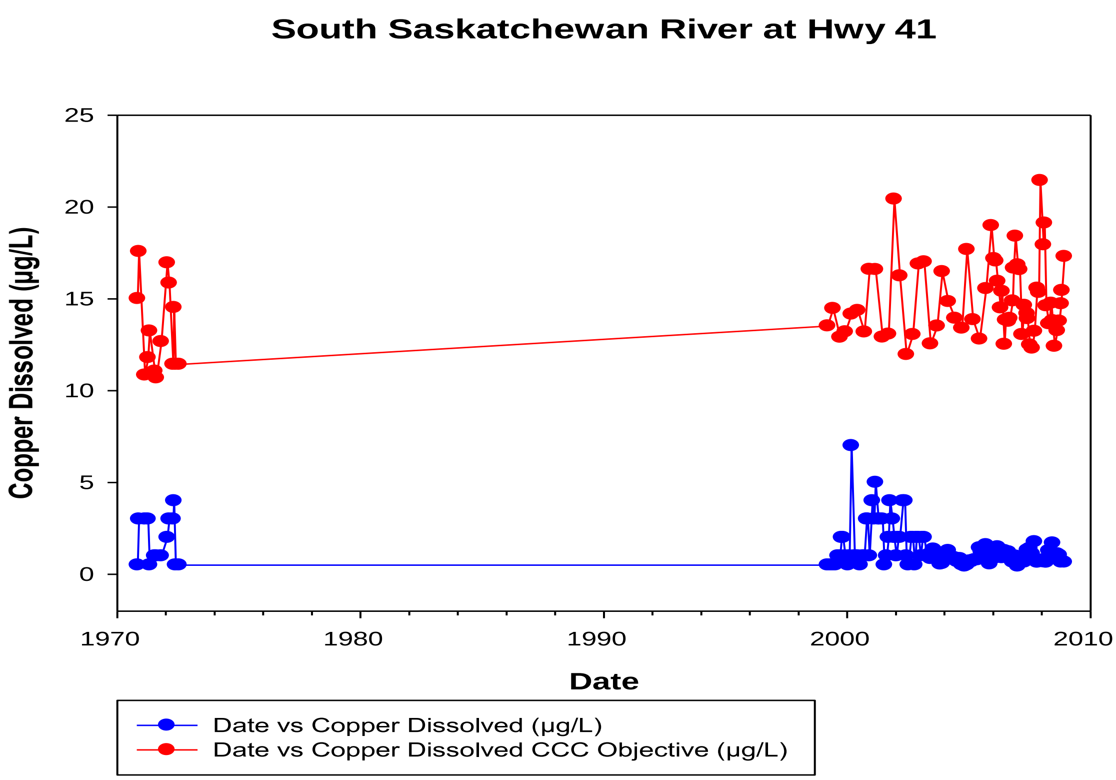

Figure 6-f18: South Saskatchewan River Copper Dissolved

South Saskatchewan River at Hwy 41

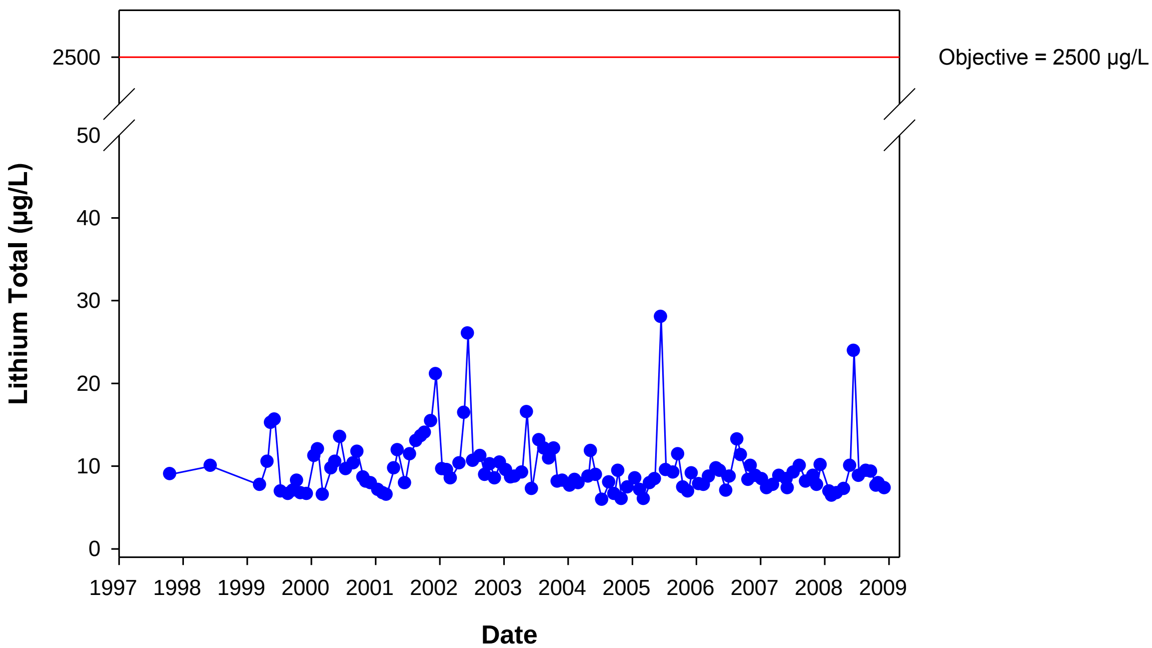

Figure 6-f19: South Saskatchewan River Lithium Total

South Saskatchewan River at Hwy 41

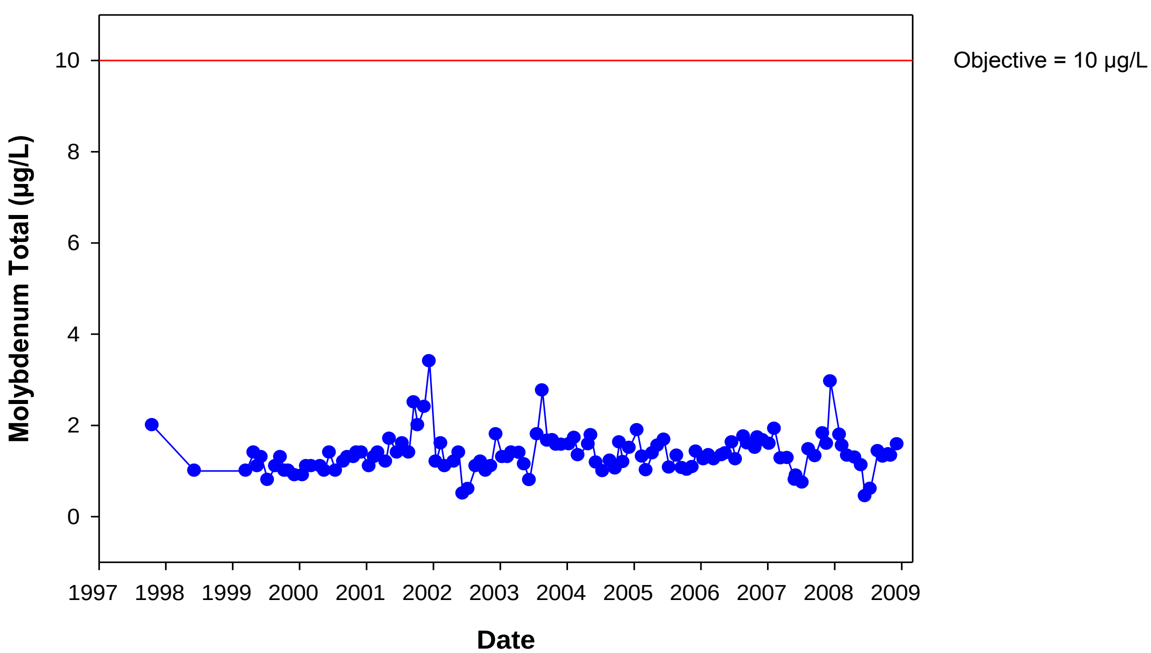

Figure 6-f20: South Saskatchewan River Molybdenum Total

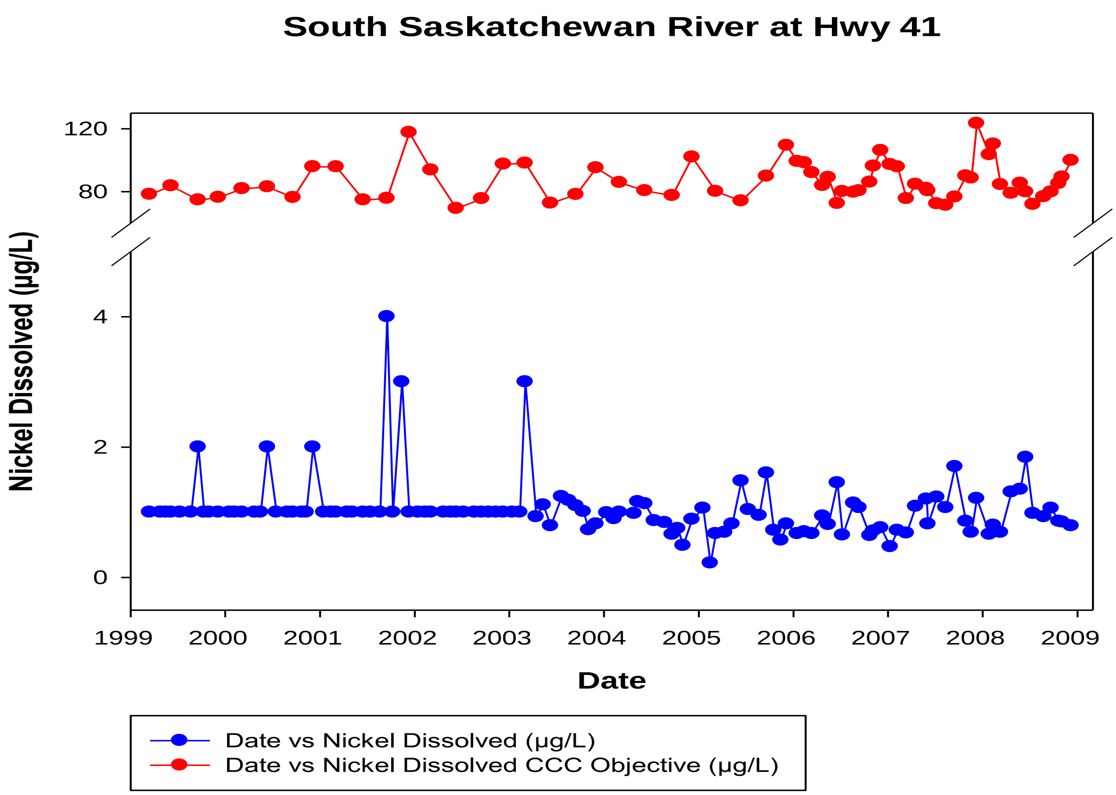

Figure 6-f21: South Saskatchewan River Nickel Dissolved

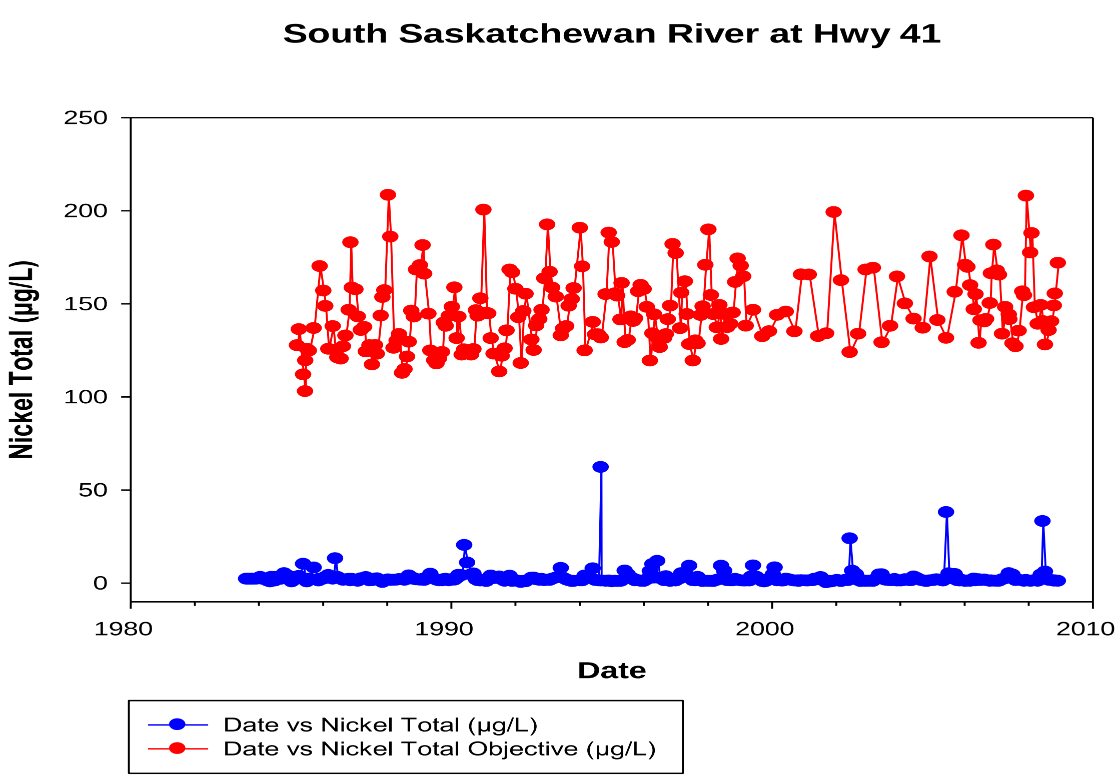

Figure 6-f22: South Saskatchewan River Nickel Total

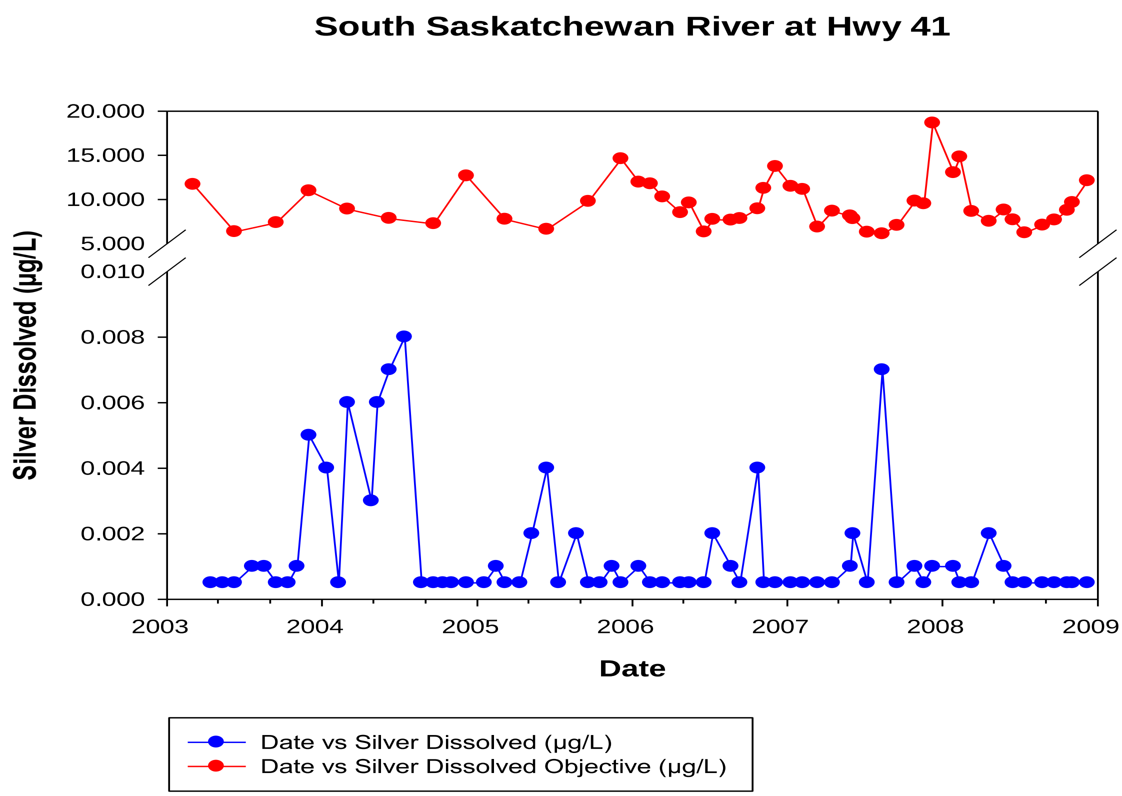

Figure 6-f23: South Saskatchewan River Silver Dissolved

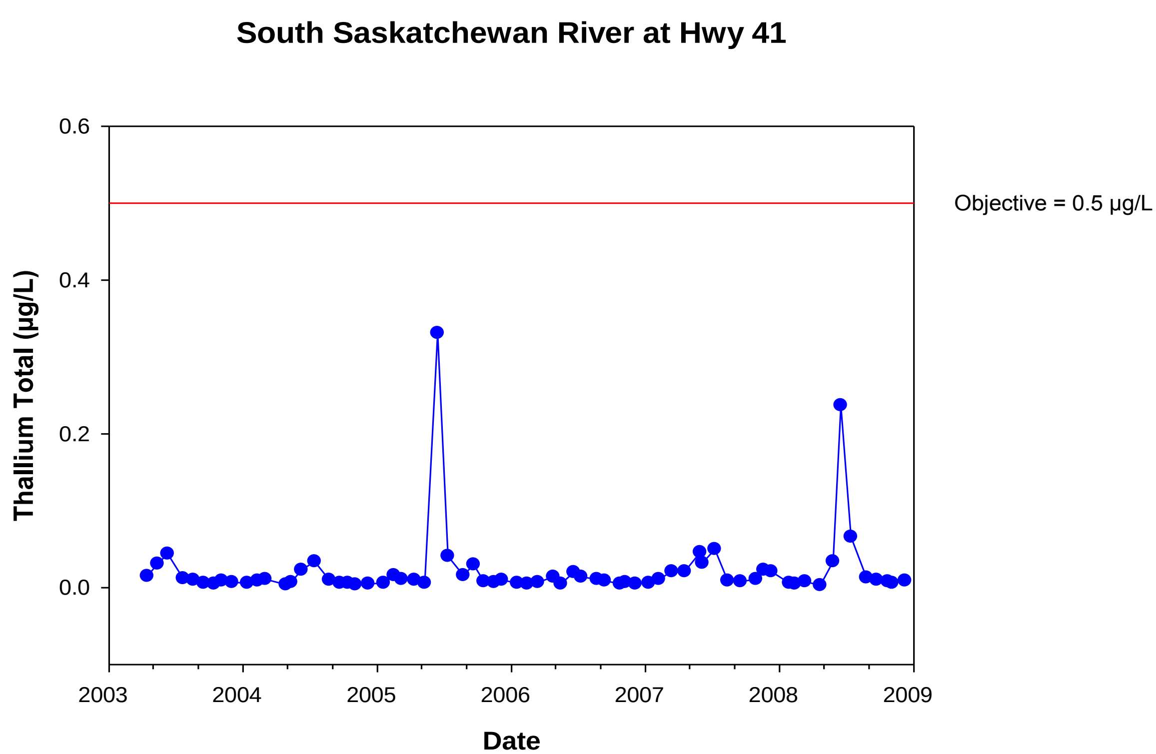

Figure 6-f24: South Saskatchewan River Thallium Total

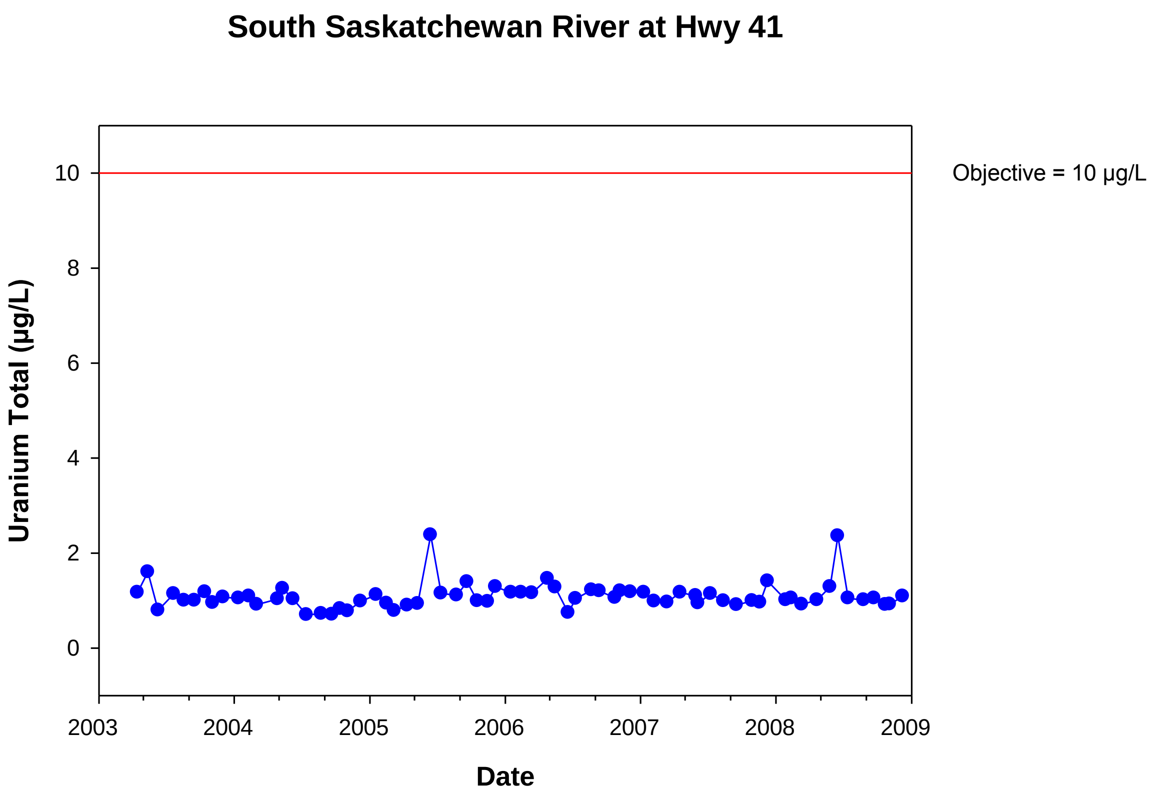

Figure 6-f25: South Saskatchewan River Uranium Total

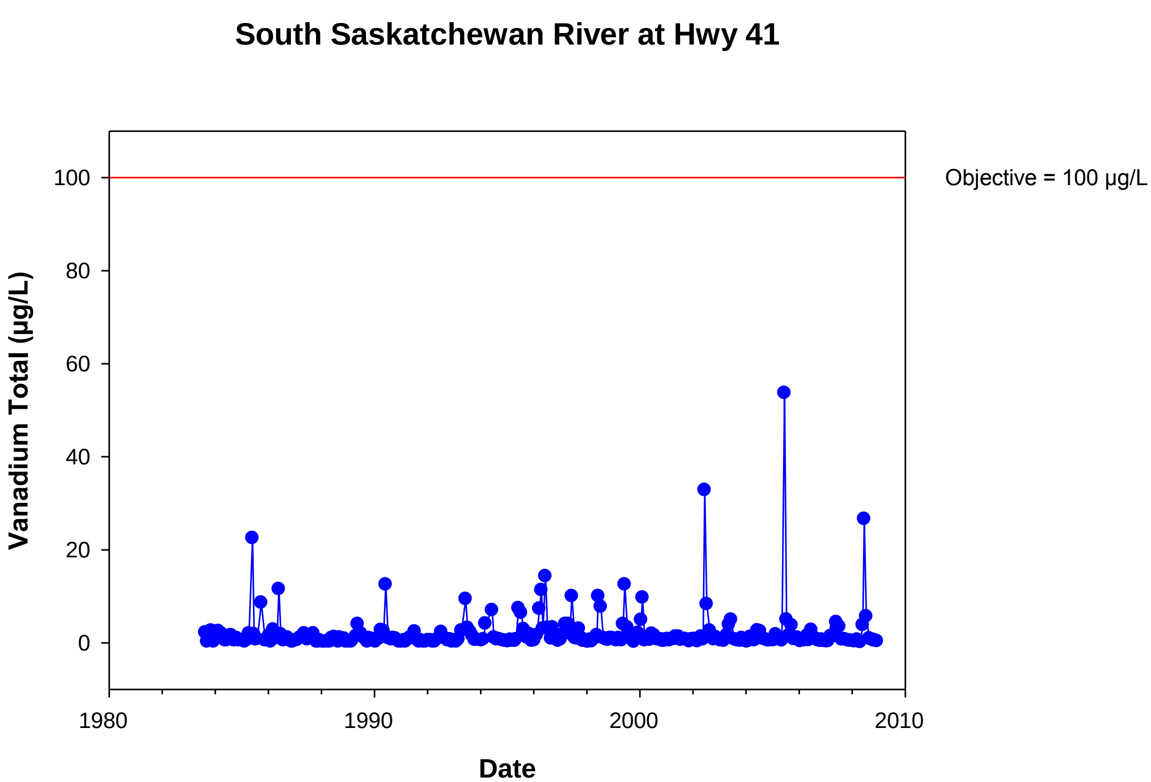

Figure 6-f26: South Saskatchewan River Vanadium Total

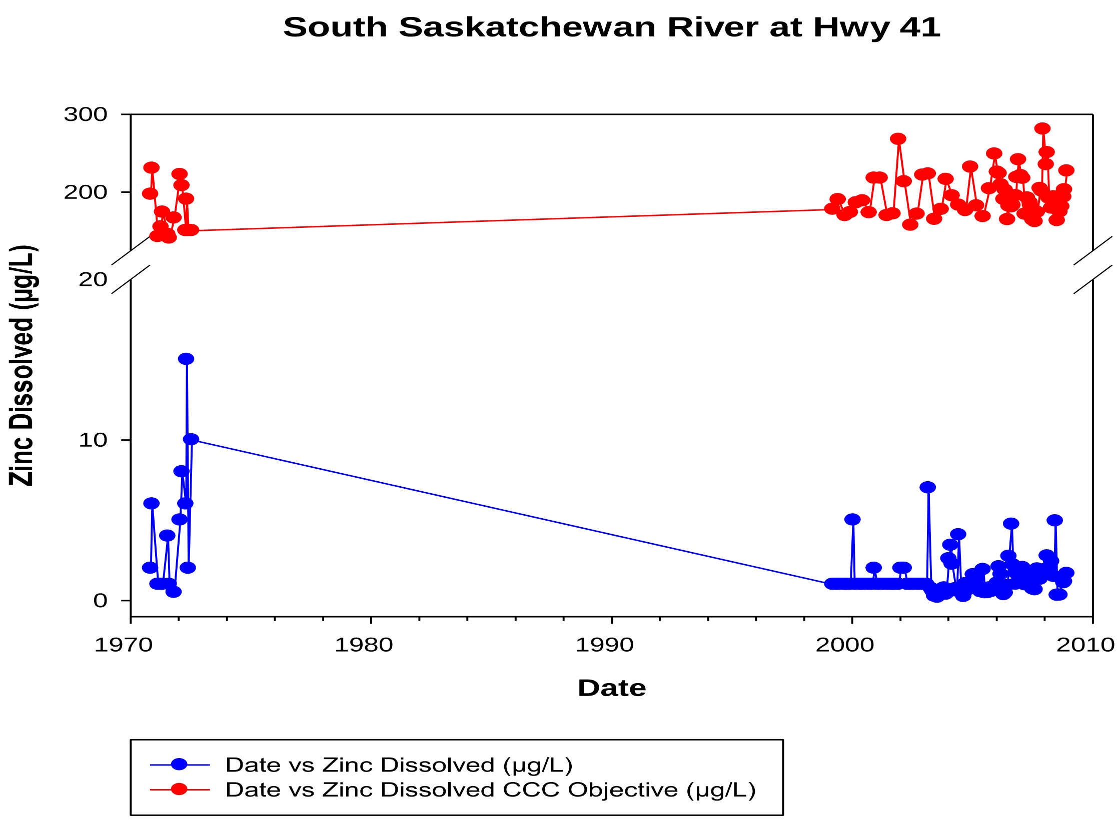

Figure 6-f27: South Saskatchewan River Zinc Dissolved

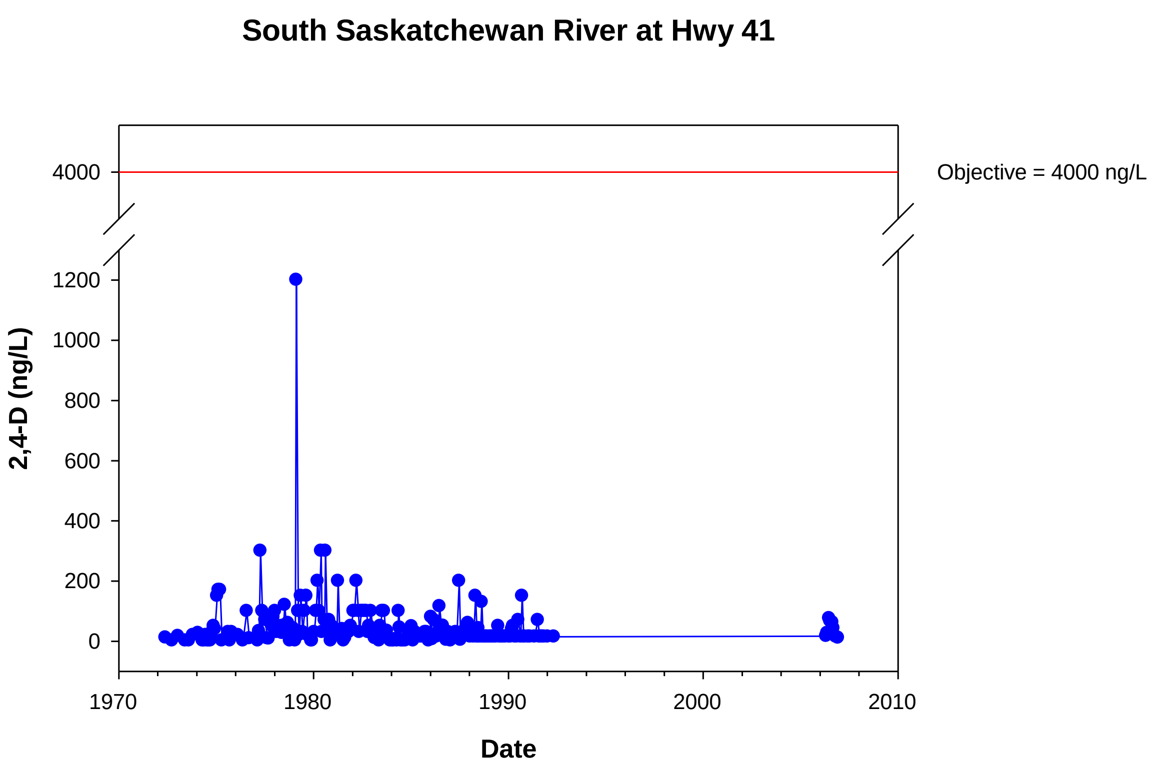

Figure 6-f28: South Saskatchewan River 2,4-D

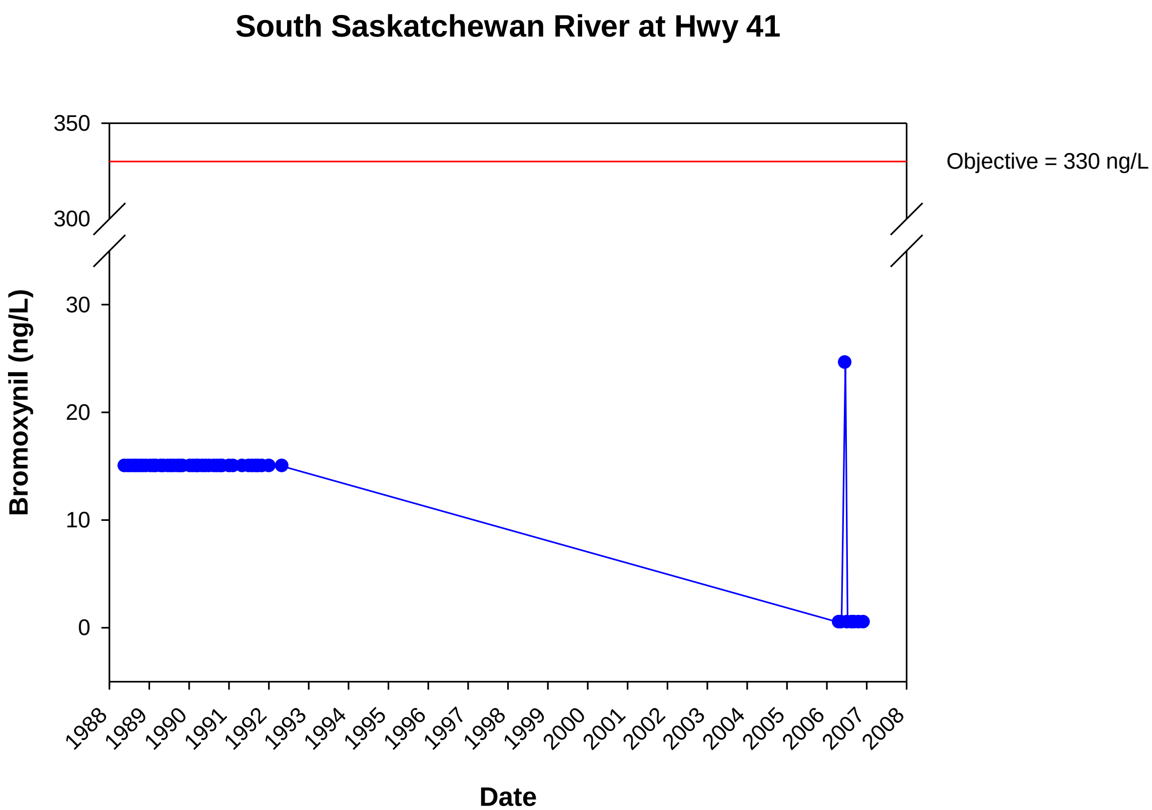

Figure 6-f29: South Saskatchewan River Bromoxynil

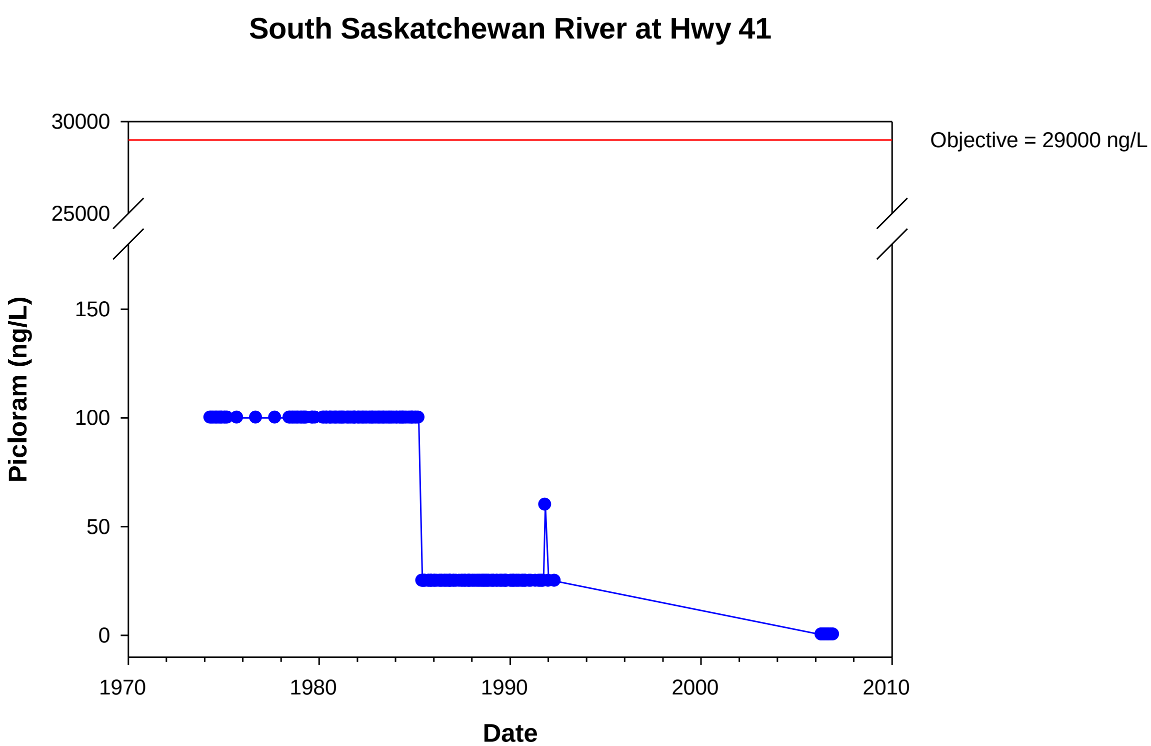

Figure 6-f30: South Saskatchewan River Picloram

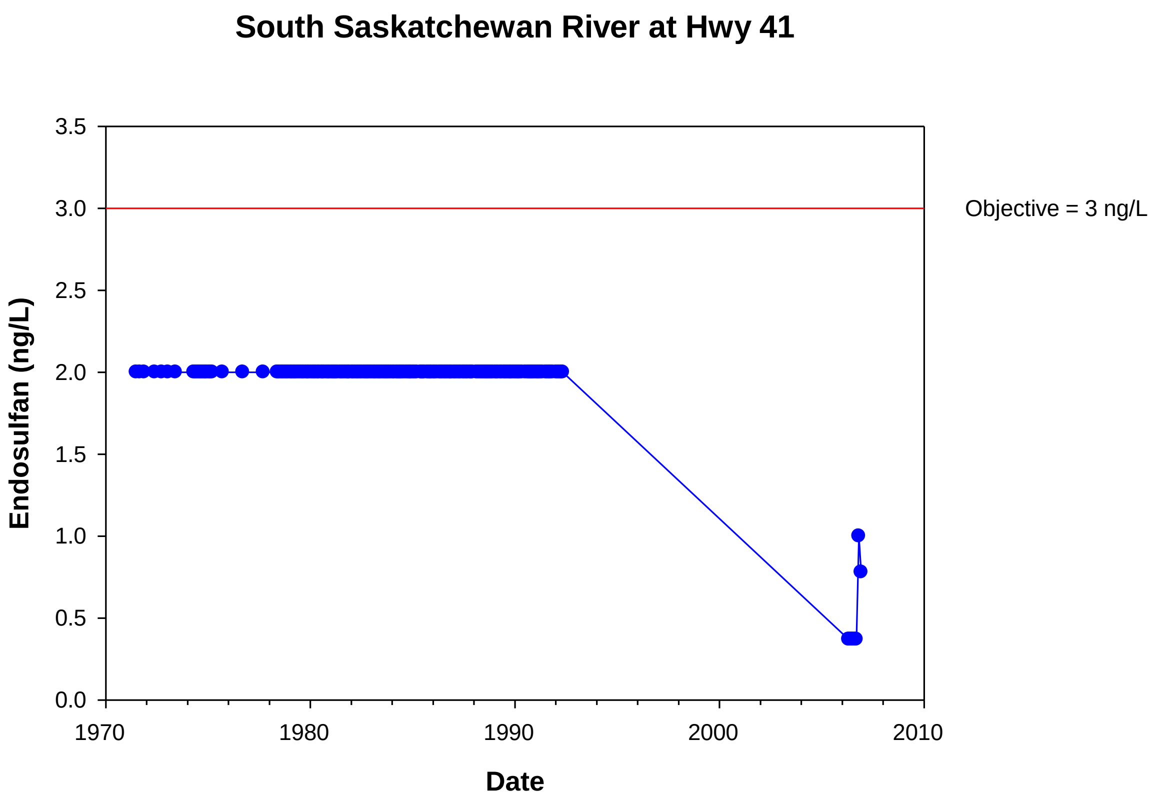

Figure 6-f31: South Saskatchewan River Endosulfan

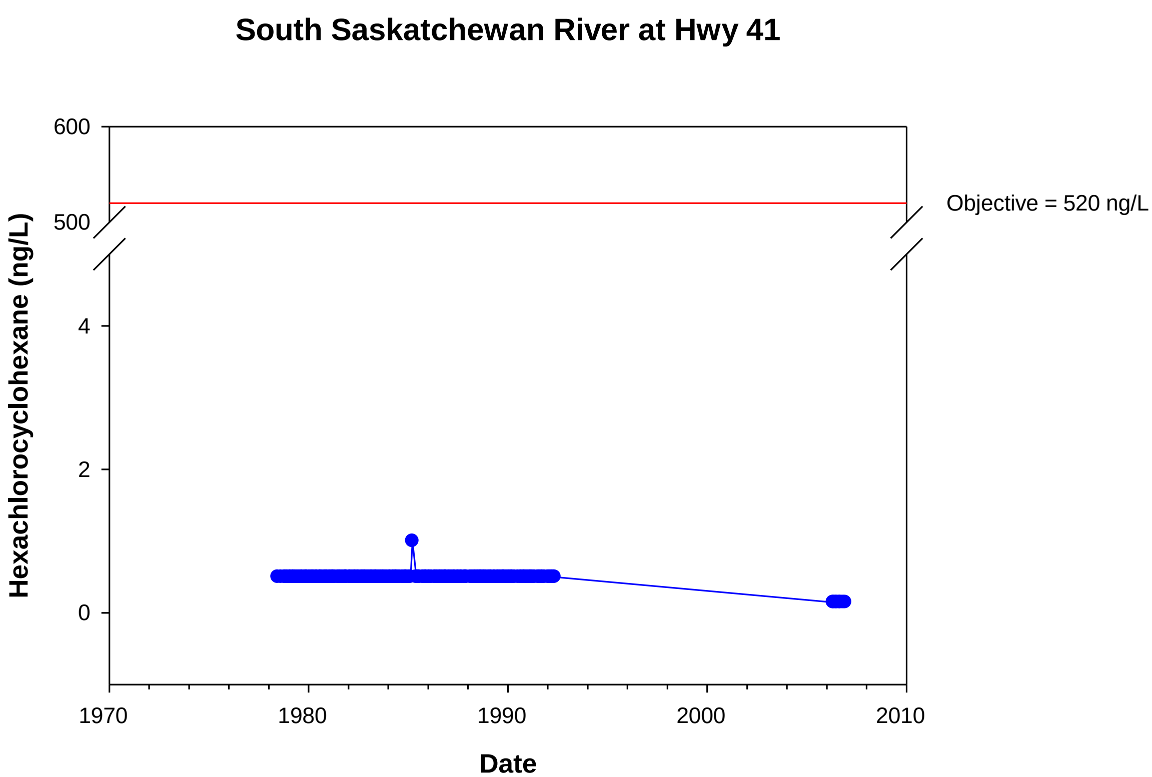

Figure 6-f32: South Saskatchewan River Hexachlorocyclohexane

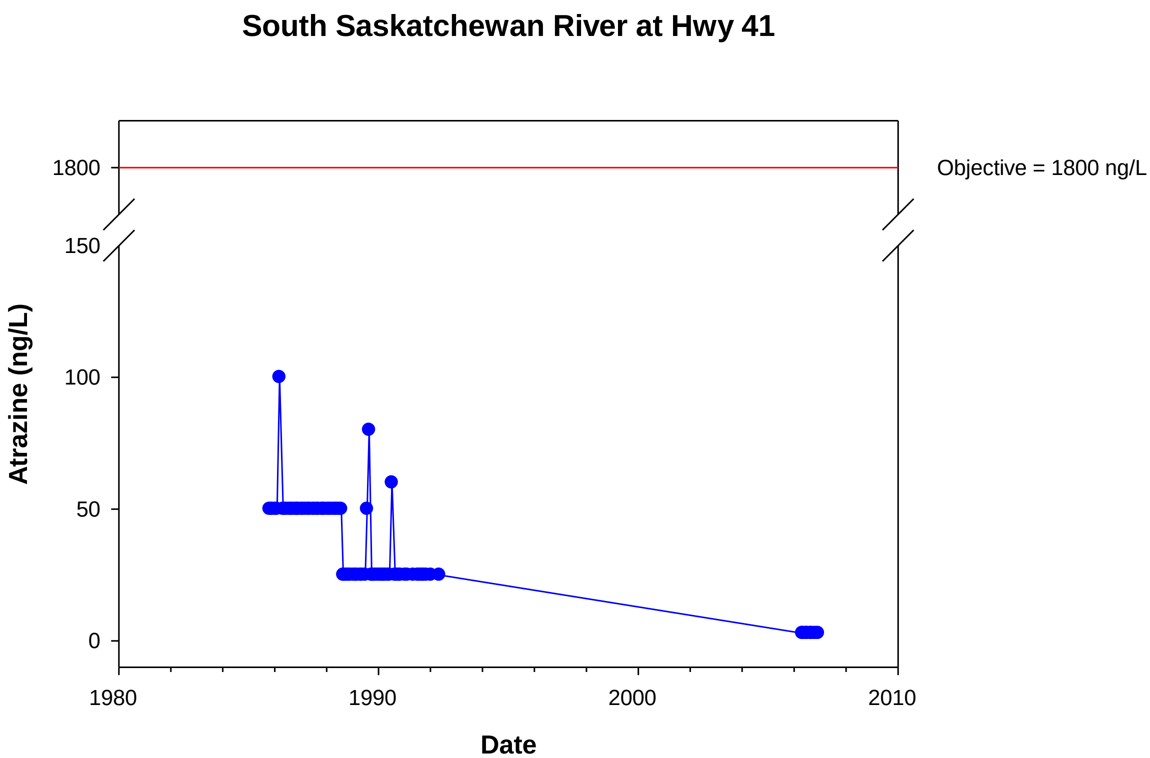

Figure 6-f33: South Saskatchewan River Atrazine

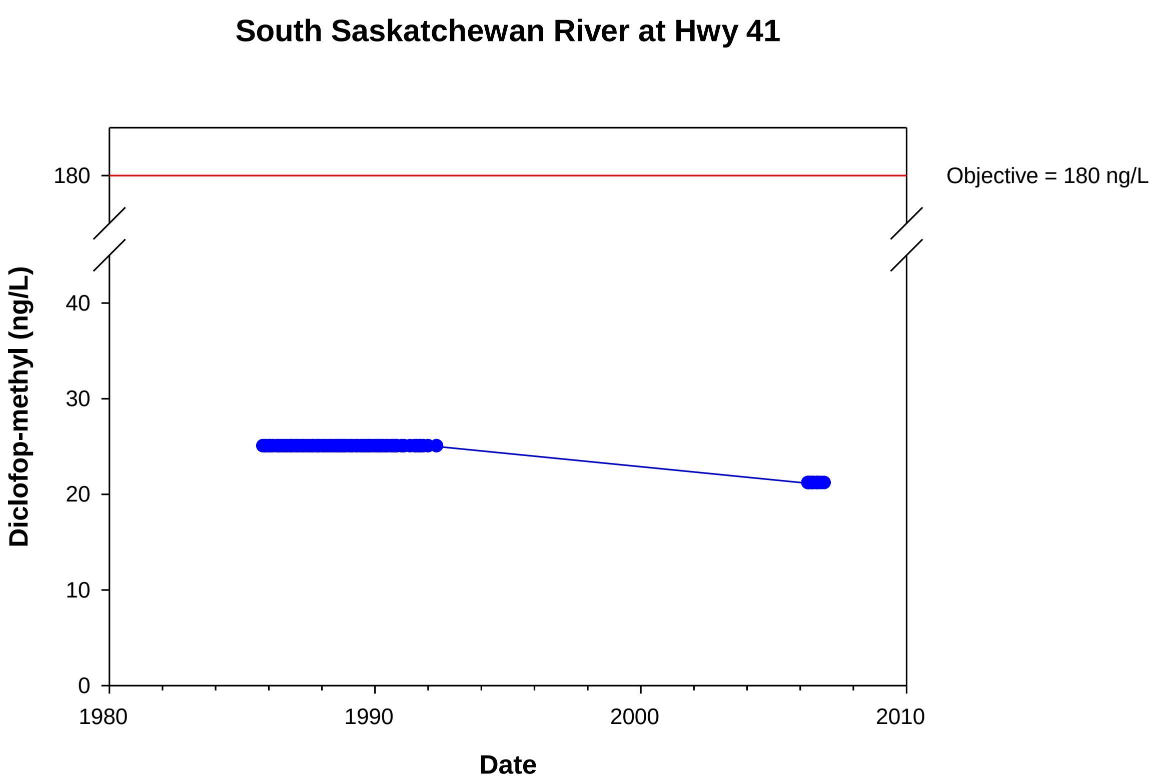

Figure 6-f34: South Saskatchewan River Diclofop-methyl

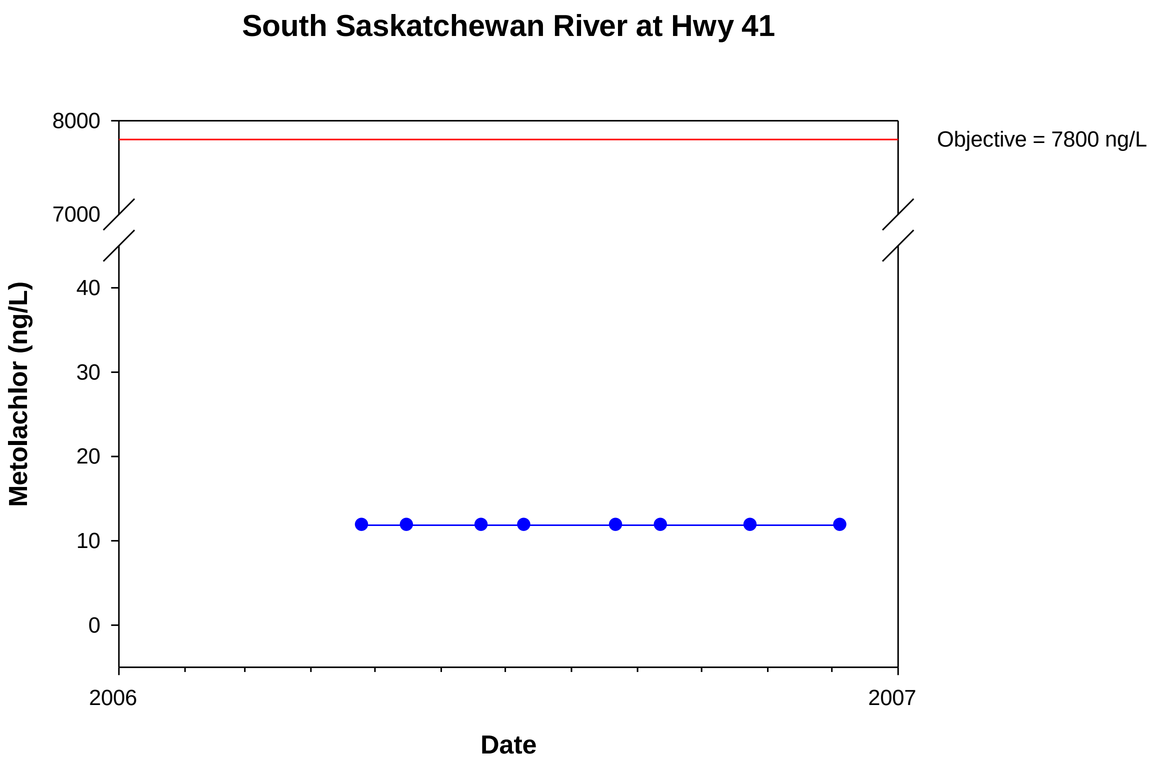

Figure 6-f35: South Saskatchewan River Metolachlor

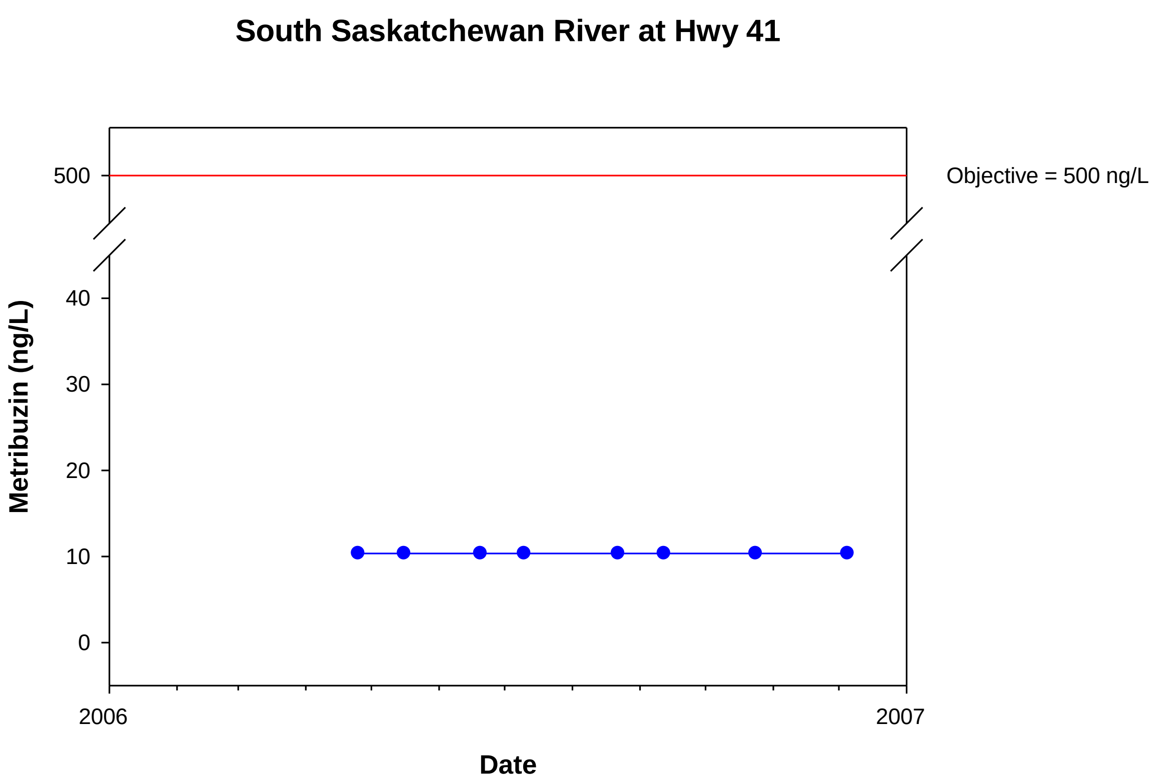

Figure 6-f36: South Saskatchewan River Metribuzin

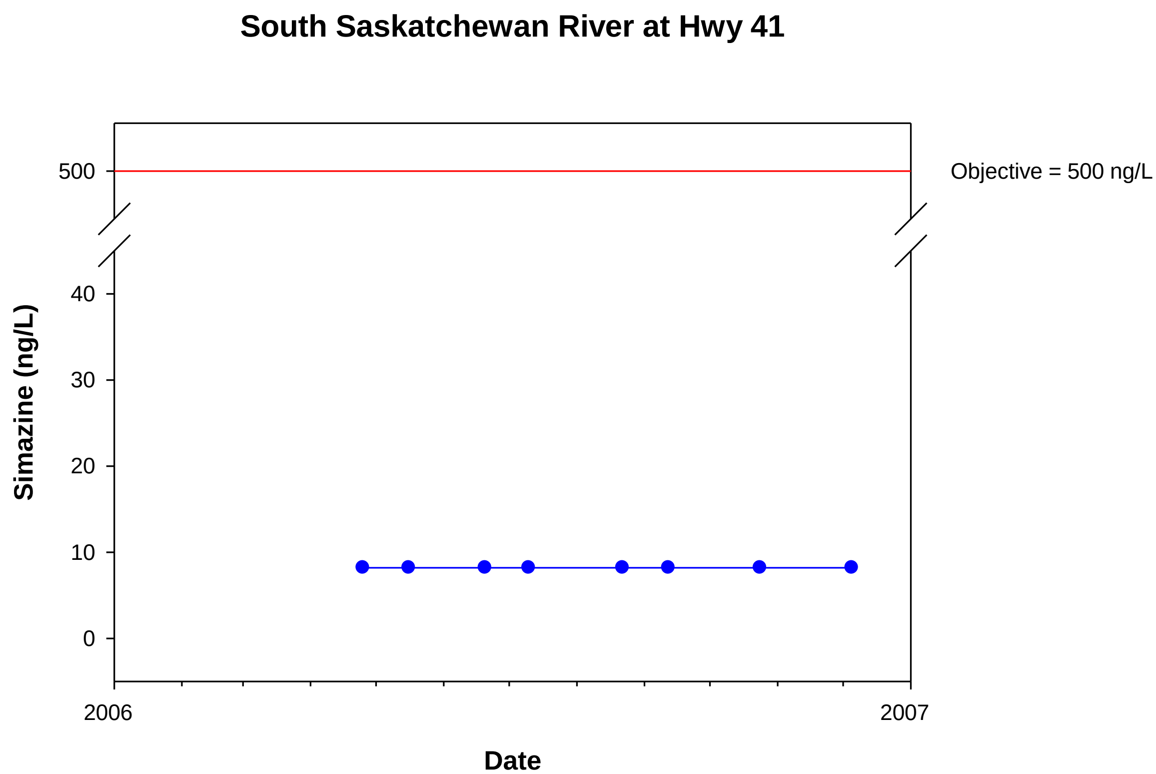

Figure 6-f37: South Saskatchewan River Simazine

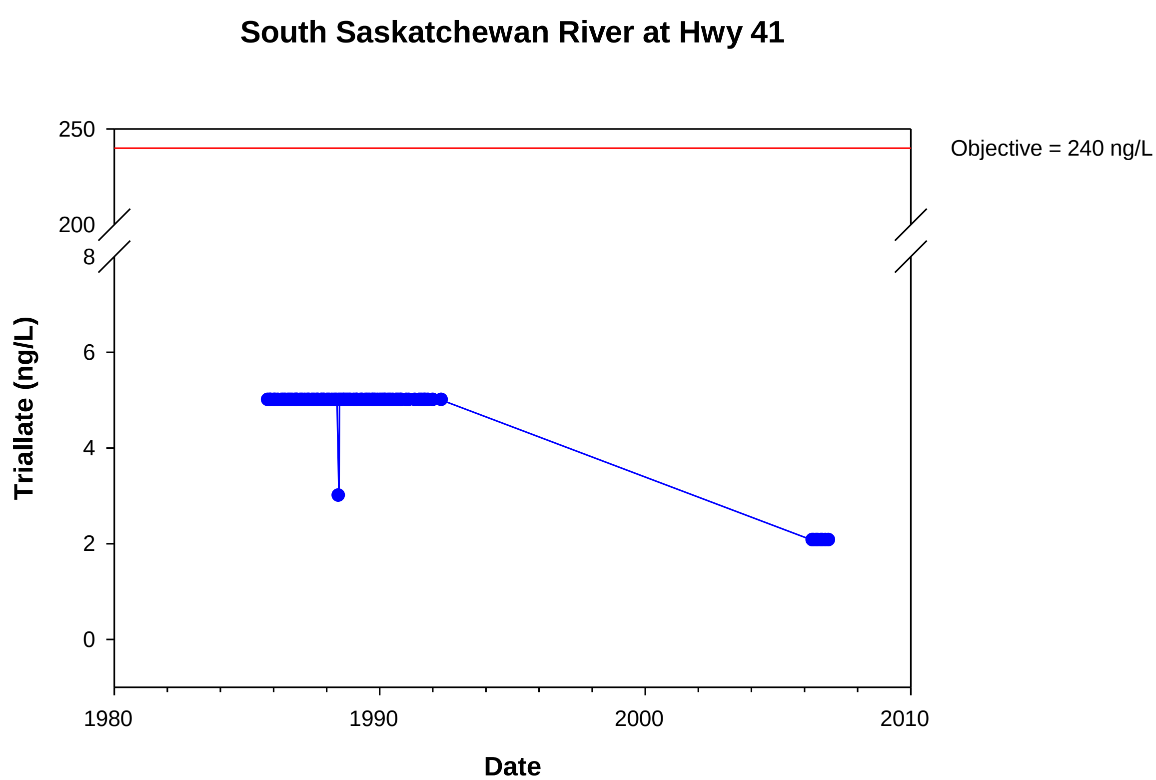

Figure 6-f38: South Saskatchewan River Triallate

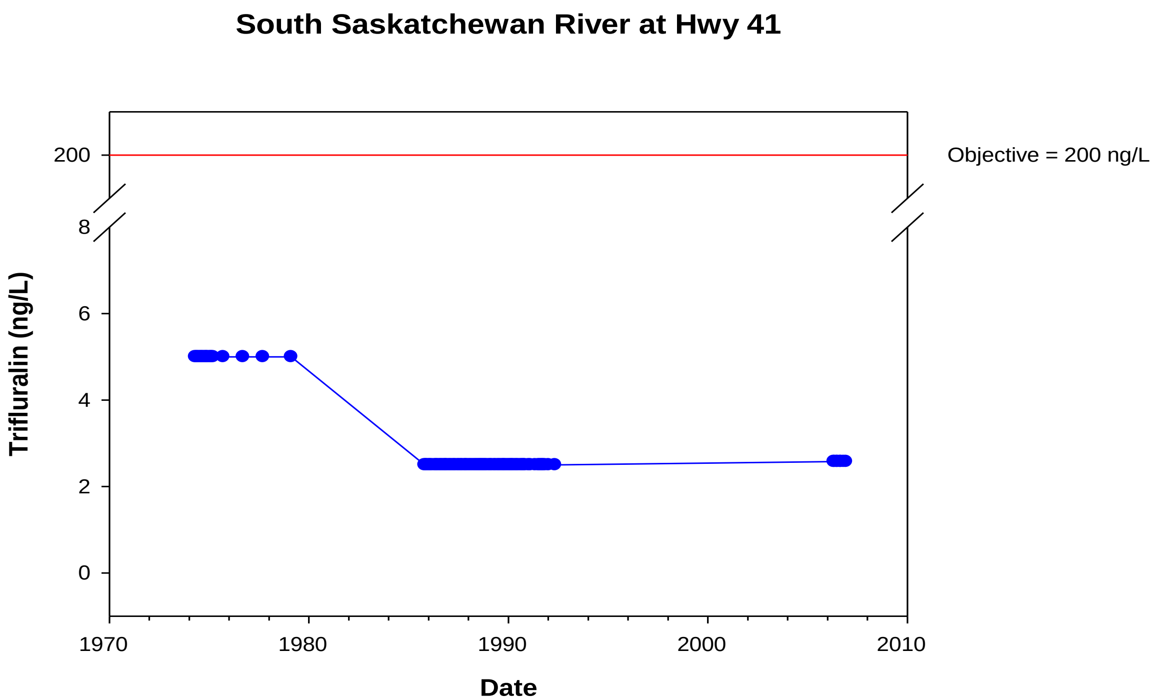

Figure 6-f39: South Saskatchewan River Trifluralin

Appendix 6-g: Assiniboine River

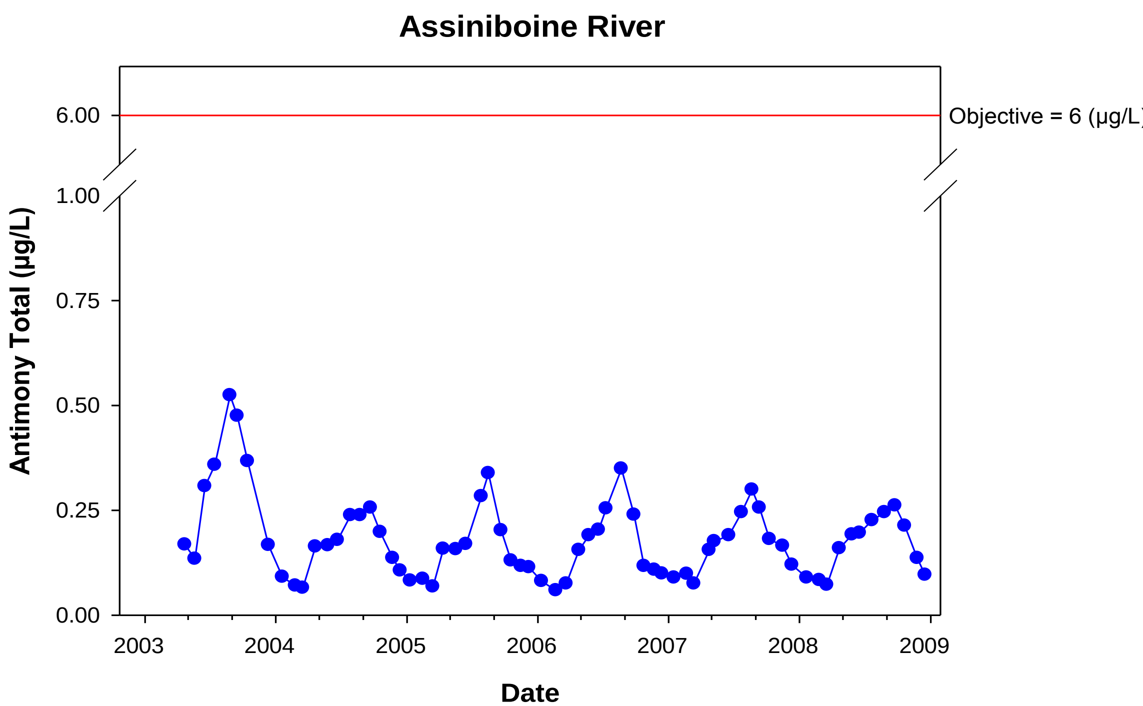

Figure 6-g1: Assiniboine River Antimony Total

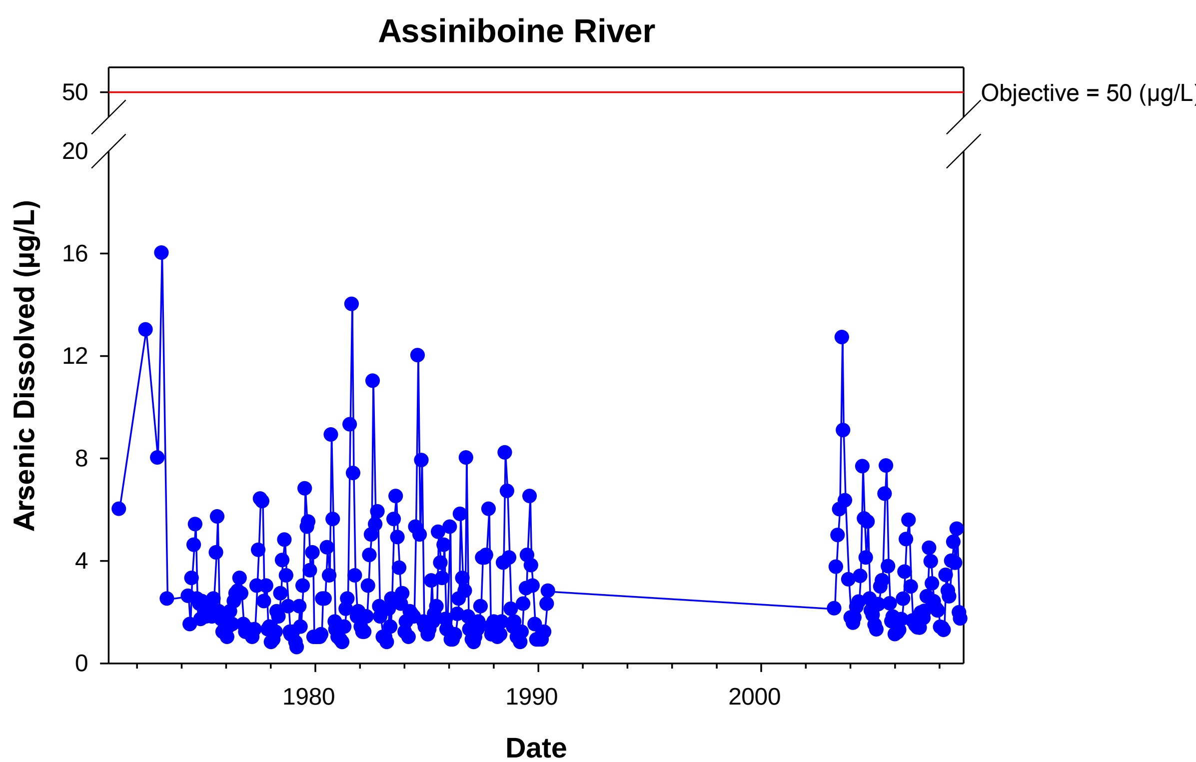

Figure 6-g2: Assiniboine River Arsenic Dissolved

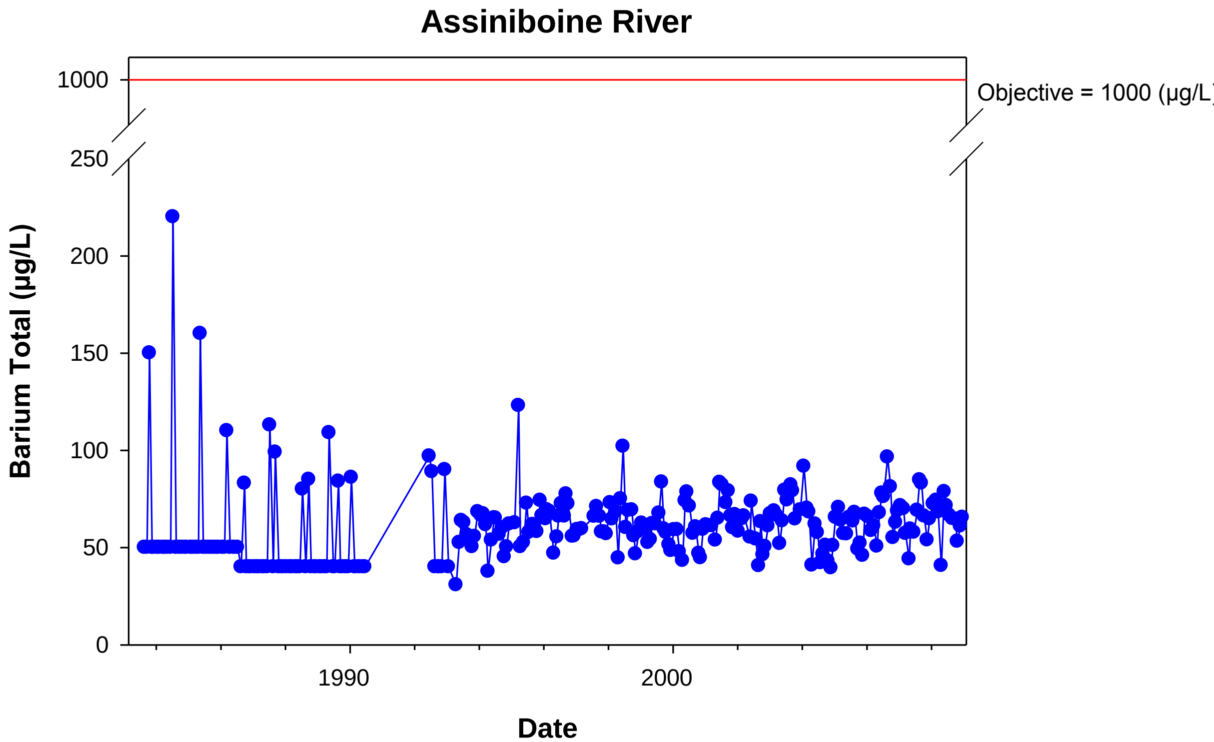

Figure 6-g3: Assiniboine River Barium Total

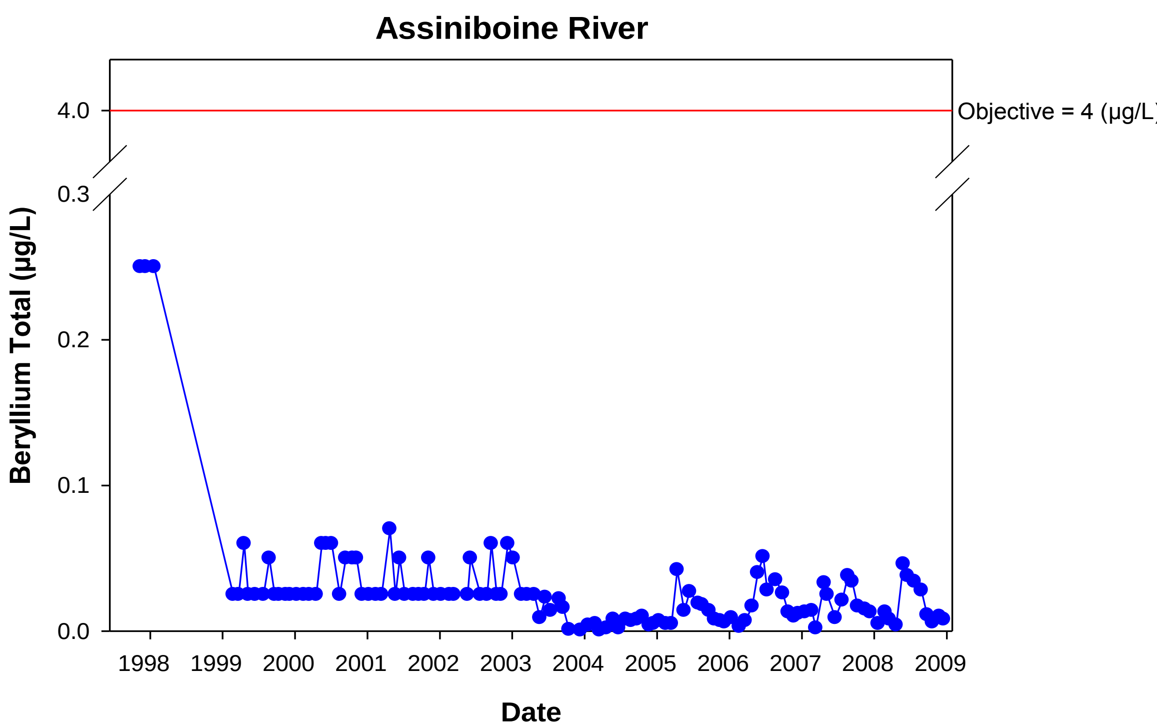

Figure 6-g4: Assiniboine River Beryllium Total

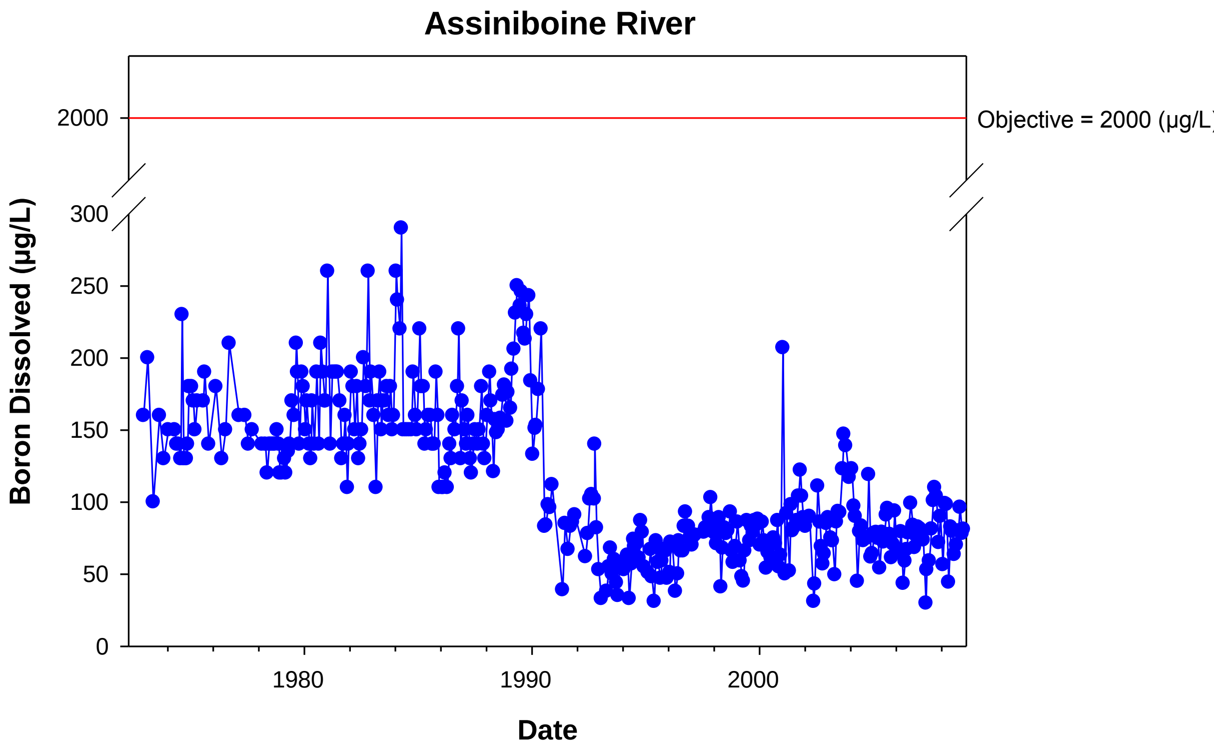

Figure 6-g5: Assiniboine River Boron Dissolved

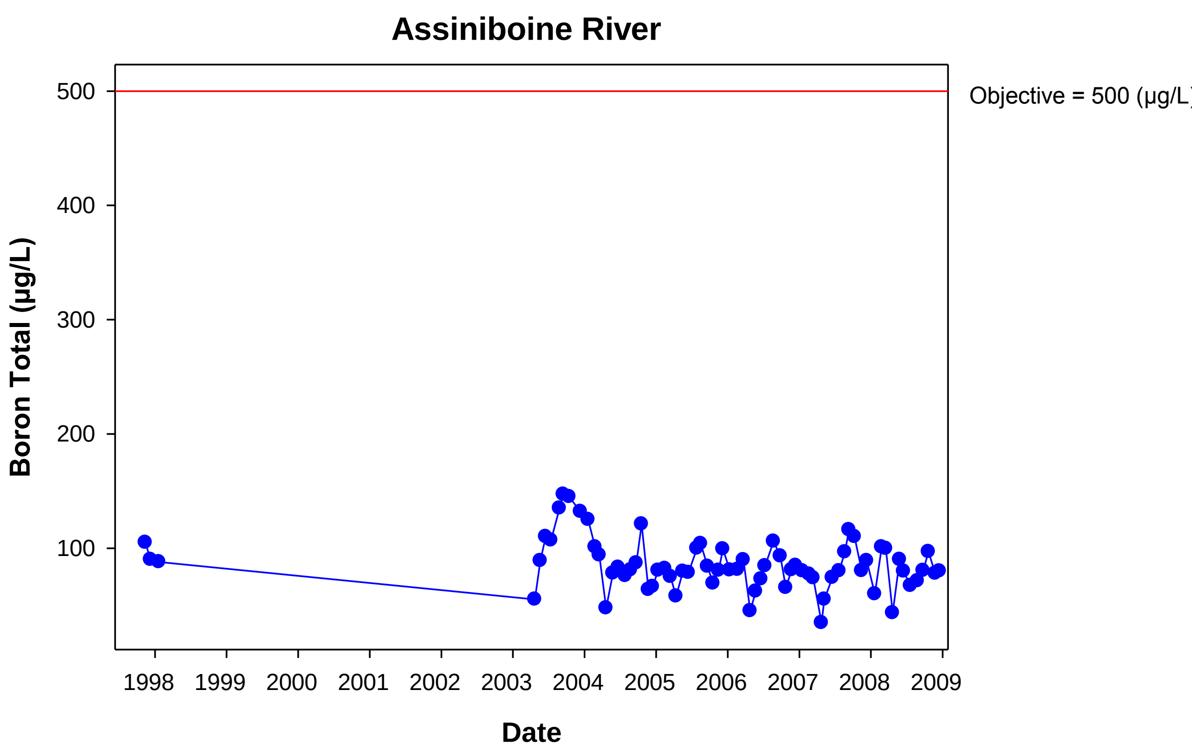

Figure 6-g6: Assiniboine River Boron Total

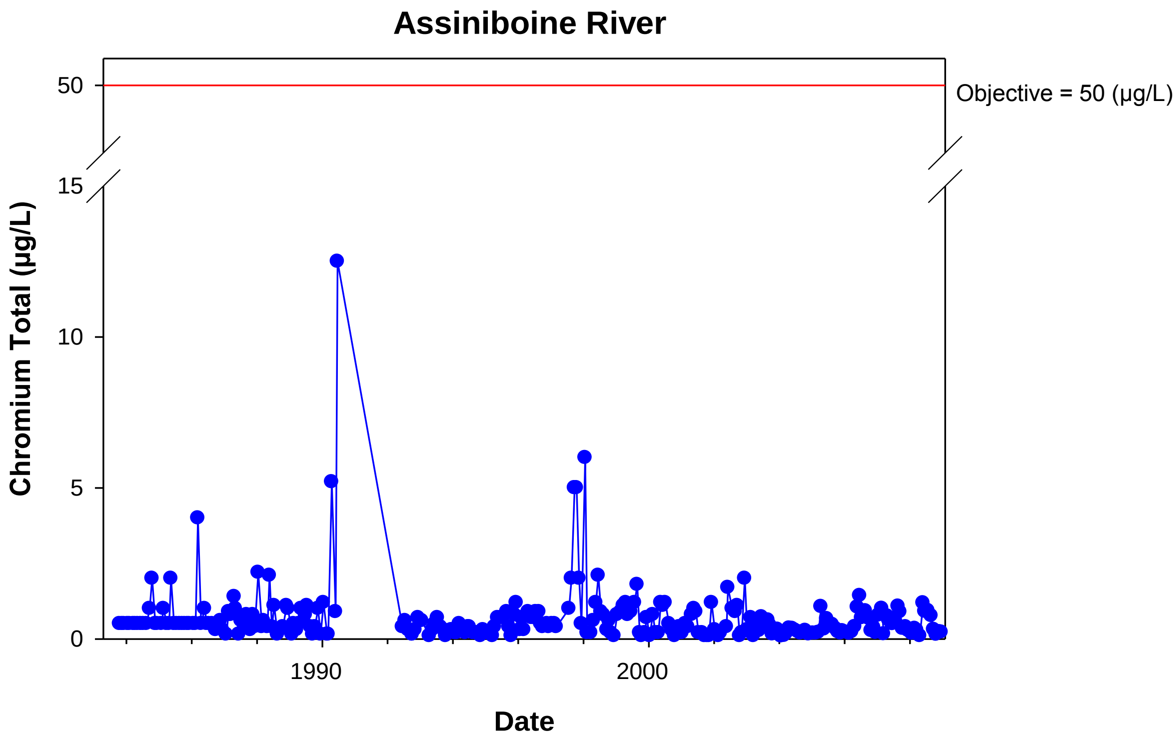

Figure 6-g9: Assiniboine River Chromium Total

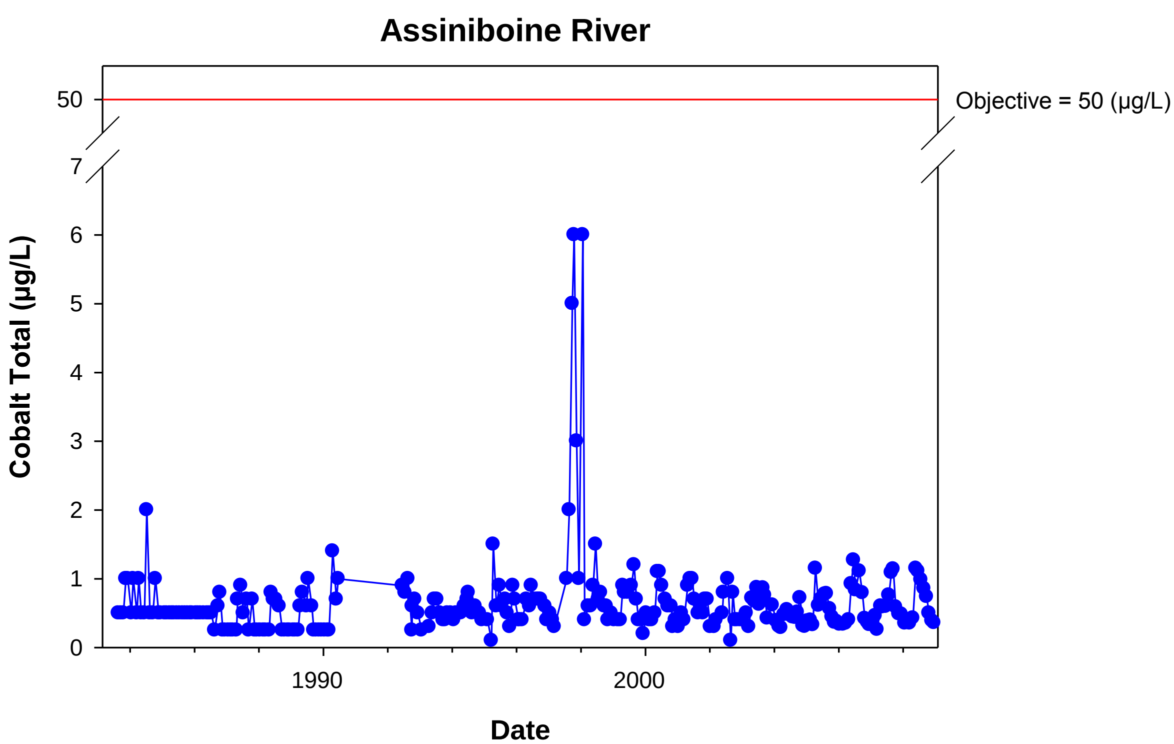

Figure 6-g10: Assiniboine River Cobalt Total

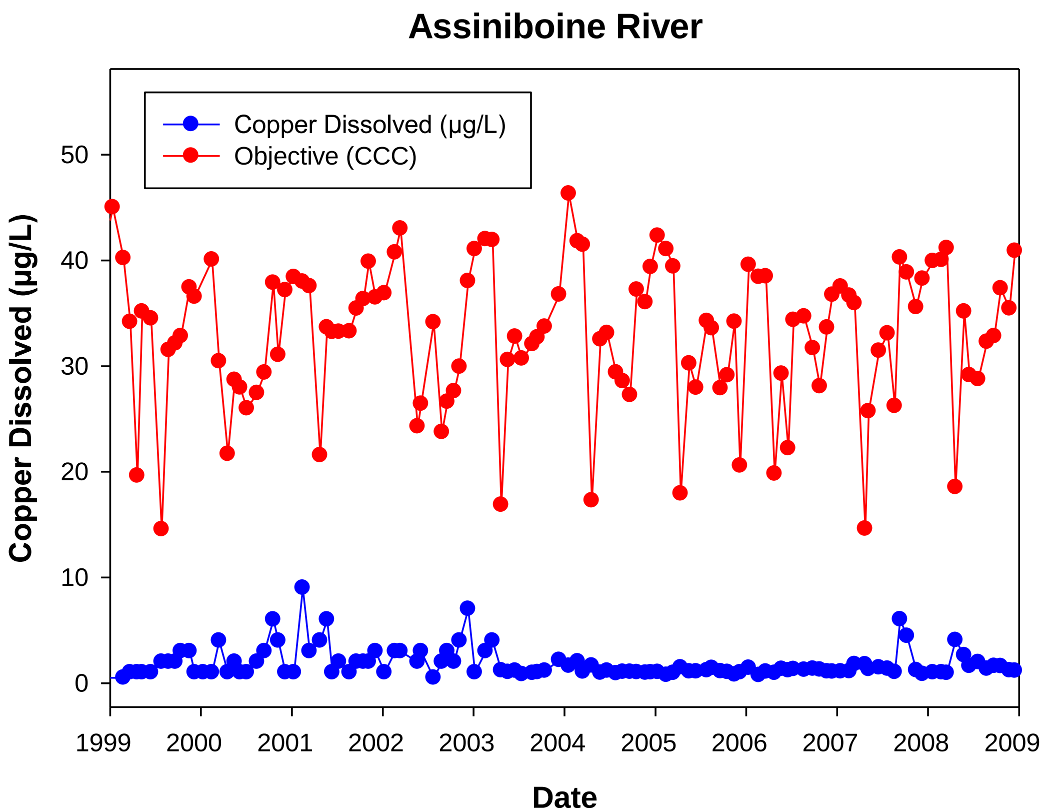

Figure 6-g11: Assiniboine River Copper Dissolved

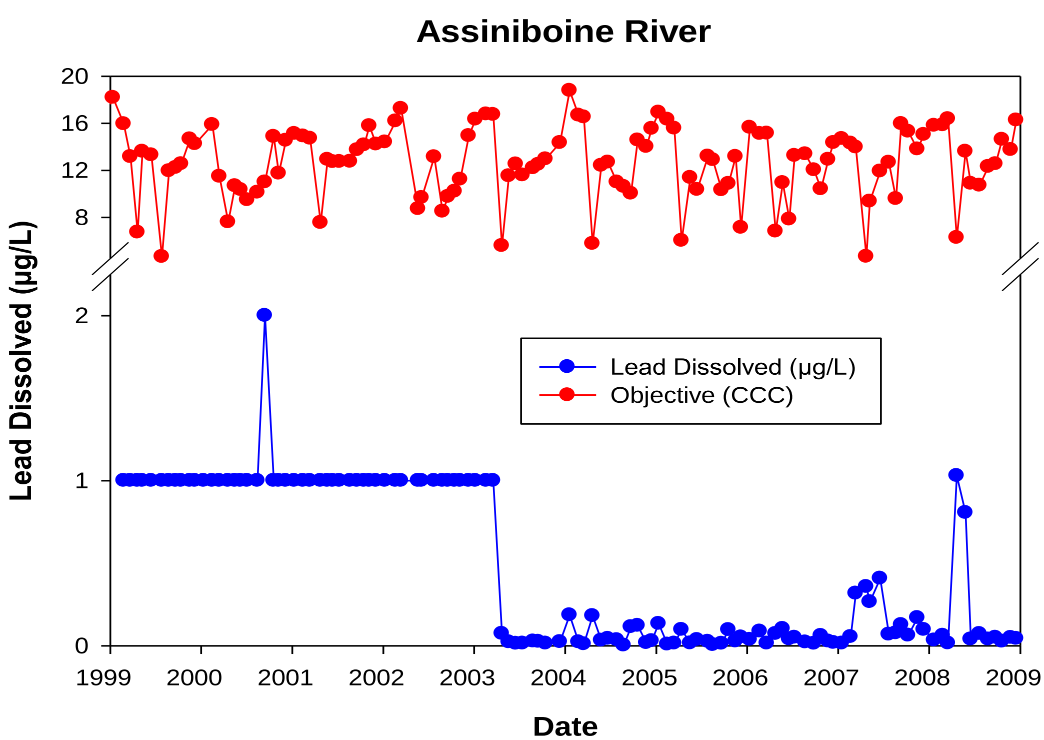

Figure 6-g12: Assiniboine River Lead Dissolved

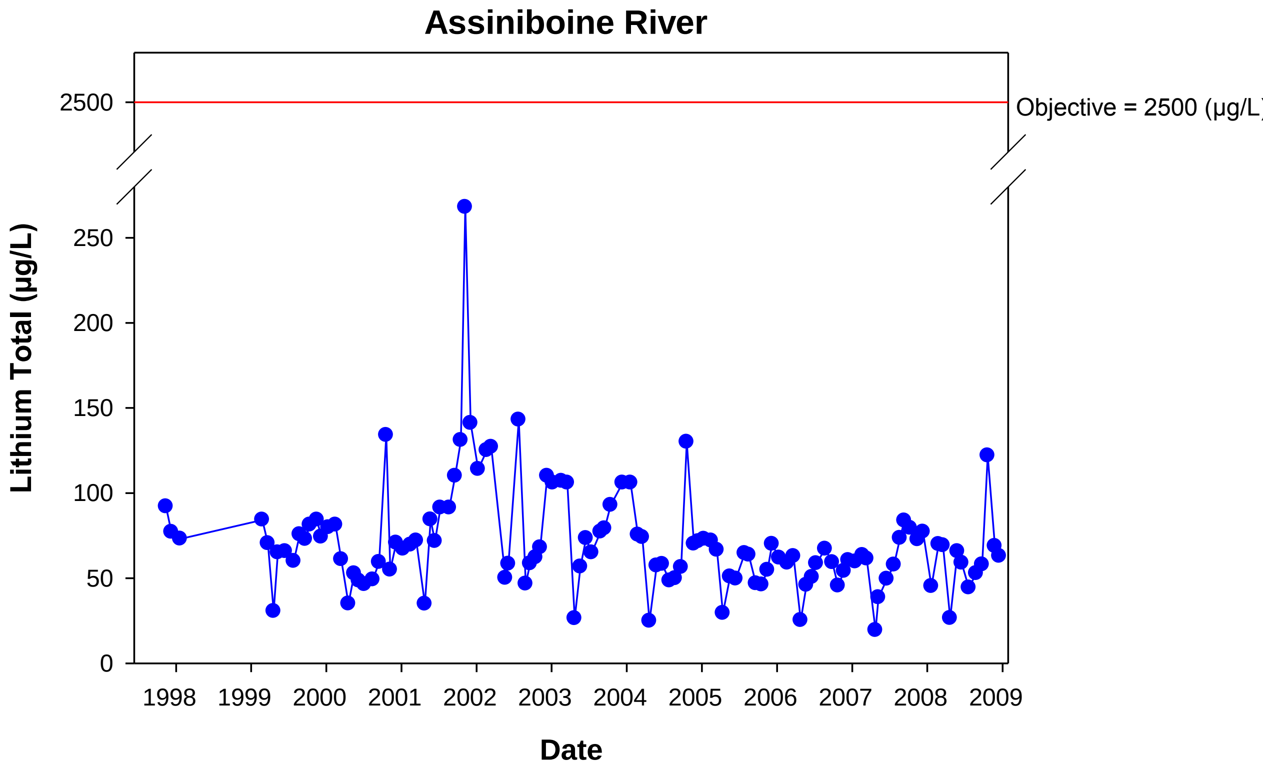

Figure 6-g13: Assiniboine River Lithium Total

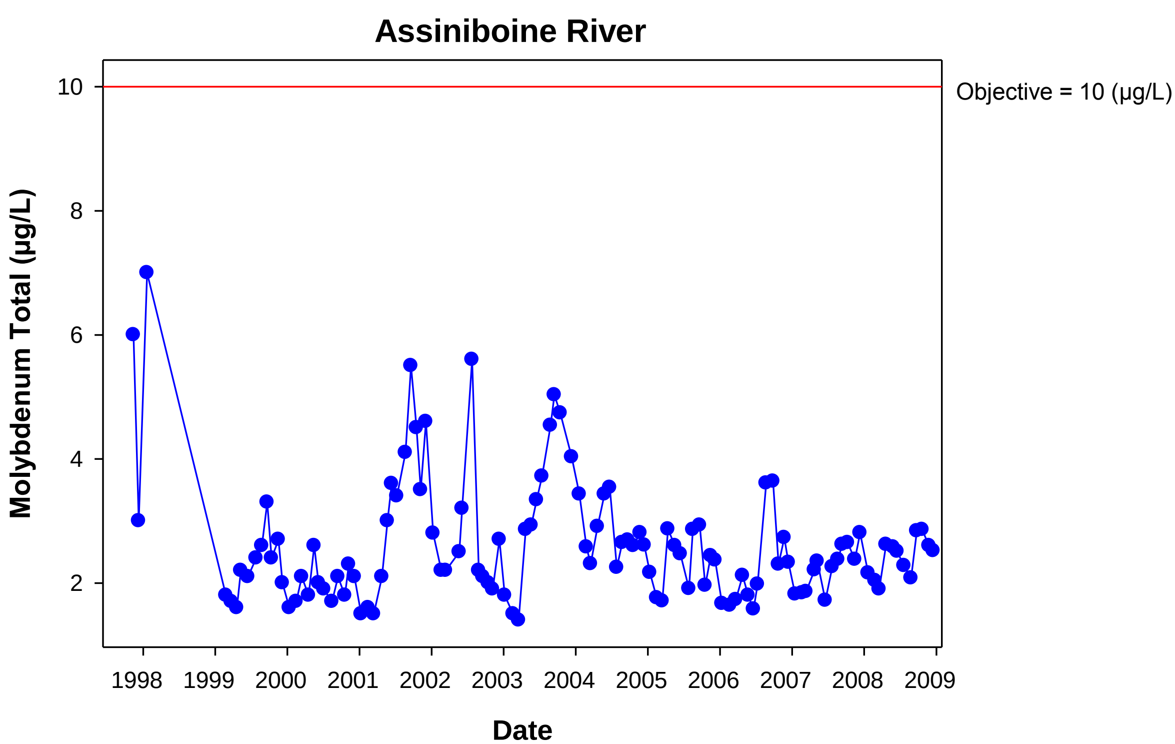

Figure 6-g14: Assiniboine River Molybdenum Total

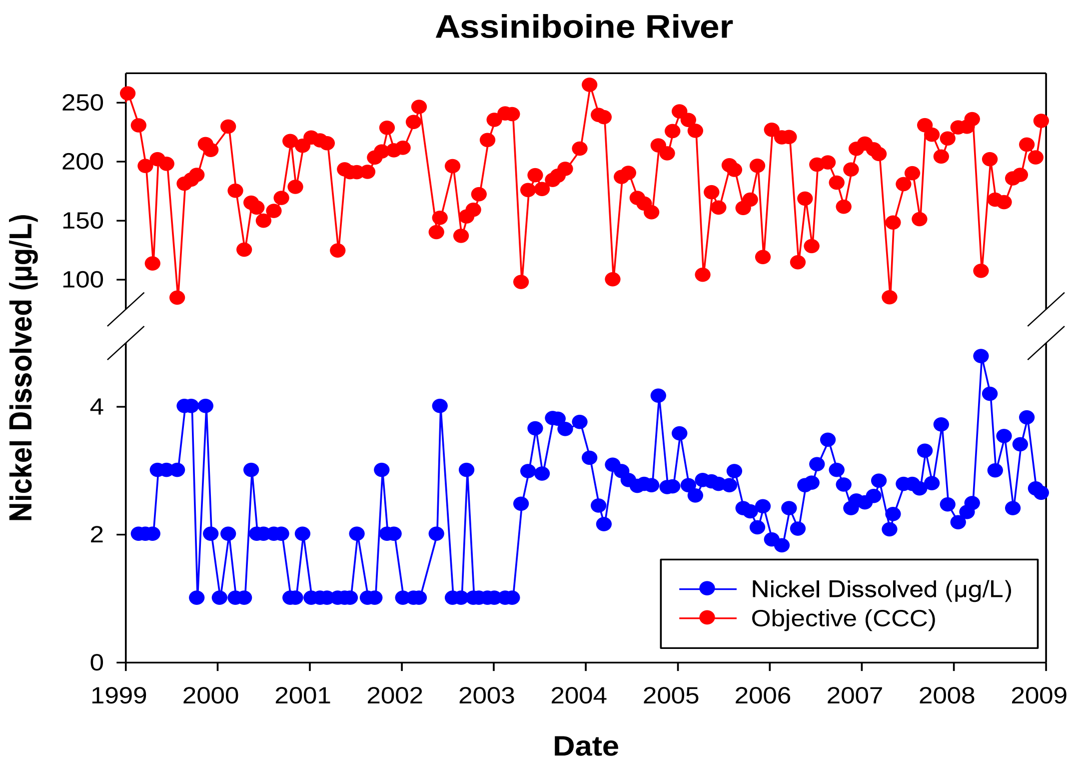

Figure 6-g15: Assiniboine River Nickel Dissolved

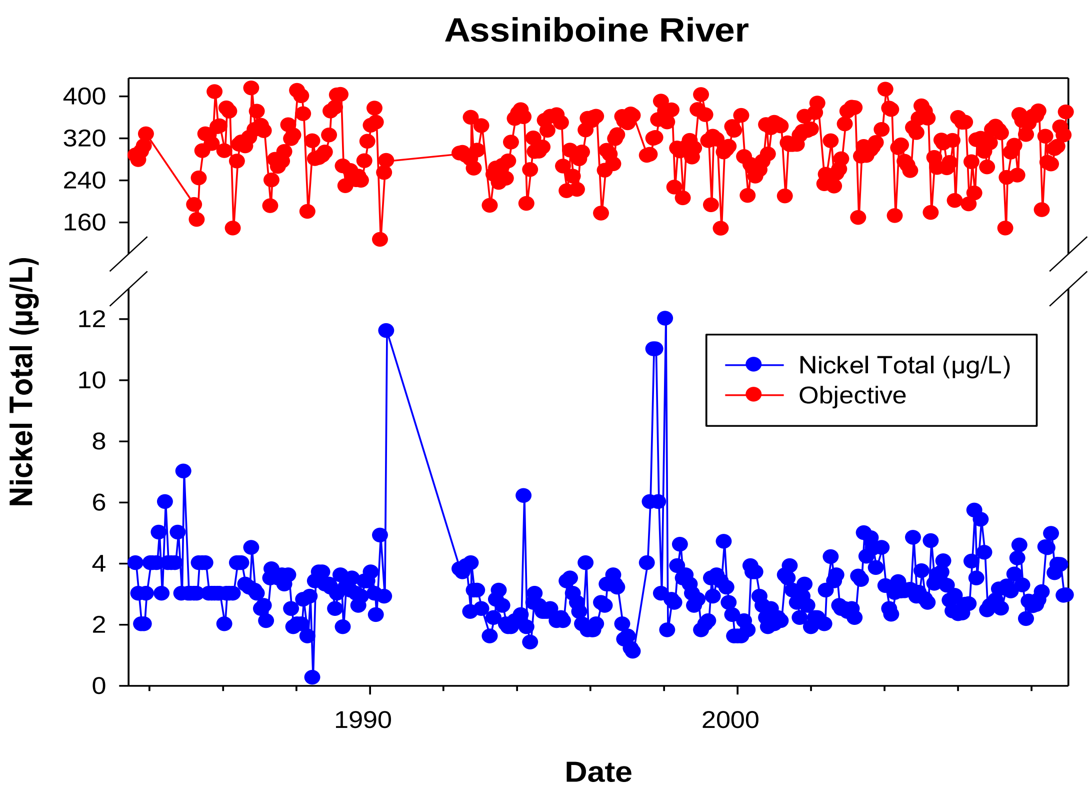

Figure 6-g16: Assiniboine River Nickel Total

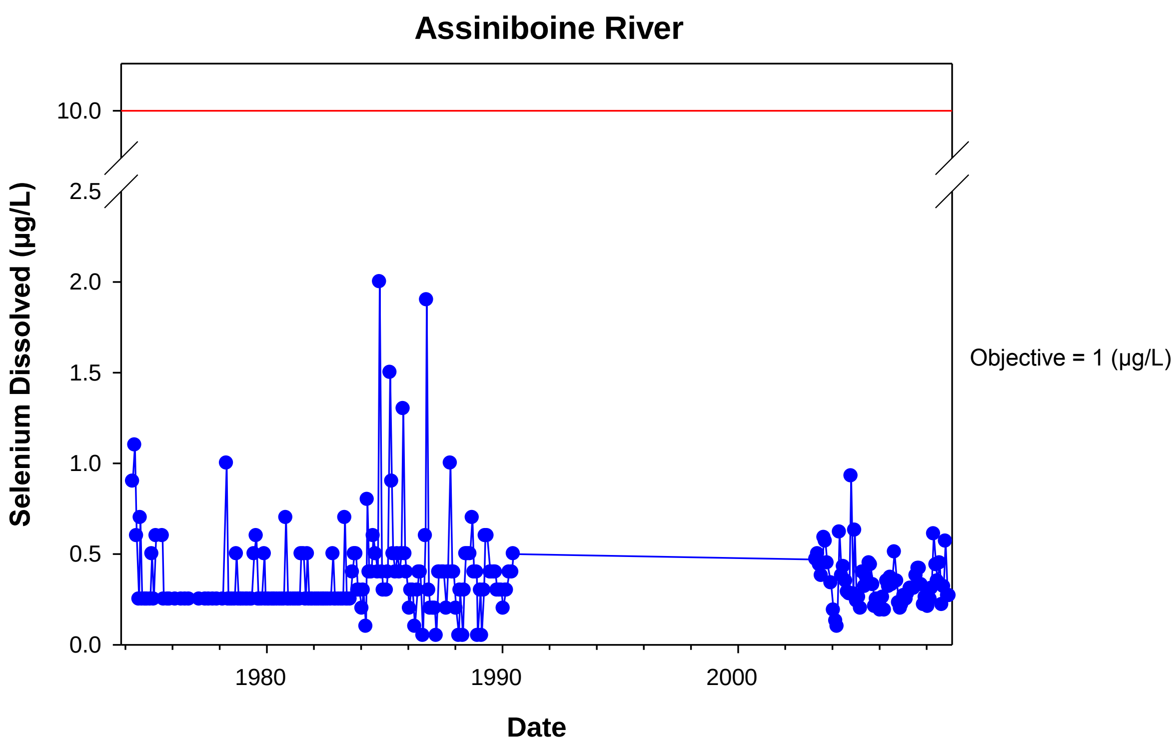

Figure 6-g17: Assiniboine River Selenium Dissolved

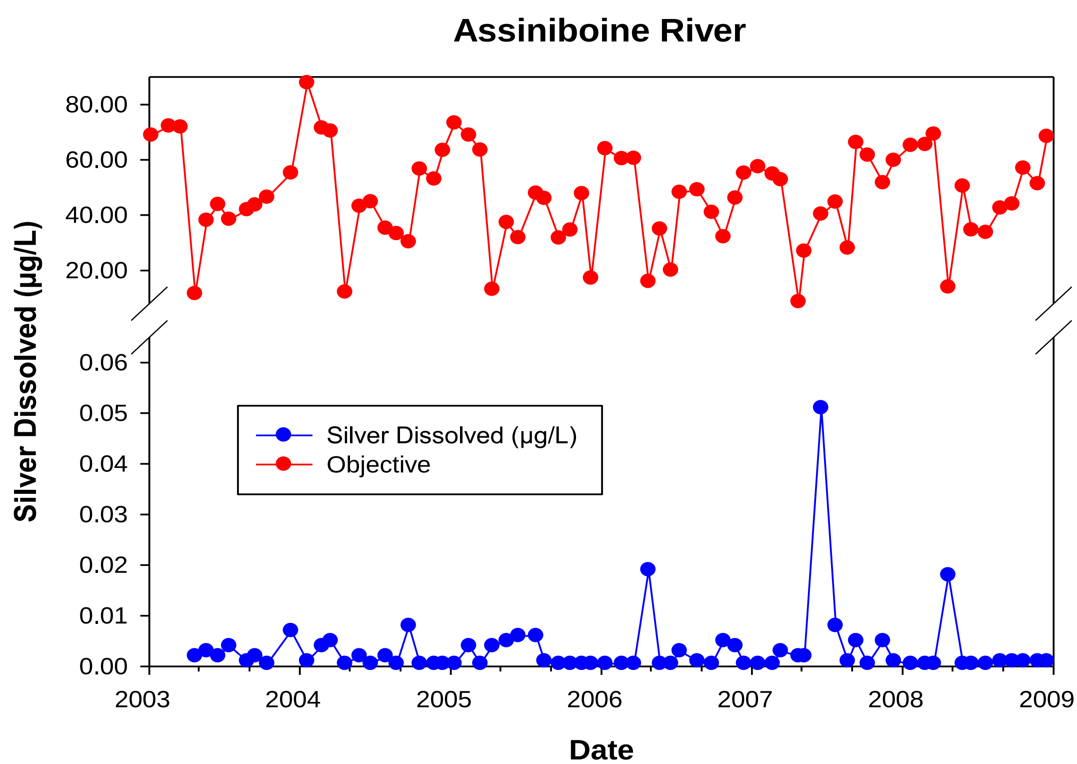

Figure 6-g18: Assiniboine River Silver Dissolved

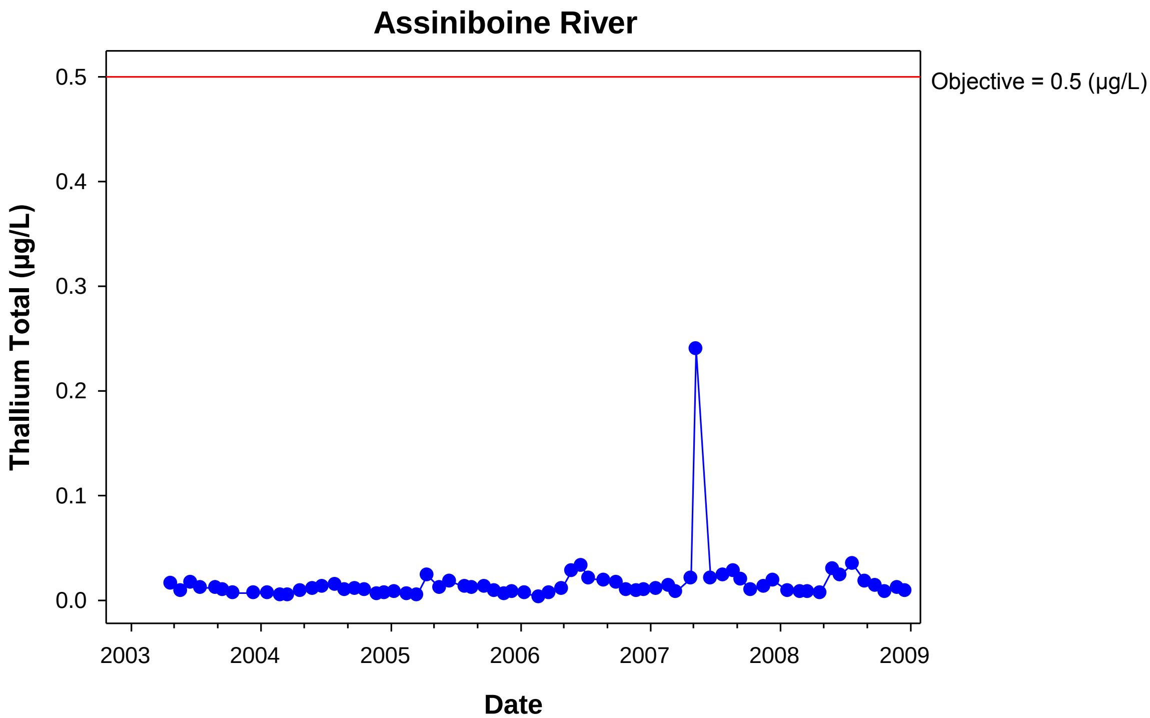

Figure 6-g19: Assiniboine River Thallium Total

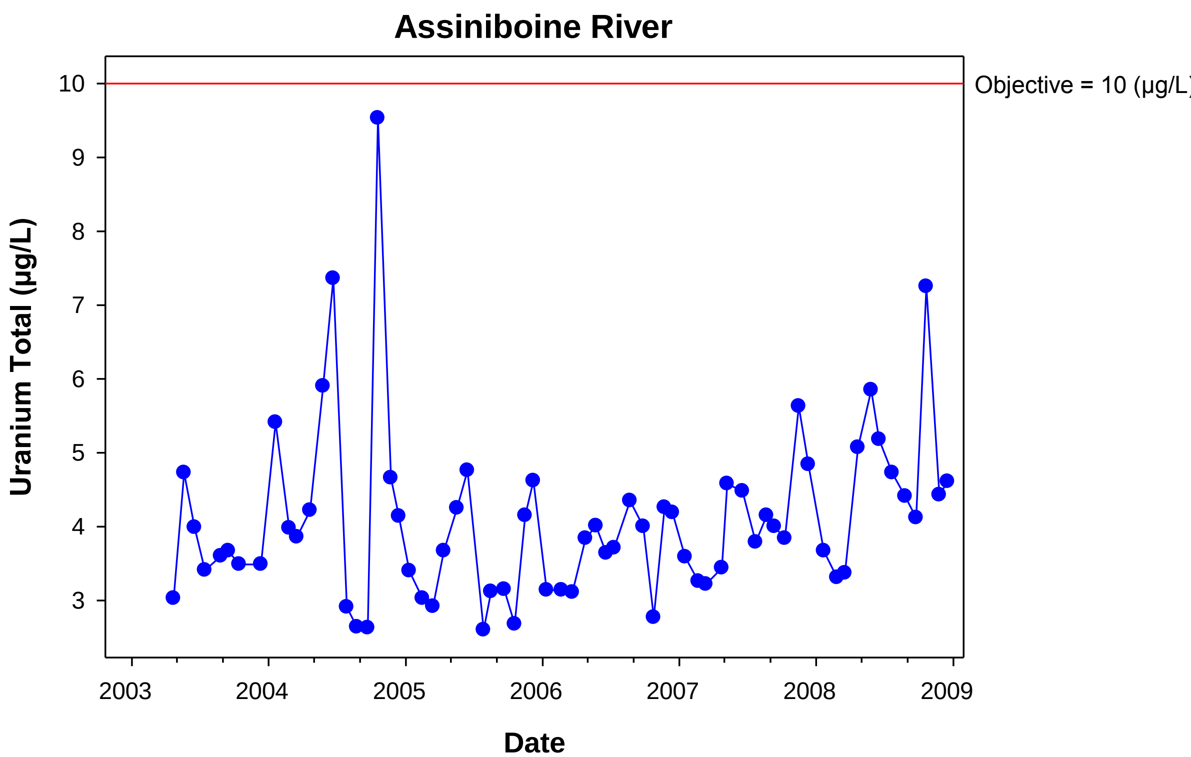

Figure 6-g20: Assiniboine River Uranium Total

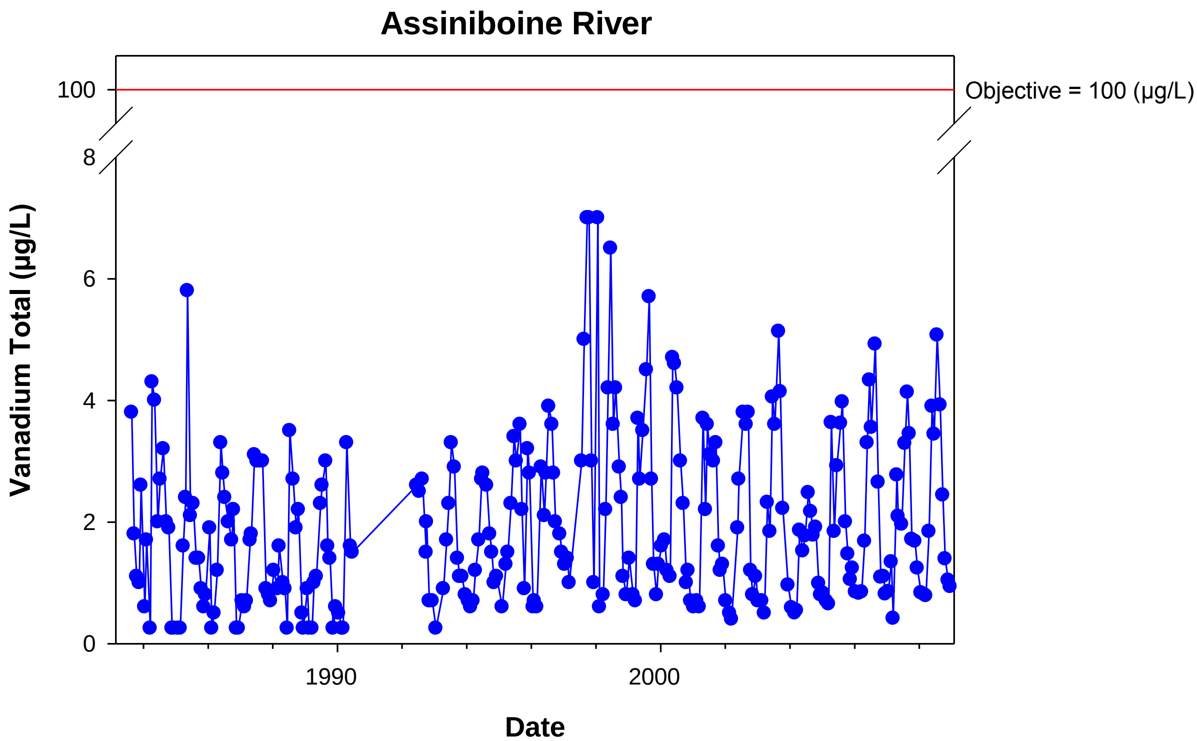

Figure 6-g21: Assiniboine River Vanadium Total

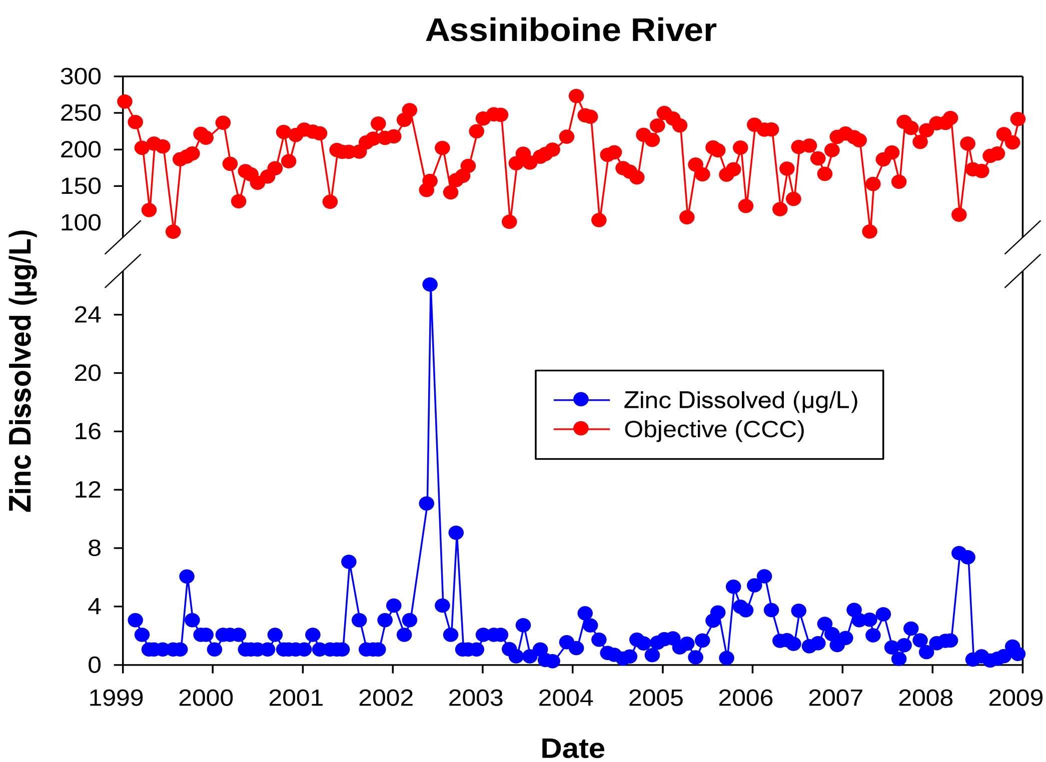

Figure 6-g22: Assiniboine River Zinc Dissolved

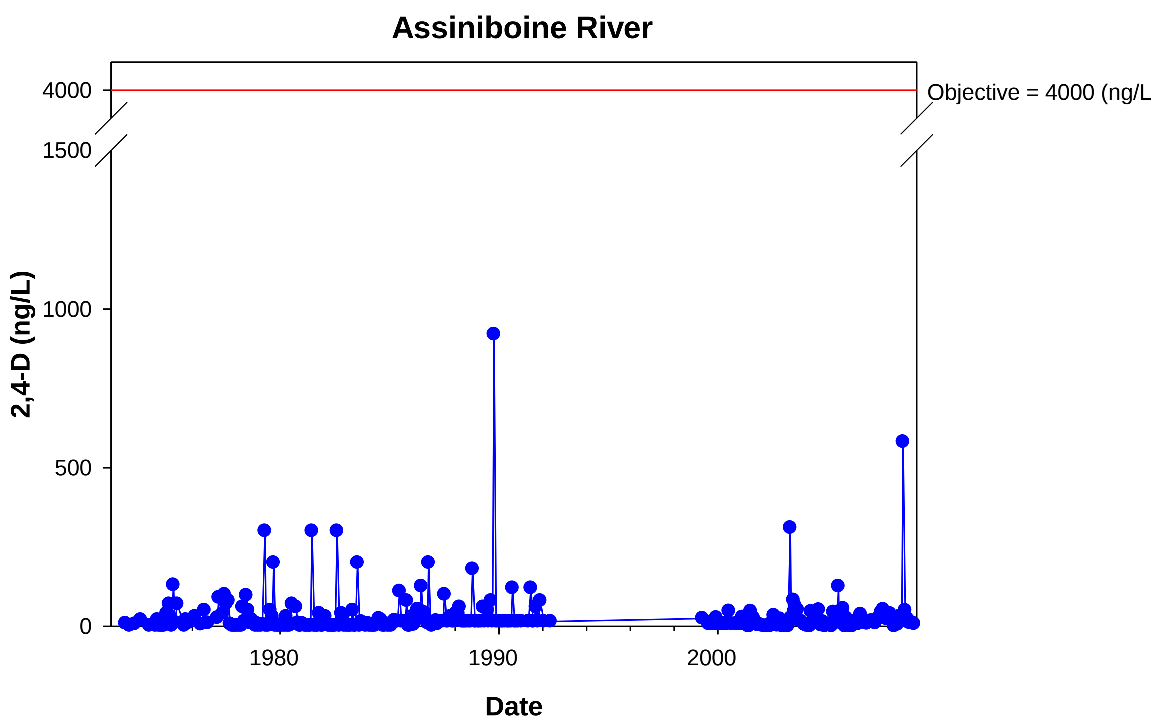

Figure 6-g23: Assiniboine River 2,4-D

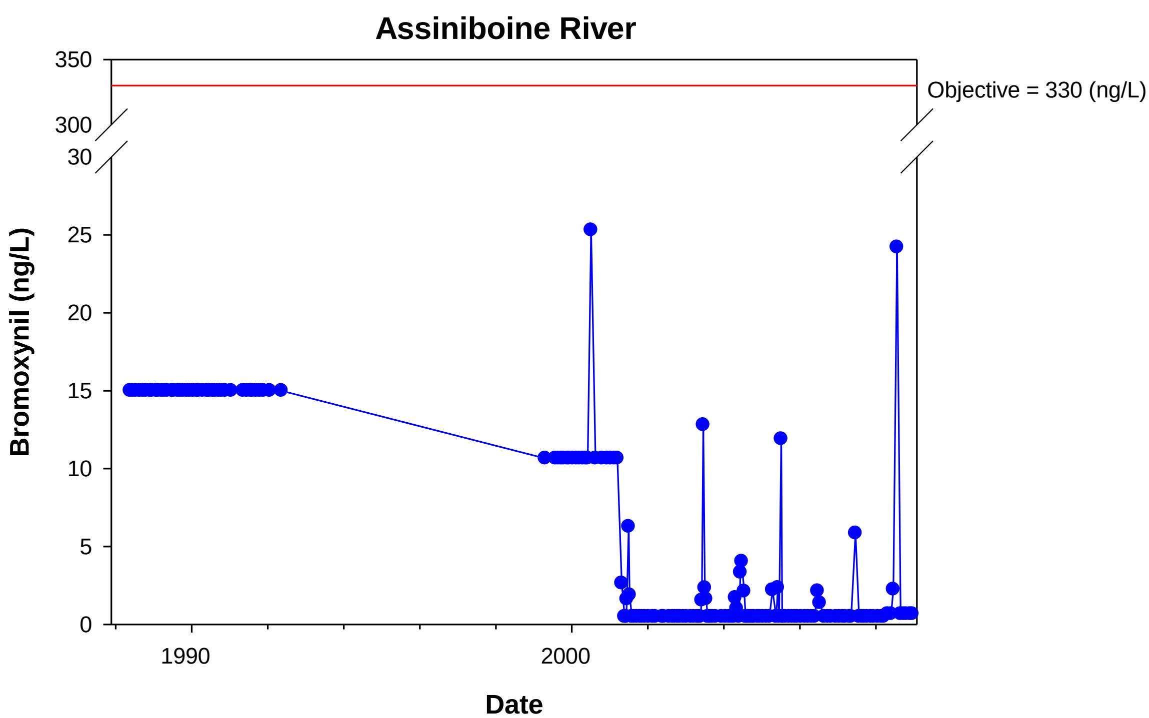

Figure 6-g24: Assiniboine River Bromoxynil

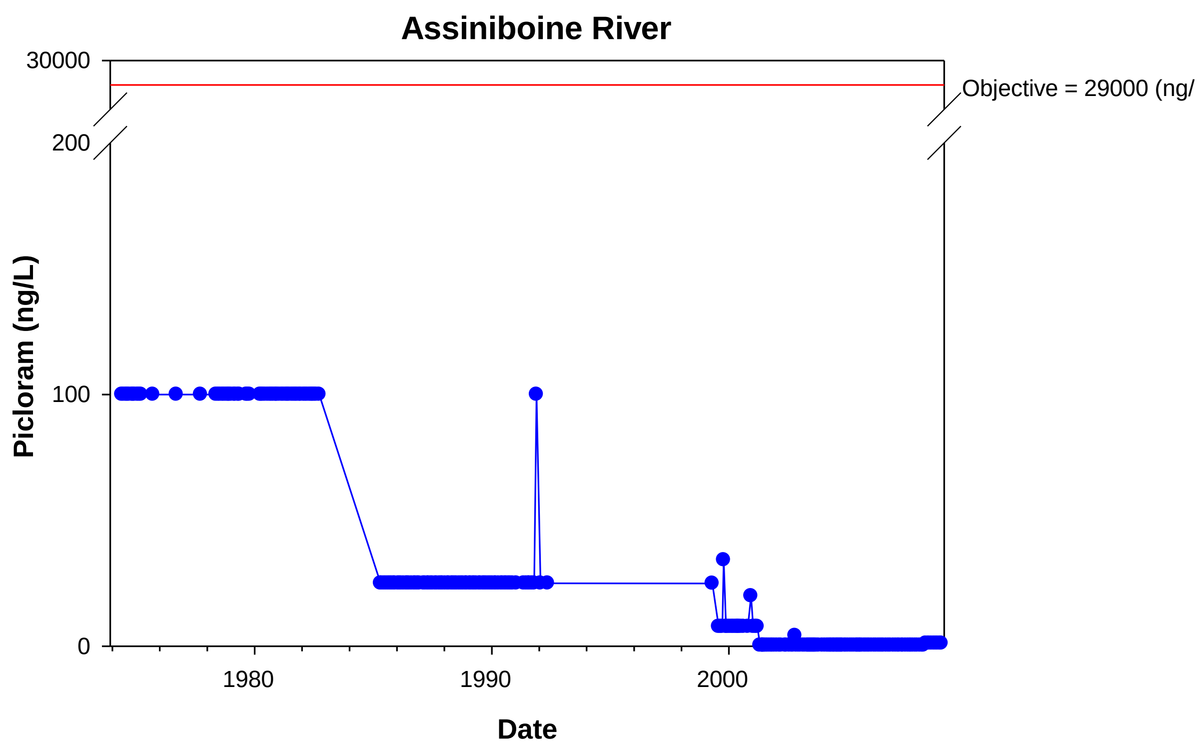

Figure 6-g25: Assiniboine River Picloram

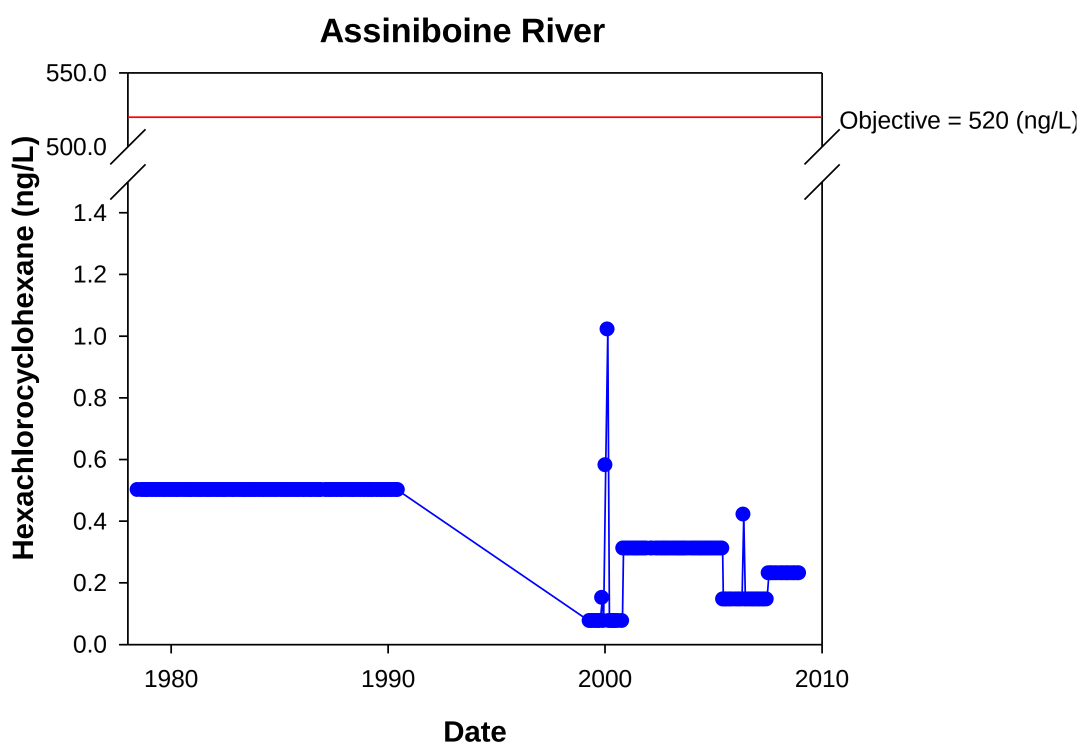

Figure 6-g26: Assiniboine River Hexachlorocyclohexane

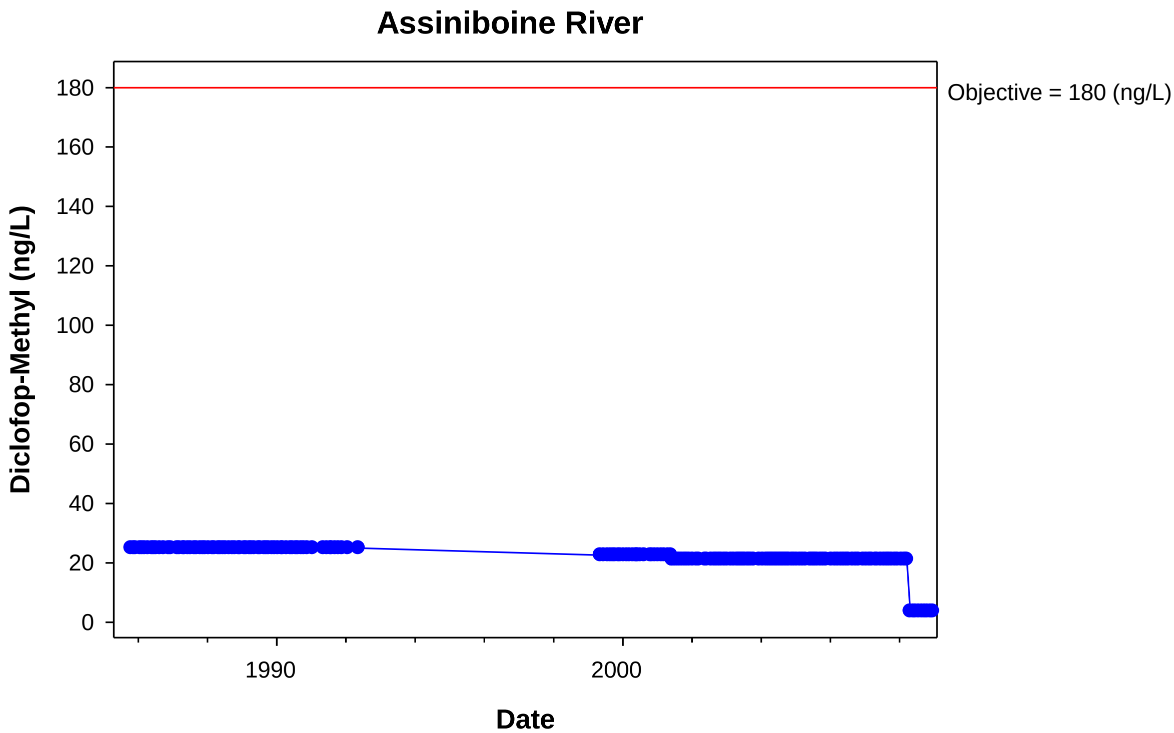

Figure 6-g27: Assiniboine River Diclofop-Methyl

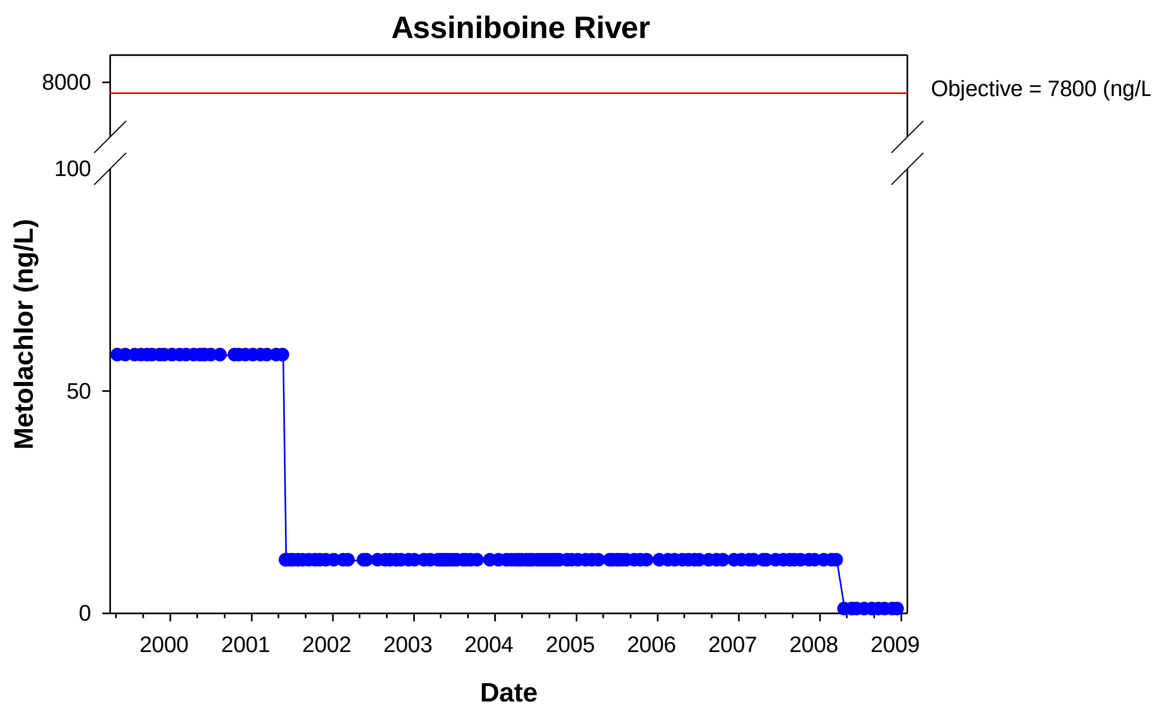

Figure 6-g28: Assiniboine River Metolachlor

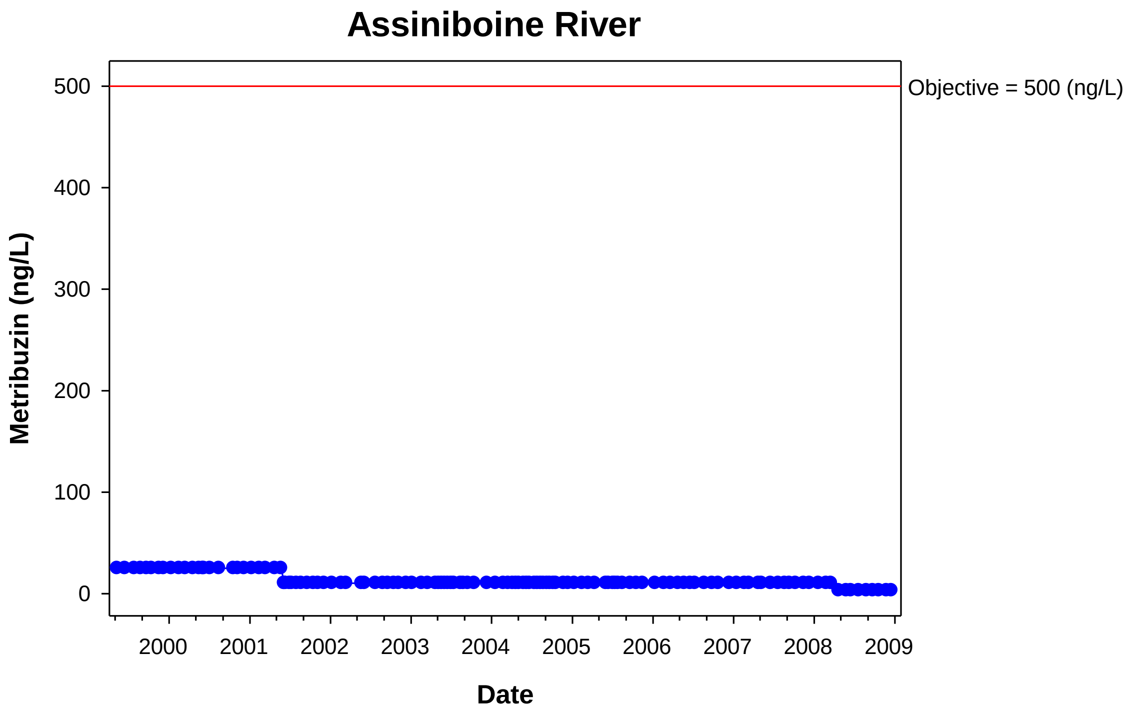

Figure 6-g29: Assiniboine River Metribuzin

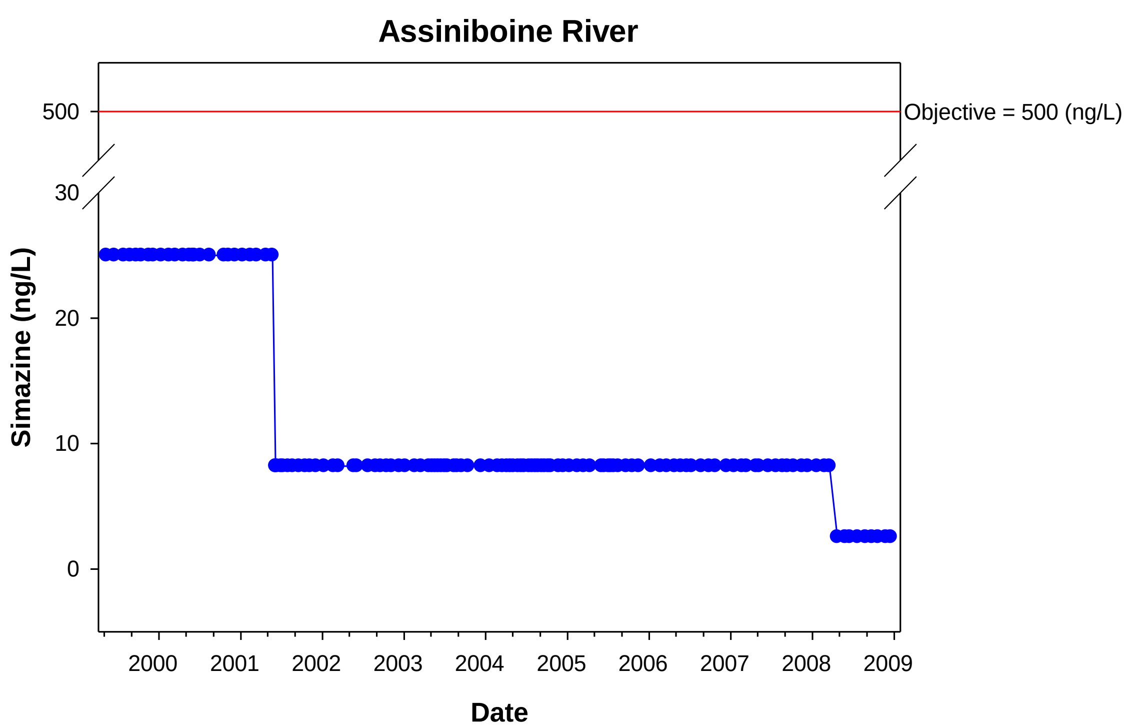

Figure 6-g30: Assiniboine River Simazine

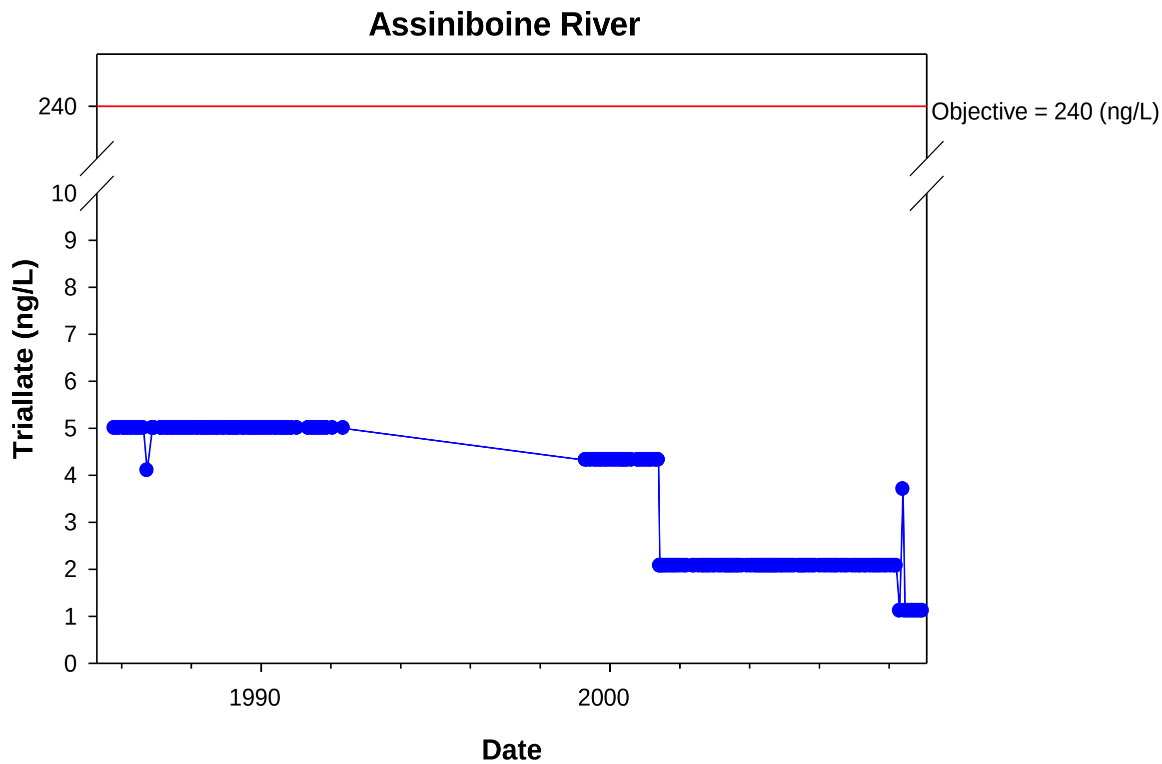

Figure 6-g31: Assiniboine River Triallate

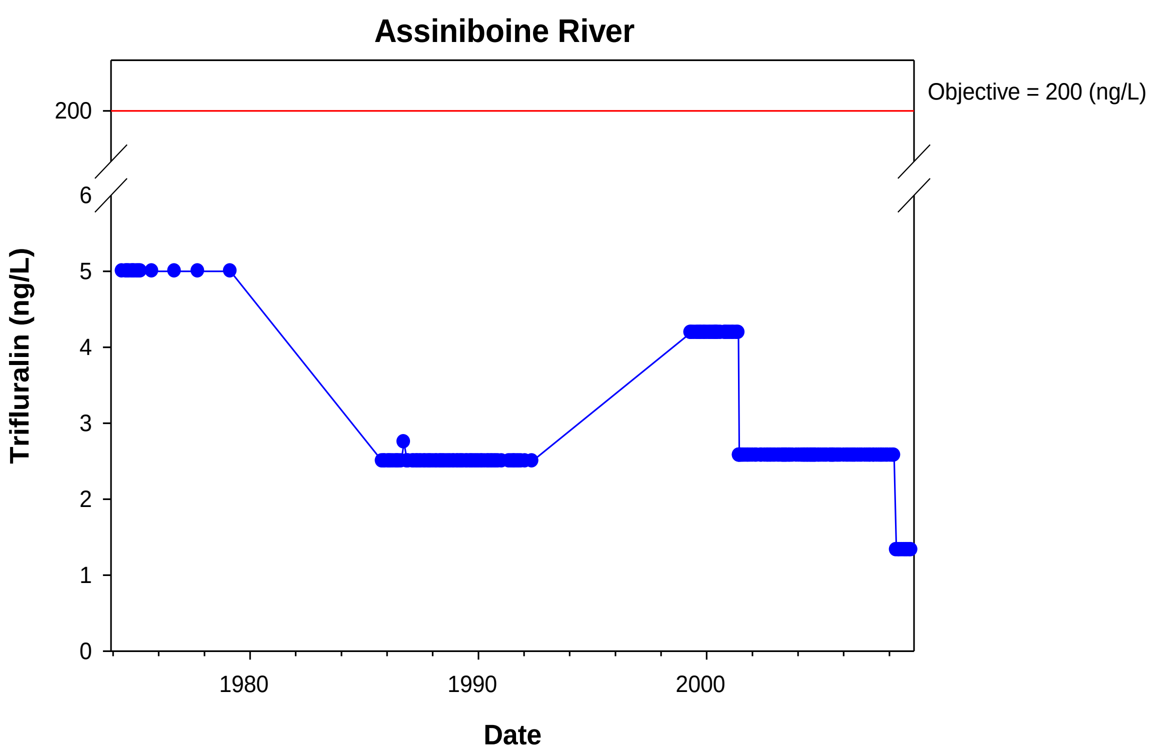

Figure 6-g32: Assiniboine River Trifluralin

Appendix 6-h: Carrot River

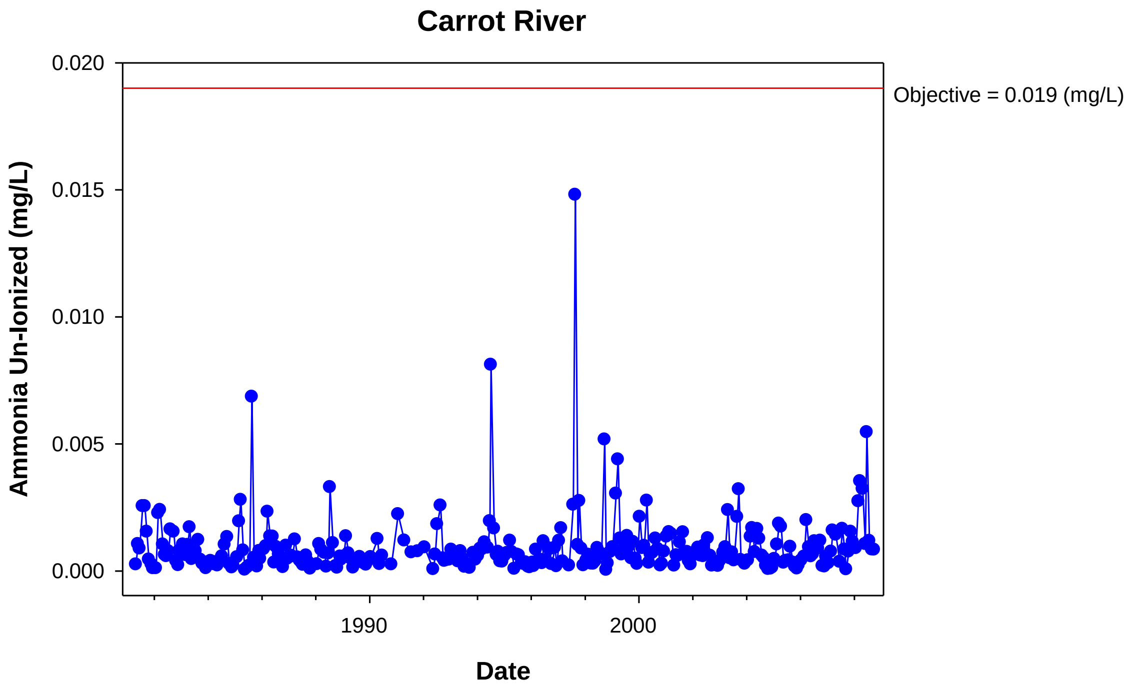

Figure 6-h1: Carrot River Ammonia Un-Ionized

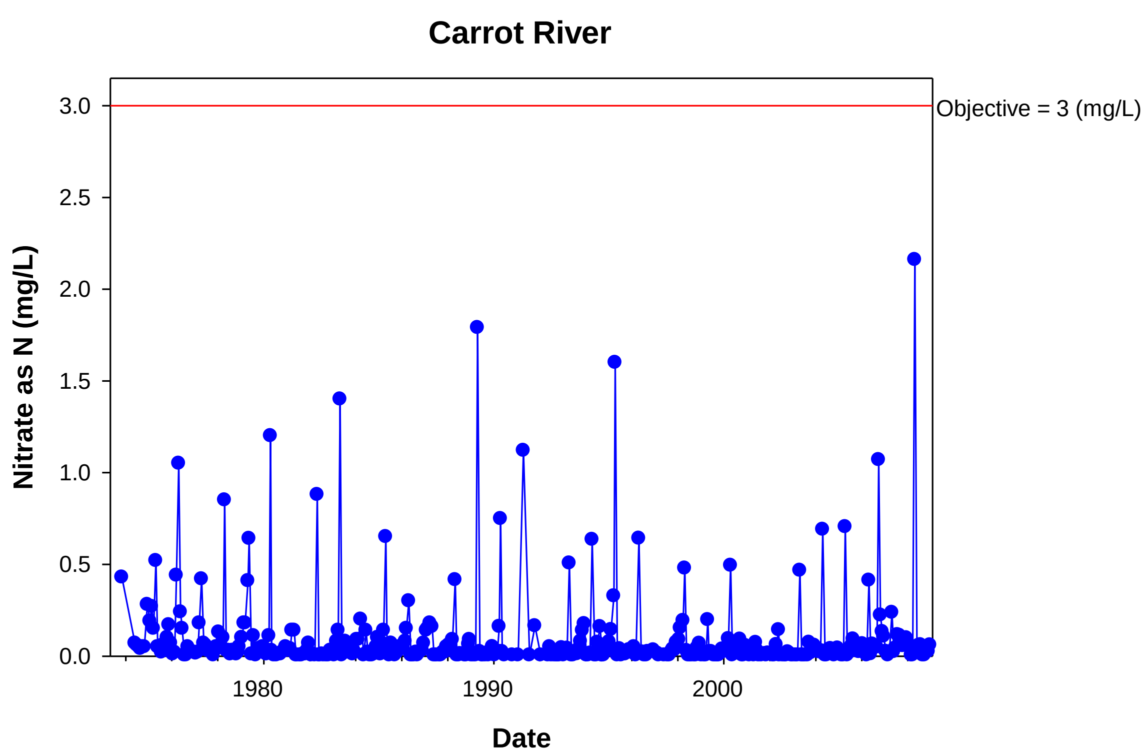

Figure 6-h2: Carrot River Nitrate as N

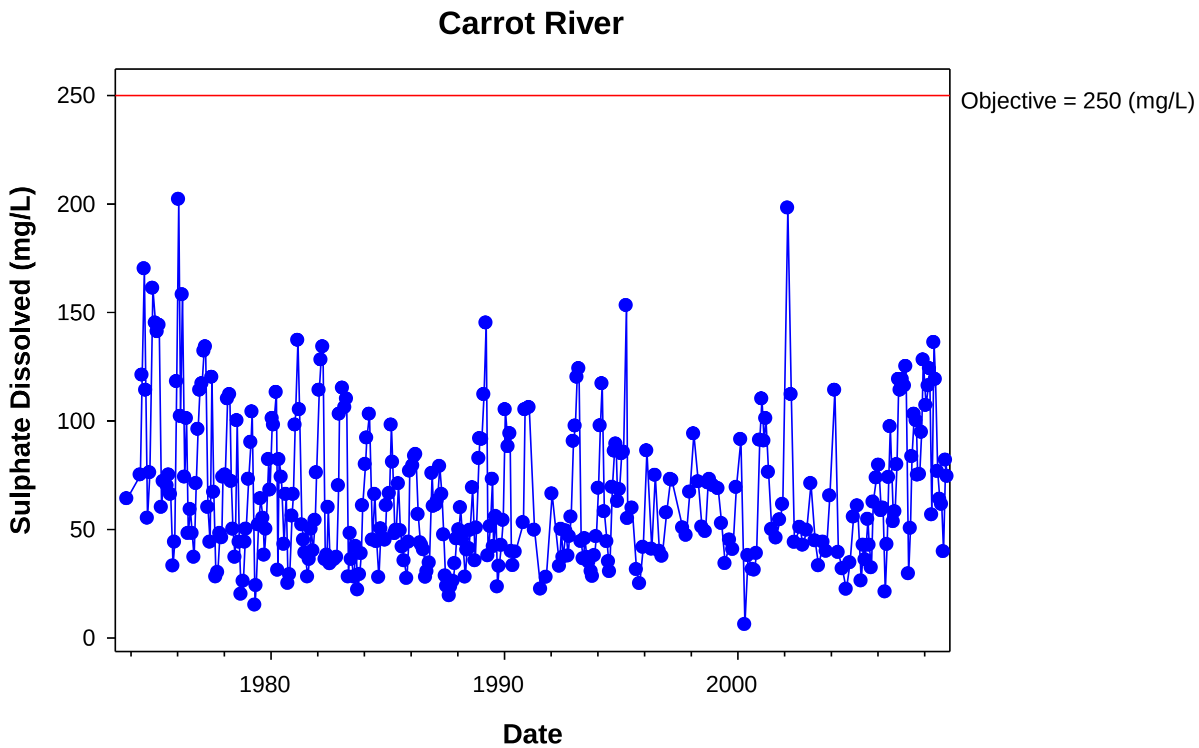

Figure 6-h3: Carrot River Sulphate Dissolved

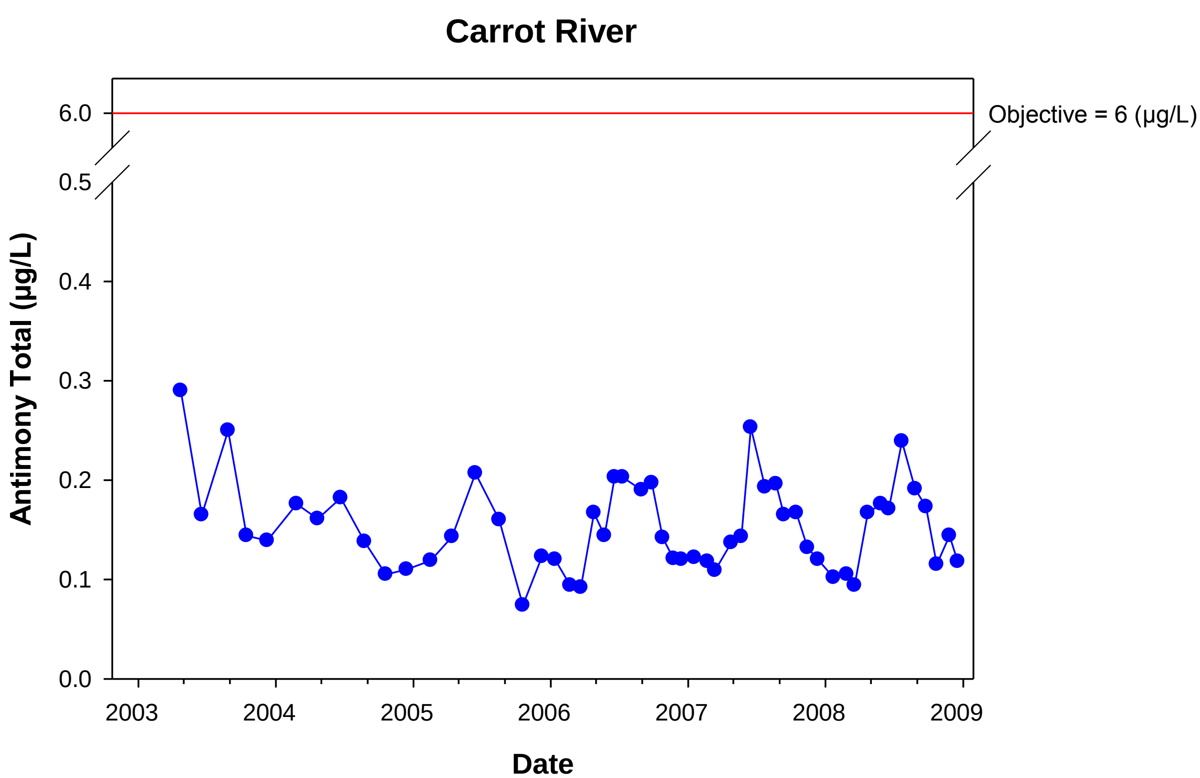

Figure 6-h4: Carrot River Antimony Total

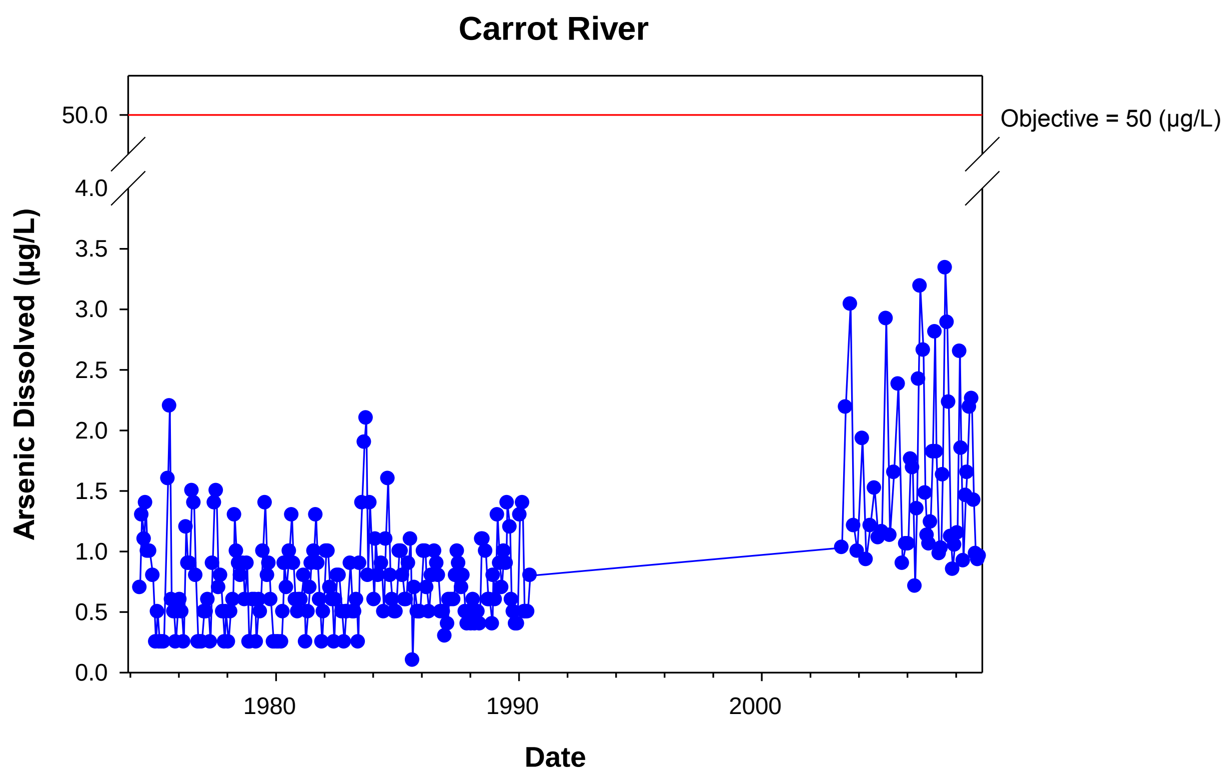

Figure 6-h5: Carrot River Arsenic Dissolved

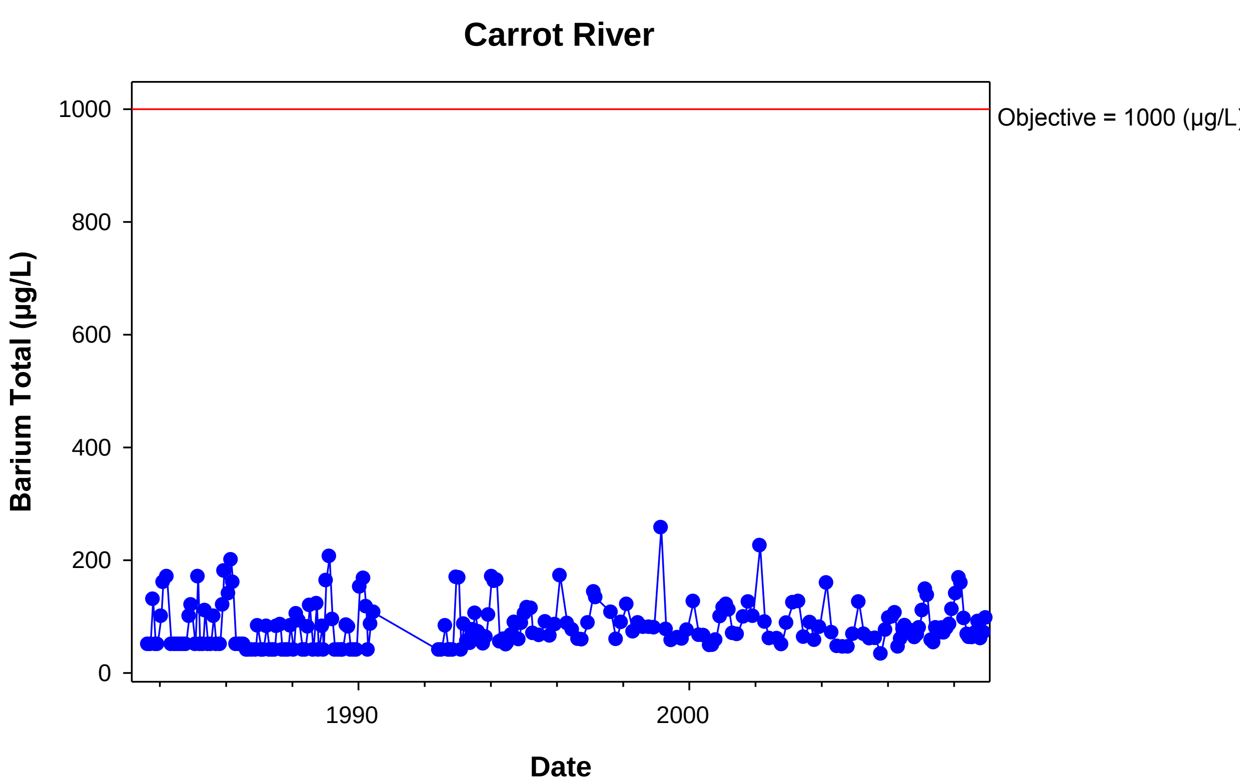

Figure 6-h6: Carrot River Barium Total

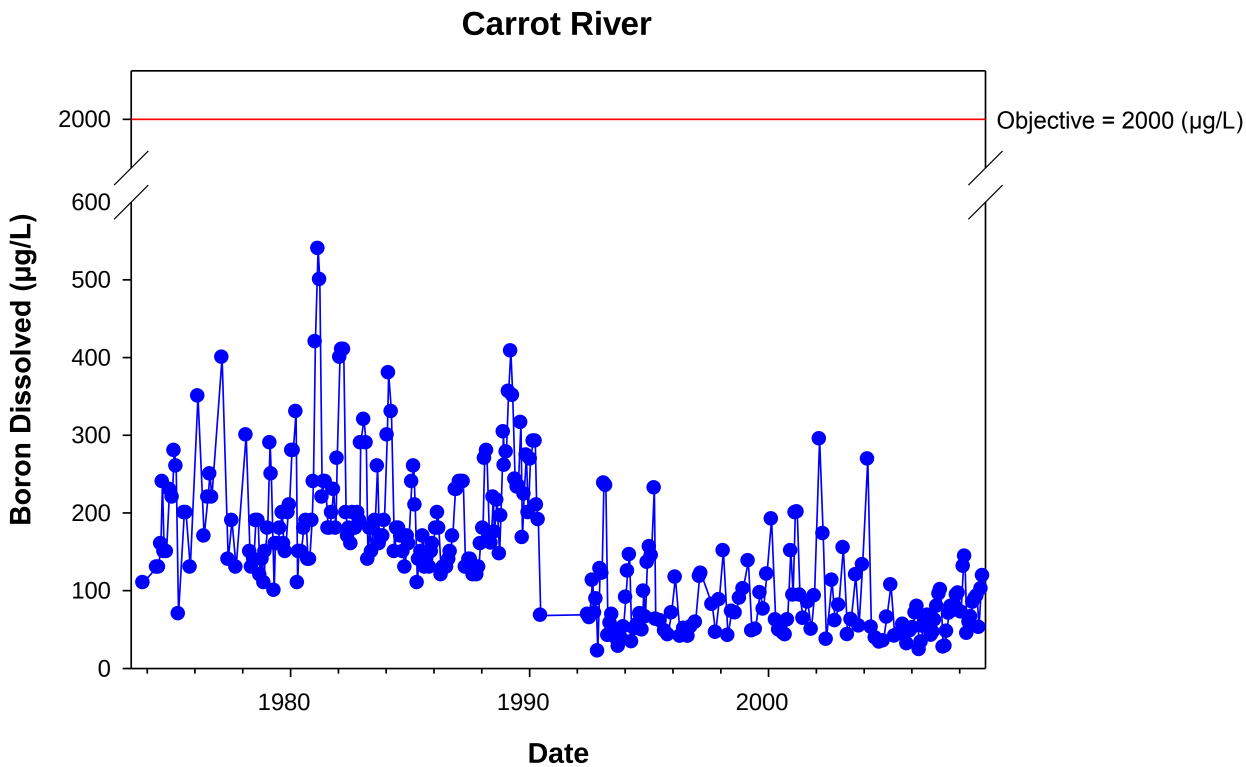

Figure 6-h7: Carrot River Boron Dissolved

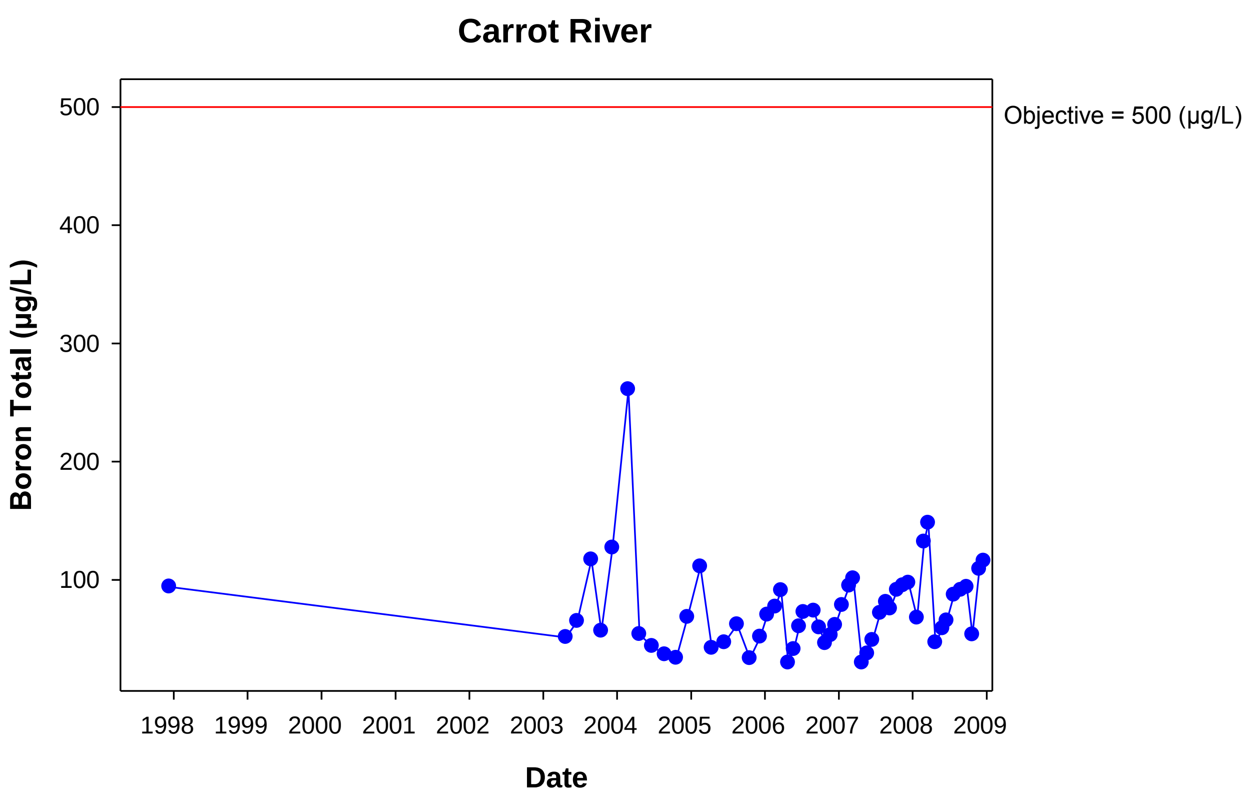

Figure 6-h8: Carrot River Boron Total

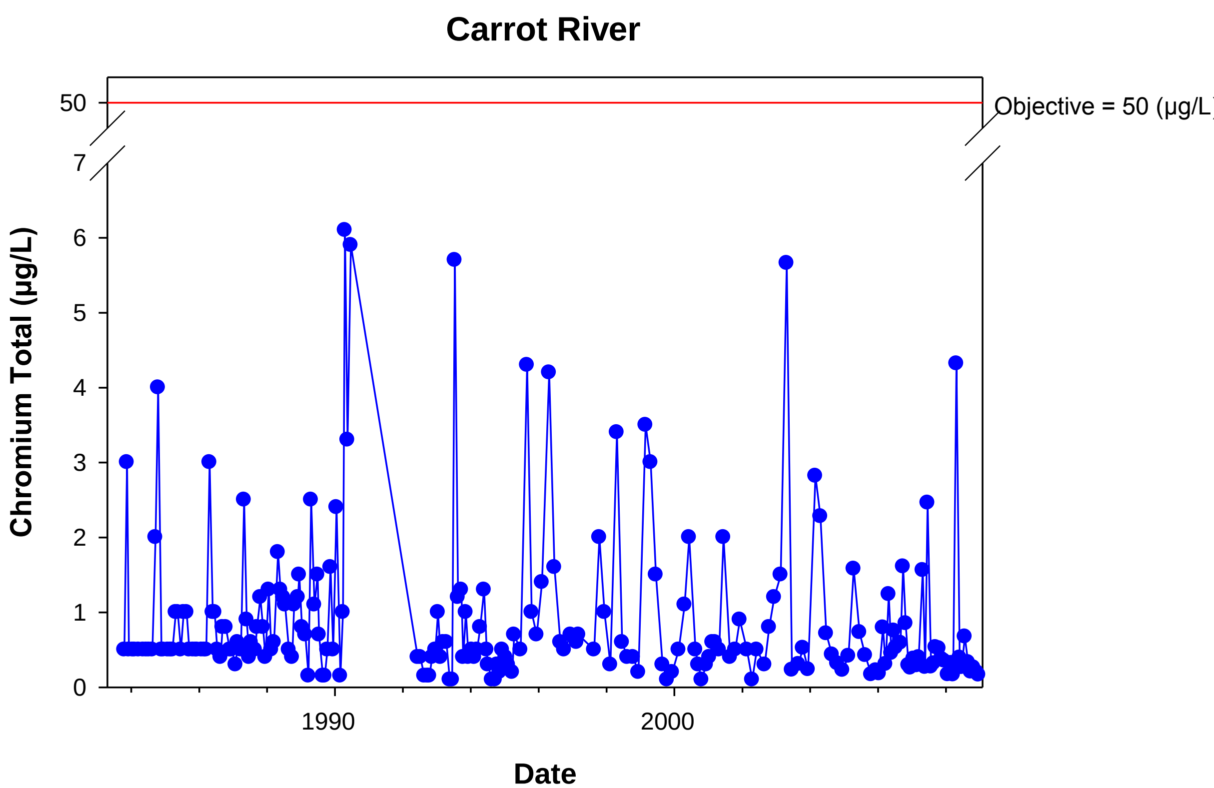

Figure 6-h9: Carrot River Chromium Total

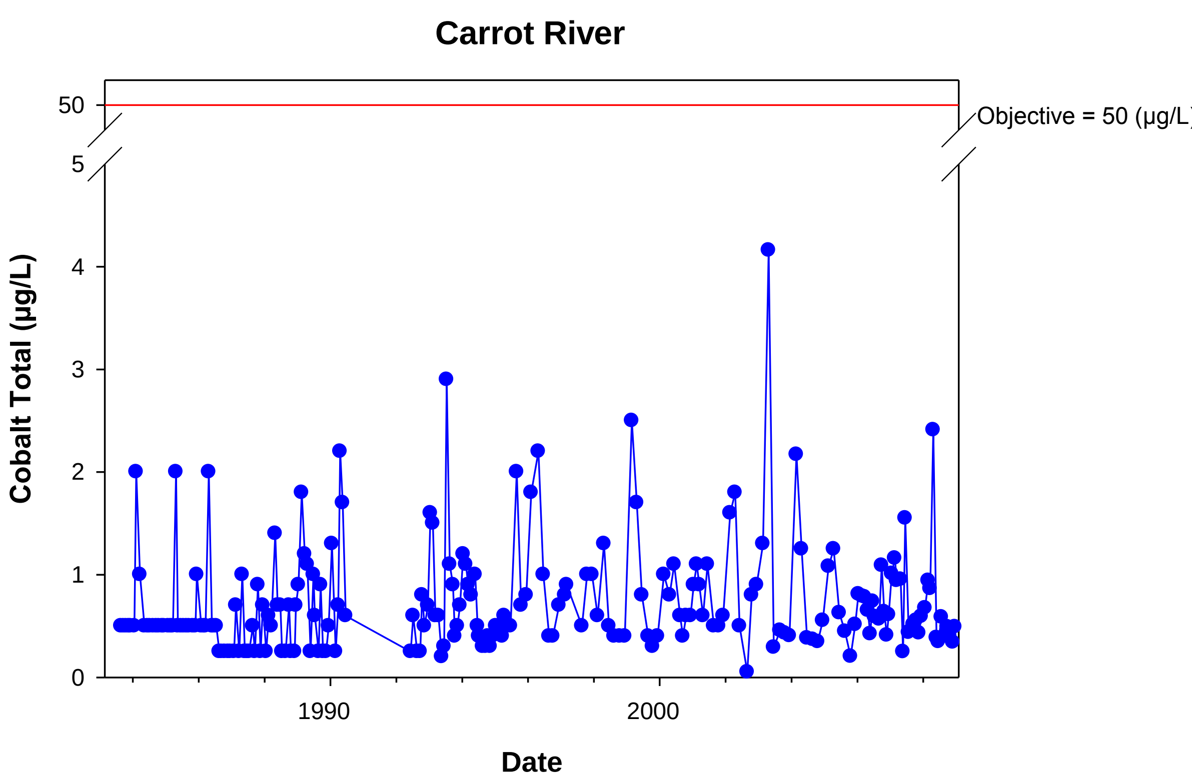

Figure 6-h10: Carrot River Cobalt Total

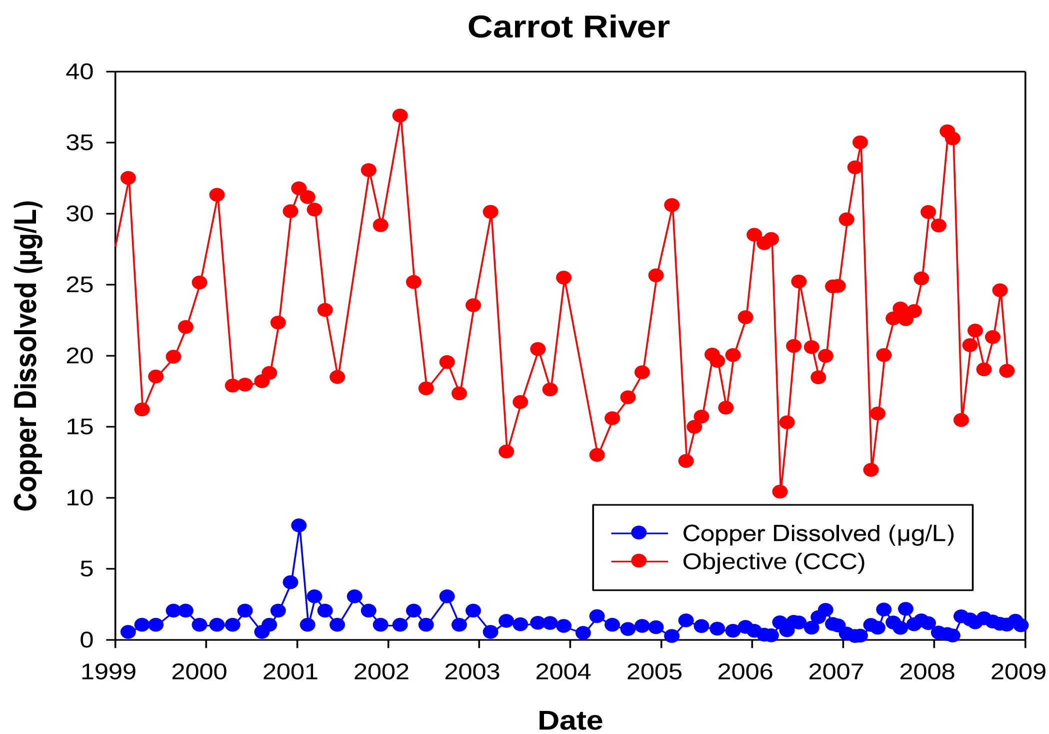

Figure 6-h11: Carrot River Copper Dissolved

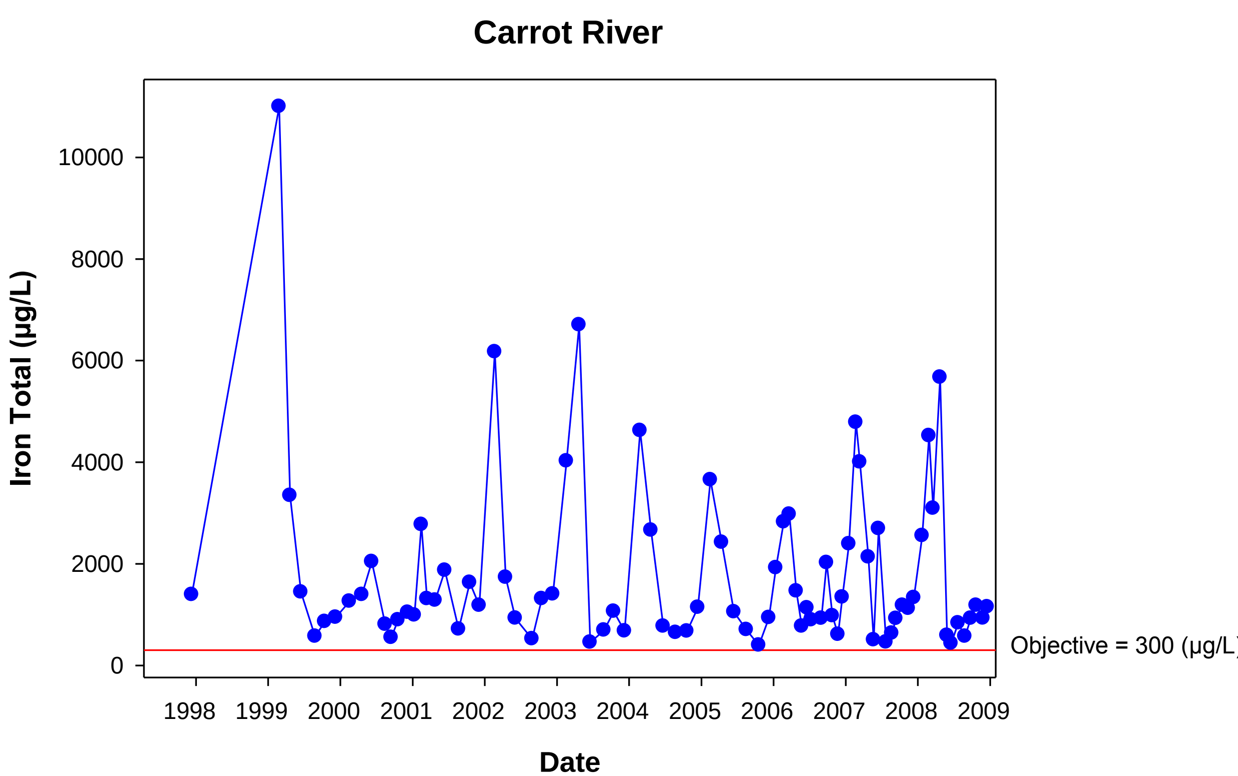

Figure 6-h12: Carrot River Iron Total

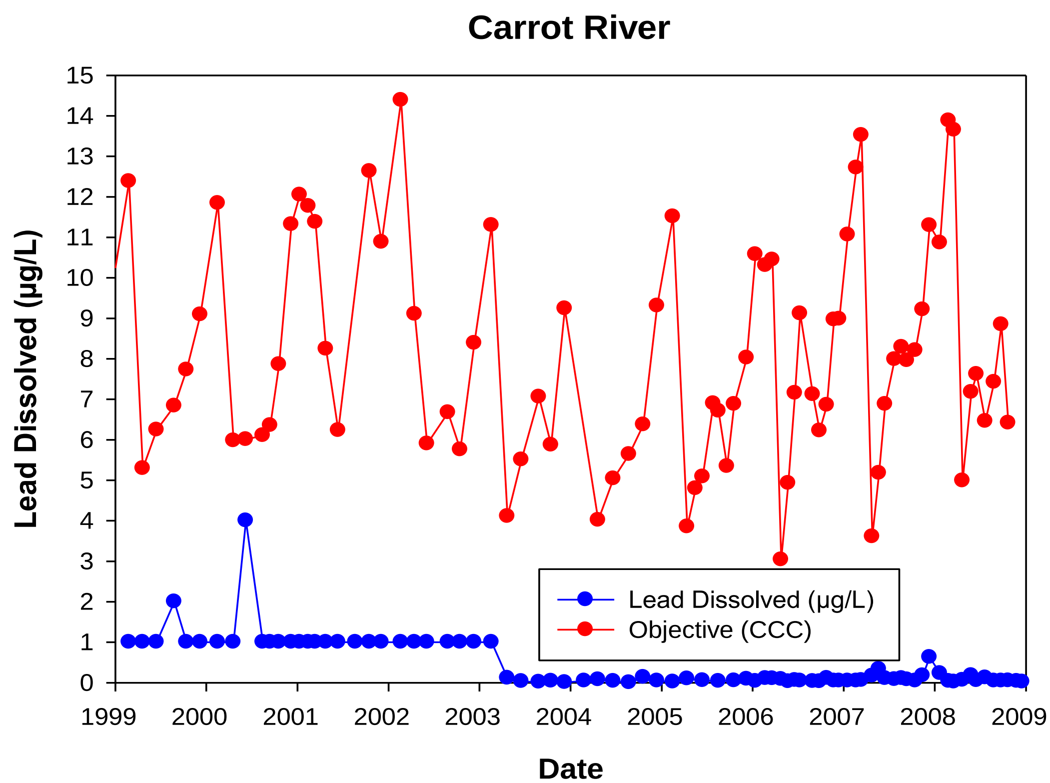

Figure 6-h13: Carrot River Lead Dissolved

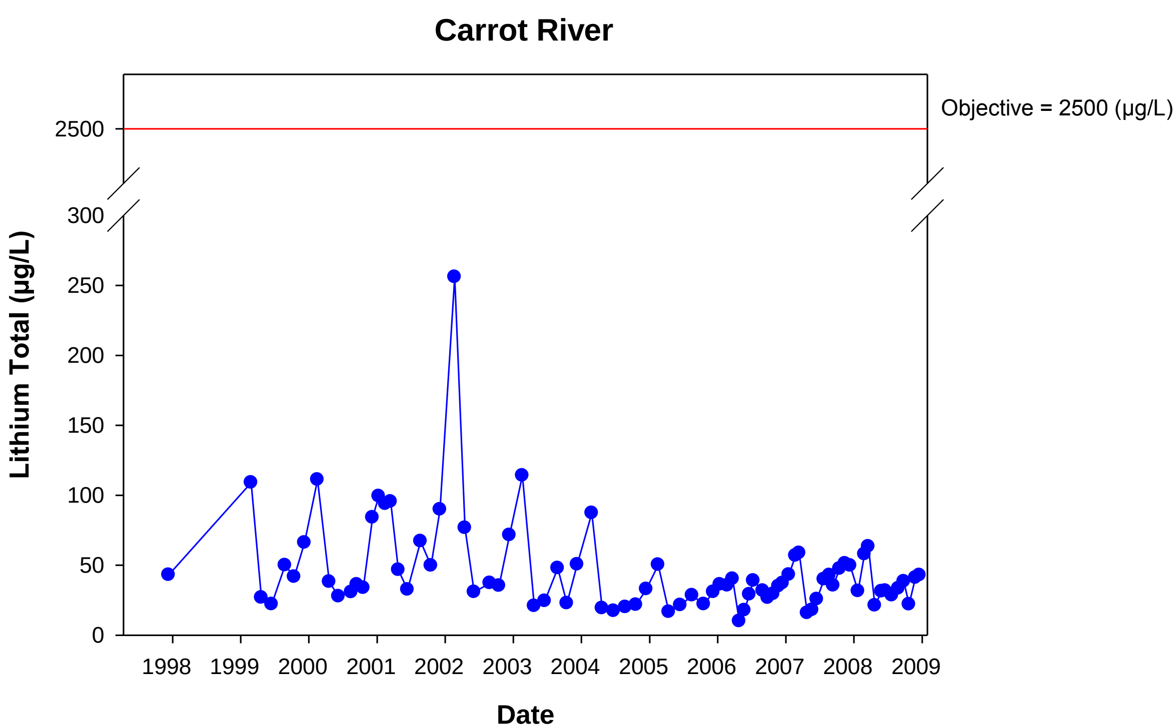

Figure 6-h14: Carrot River Lithium Total

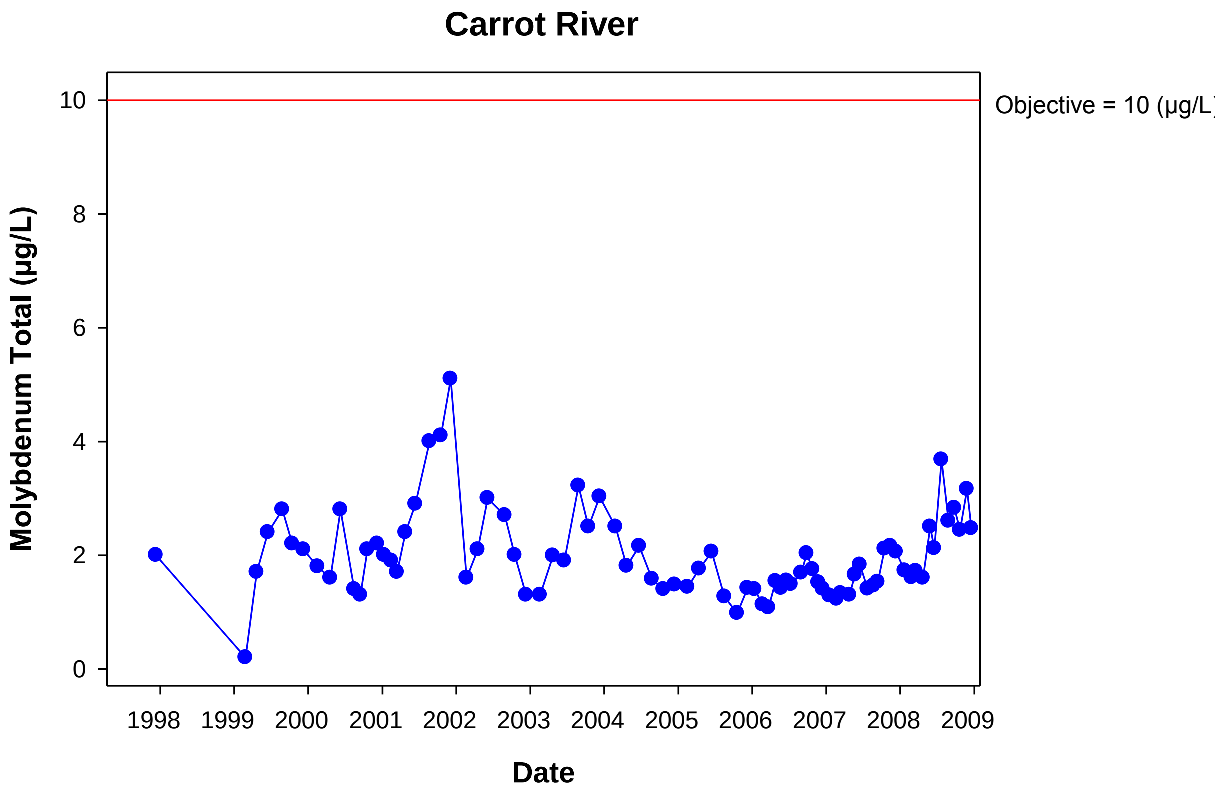

Figure 6-h15: Carrot River Molybdenum Total

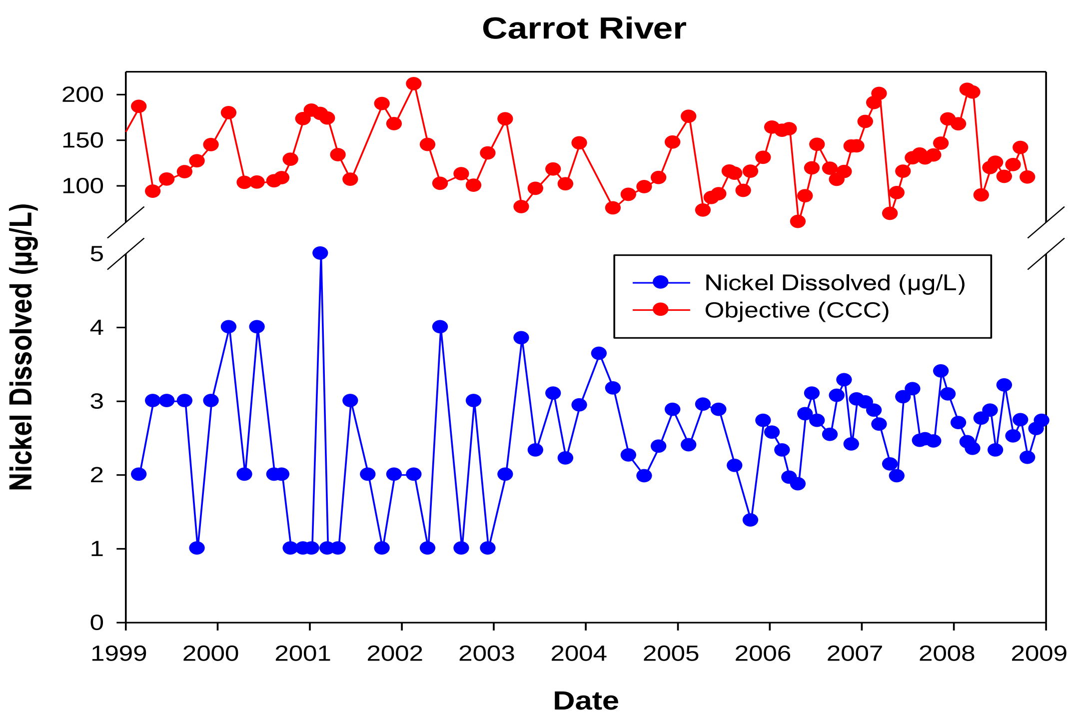

Figure 6-h16: Carrot River Nickel Dissolved

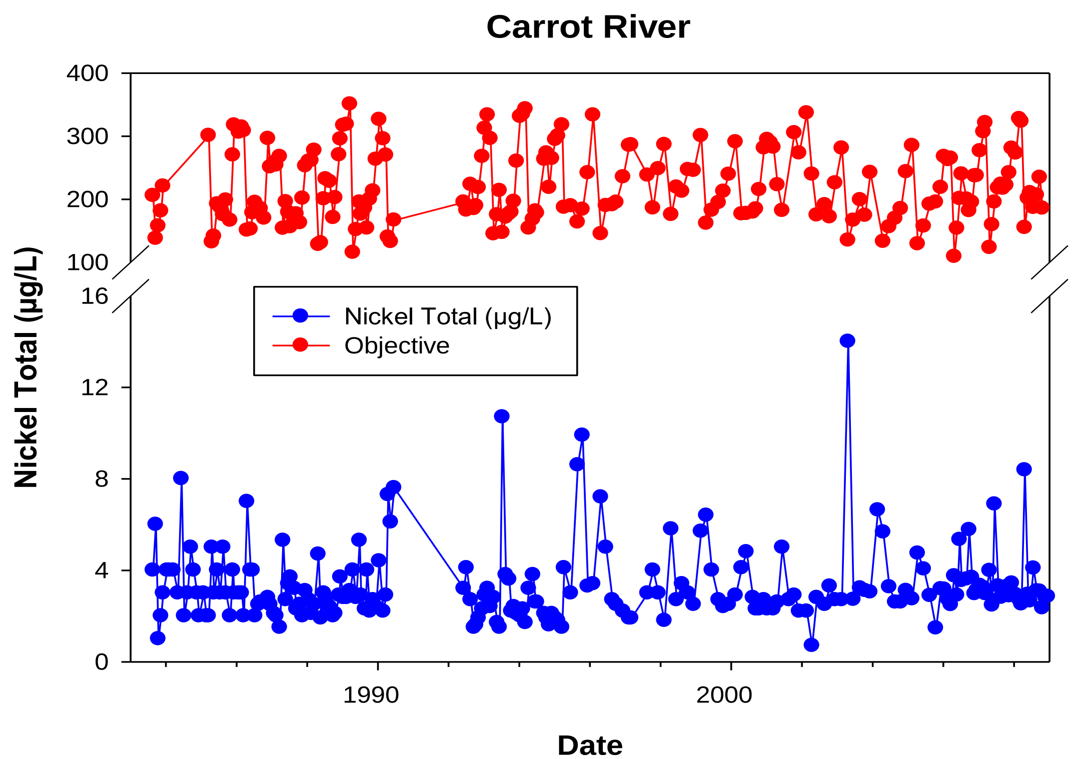

Figure 6-h17: Carrot River Nickel Total

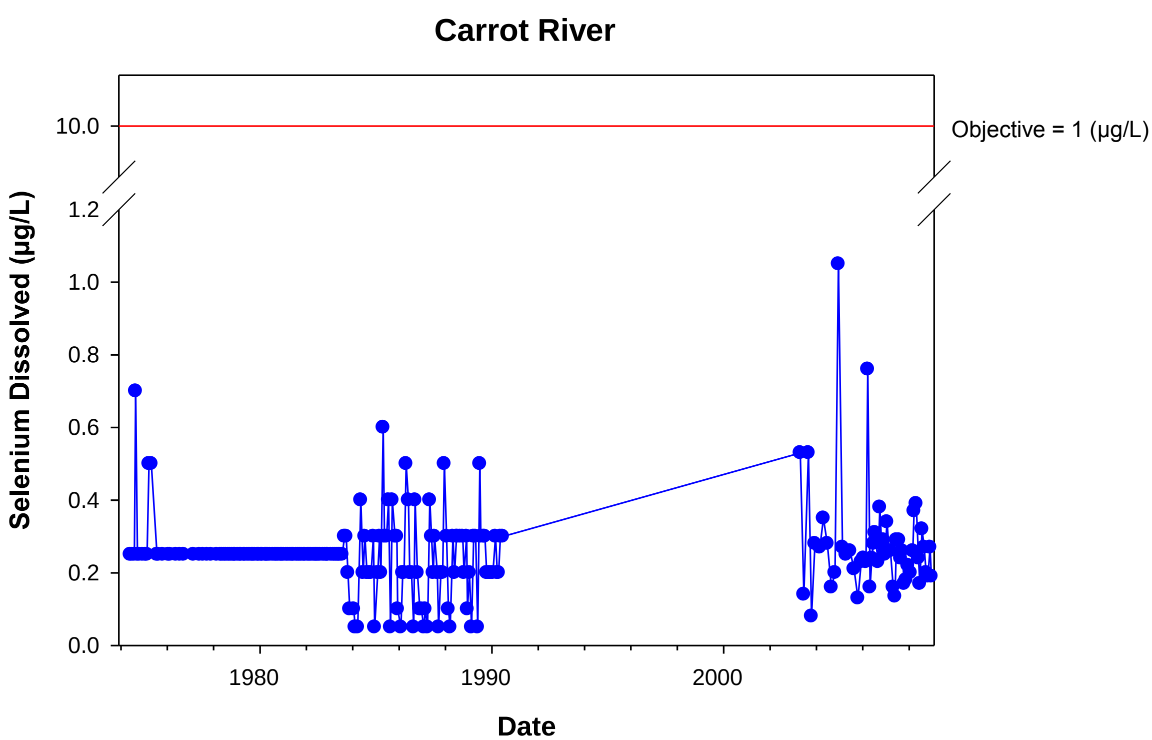

Figure 6-h18: Carrot River Selenium Dissolved

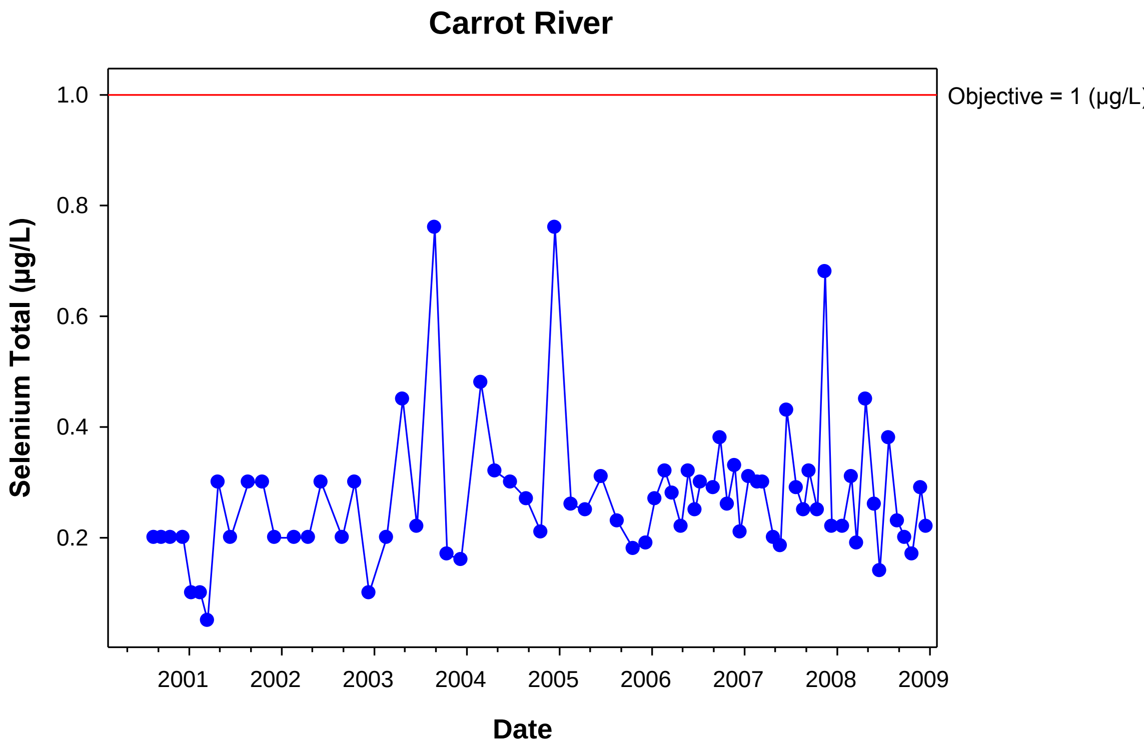

Figure 6-h19: Carrot River Selenium Total

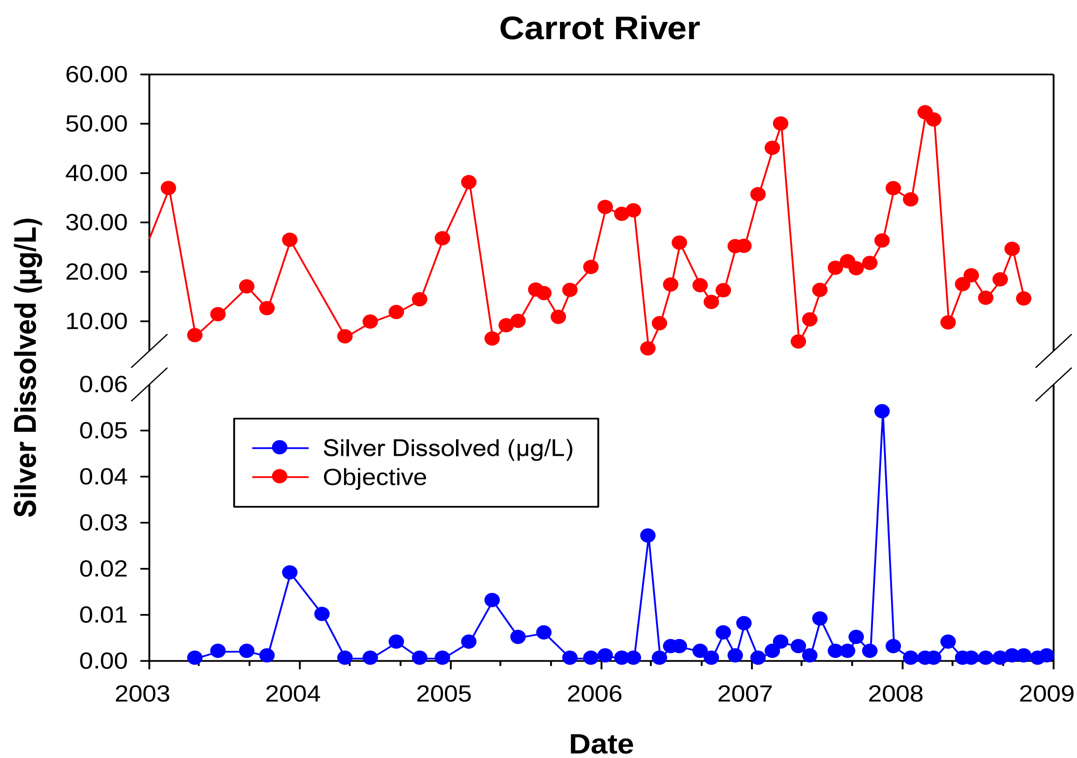

Figure 6-h20: Carrot River Silver Dissolved

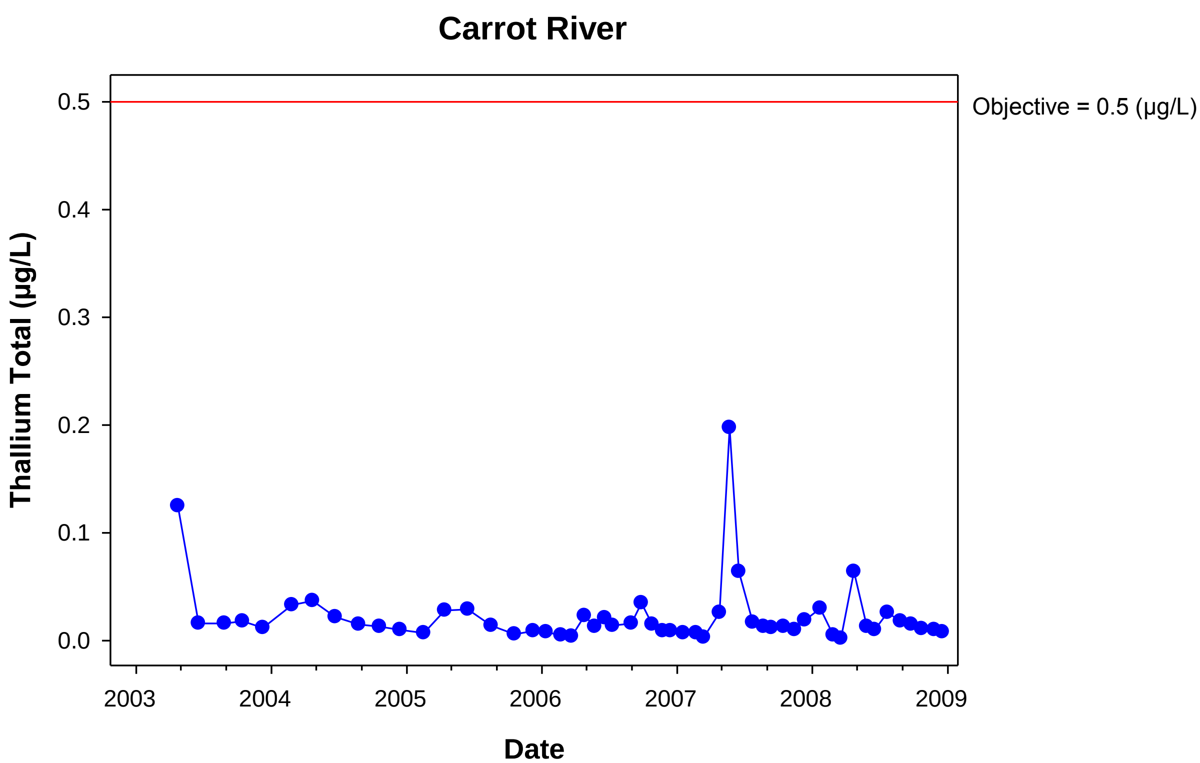

Figure 6-h21: Carrot River Thallium Total

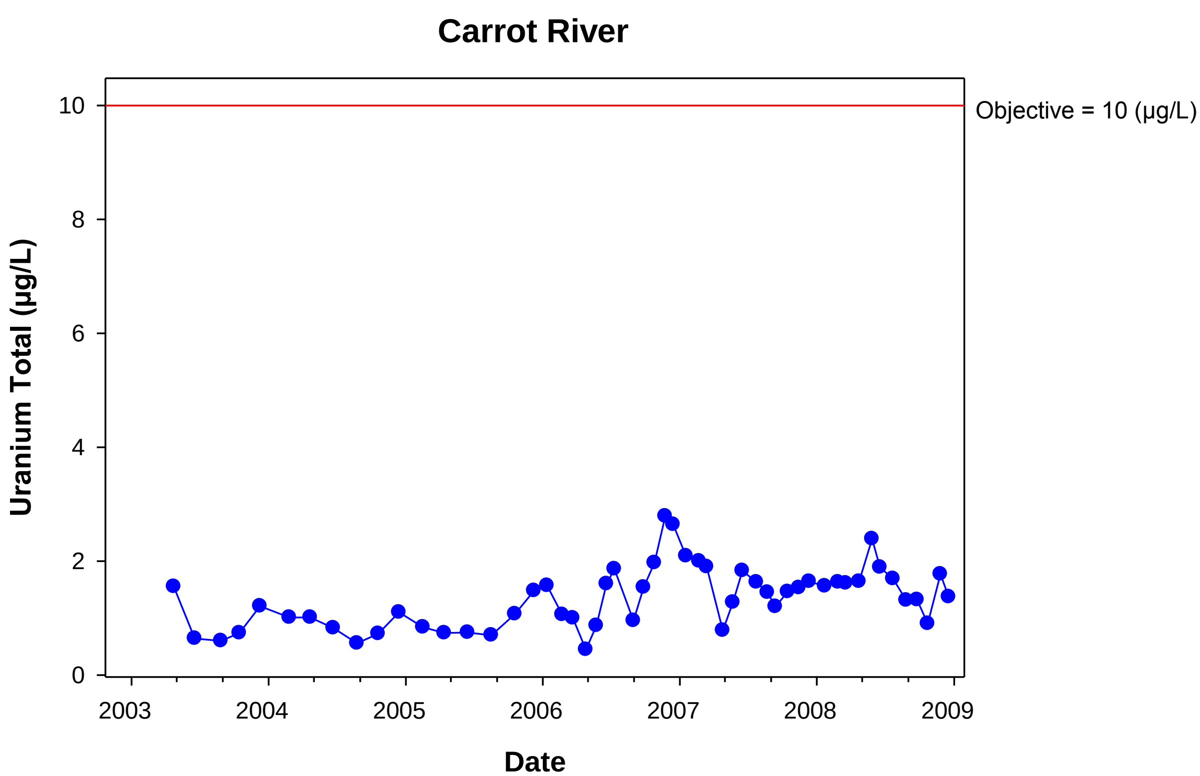

Figure 6-h22: Carrot River Uranium Total

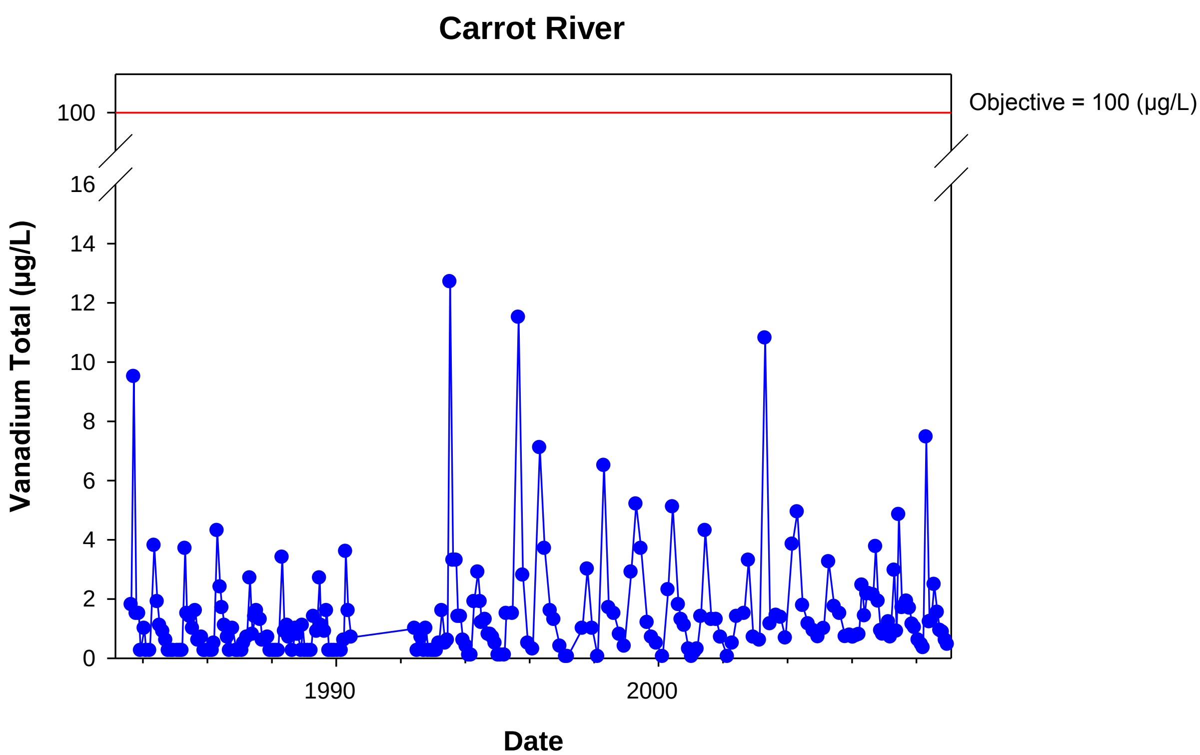

Figure 6-h23: Carrot River Vanadium Total

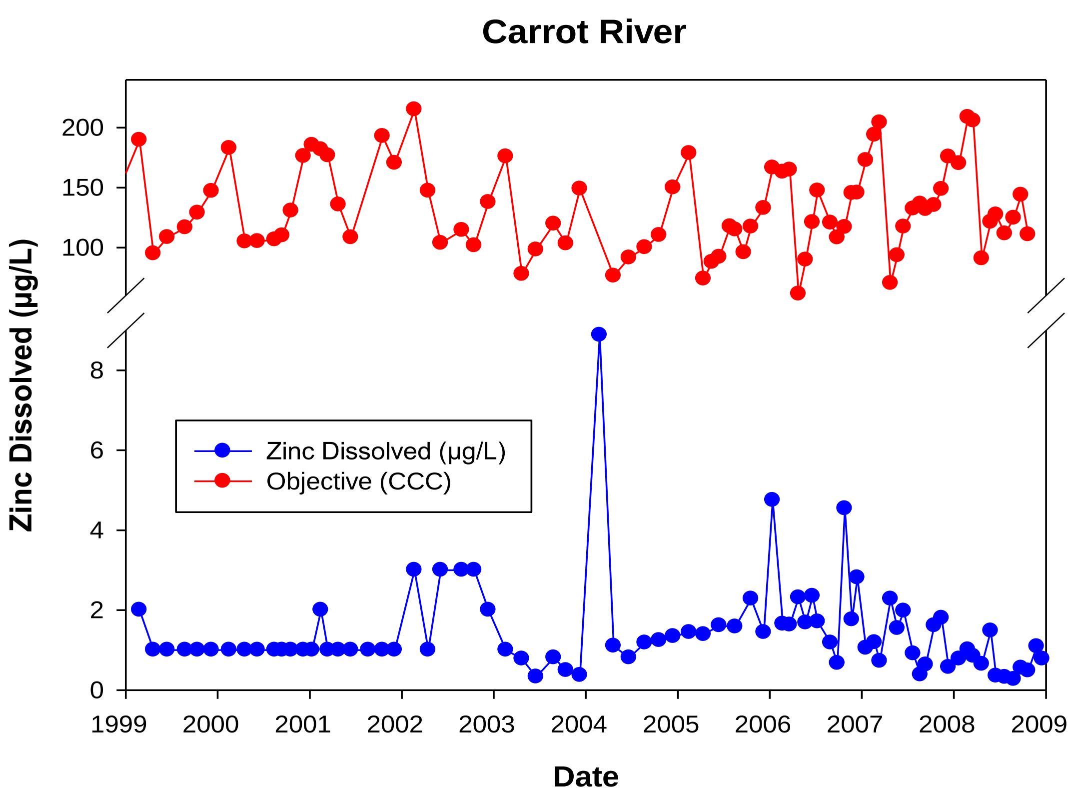

Figure 6-h24: Carrot River Zinc Dissolved

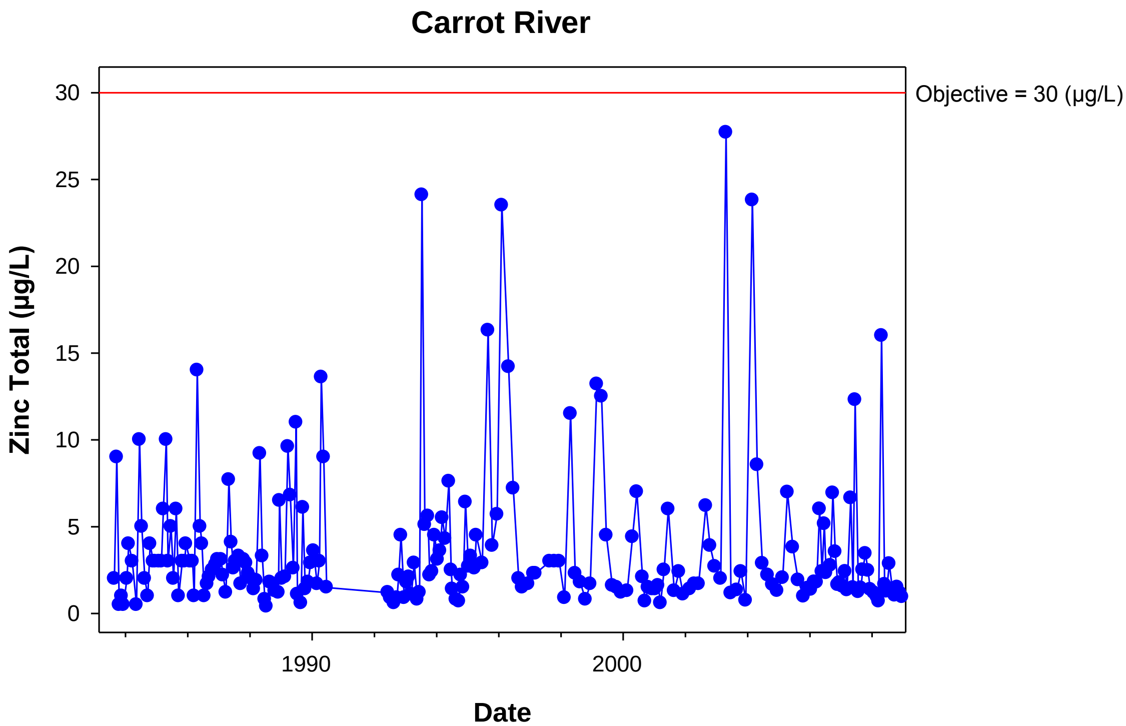

Figure 6-h25: Carrot River Zinc Total

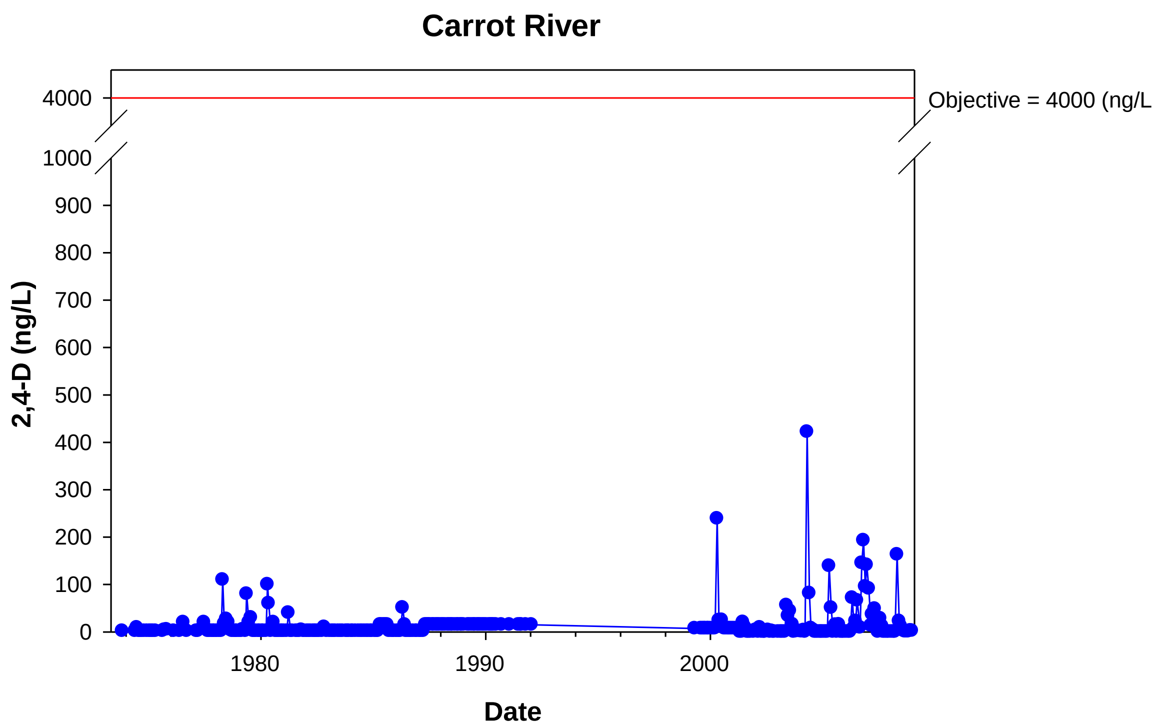

Figure 6-h26: Carrot River 2,4-D

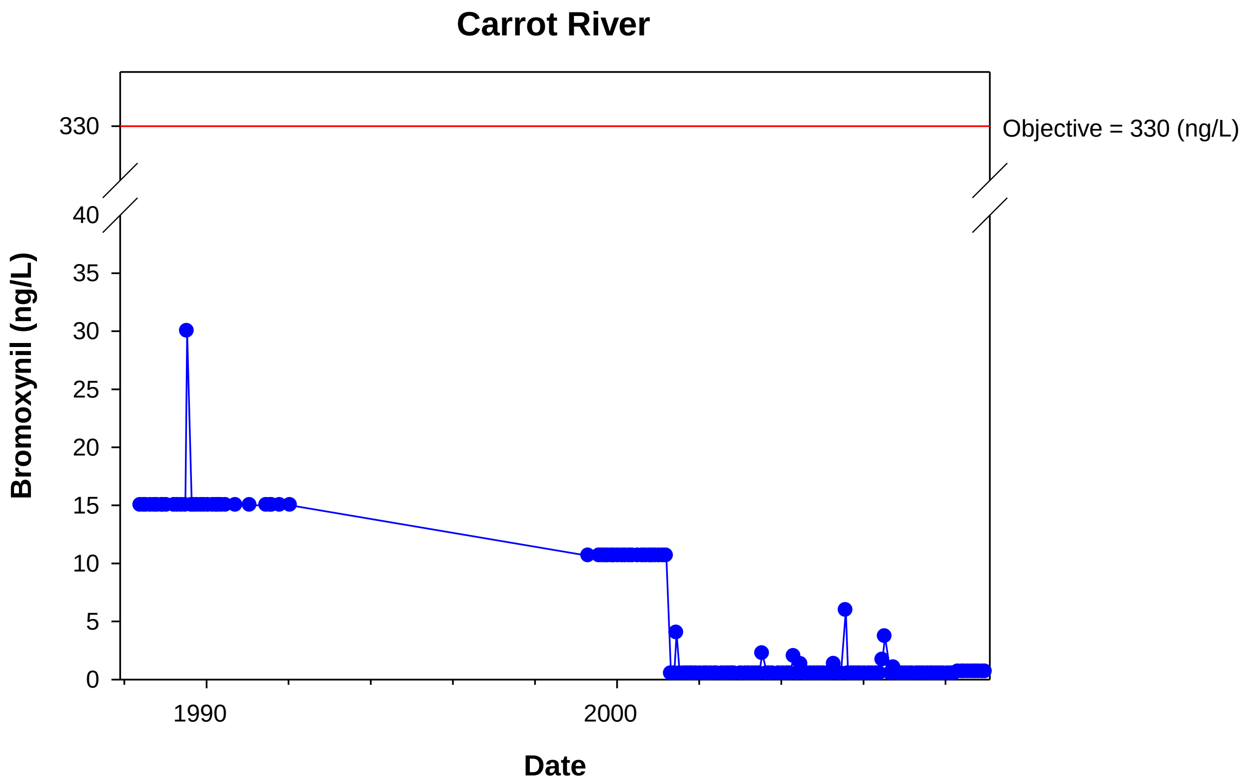

Figure 6-h27: Carrot River Bromoxynil

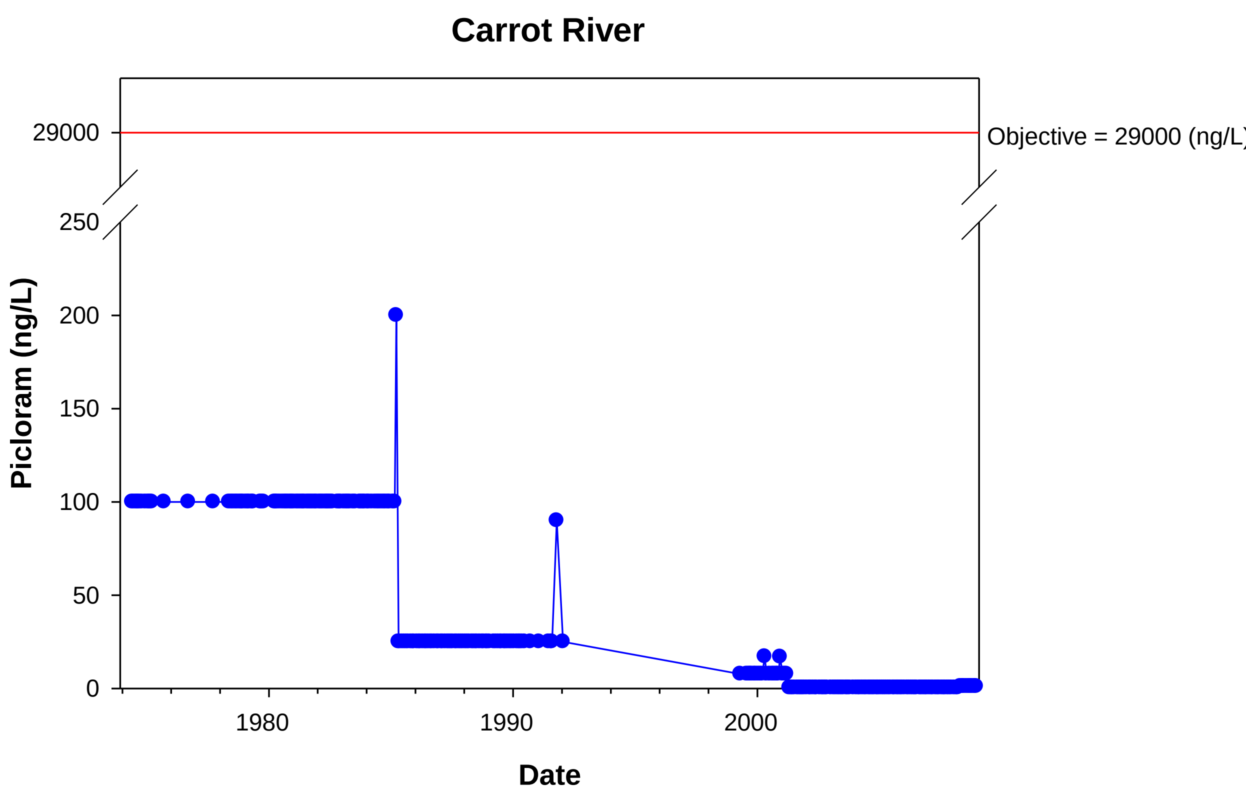

Figure 6-h28: Carrot River Picloram

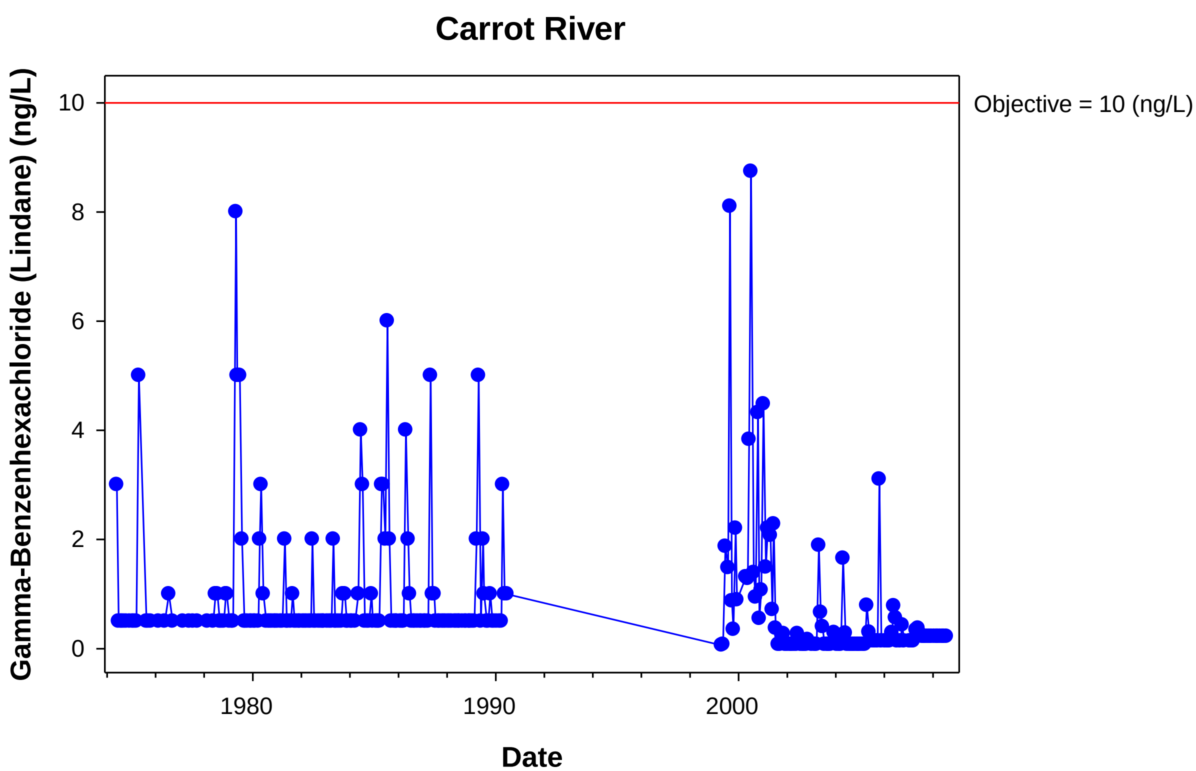

Figure 6-h29: Carrot River Lindane

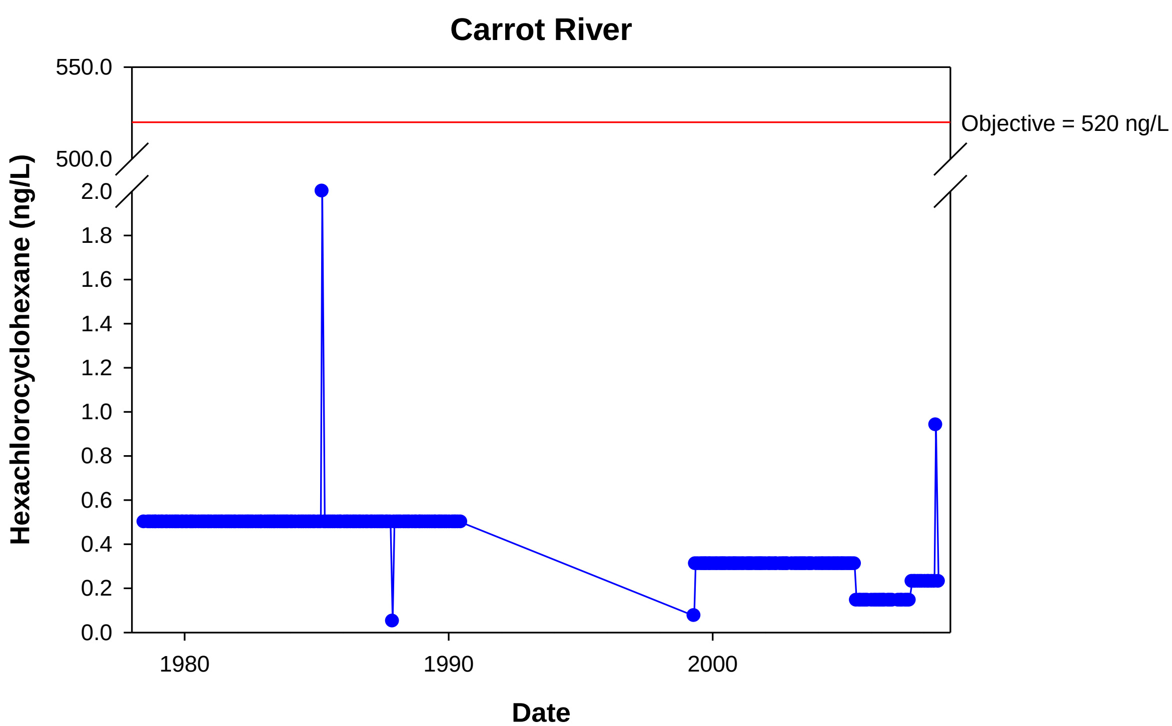

Figure 6-h30: Carrot River Hexachlorocyclohexane

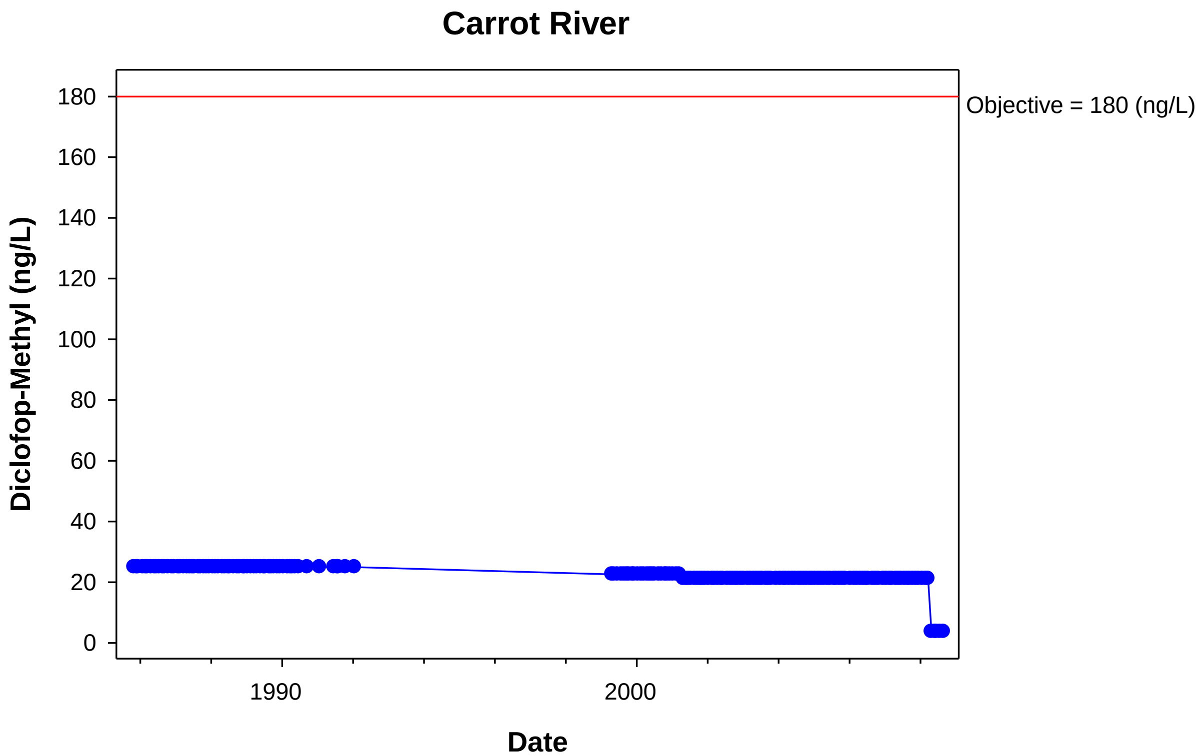

Figure 6-h31: Carrot River Diclofop-Methyl

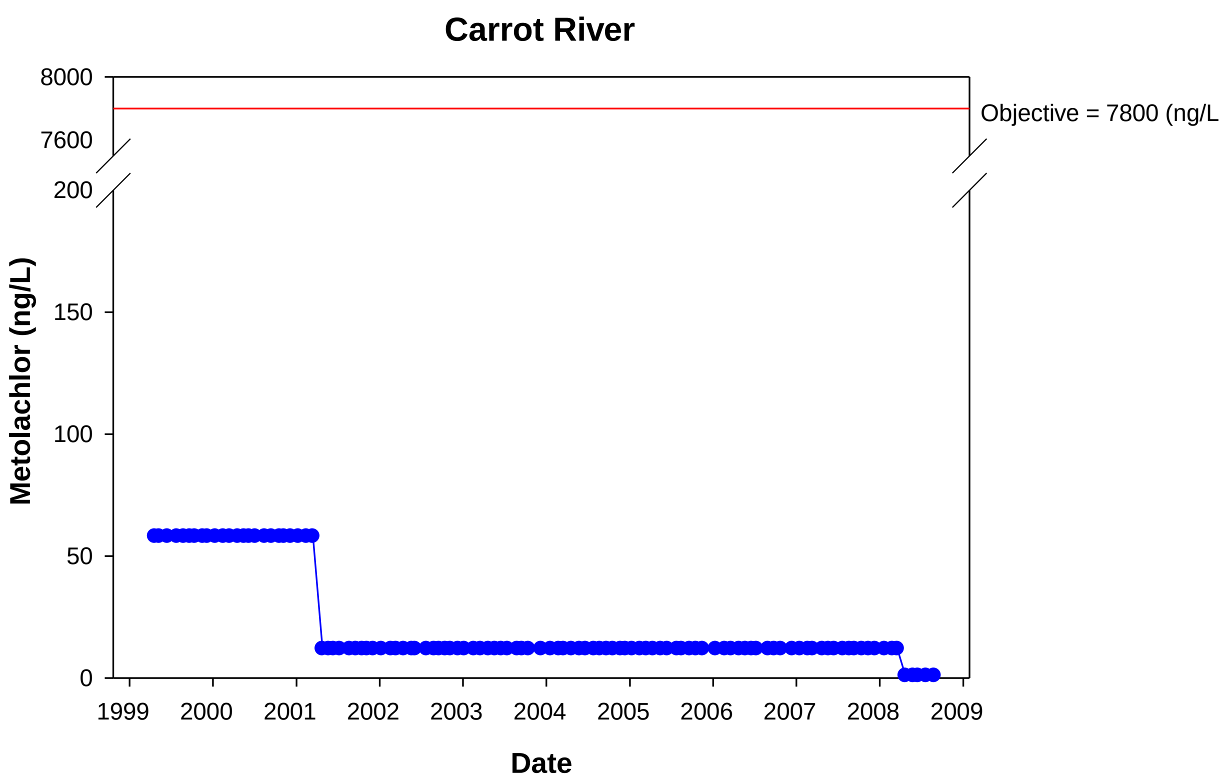

Figure 6-h32: Carrot River Metolachlor

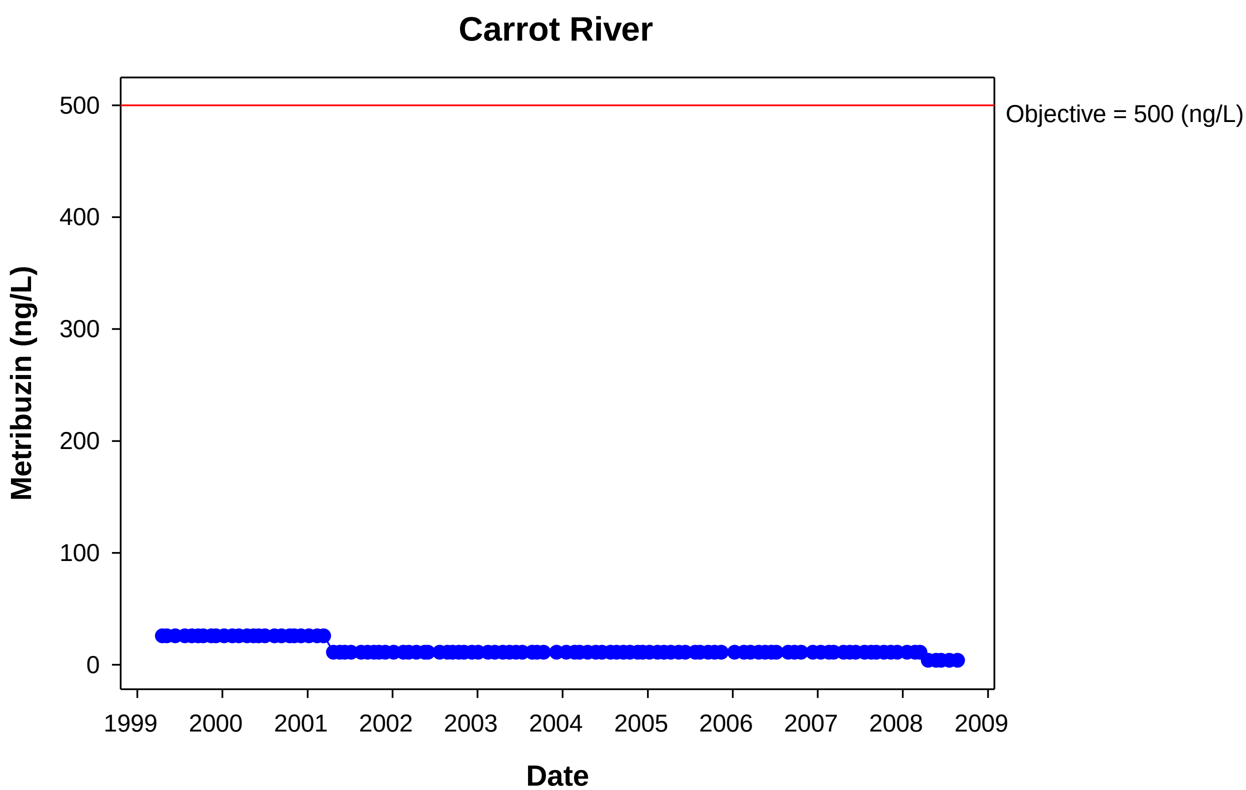

Figure 6-h33: Carrot River Metribuzin

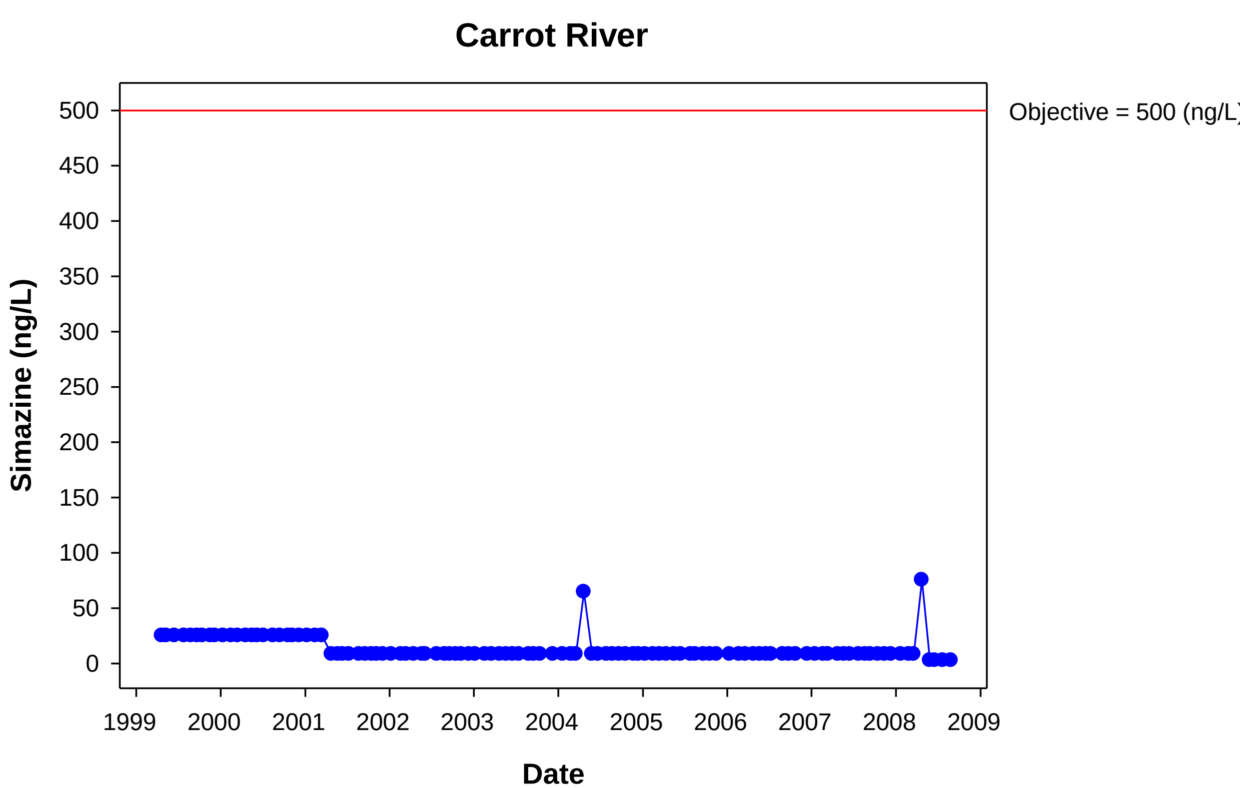

Figure 6-h34: Carrot River Simazine

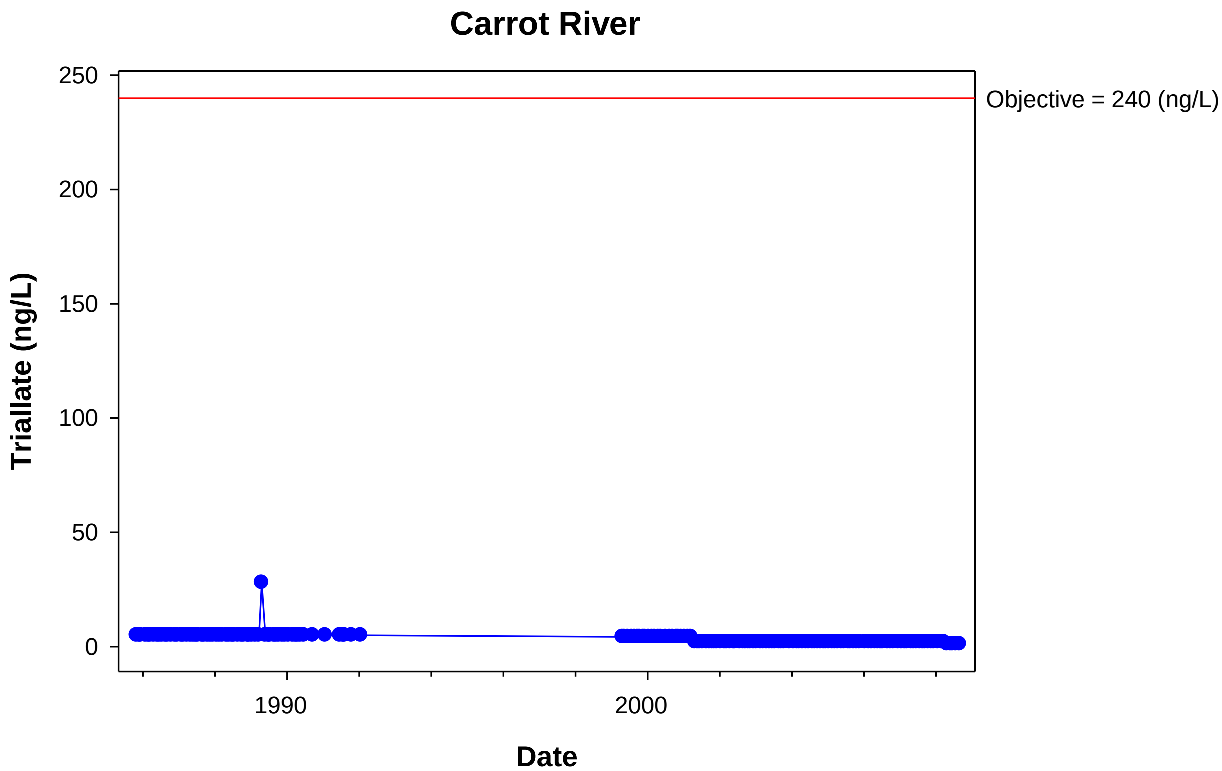

Figure 6-h35: Carrot River Triallate

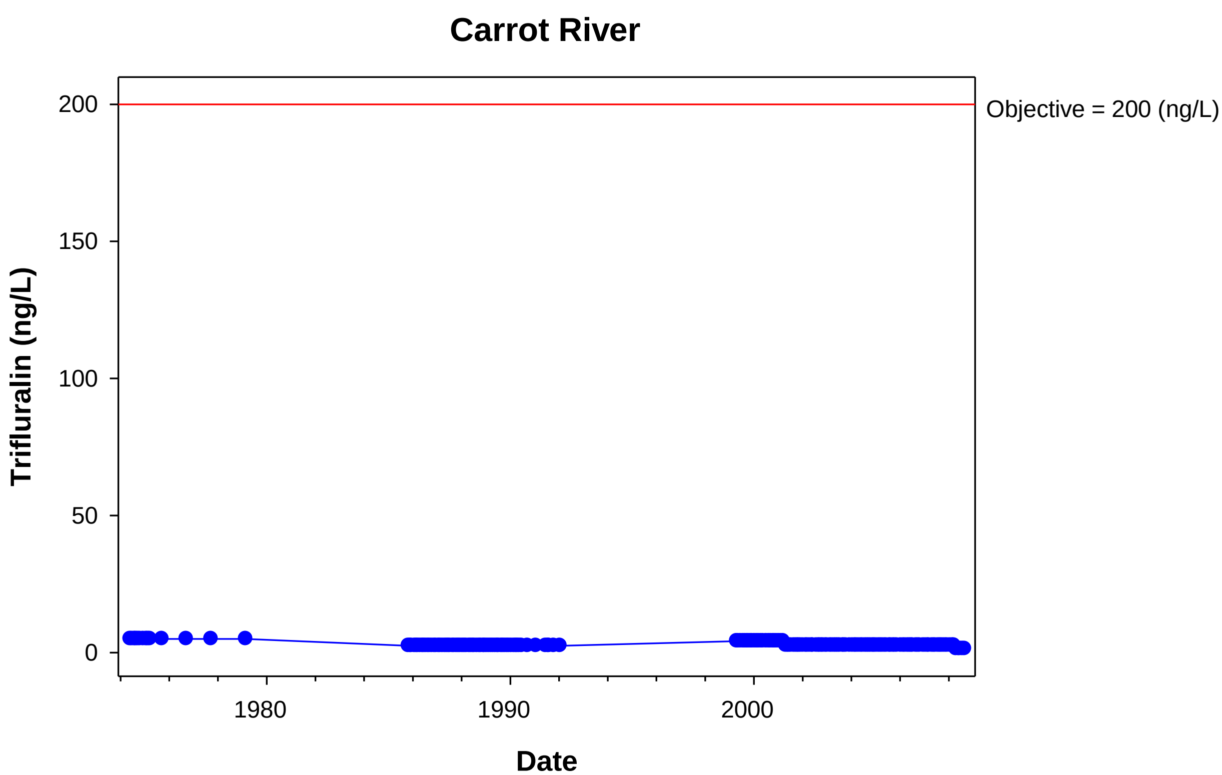

Figure 6-h36: Carrot River Trifluralin

Appendix 6-i: Churchill River

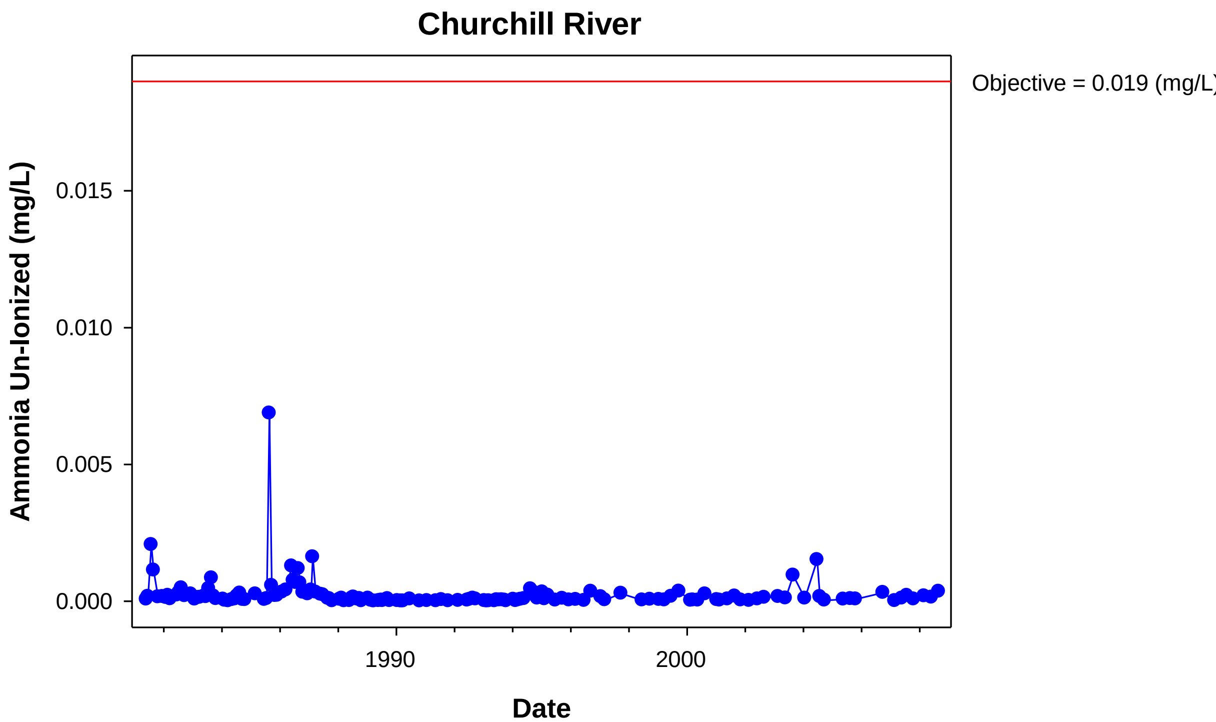

Figure 6-i1: Churchill River Ammonia Un-Ionized

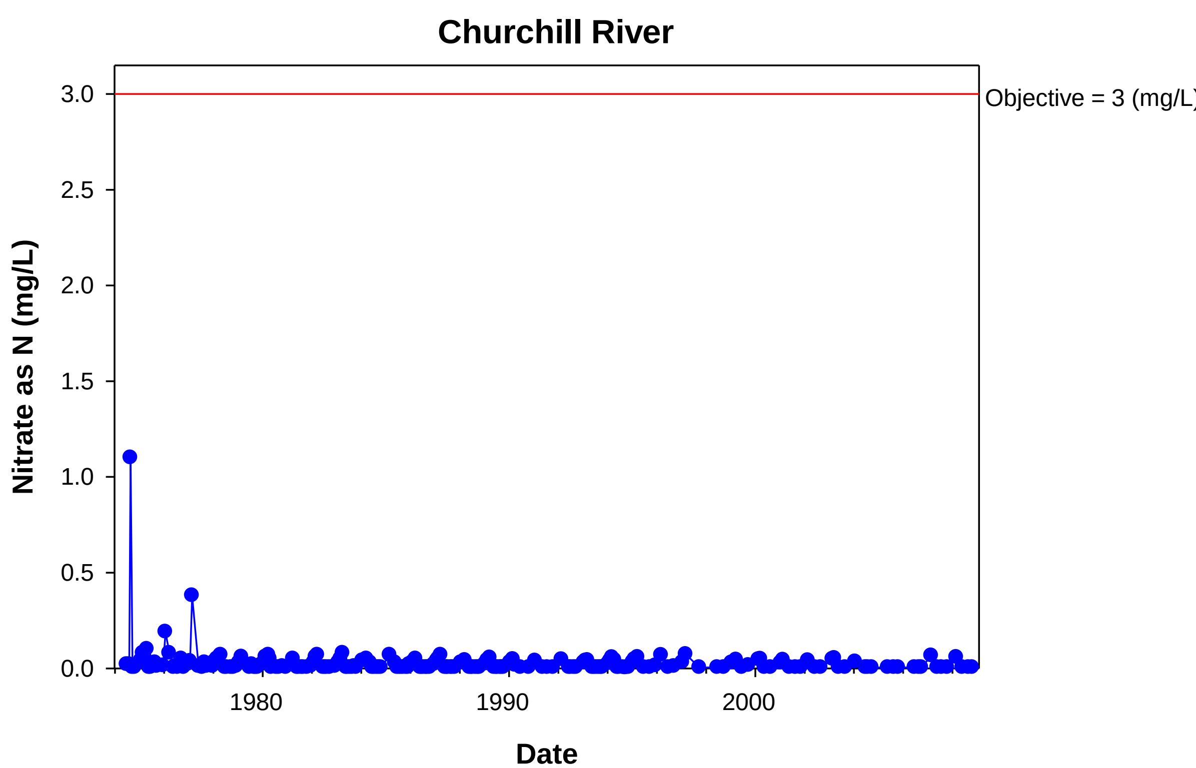

Figure 6-i2: Churchill River Nitrate as N

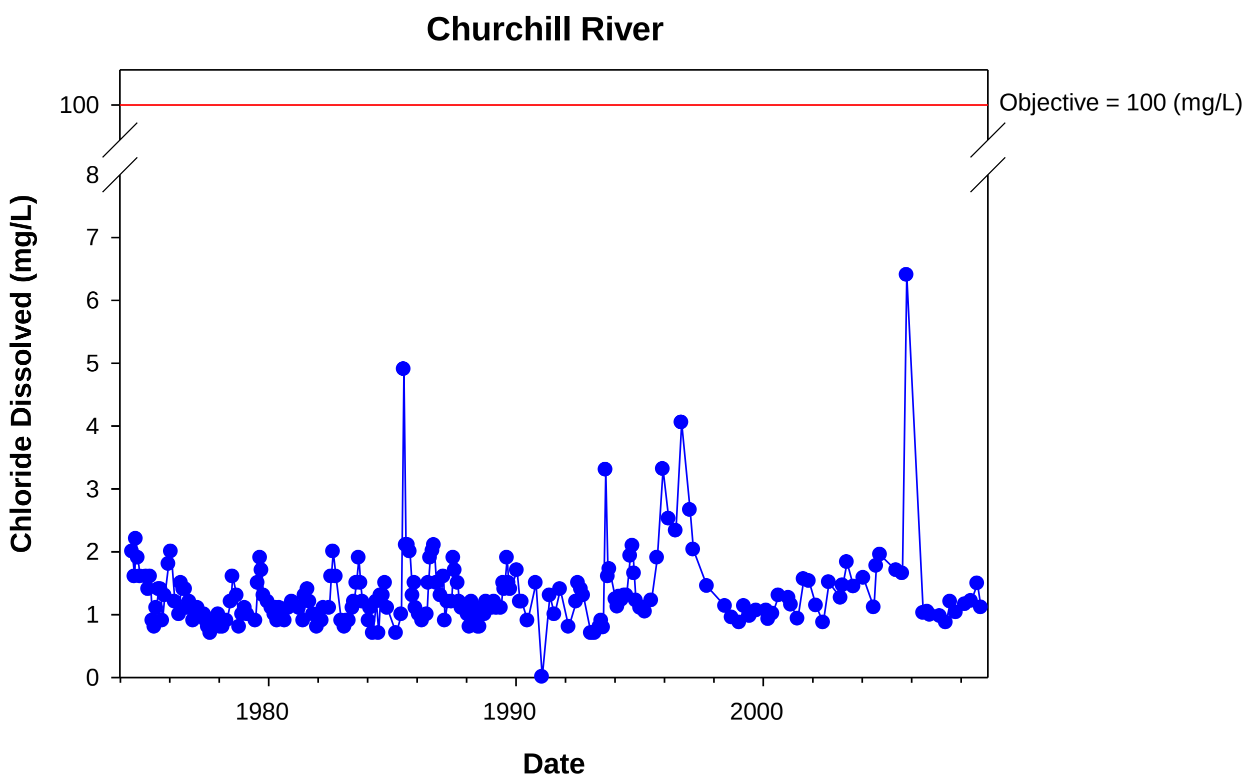

Figure 6-i3: Churchill River Chloride Dissolved

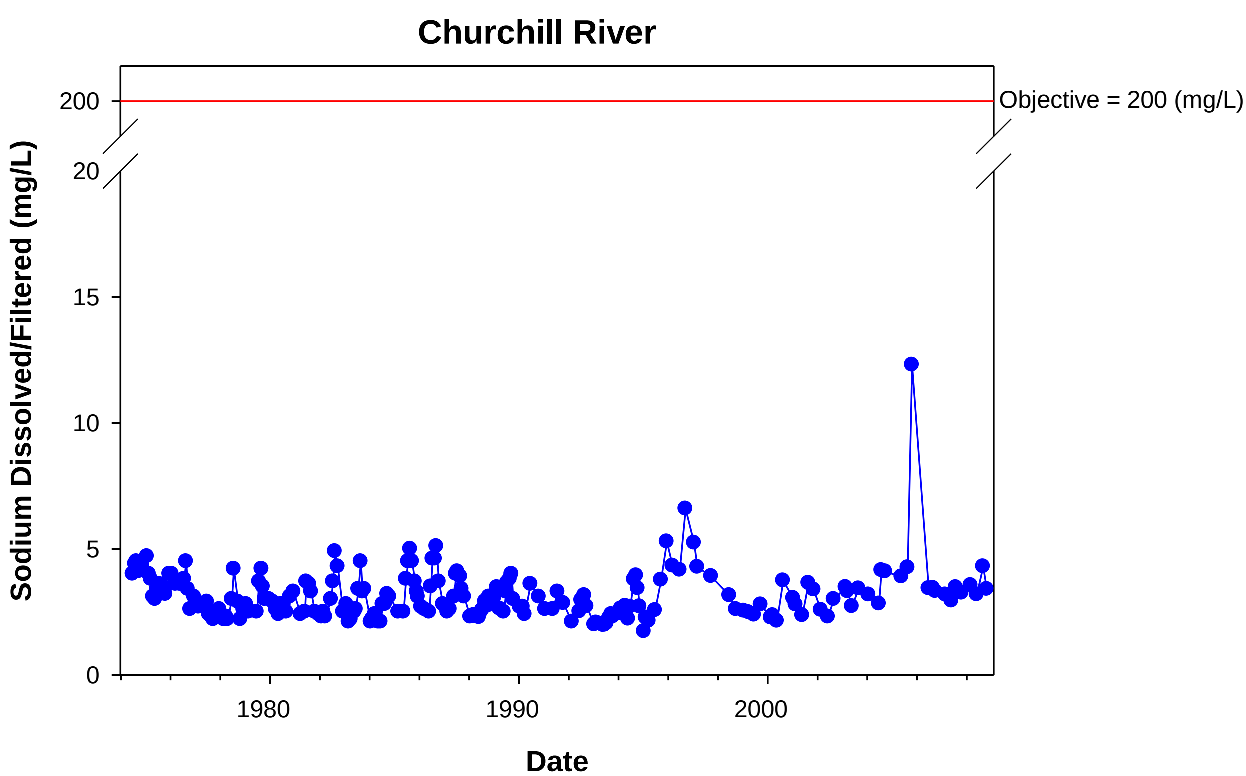

Figure 6-i4: Churchill River Sodium Dissolved/Filtered

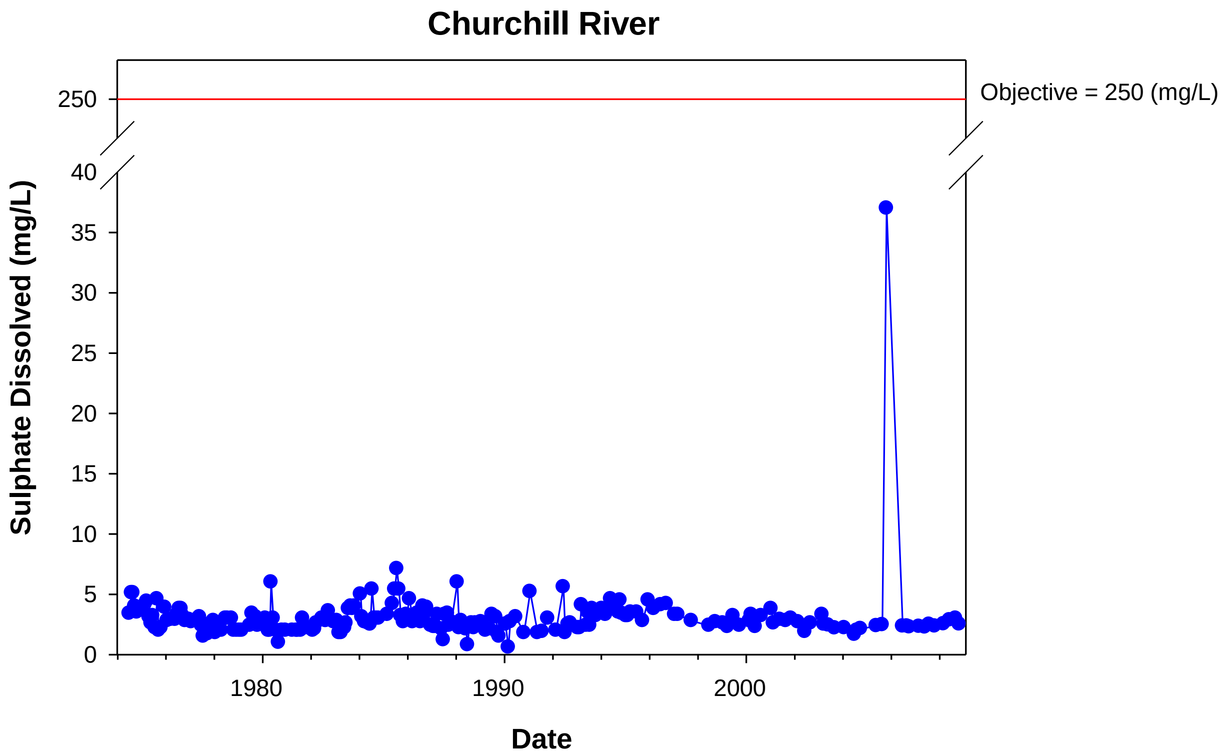

Figure 6-i5: Churchill River Sulphate Dissolved

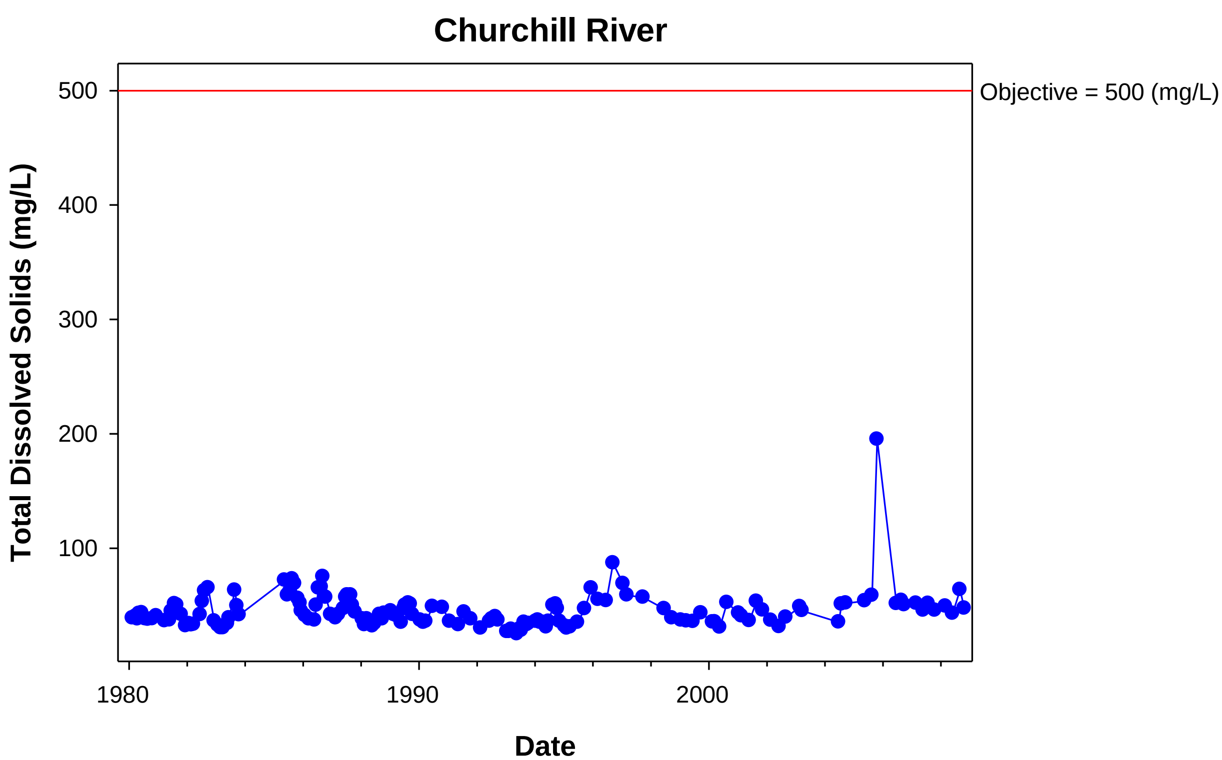

Figure 6-i6: Churchill River Total Dissolved Solids

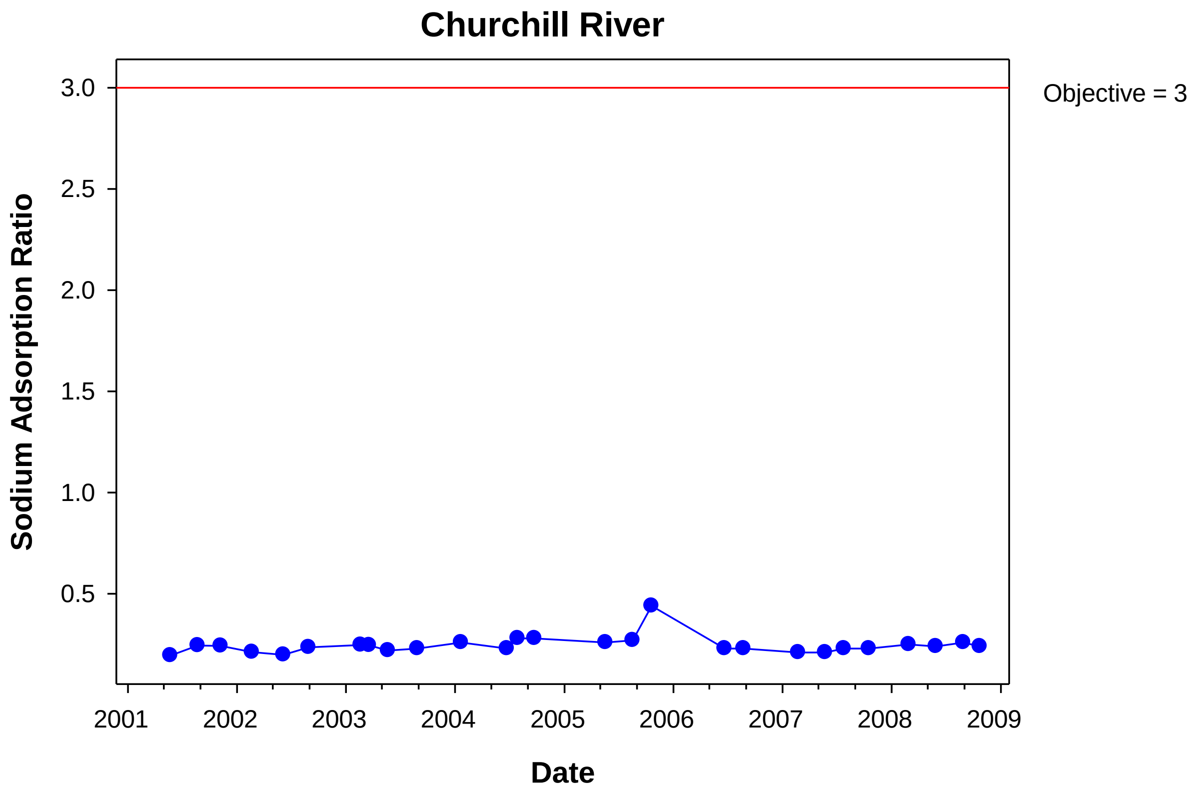

Figure 6-i7: Churchill River Sodium Adsorption Ratio

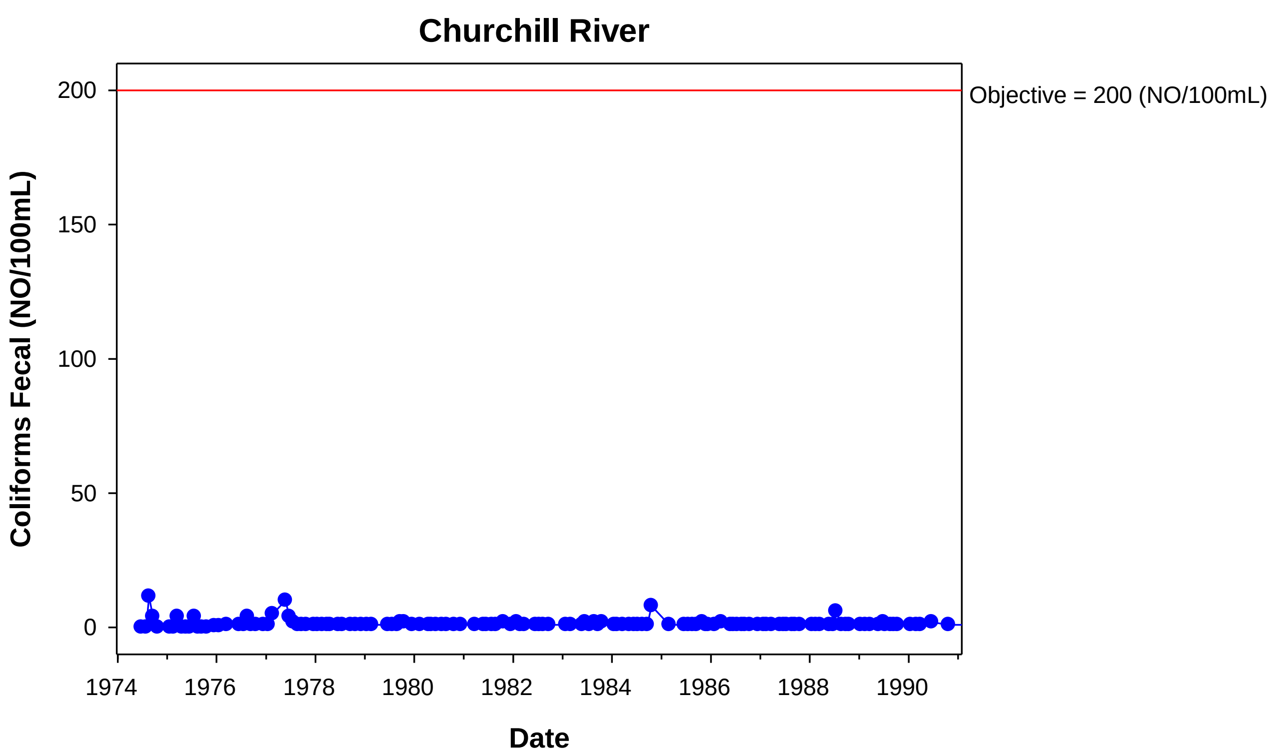

Figure 6-i8: Churchill River Coliforms Fecal

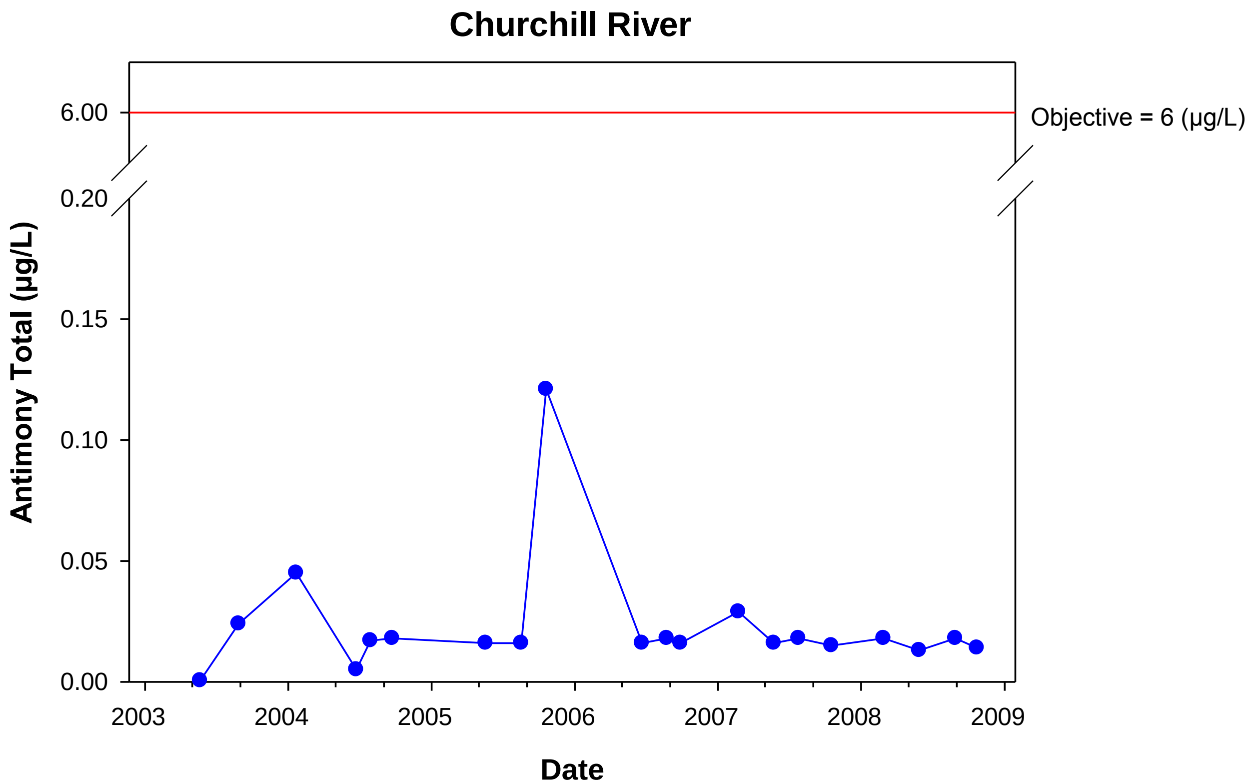

Figure 6-i9: Churchill River Antimony Total

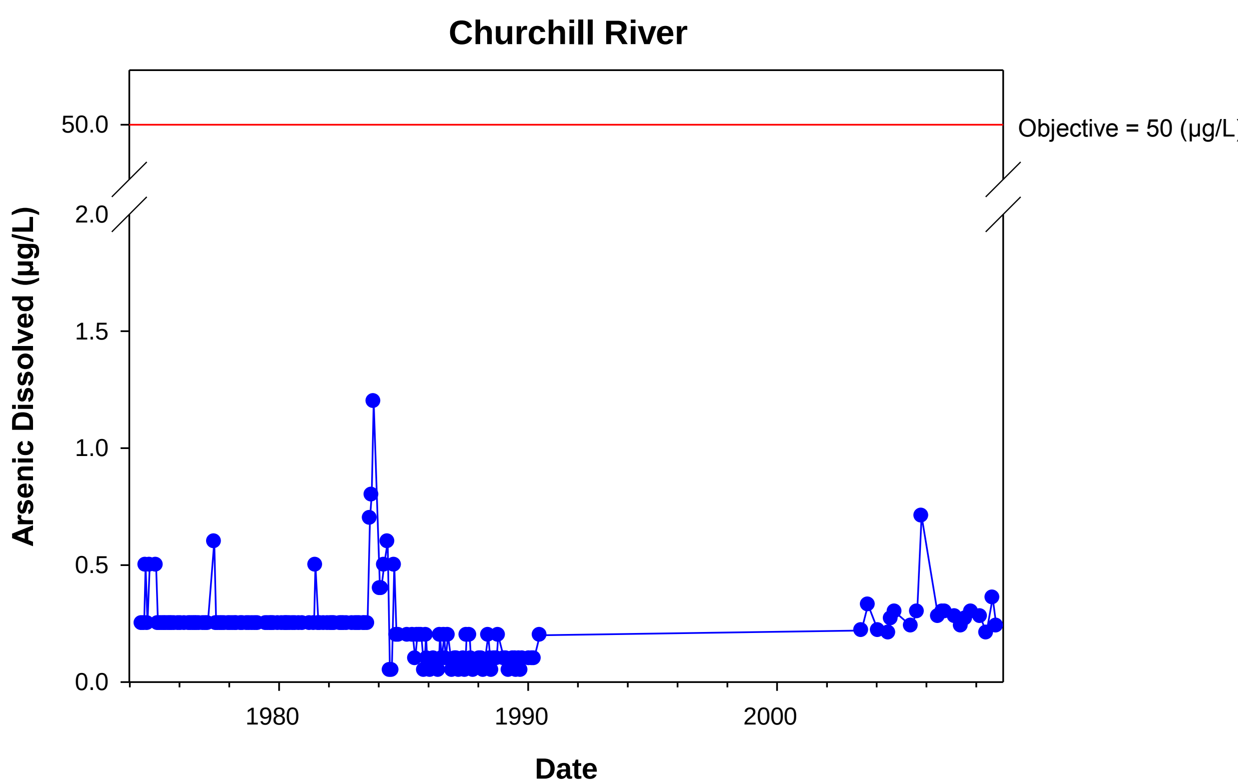

Figure 6-i10: Churchill River Arsenic Dissolved

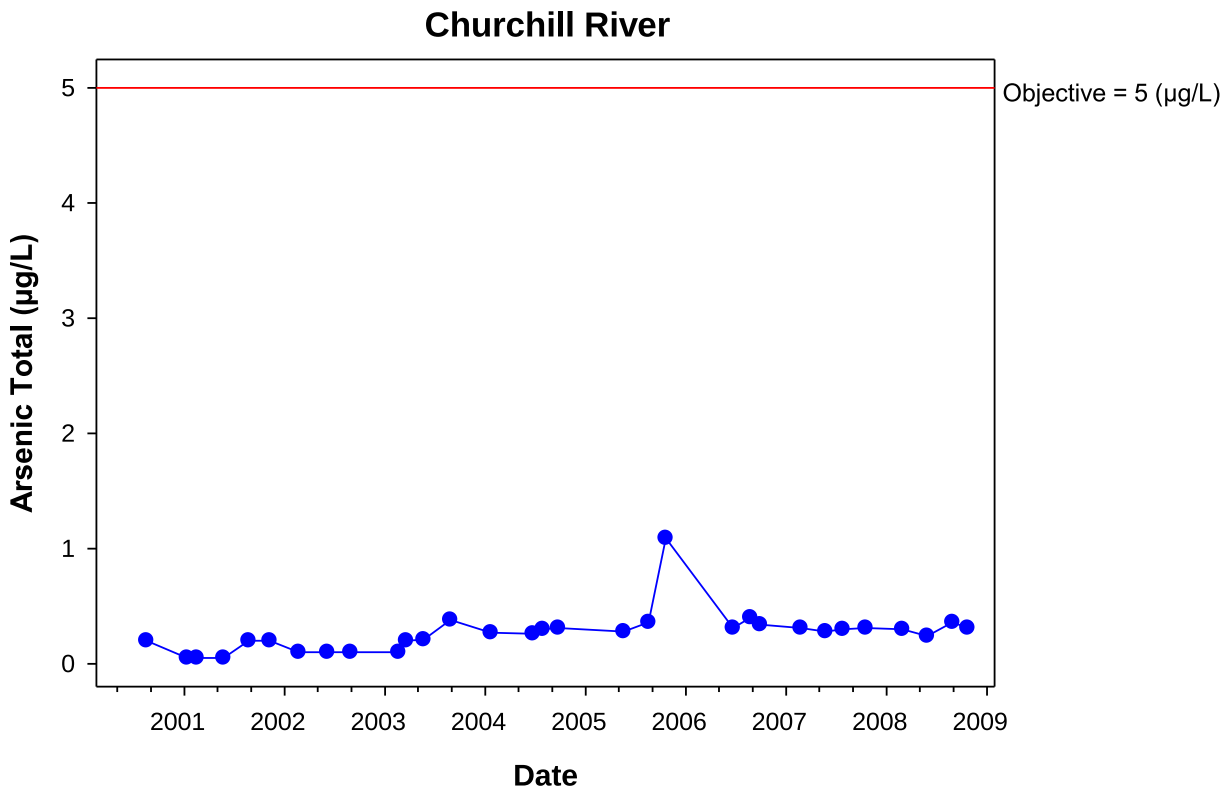

Figure 6-i11: Churchill River Arsenic Total

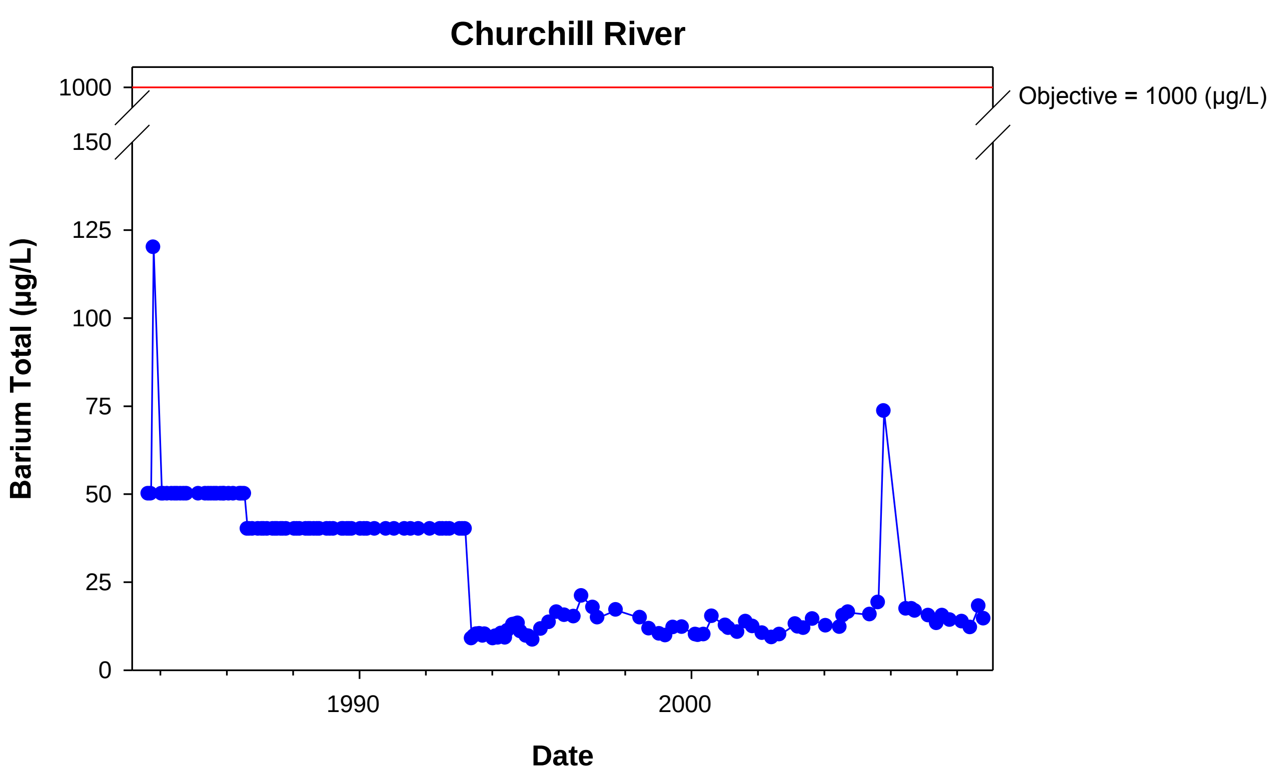

Figure 6-i12: Churchill River Barium Total

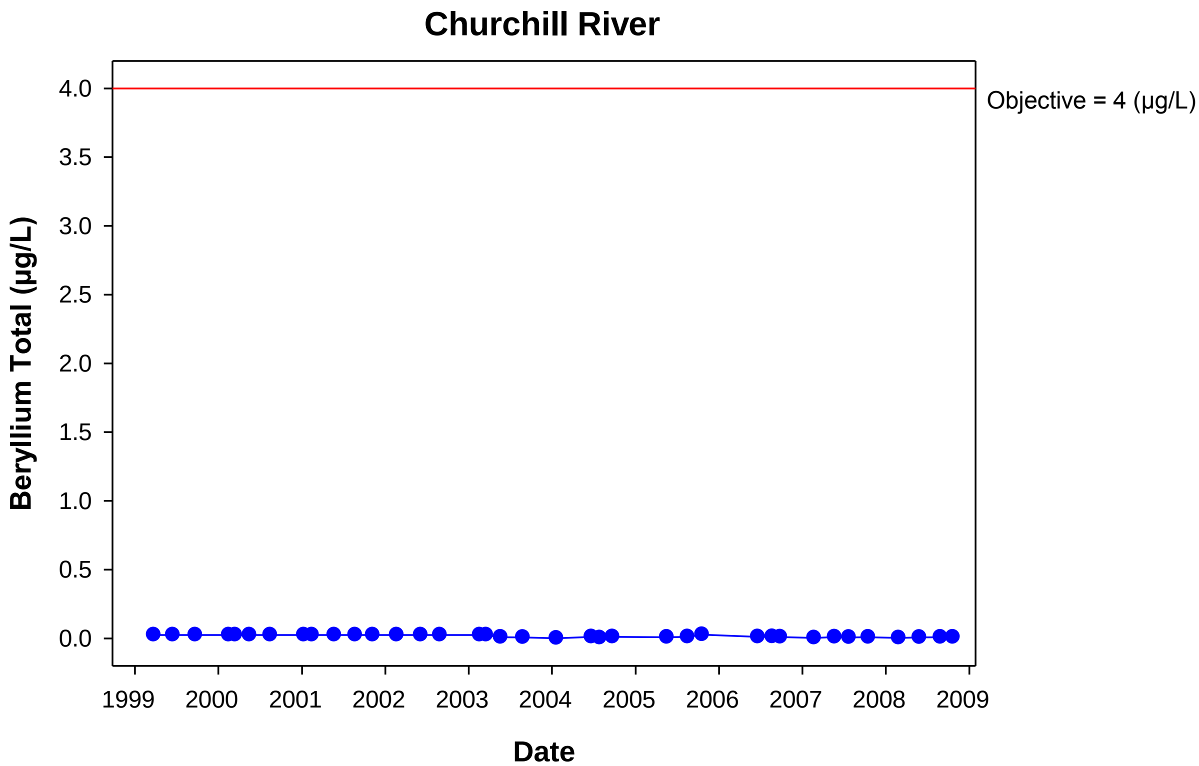

Figure 6-i13: Churchill River Beryllium Total

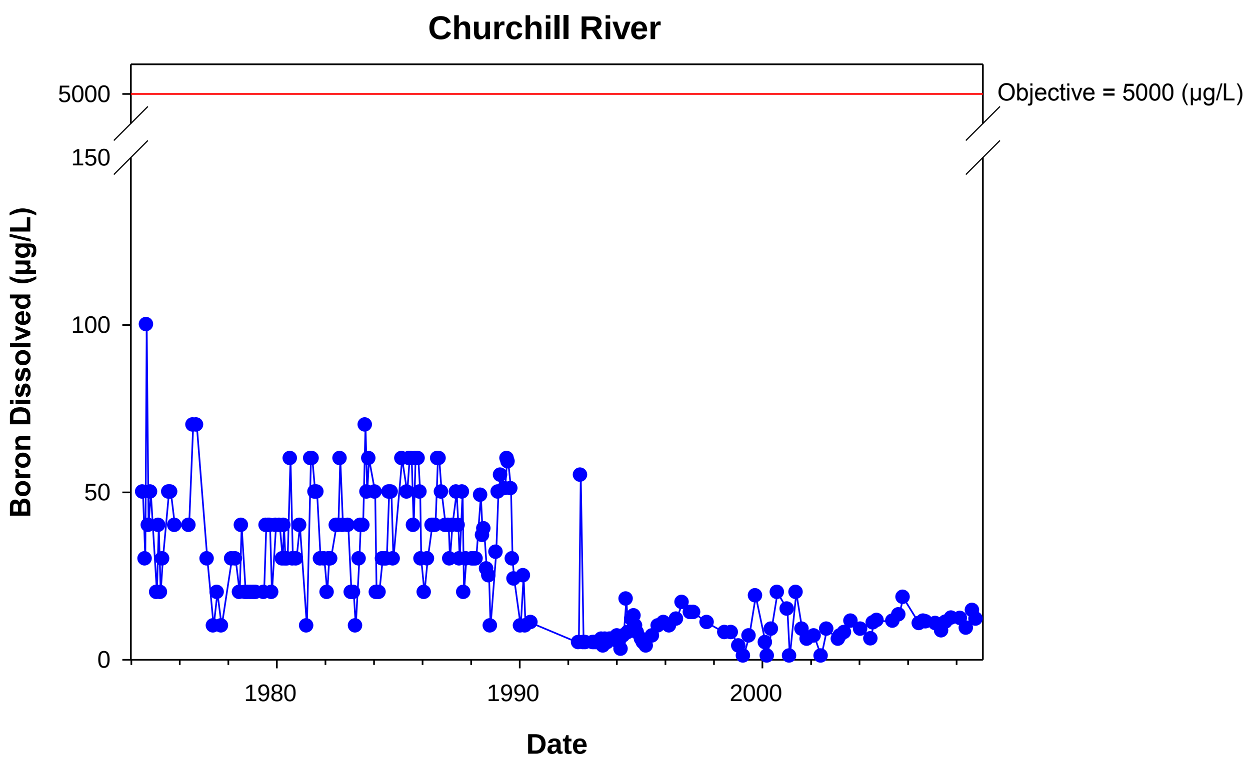

Figure 6-i14: Churchill River Boron Dissolved

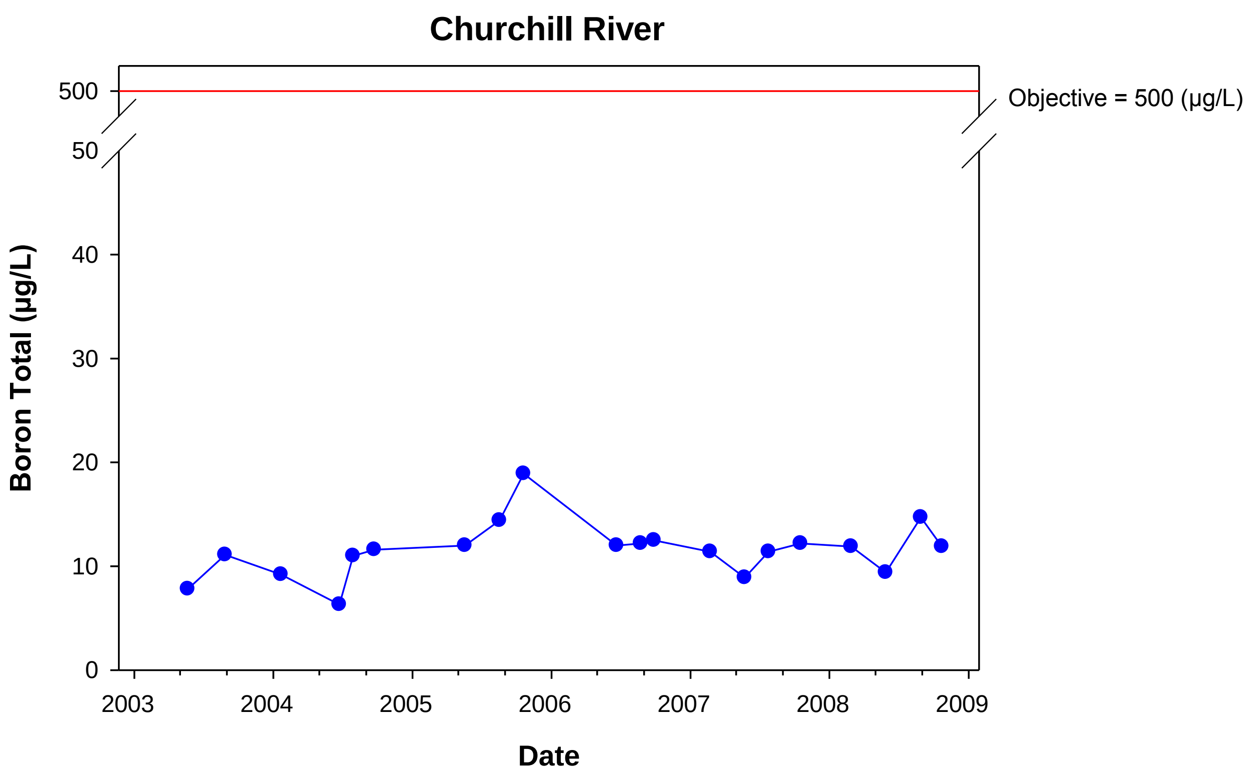

Figure 6-i15: Churchill River Boron Total

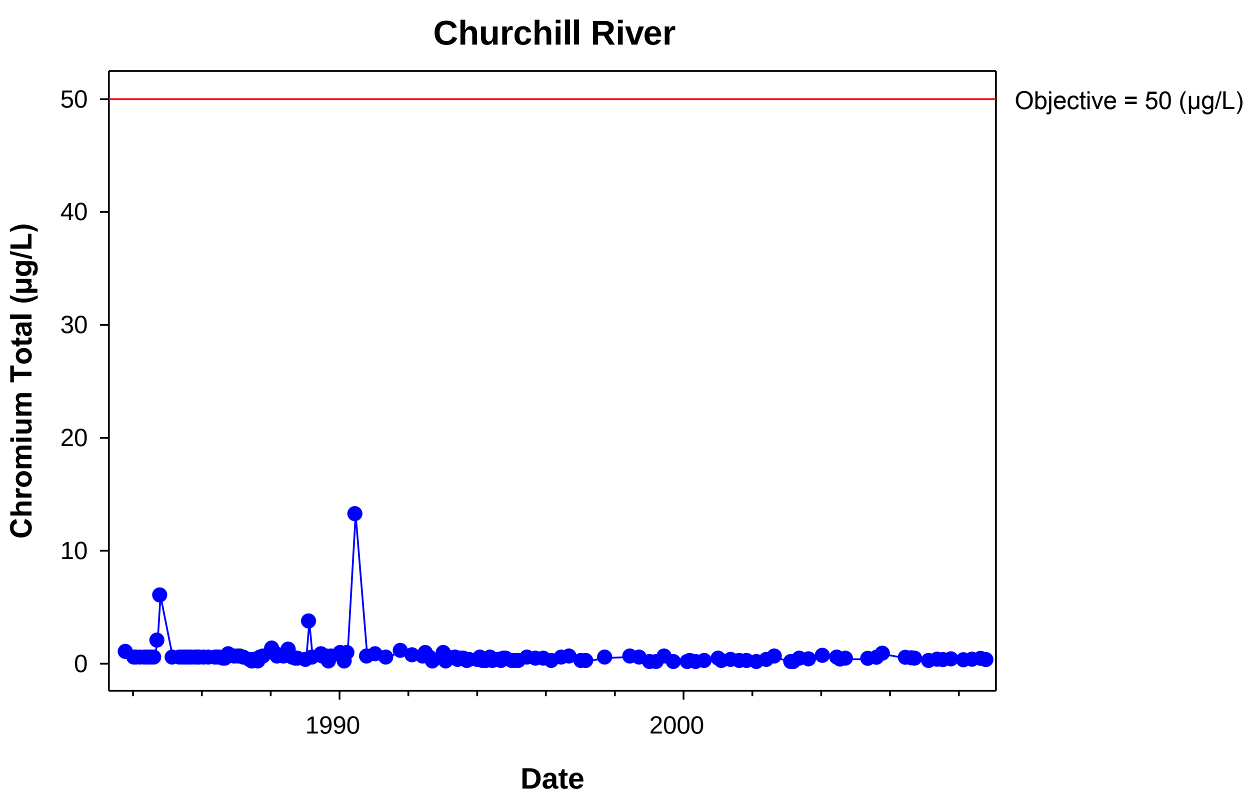

Figure 6-i16: Churchill River Chromium Total

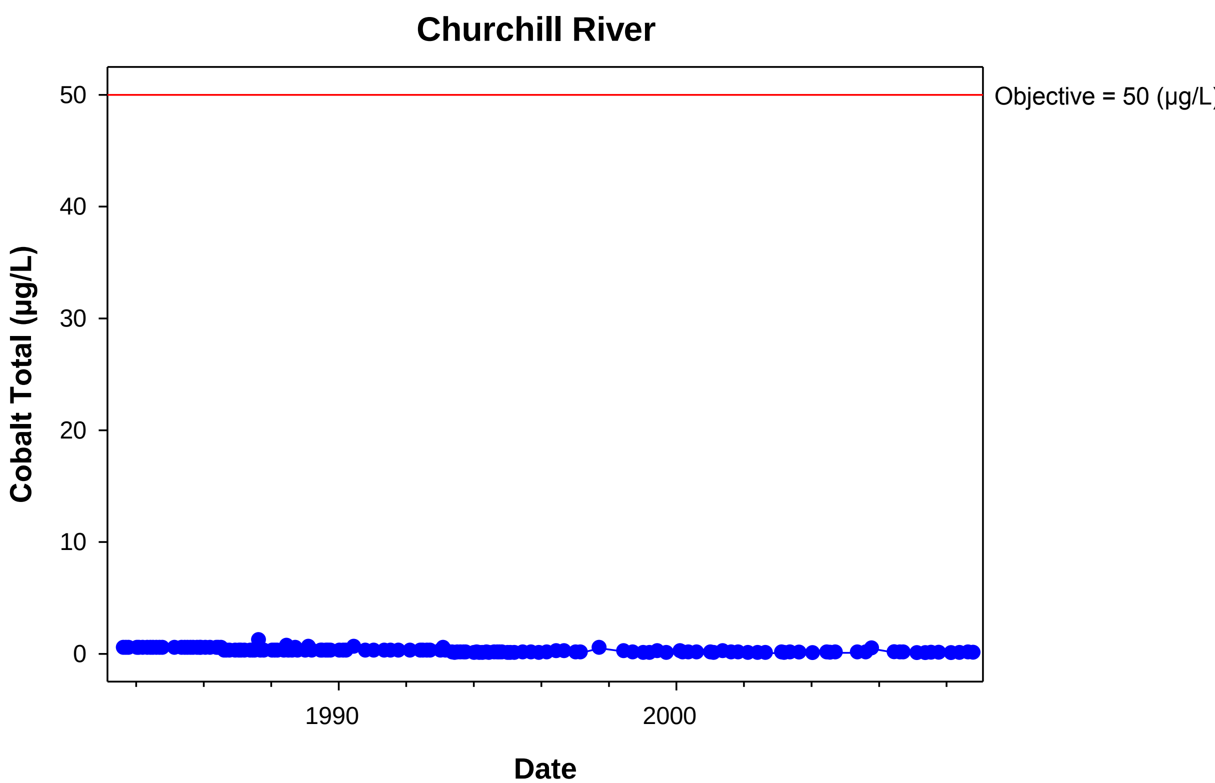

Figure 6-i17: Churchill River Cobalt Total

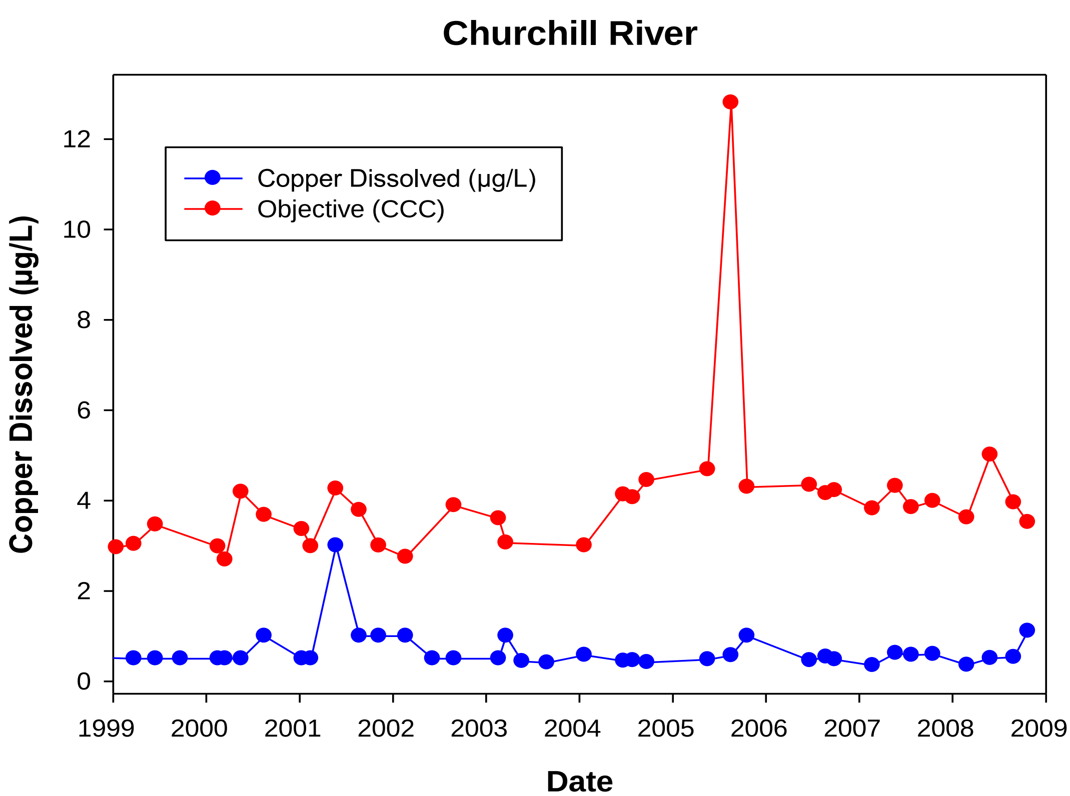

Figure 6-i18: Churchill River Copper Dissolved

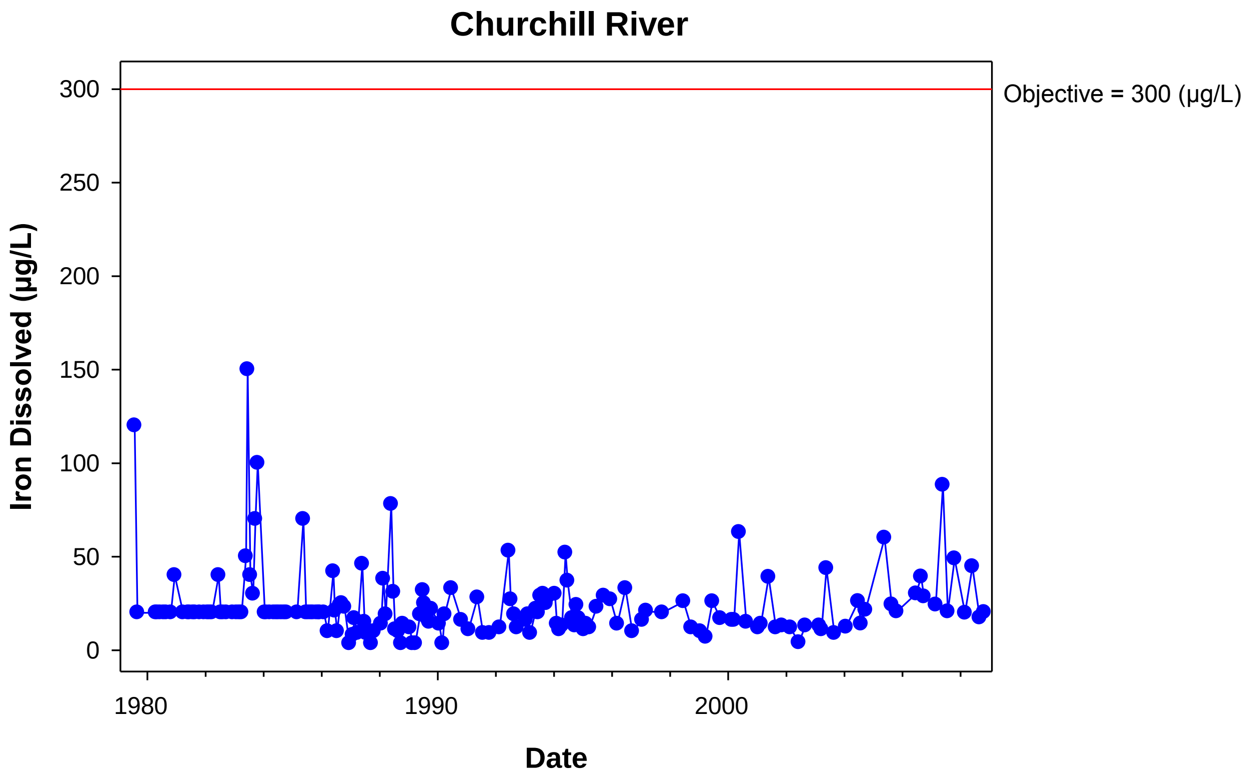

Figure 6-i19: Churchill River Iron Dissolved

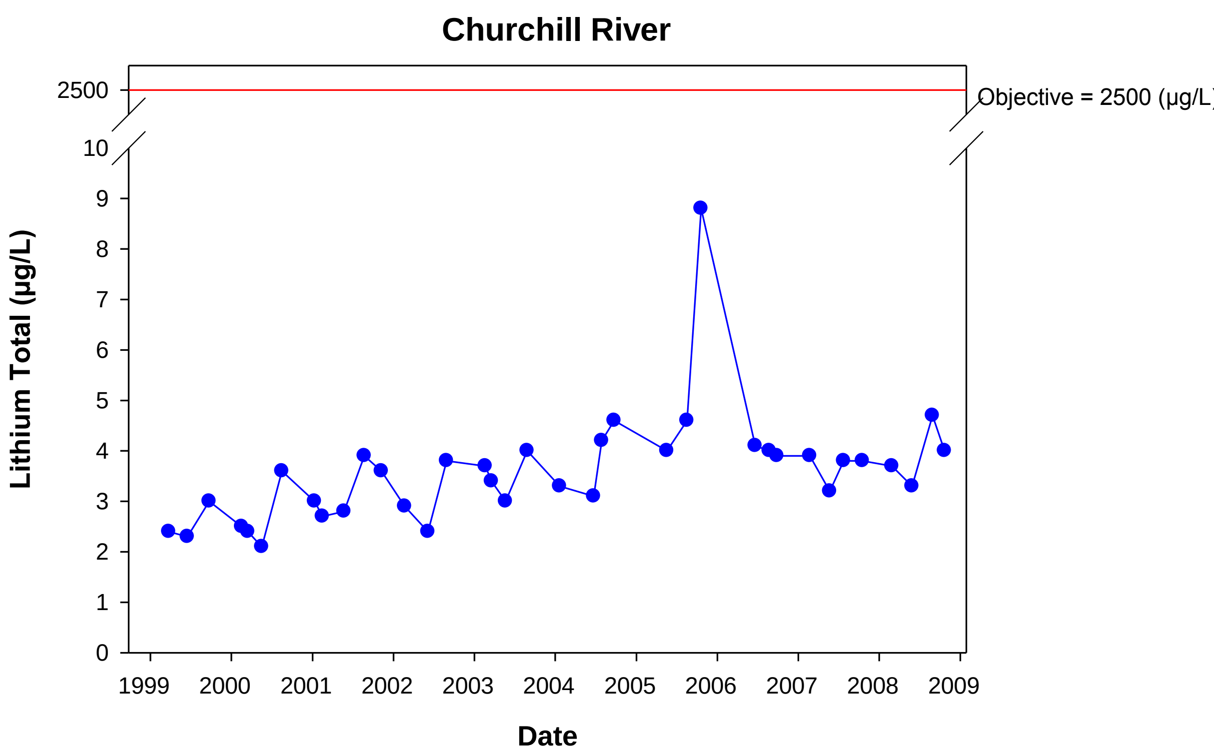

Figure 6-i20: Churchill River Lithium Total

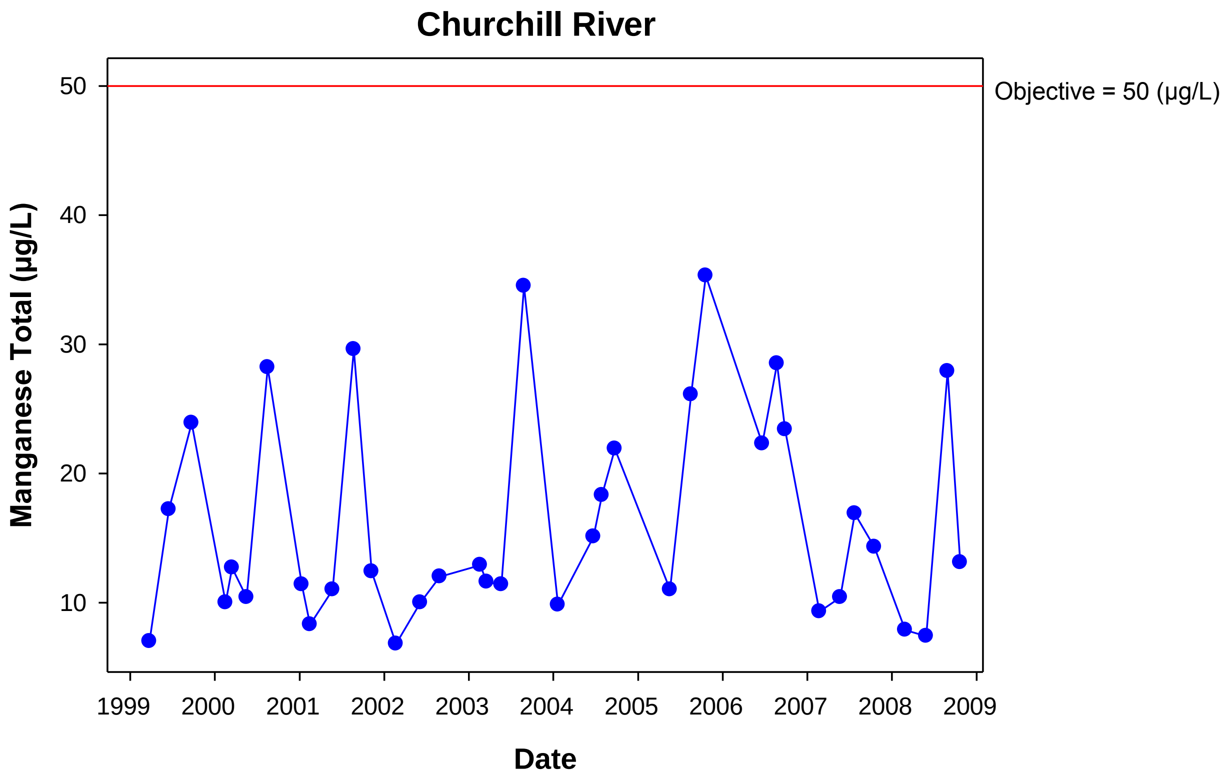

Figure 6-i21: Churchill River Manganese Total

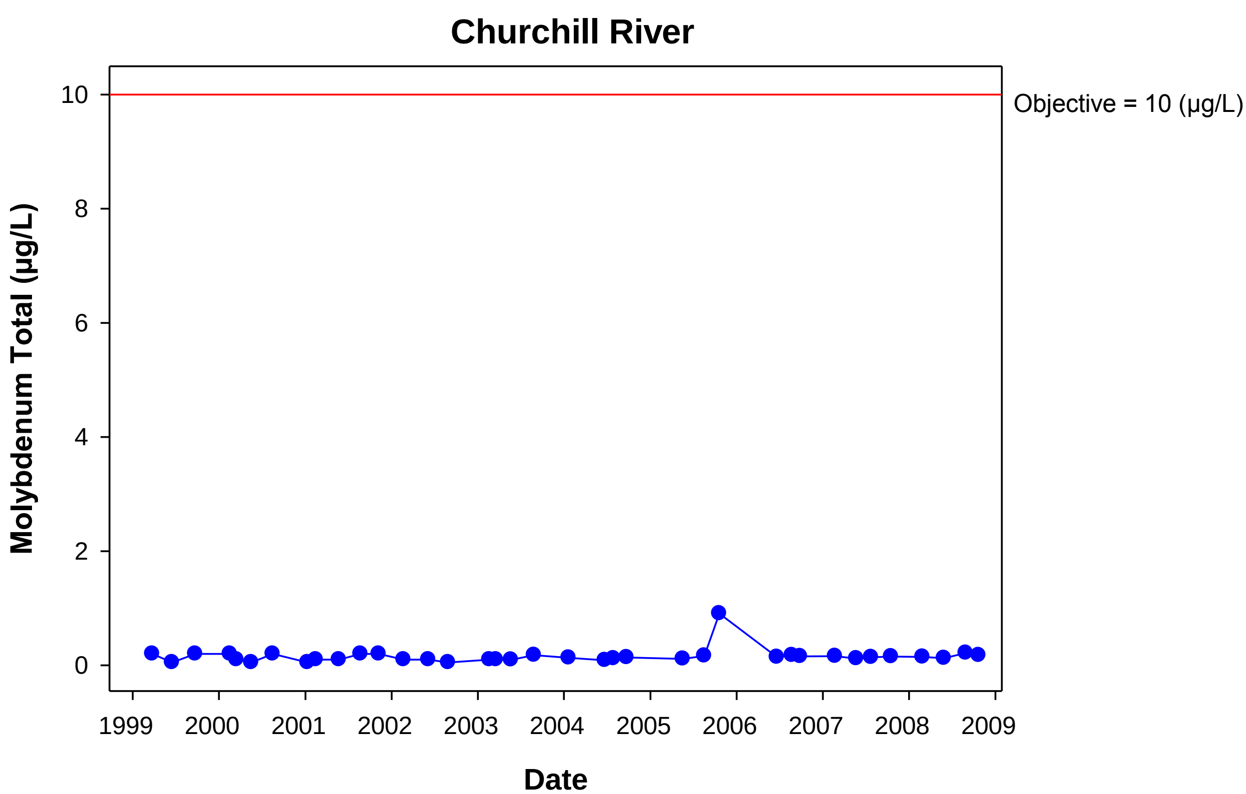

Figure 6-i22: Churchill River Molybdenum Total

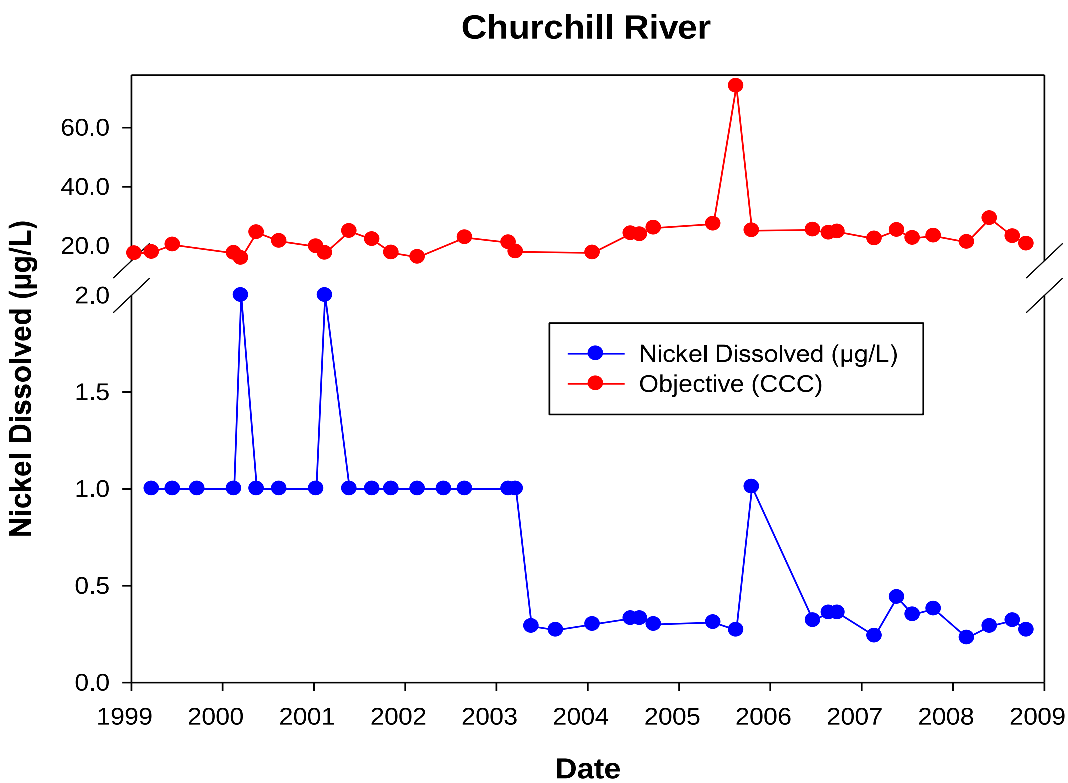

Figure 6-i23: Churchill River Nickel Dissolved

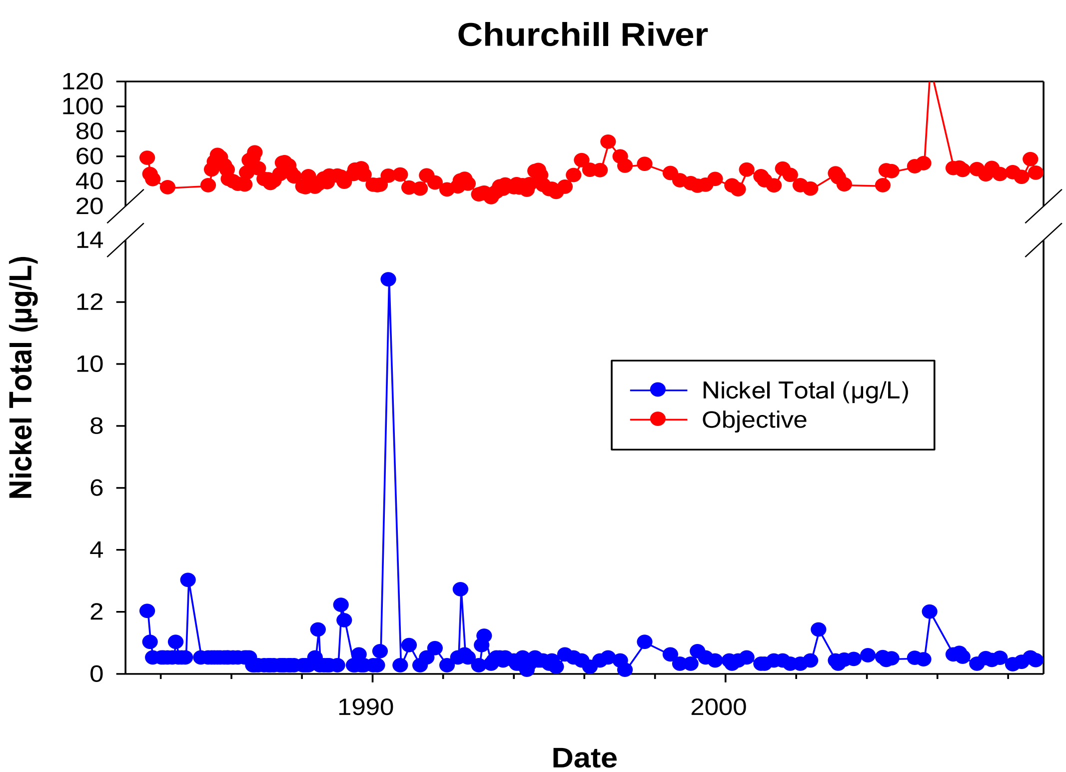

Figure 6-i24: Churchill River Nickel Total

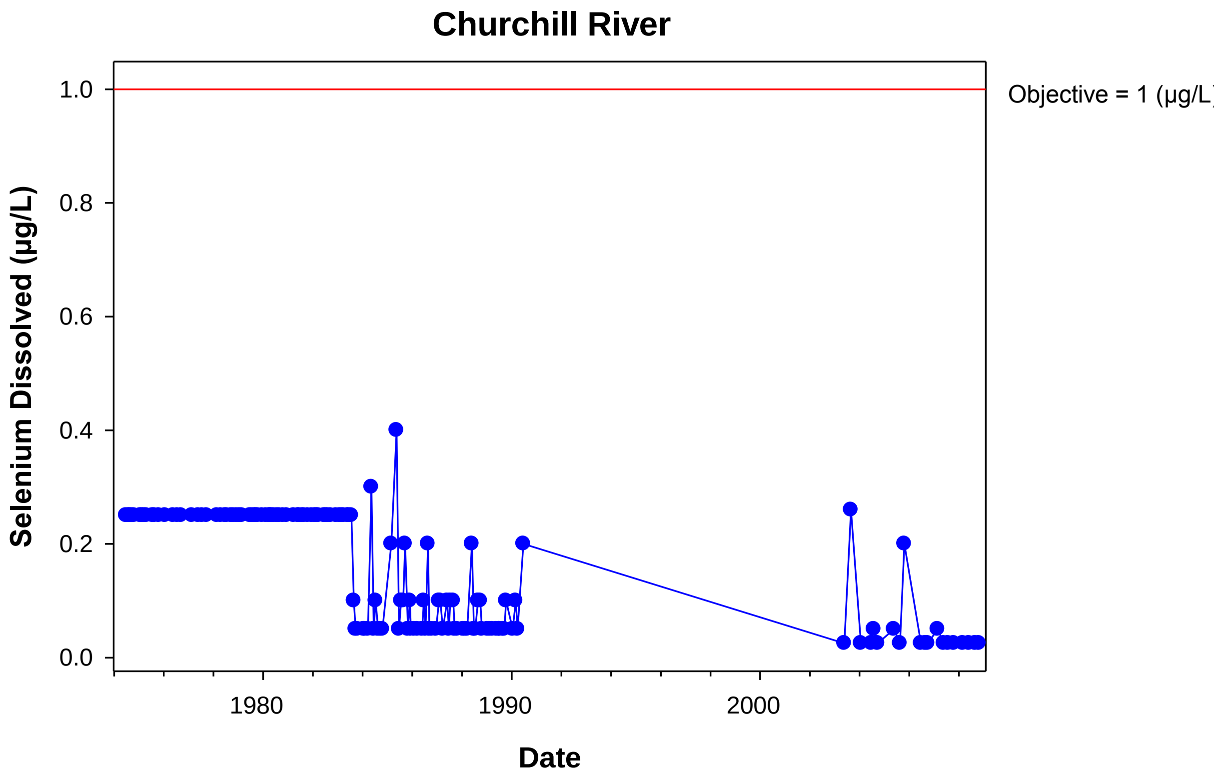

Figure 6-i25: Churchill River Selenium Dissolved

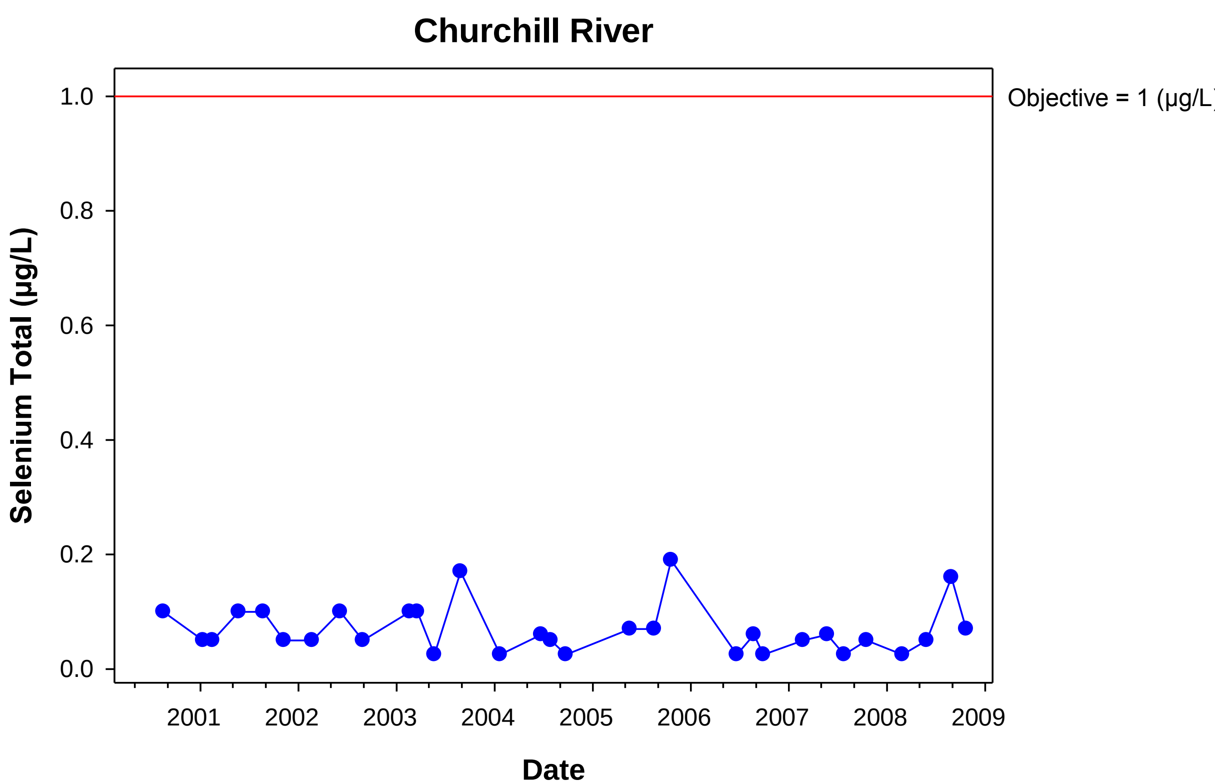

Figure 6-i26: Churchill River Selenium Total

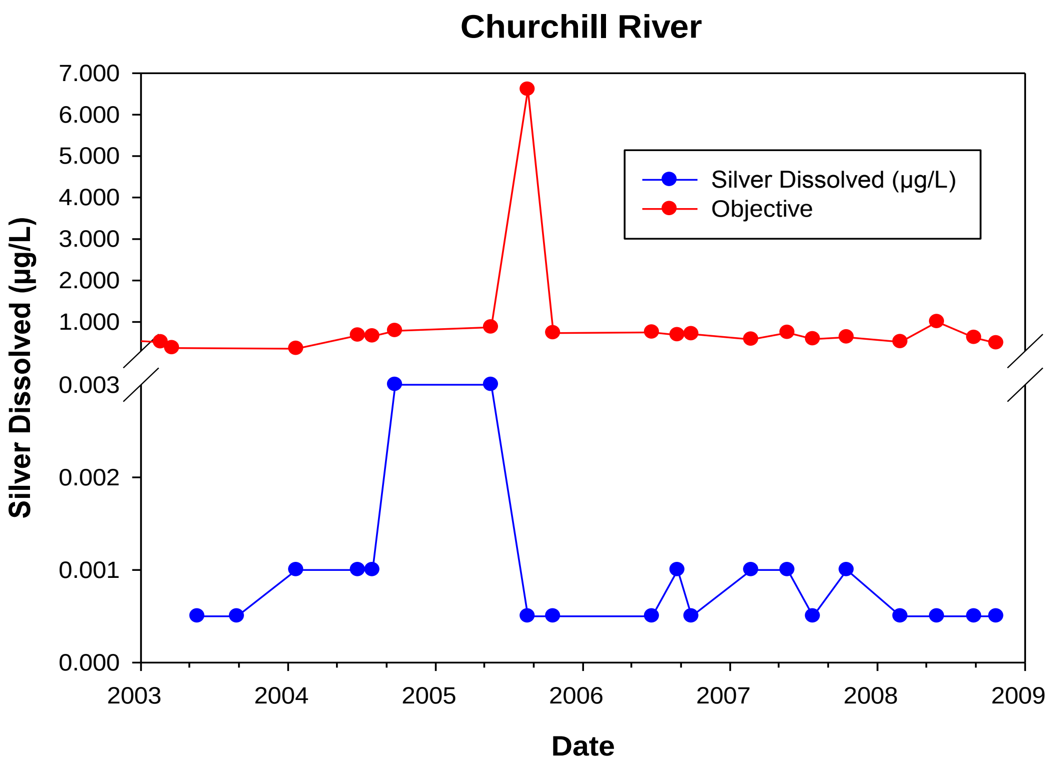

Figure 6-i27: Churchill River Silver Dissolved

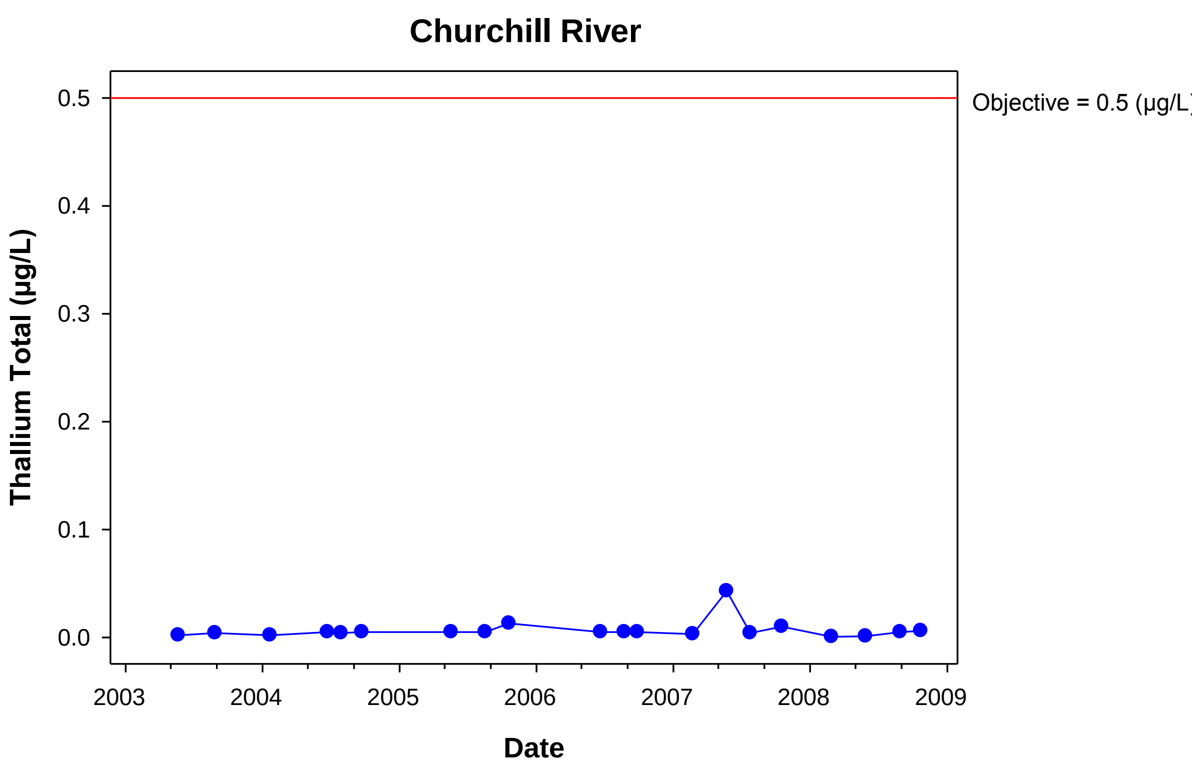

Figure 6-i28: Churchill River Thallium Total

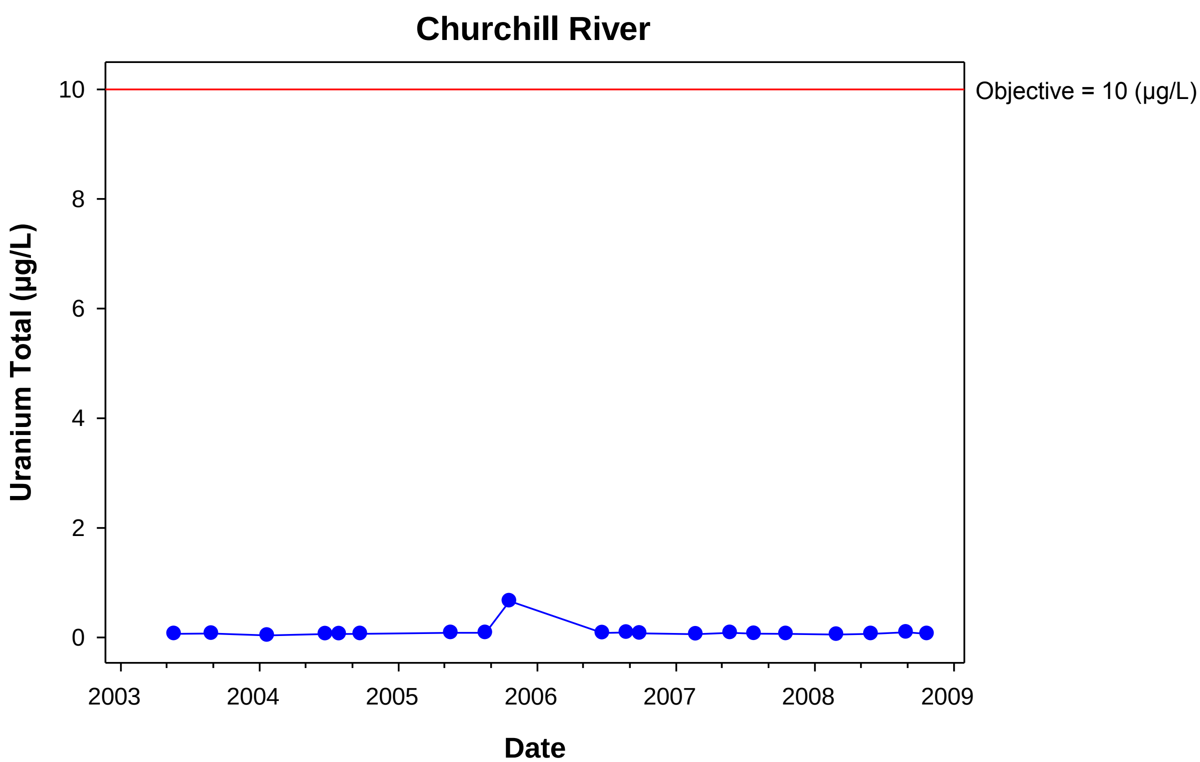

Figure 6-i29: Churchill River Uranium Total

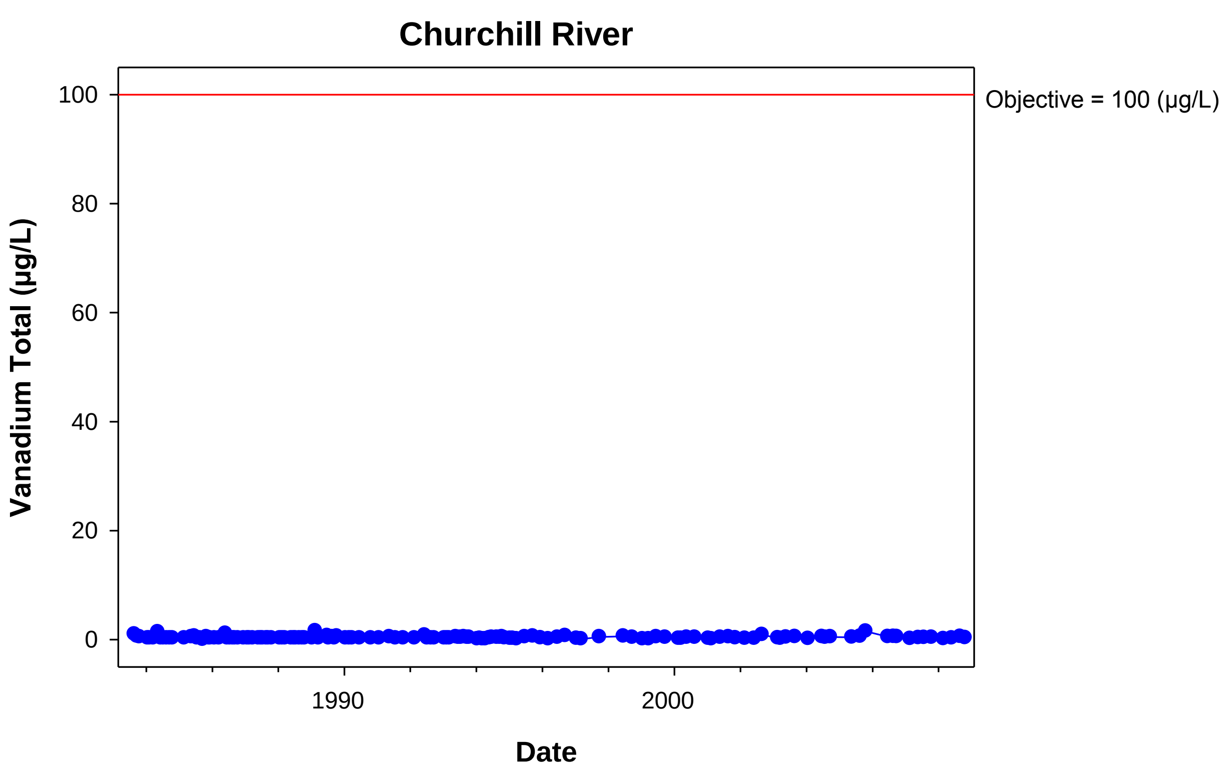

Figure 6-i30: Churchill River Vanadium Total

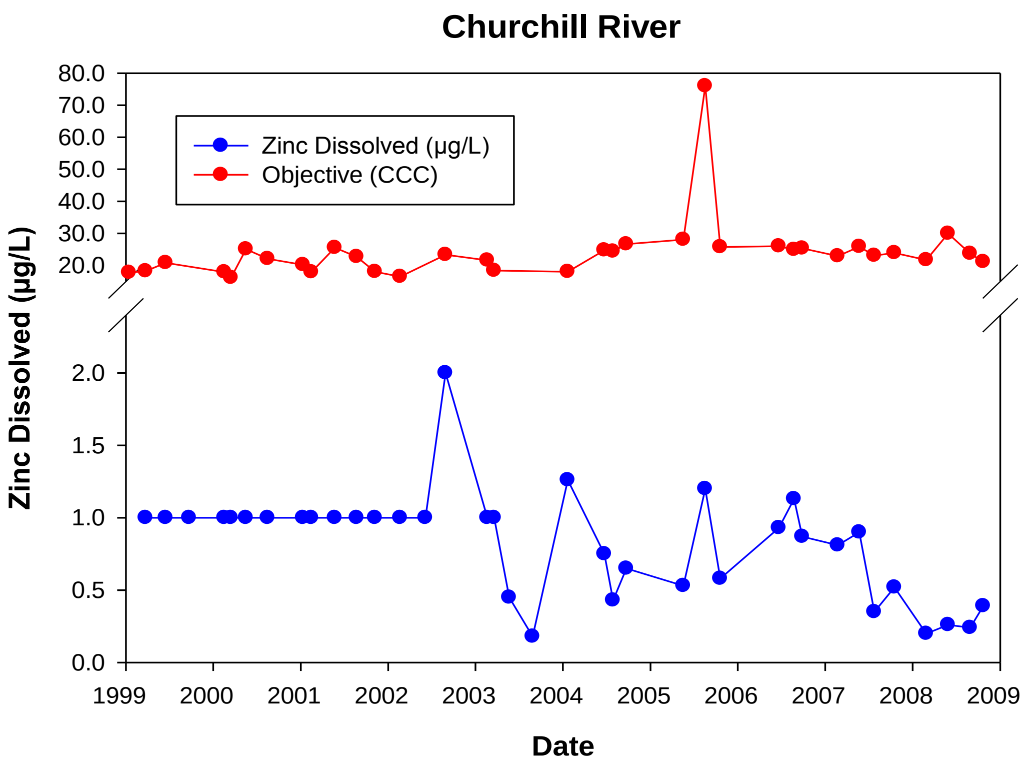

Figure 6-i31: Churchill River Zinc Dissolved

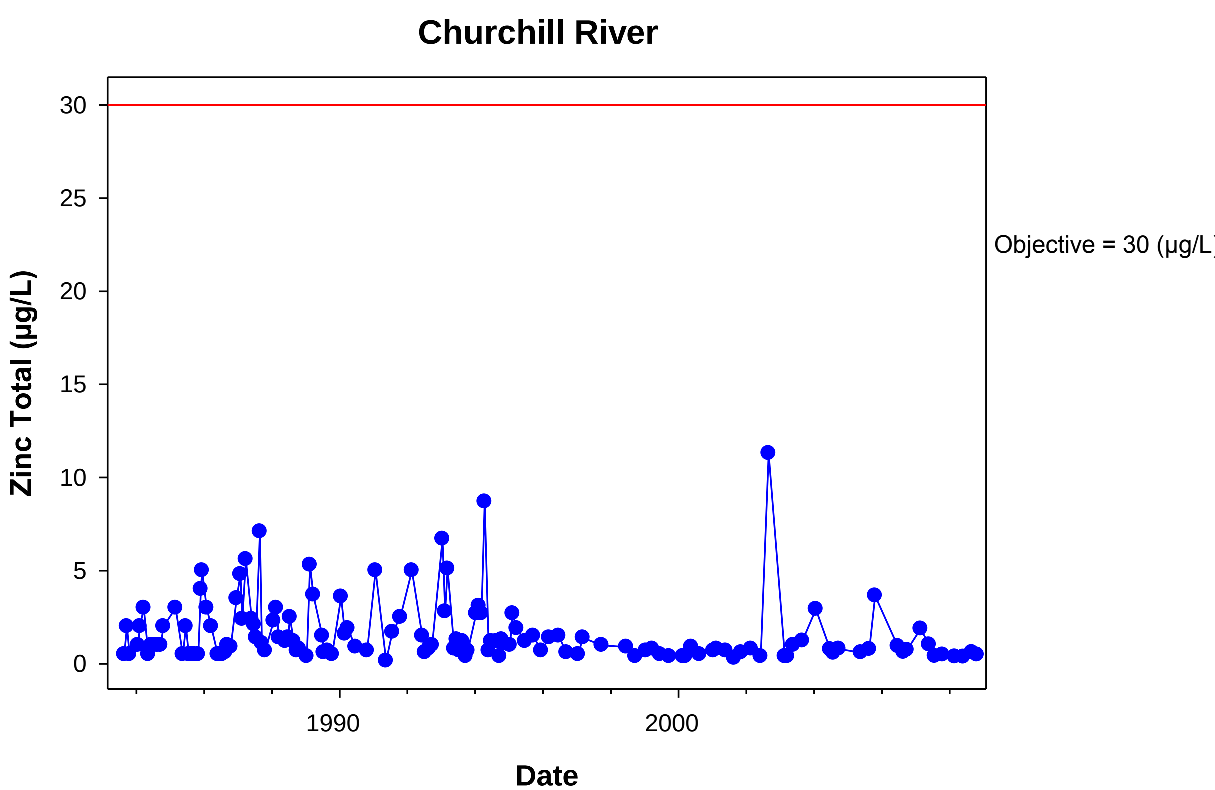

Figure 6-i32: Churchill River Zinc Total

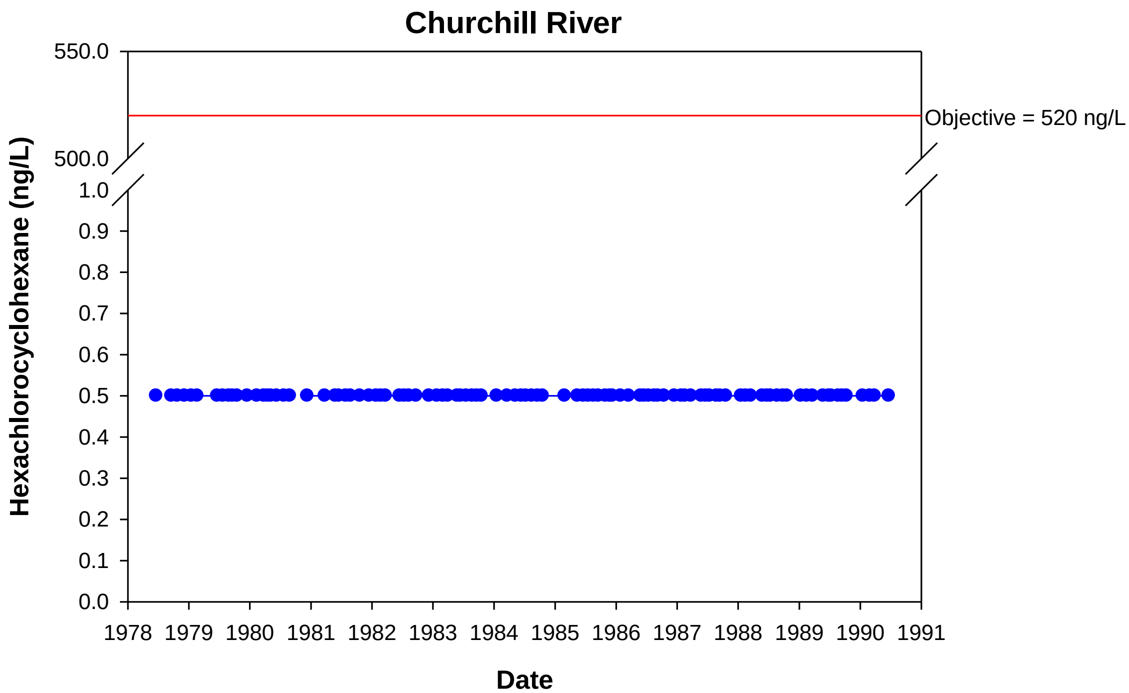

Figure 6-i33: Churchill River Hexachlorocyclohexane

Appendix 6-j: Qu'Appelle River

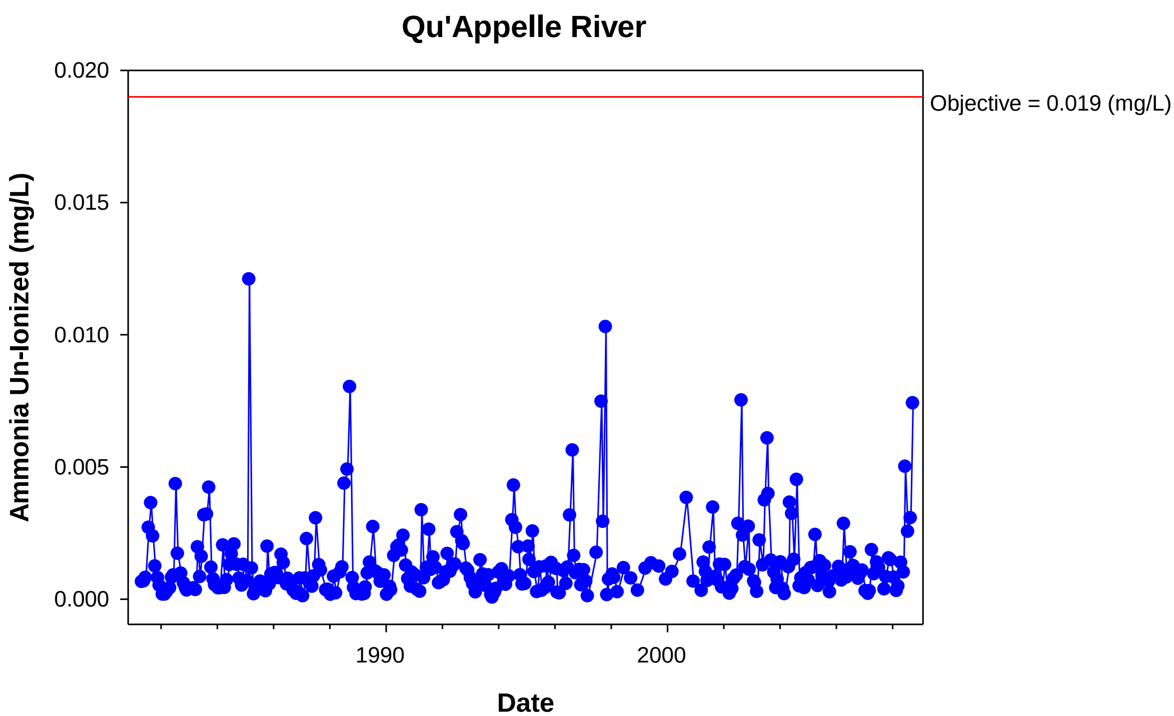

Figure 6-j1: Qu'Appelle River Ammonia Un-Ionized

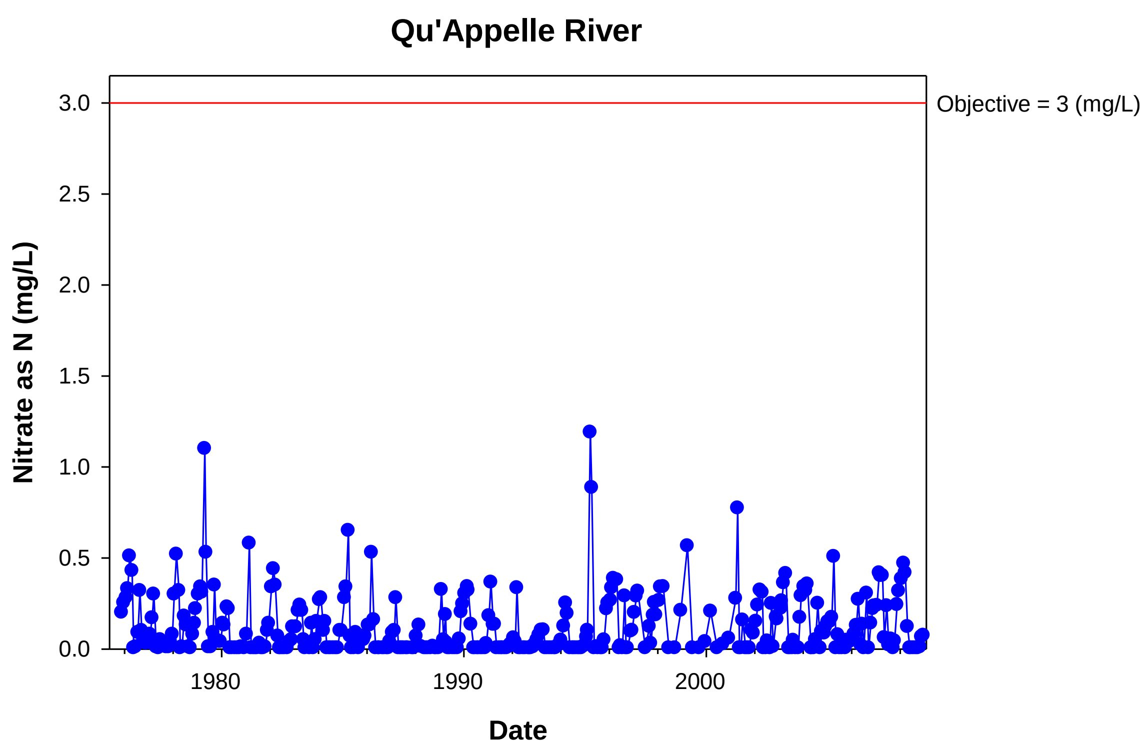

Figure 6-j2: Qu'Appelle River Nitrate as N

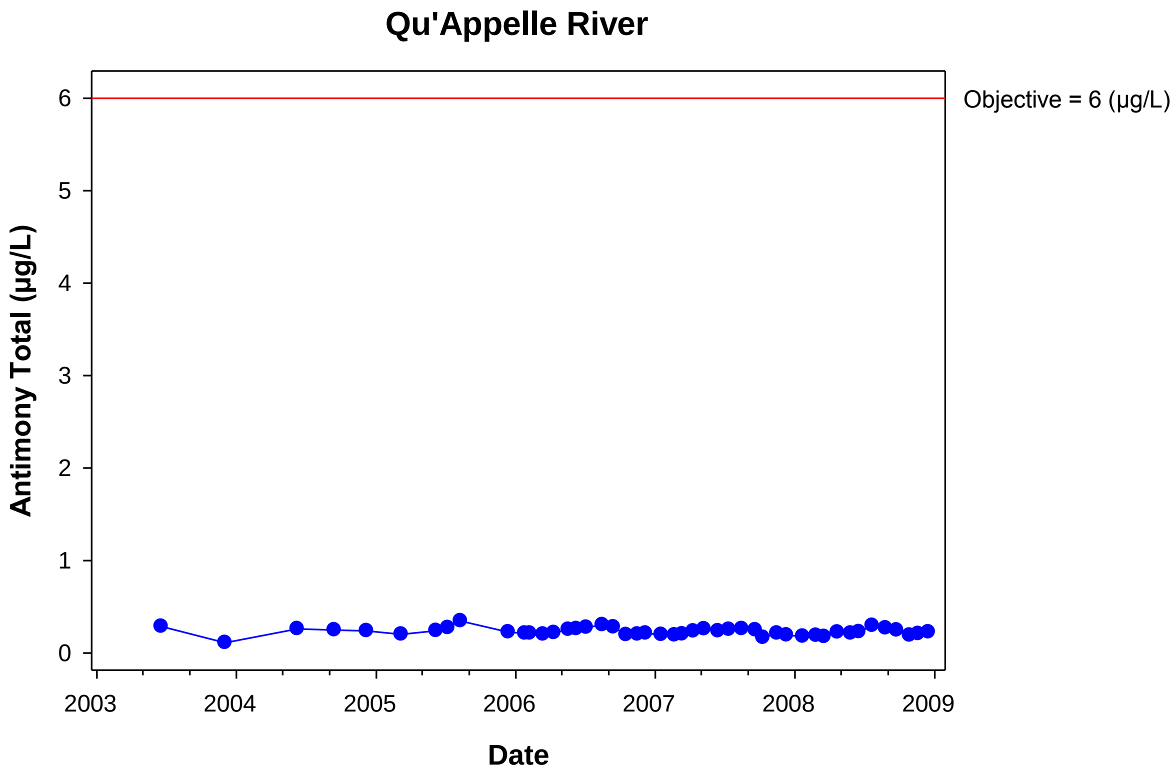

Figure 6-j3: Qu'Appelle River Antimony Total

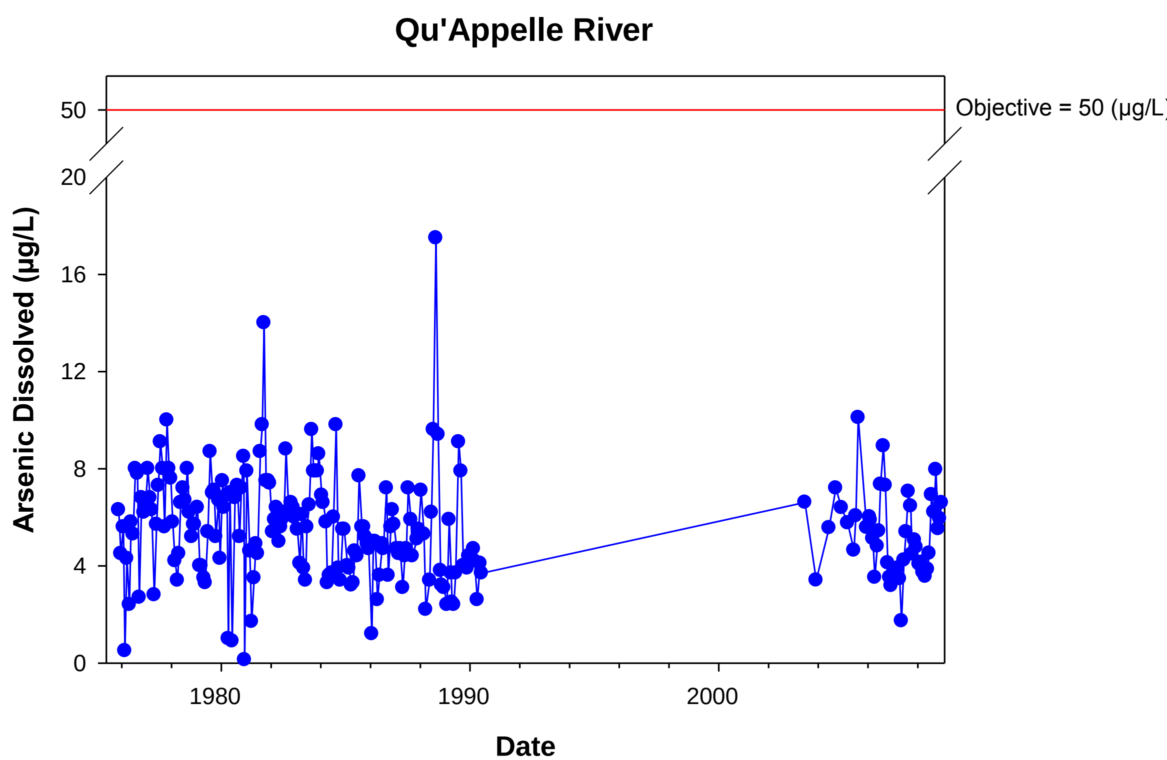

Figure 6-j4: Qu'Appelle River Arsenic Dissolved

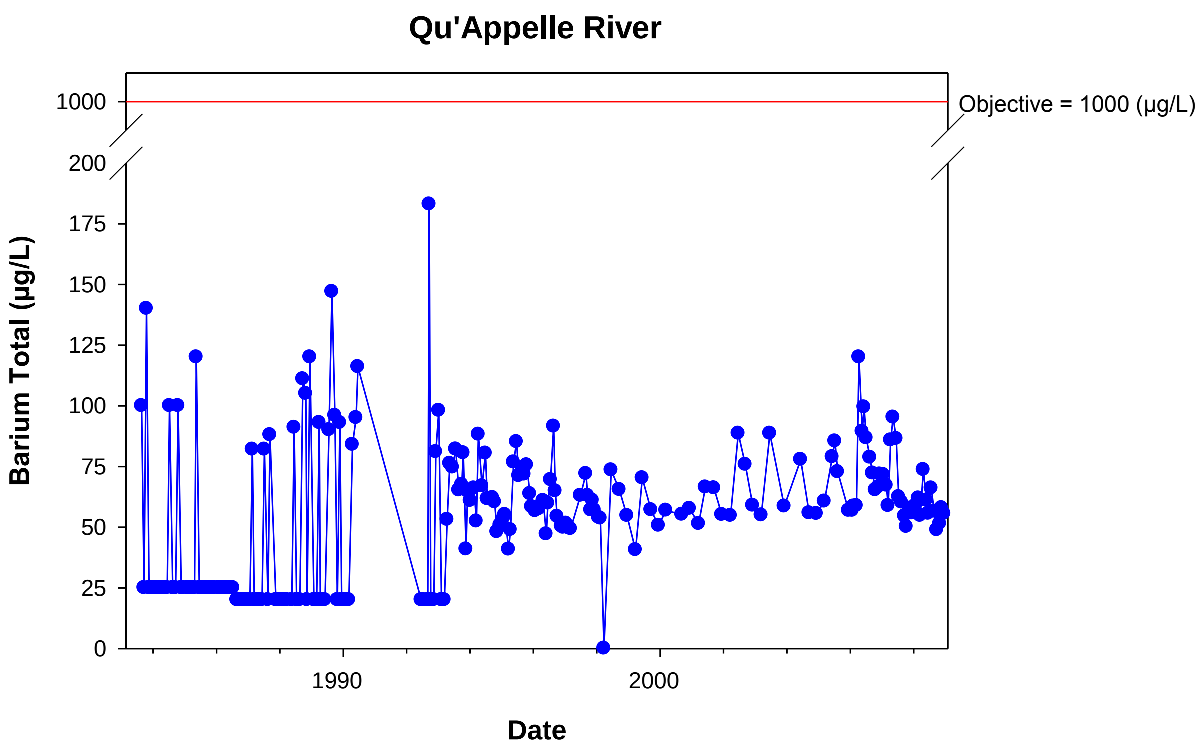

Figure 6-j5: Qu'Appelle River Barium Total

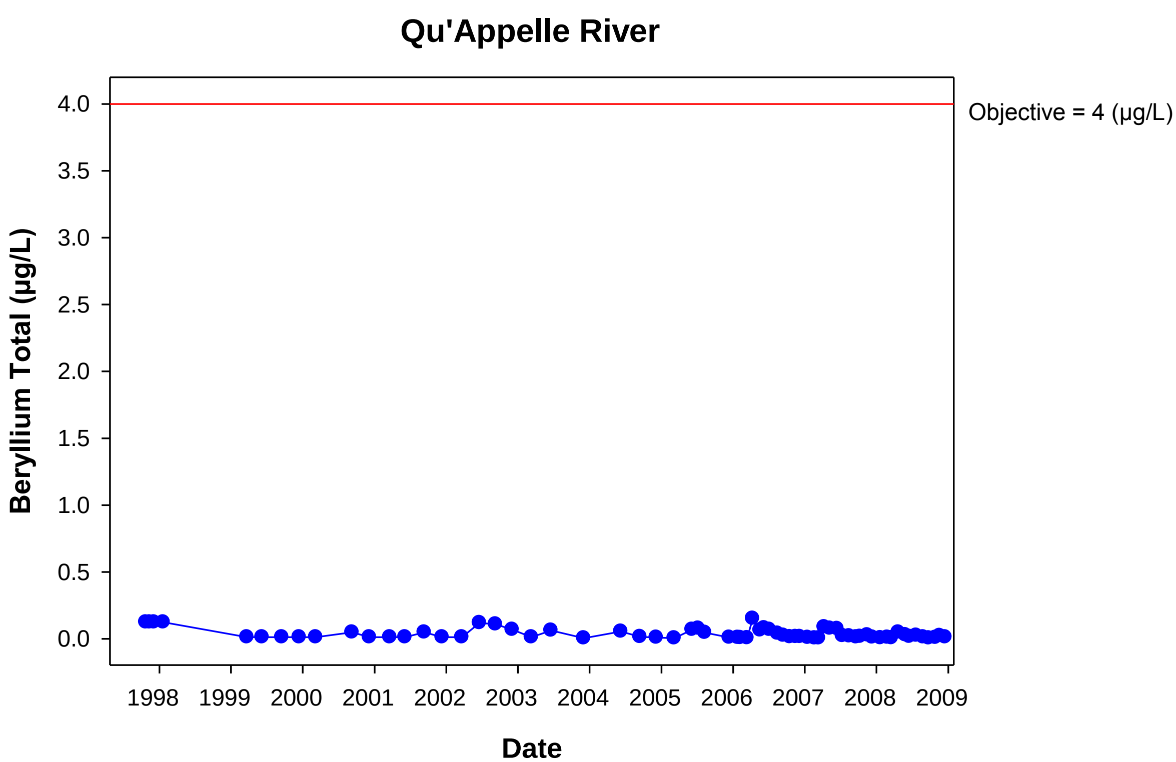

Figure 6-j6: Qu'Appelle River Beryllium Total

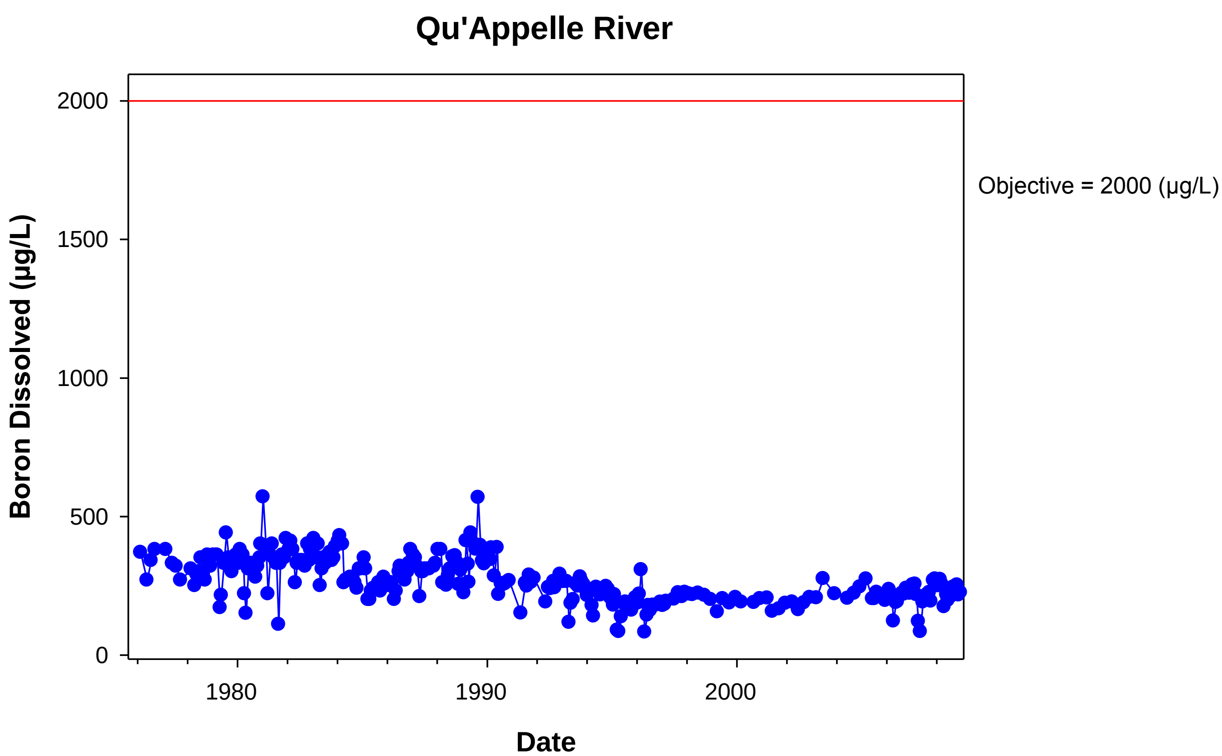

Figure 6-j7: Qu'Appelle River Boron Dissolved

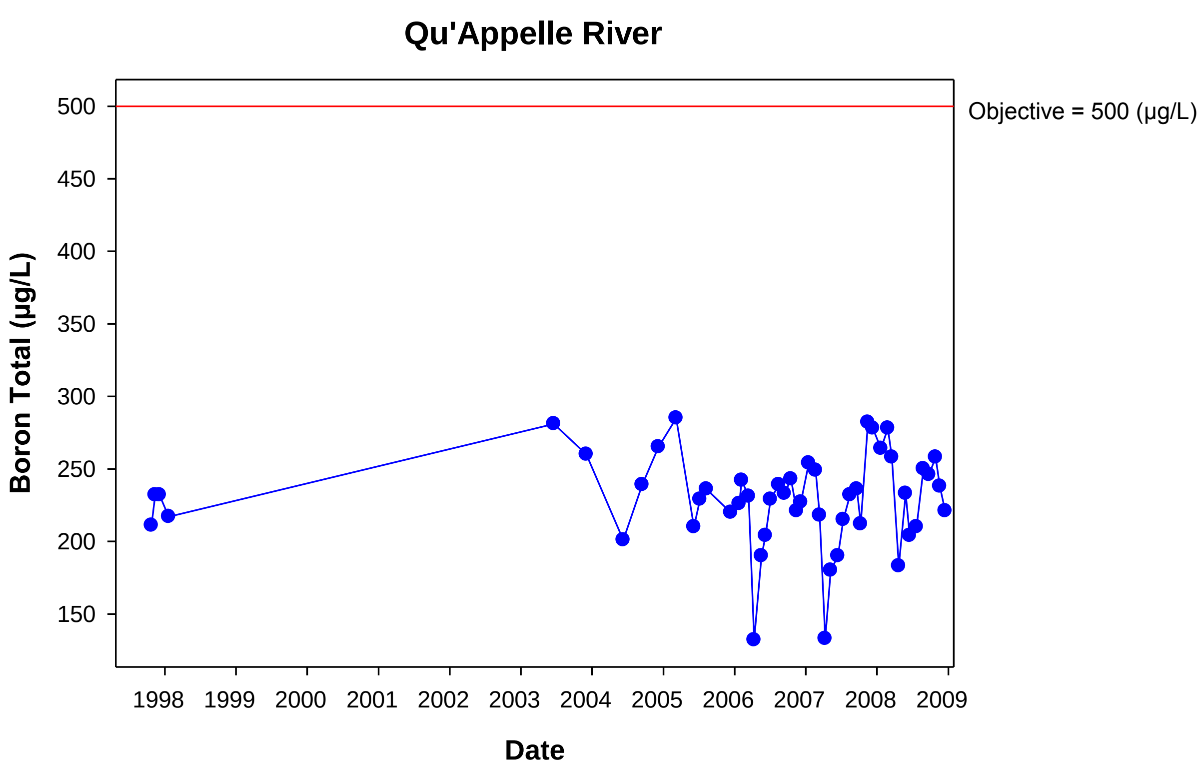

Figure 6-j8: Qu'Appelle River Boron Total

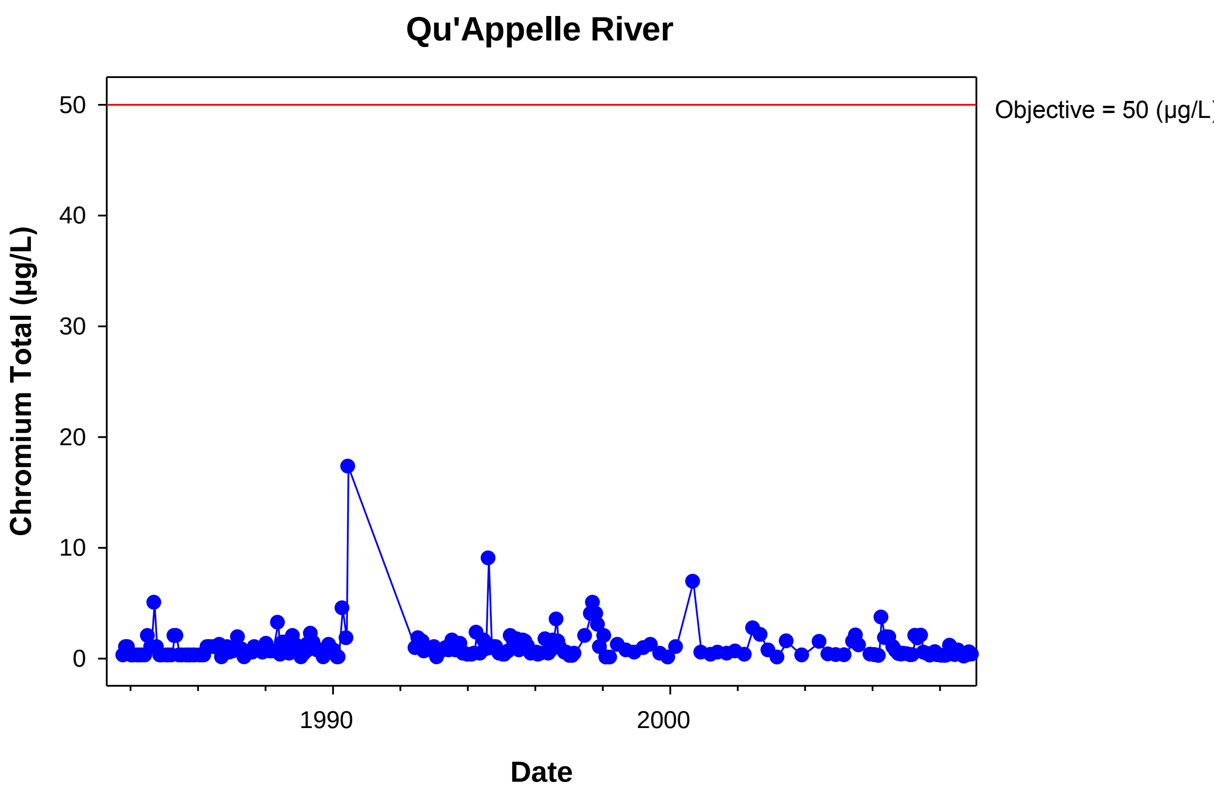

Figure 6-j9: Qu'Appelle River Chromium Total

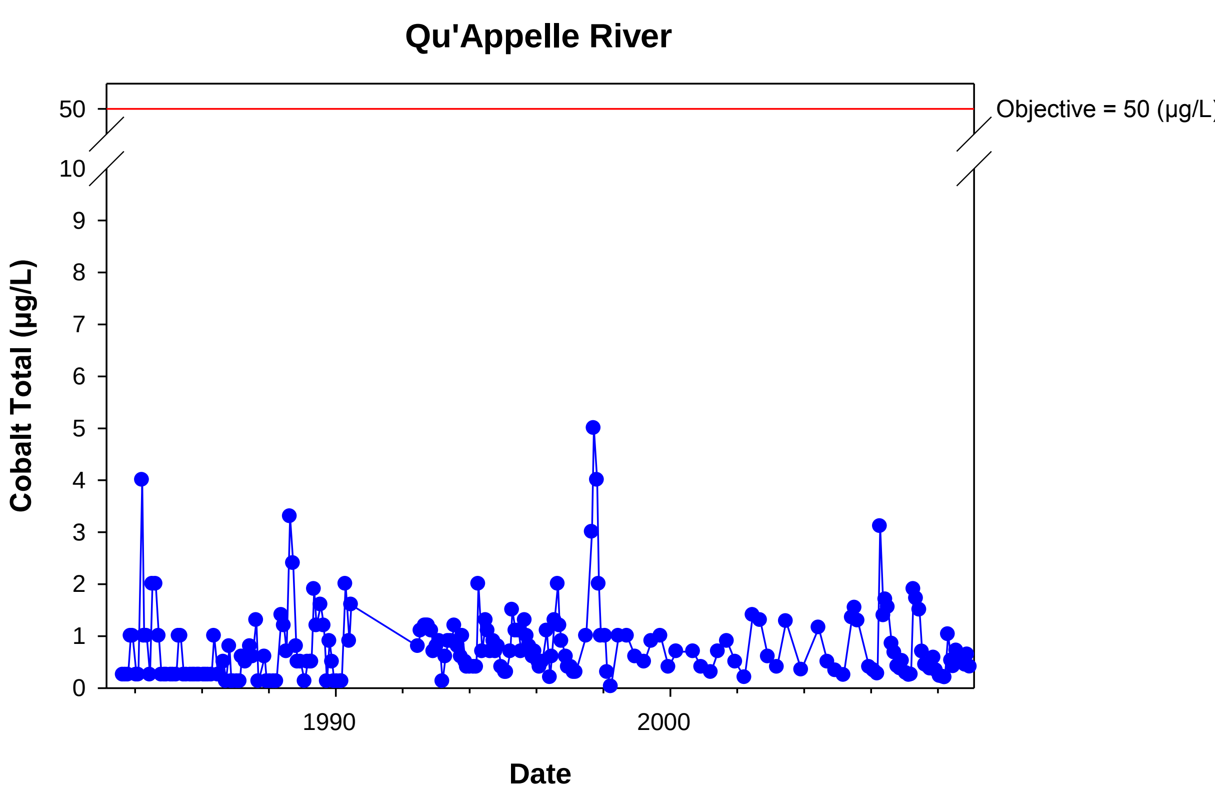

Figure 6-j10: Qu'Appelle River Cobalt Total

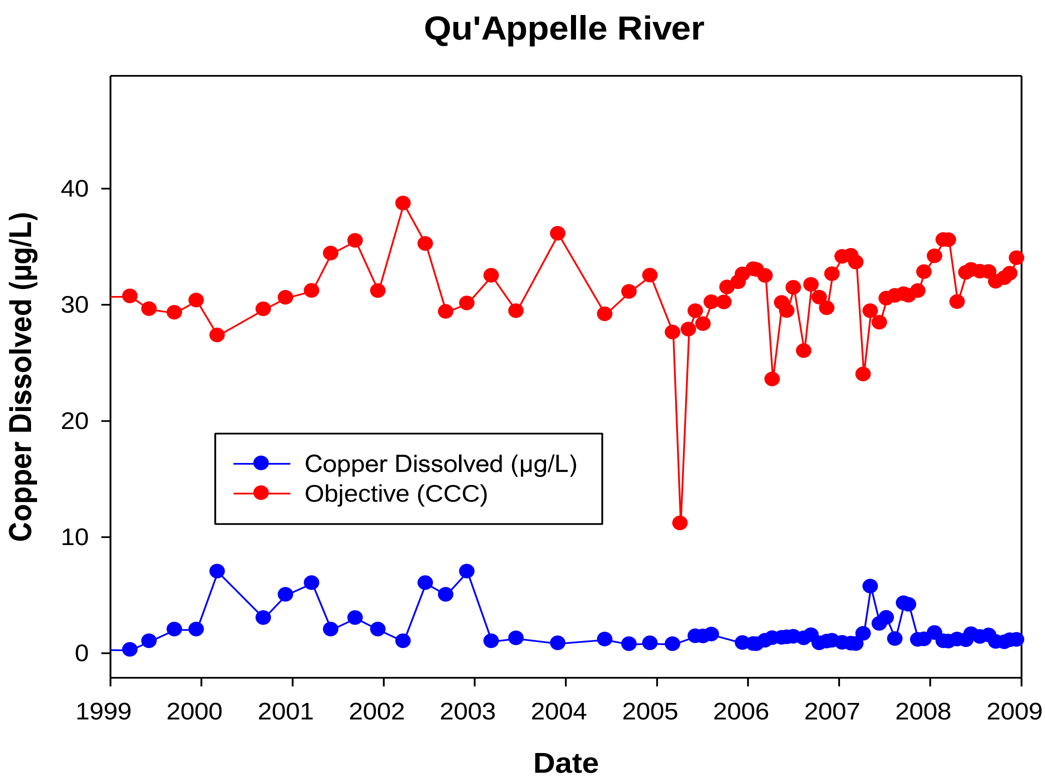

Figure 6-j11: Qu'Appelle River Copper Dissolved

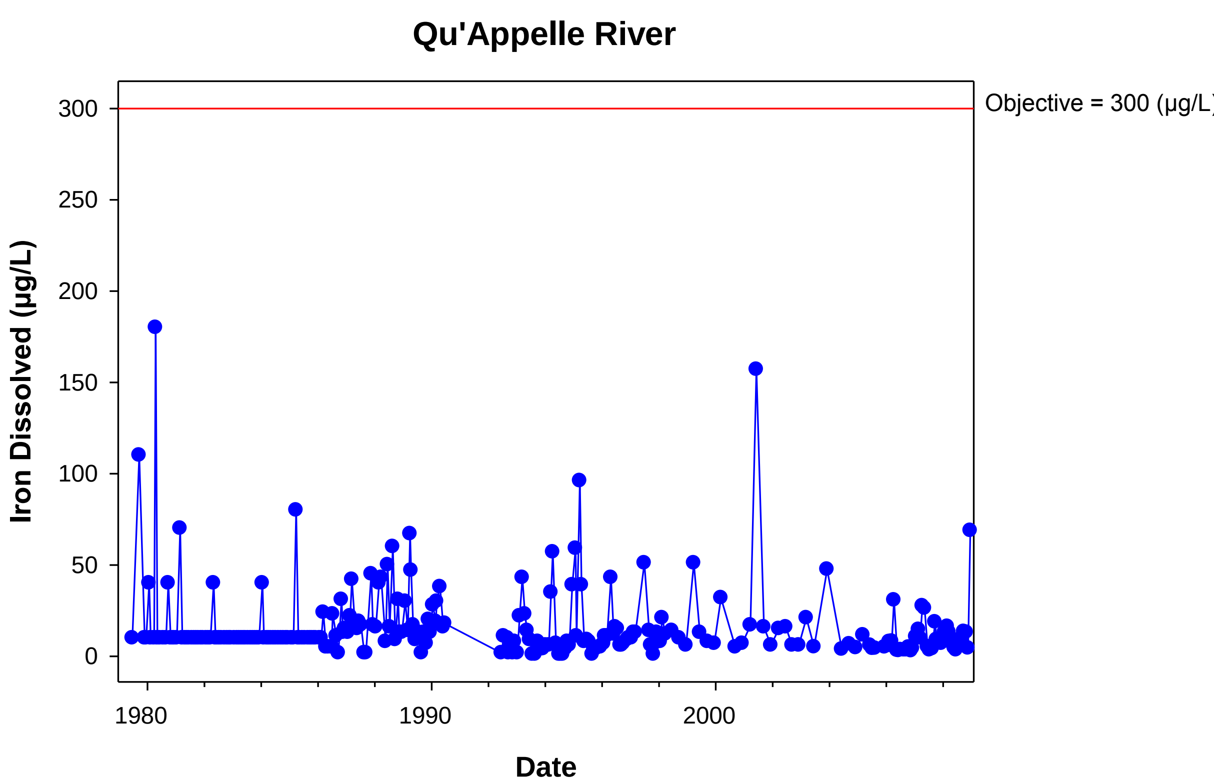

Figure 6-j12: Qu'Appelle River Iron Dissolved

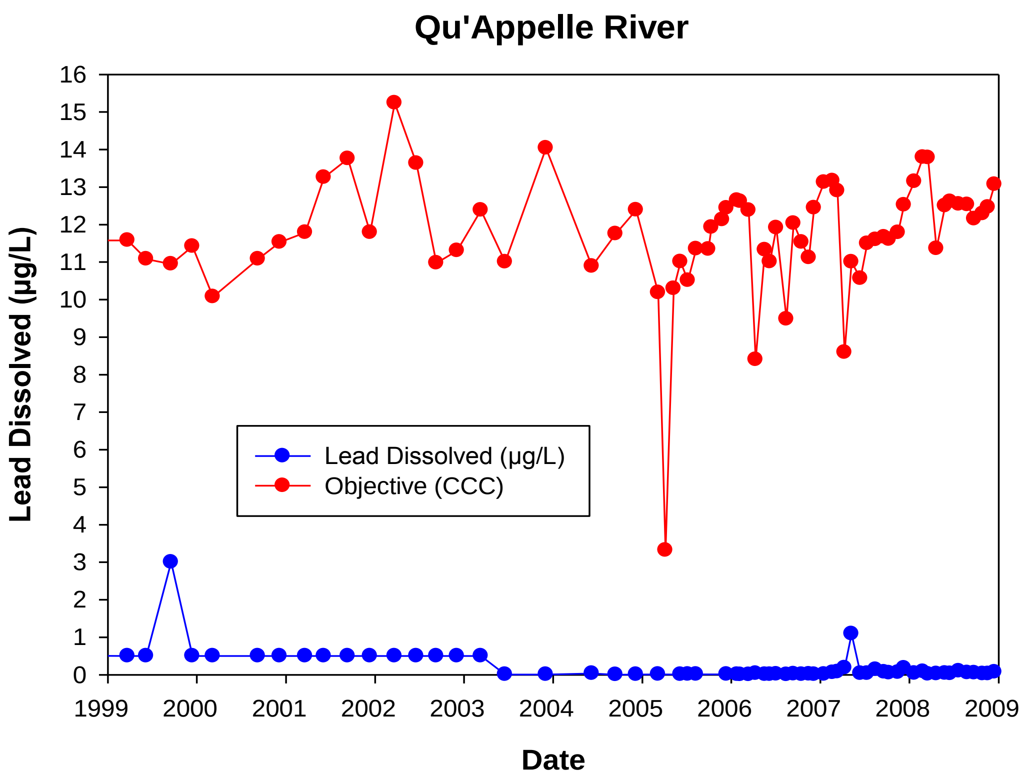

Figure 6-j13: Qu'Appelle River Lead Dissolved

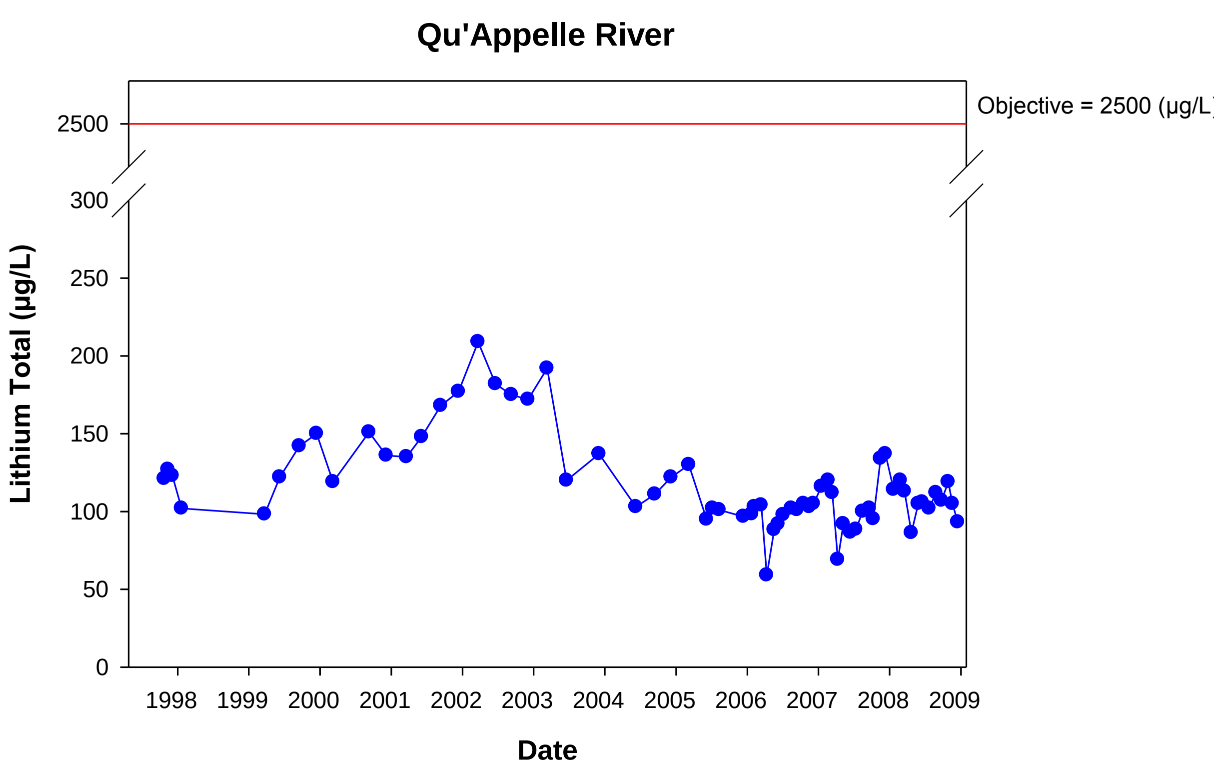

Figure 6-j14: Qu'Appelle River Lithium Total

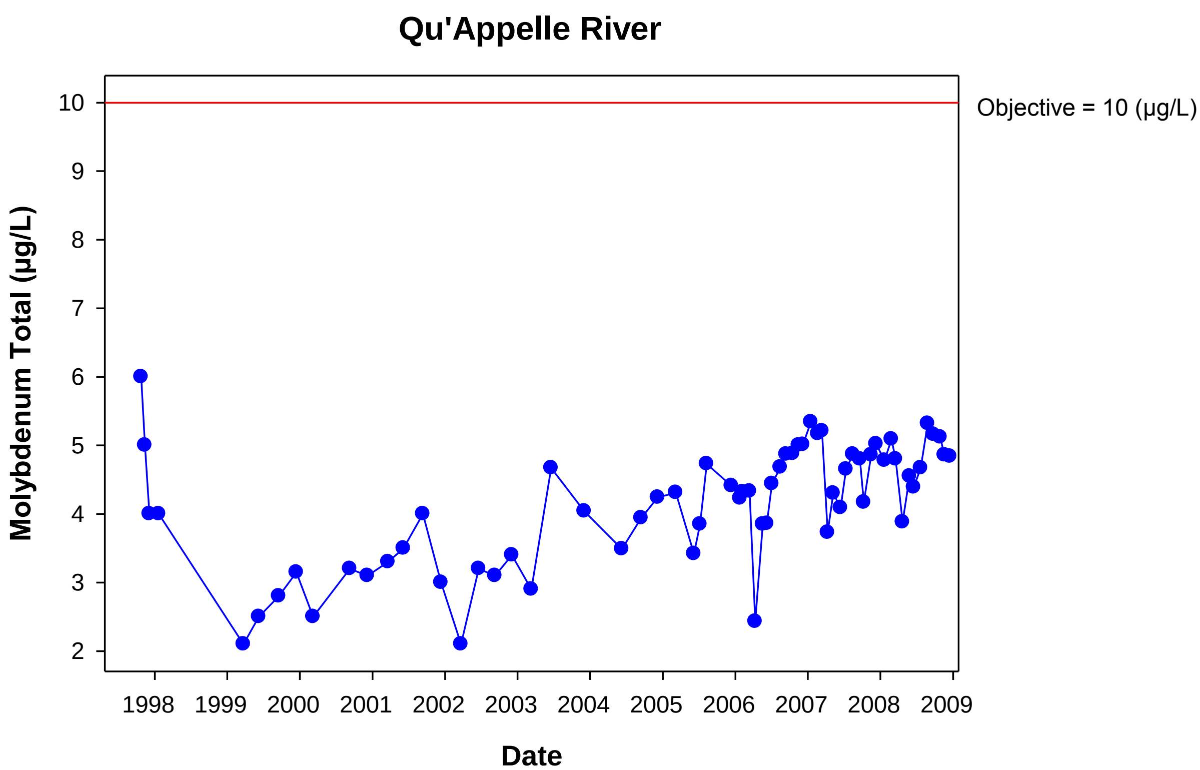

Figure 6-j15: Qu'Appelle River Molybdenum Total

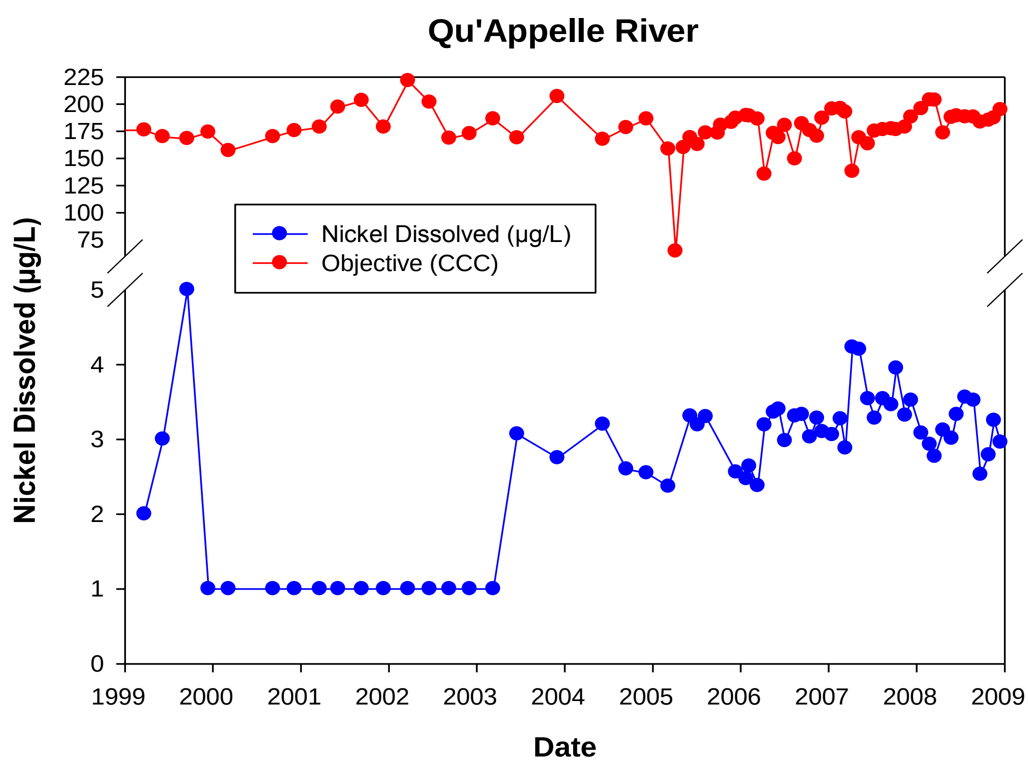

Figure 6-j16: Qu'Appelle River Nickel Dissolved

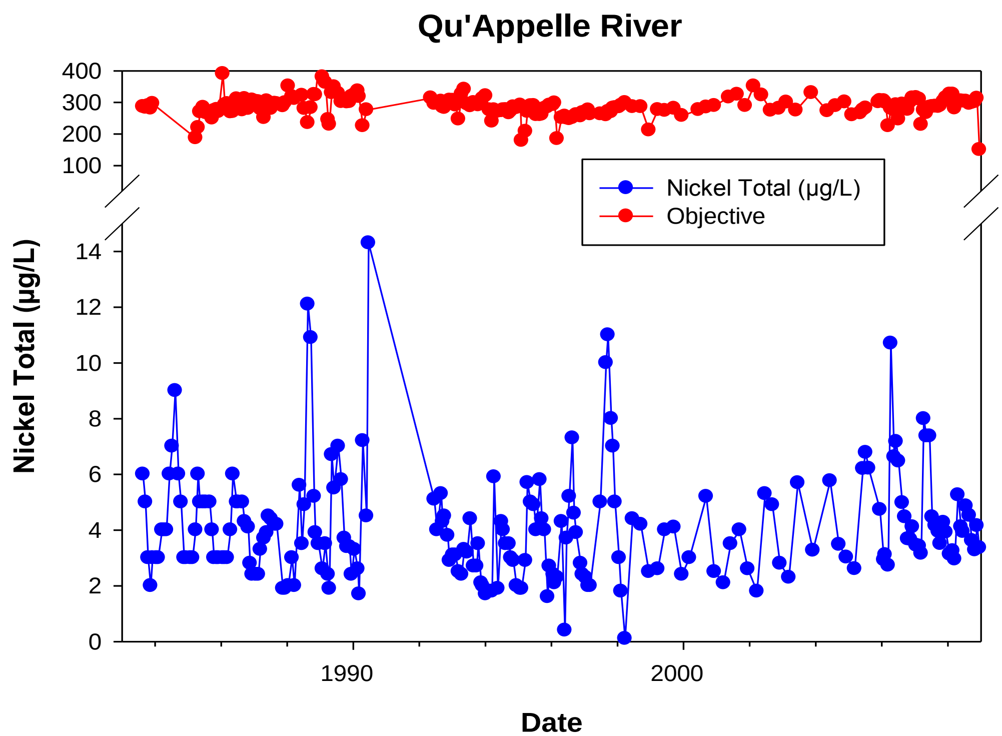

Figure 6-j17: Qu’Appelle River Nickel Total

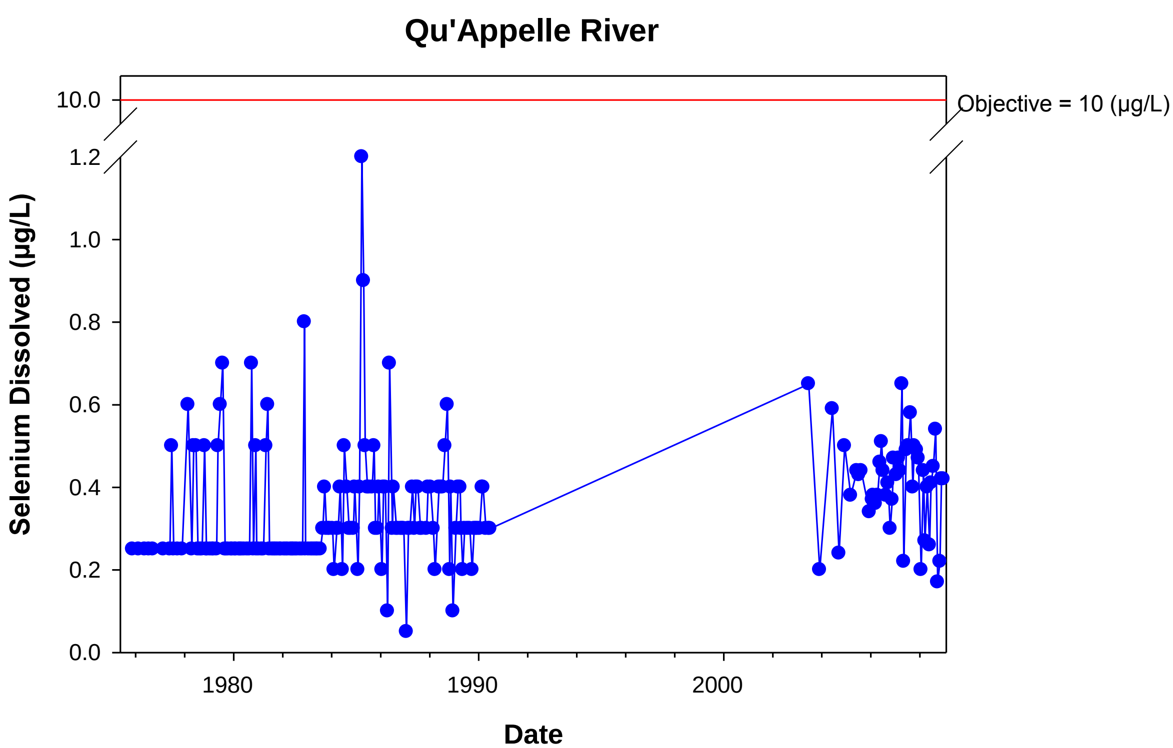

Figure 6-j18: Qu’Appelle River Selenium Dissolved

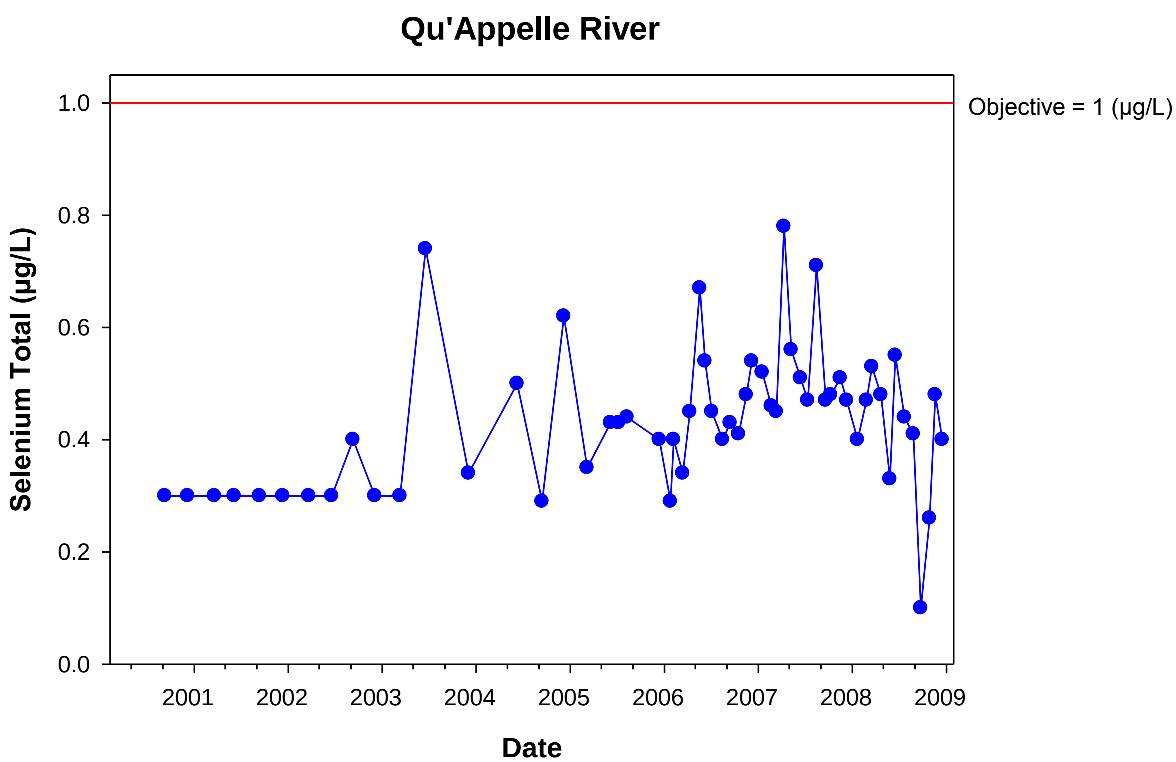

Figure 6-j19: Qu’Appelle River Selenium Total

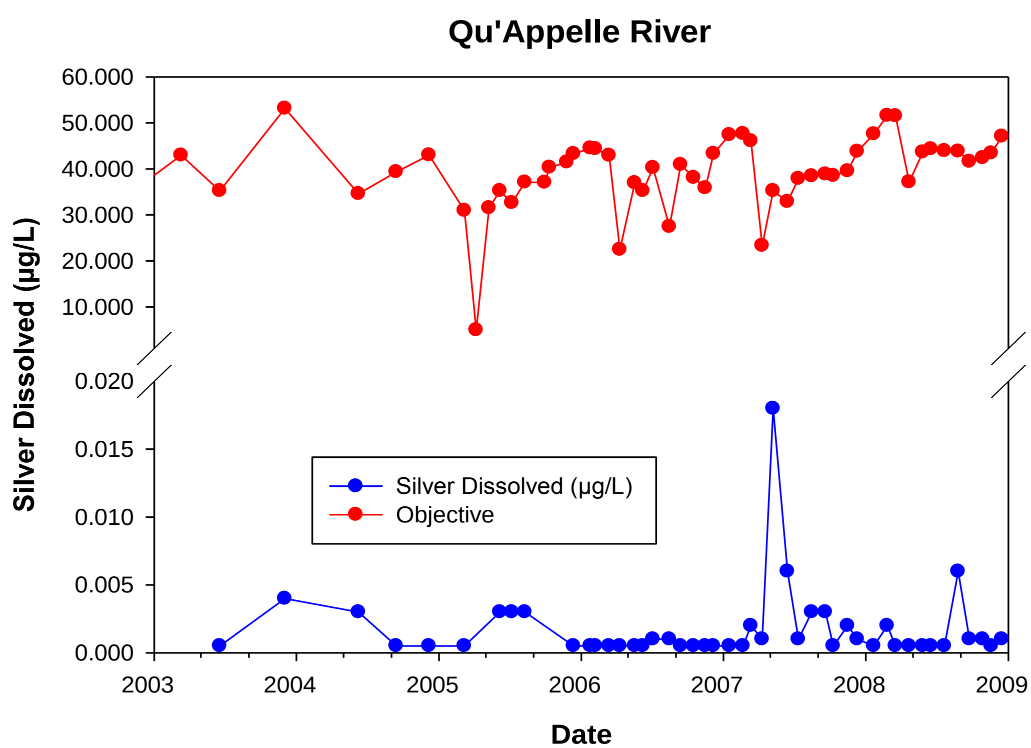

Figure 6-j20: Qu’Appelle River Silver Dissolved

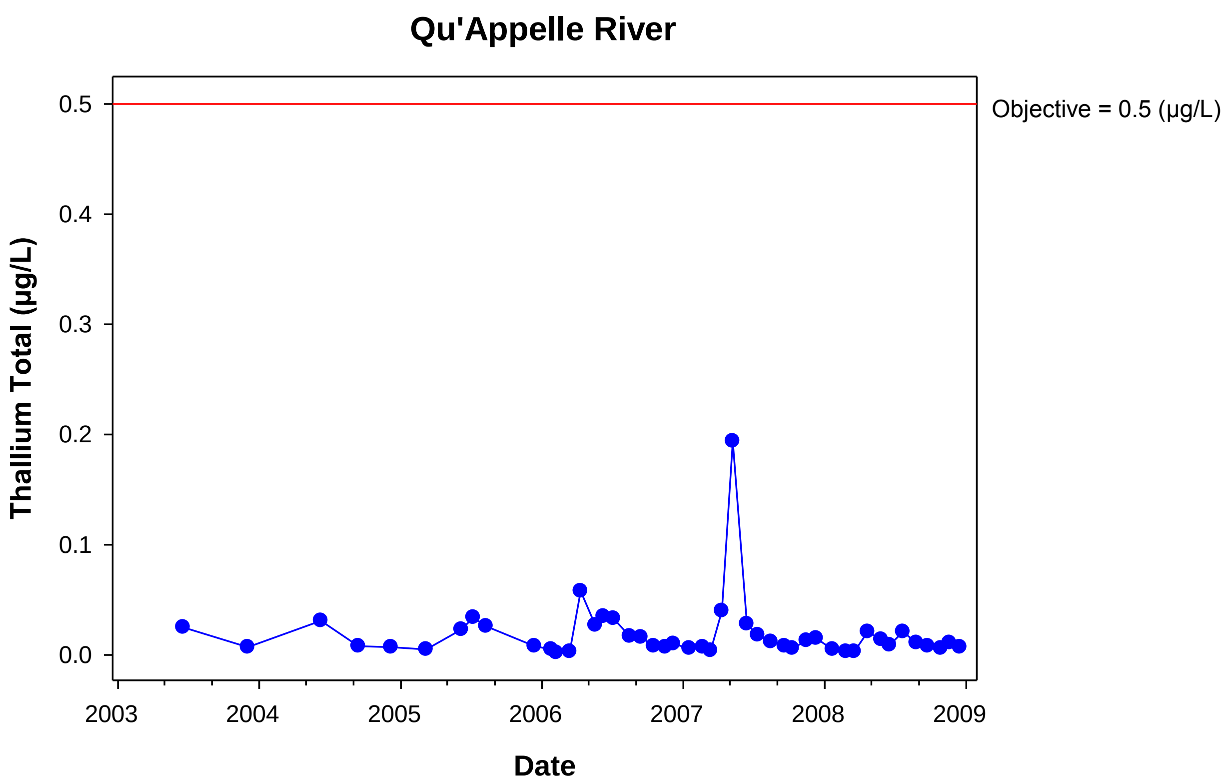

Figure 6-j21: Qu’Appelle River Thallium Total

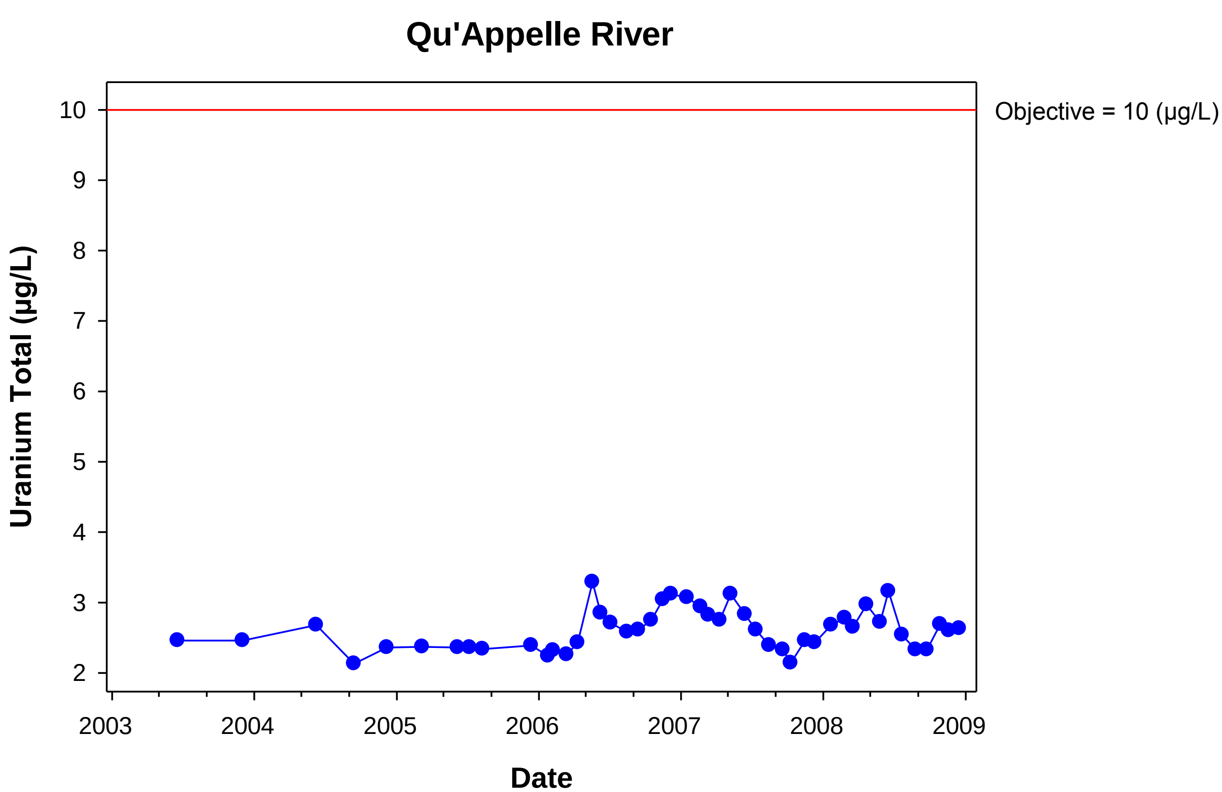

Figure 6-j22: Qu’Appelle River Uranium Total

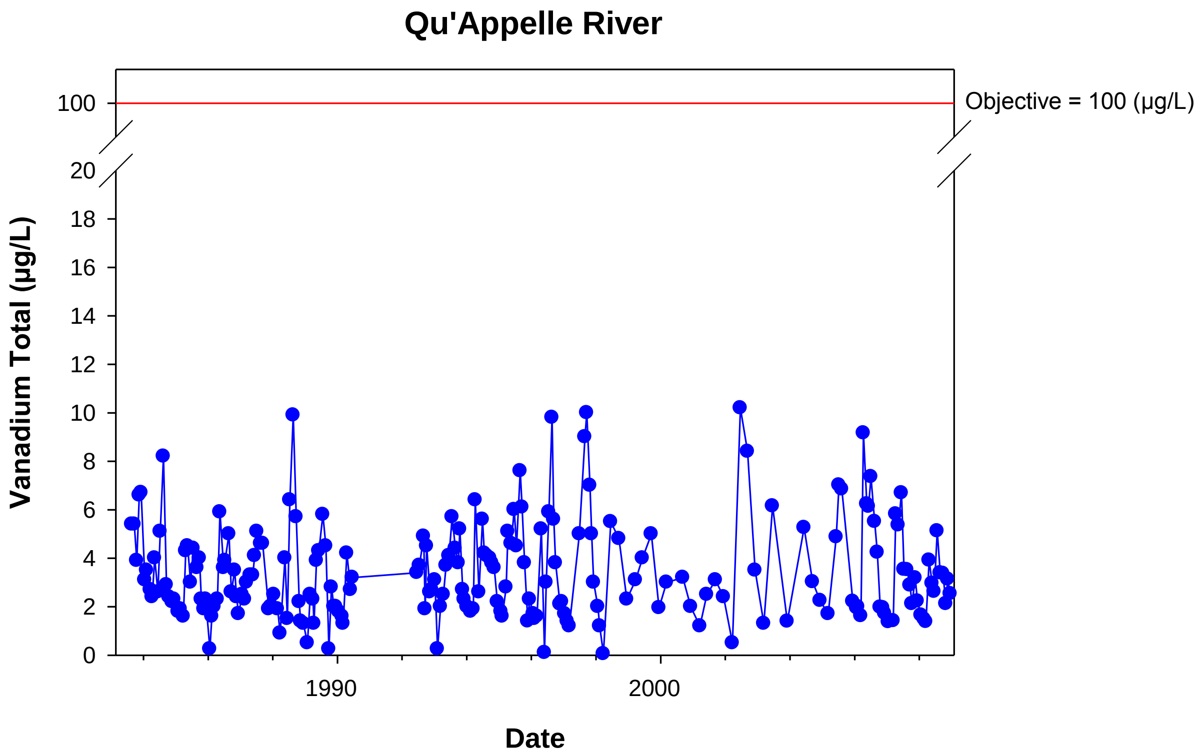

Figure 6-j23: Qu'Appelle River Vanadium Total

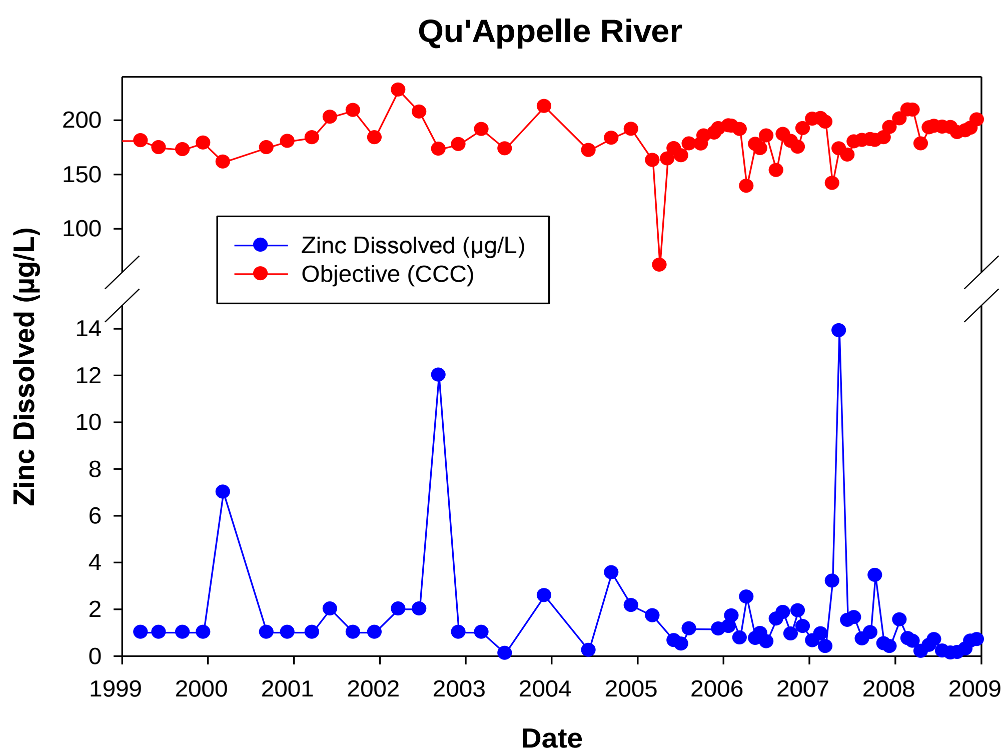

Figure 6-j24: Qu'Appelle River Zinc Dissolved

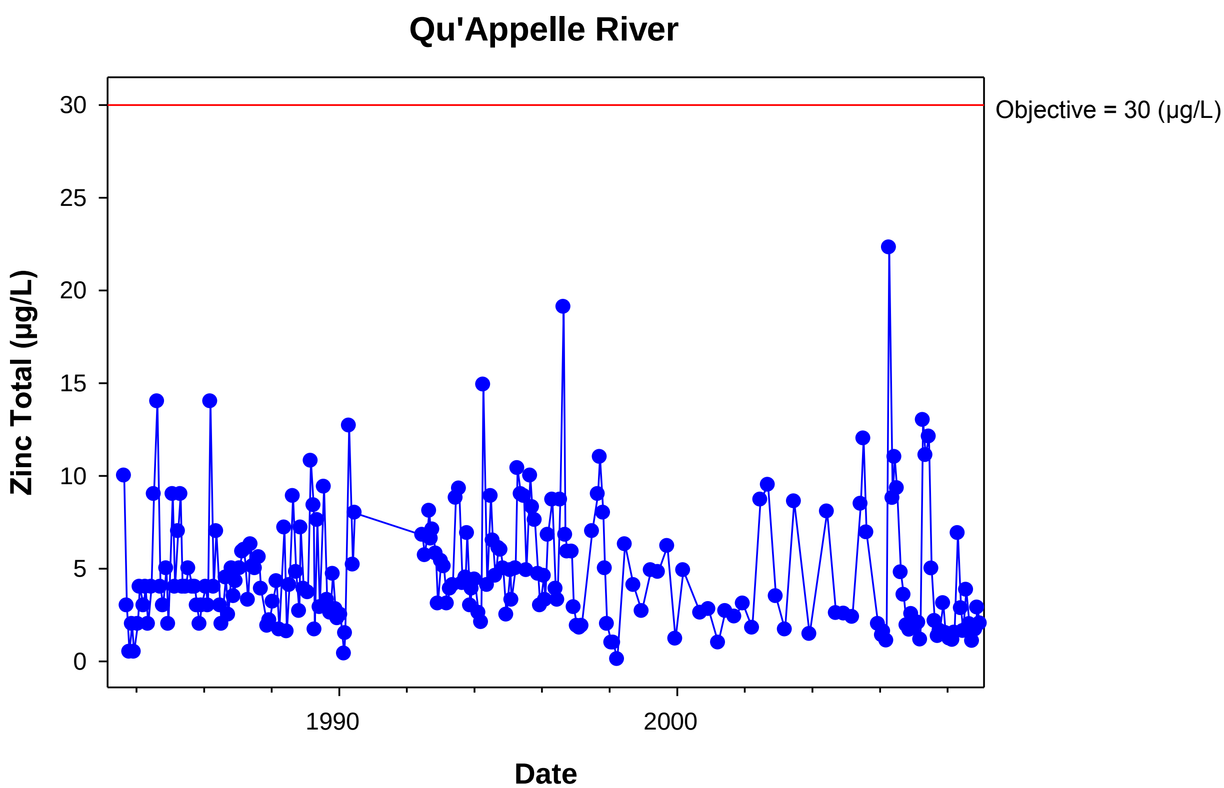

Figure 6-j25: Qu'Appelle River Zinc Total

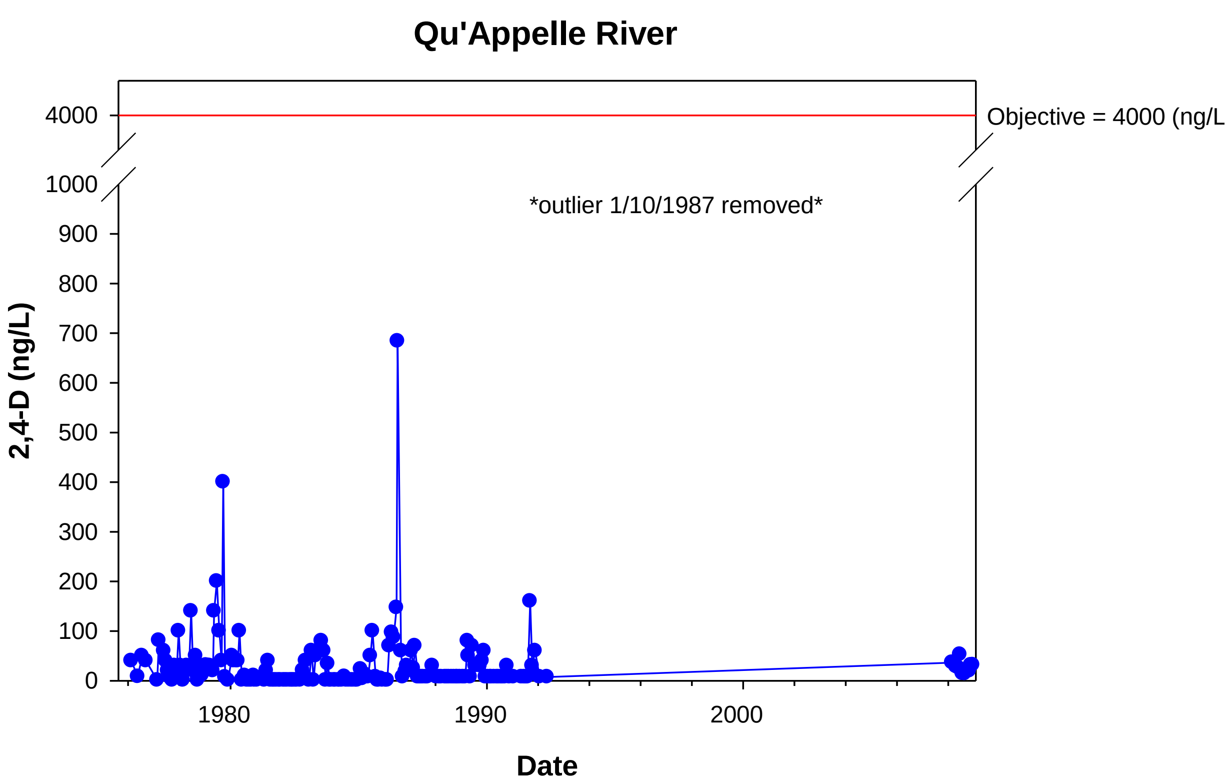

Figure 6-j26: Qu'Appelle River 2,4-D

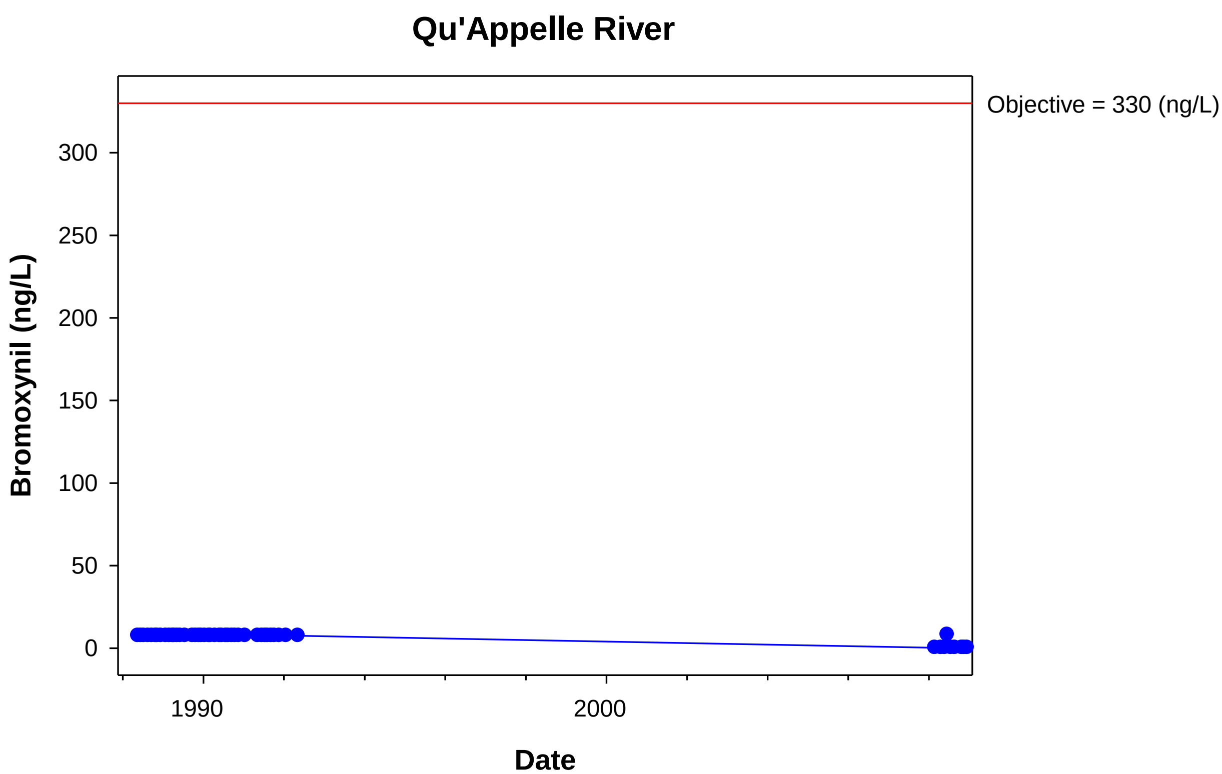

Figure 6-j27: Qu'Appelle River Bromoxynil

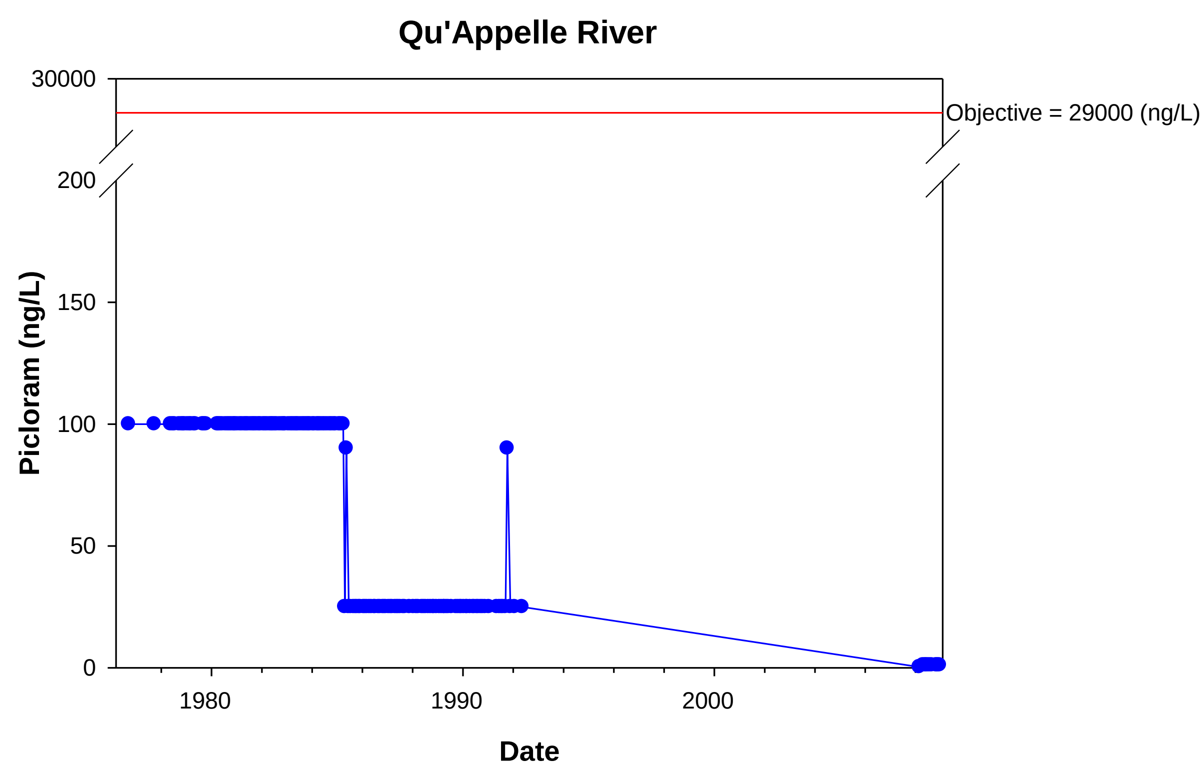

Figure 6-j28: Qu'Appelle River Picloram

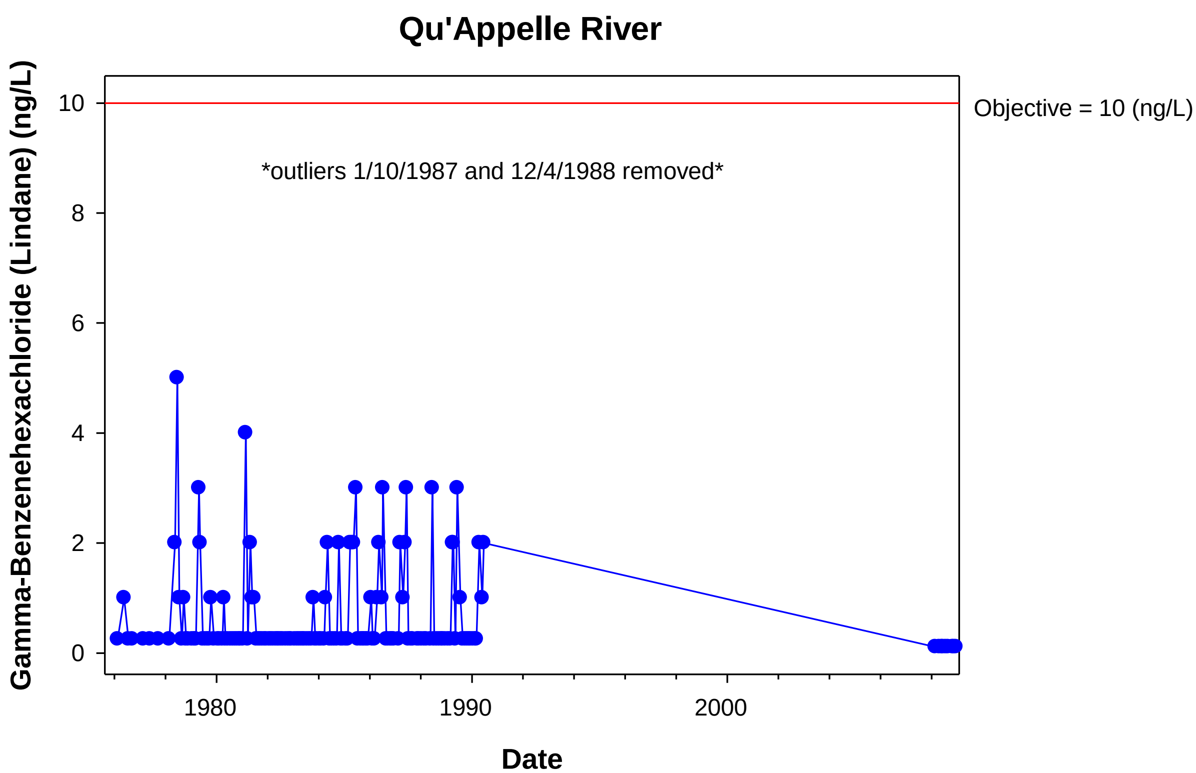

Figure 6-j29: Qu'Appelle River Lindane

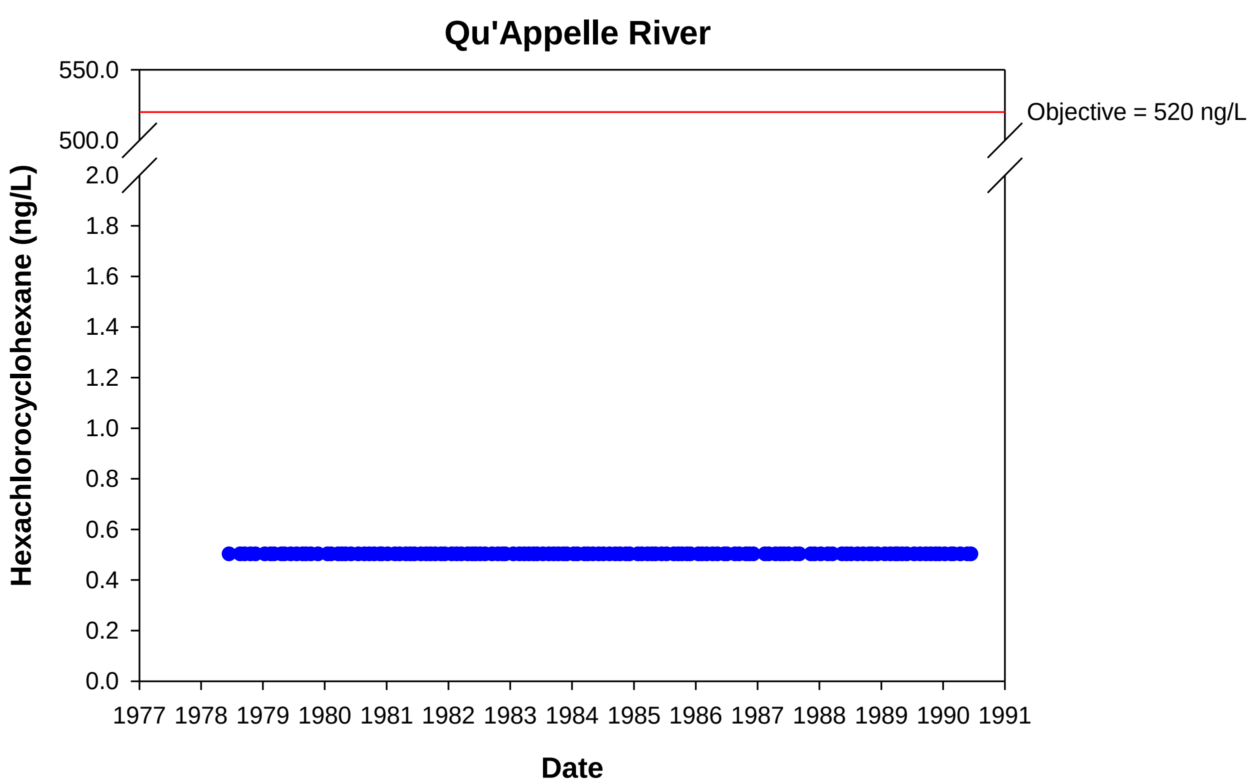

Figure 6-j30: Qu'Appelle River Hexachlorocyclohexane

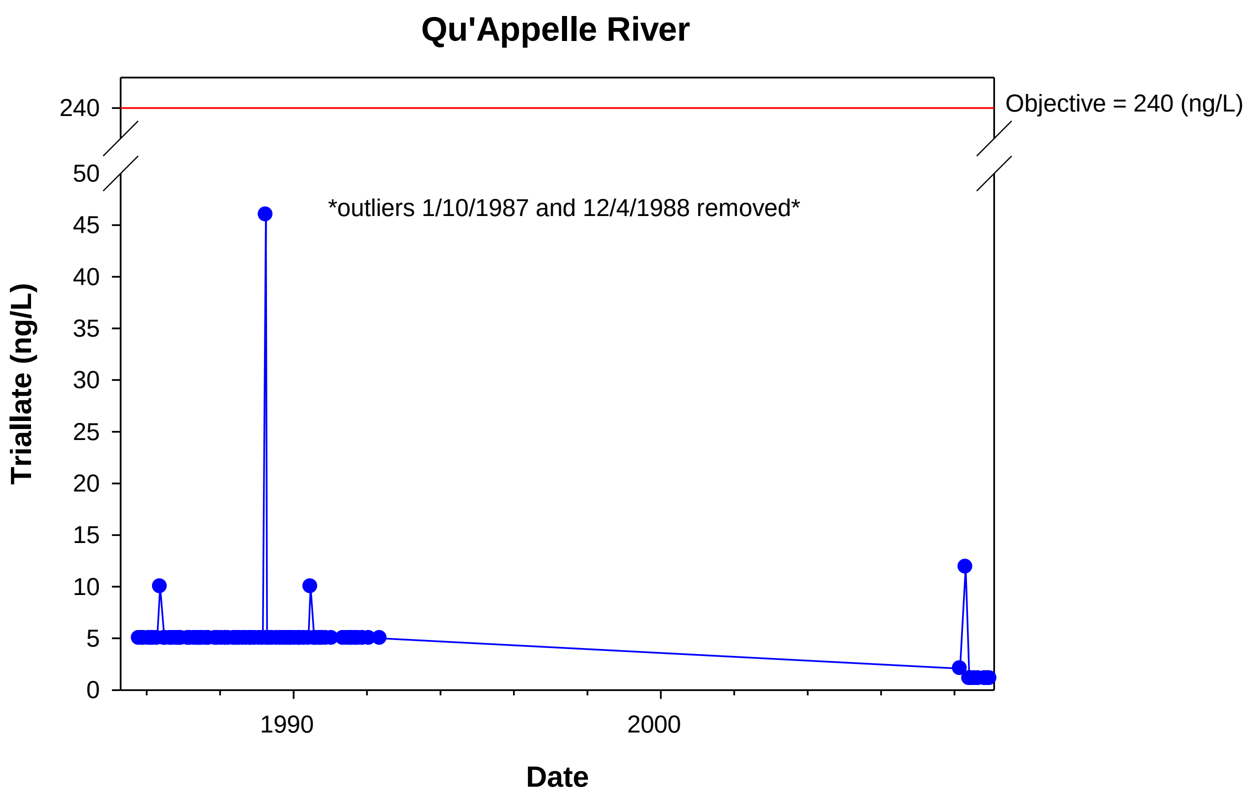

Figure 6-j31: Qu’Appelle River Triallate

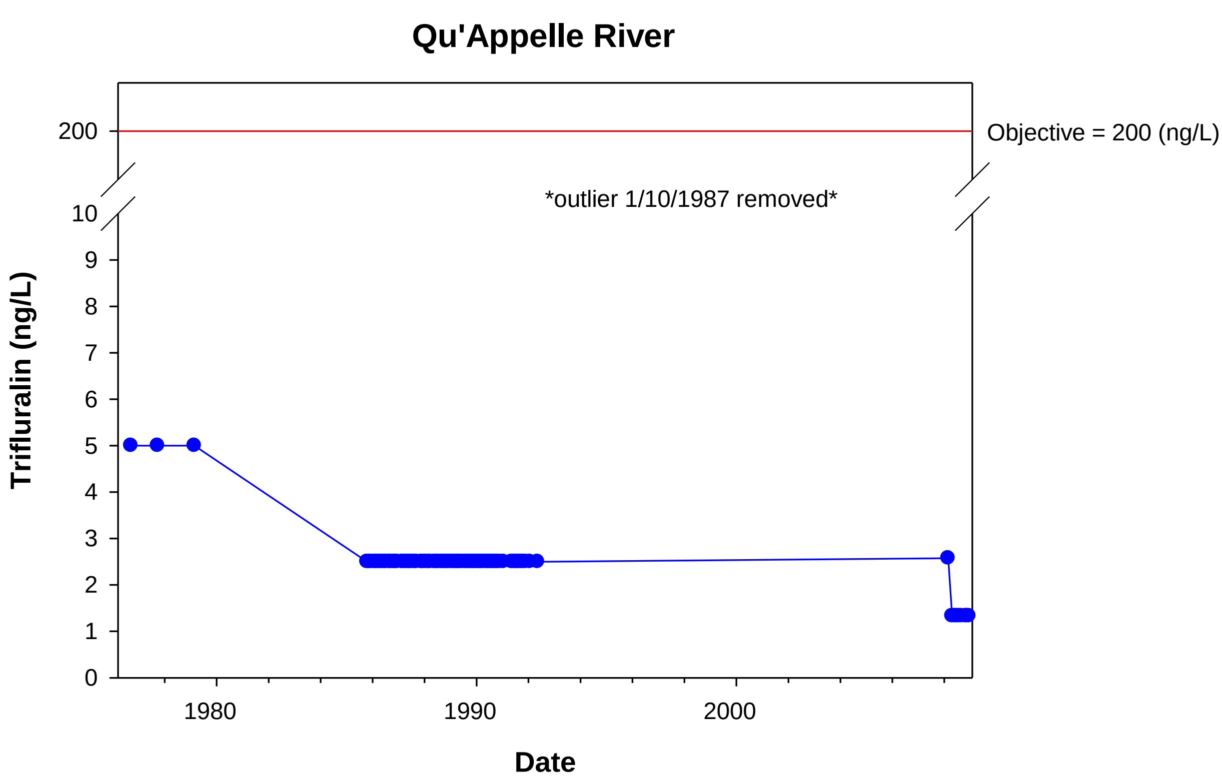

Figure 6-j32: Qu’Appelle River Trifluralin

Appendix 6-k: Red Deer River (SK-MB)

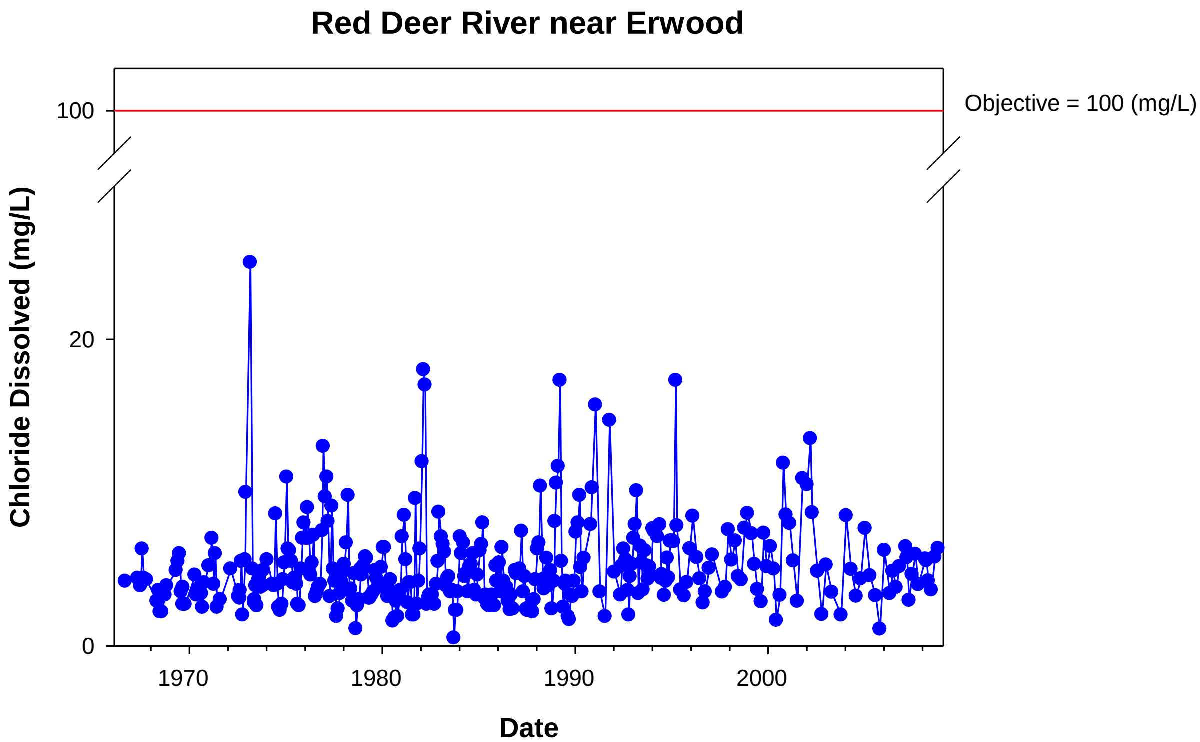

Figure 6-k1: Red Deer River (SK-MB) Chloride Dissolved

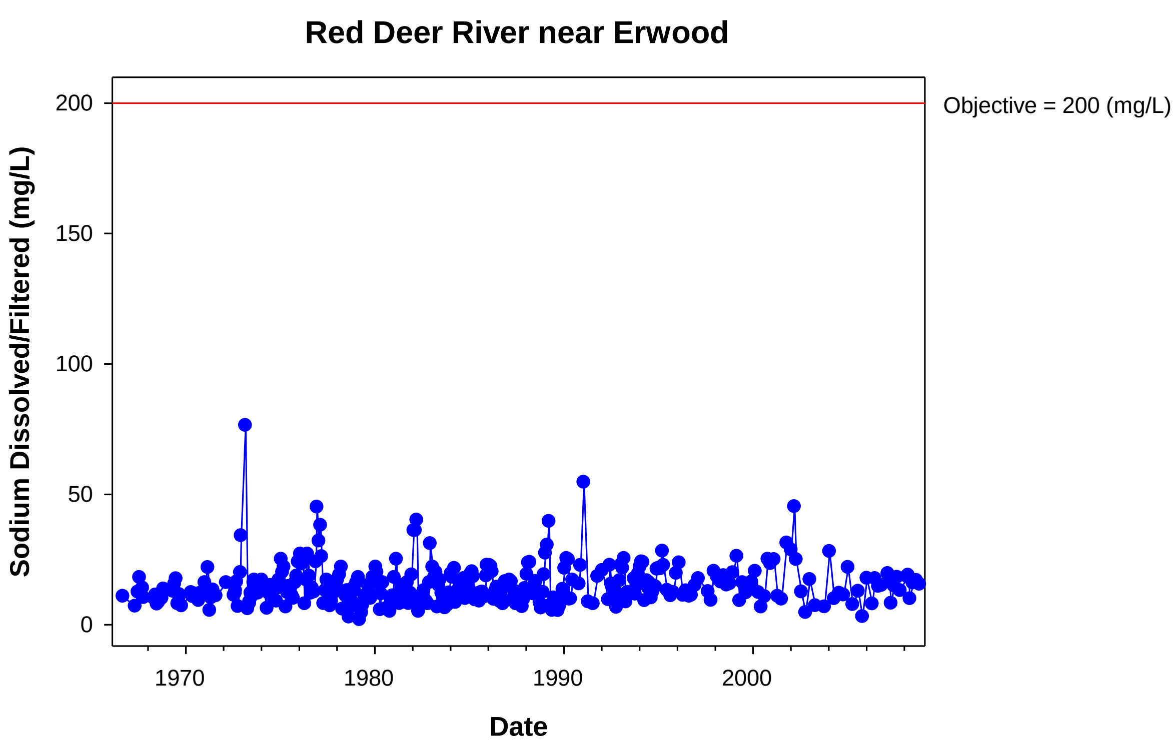

Figure 6-k2: Red Deer River (SK-MB) Sodium Dissolved/Filtered

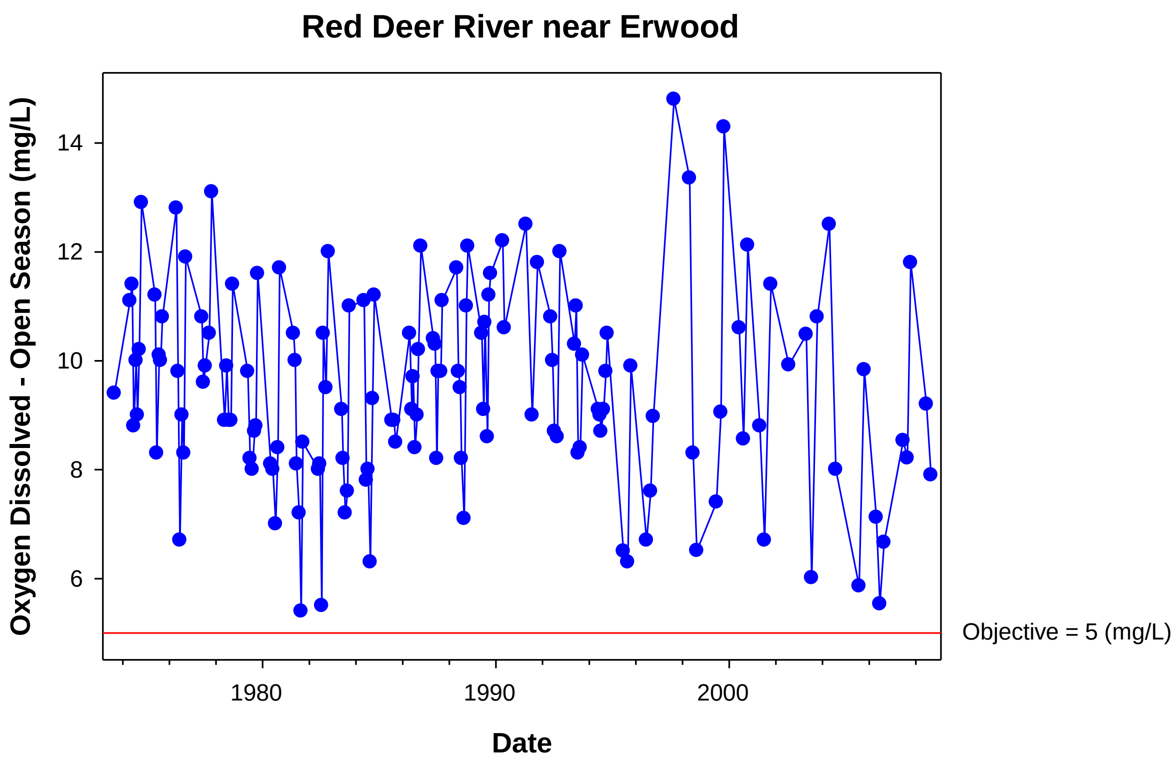

Figure 6-k3: Red Deer River (SK-MB) Oxygen Dissolved (Open Season)

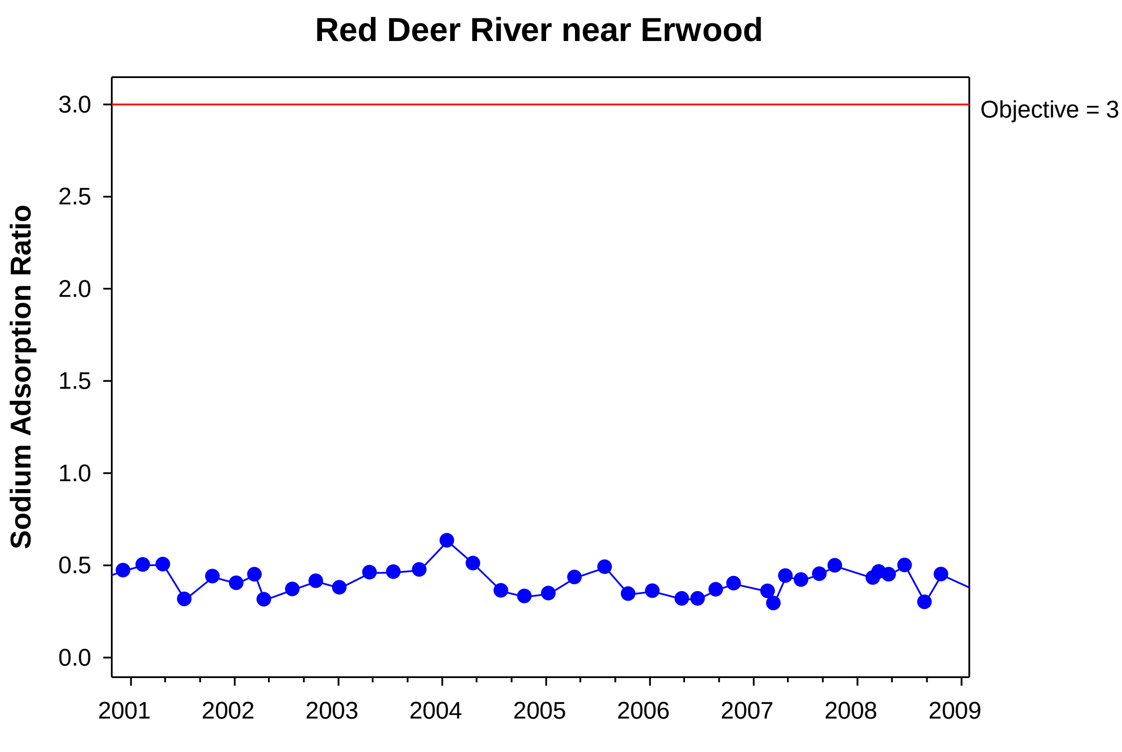

Figure 6-k4: Red Deer River (SK-MB) Sodium Adsorption Ratio

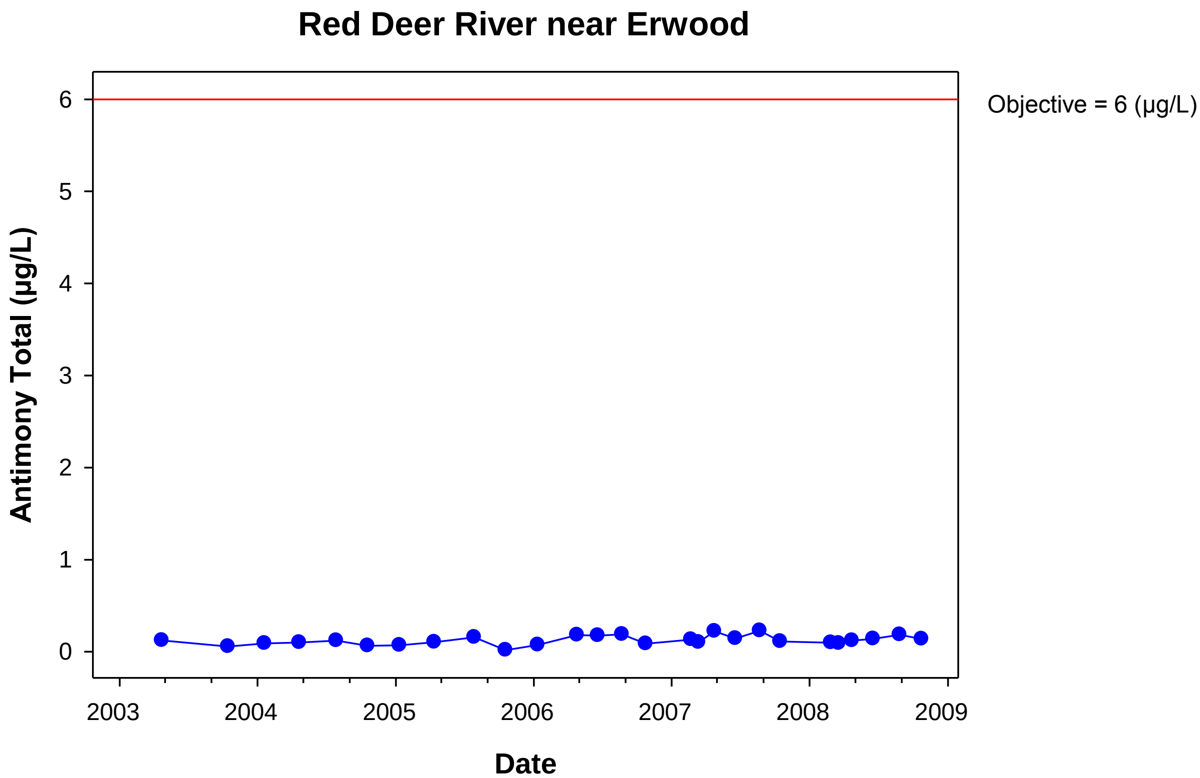

Figure 6-k5: Red Deer River (SK-MB) Antimony Total

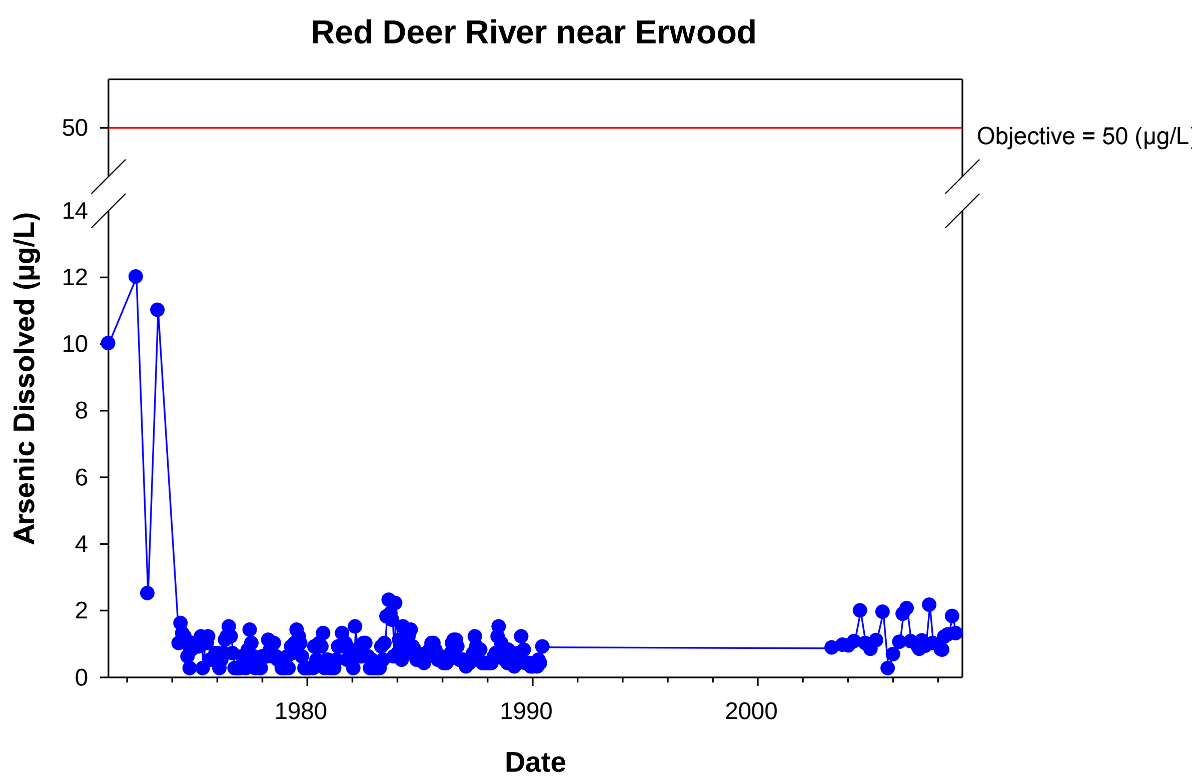

Figure 6-k6: Red Deer River (SK-MB) Arsenic Dissolved

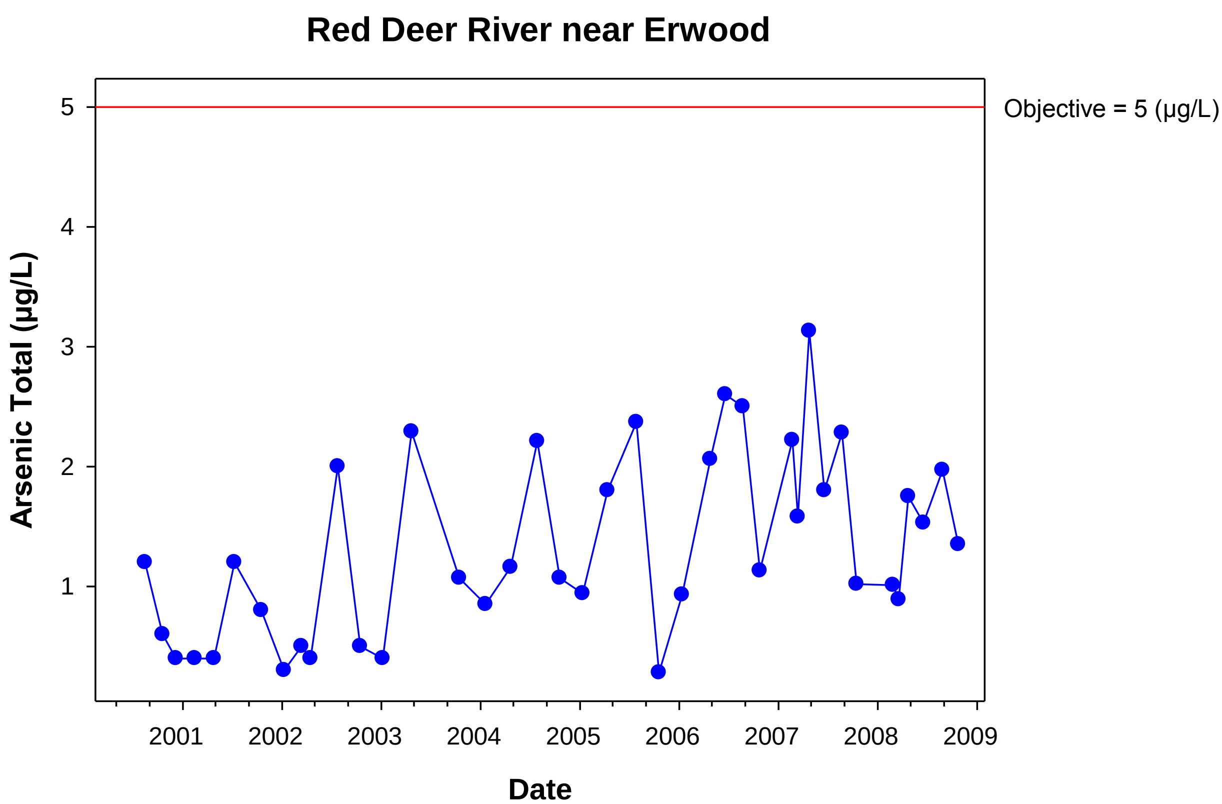

Figure 6-k7: Red Deer River (SK-MB) Arsenic Total

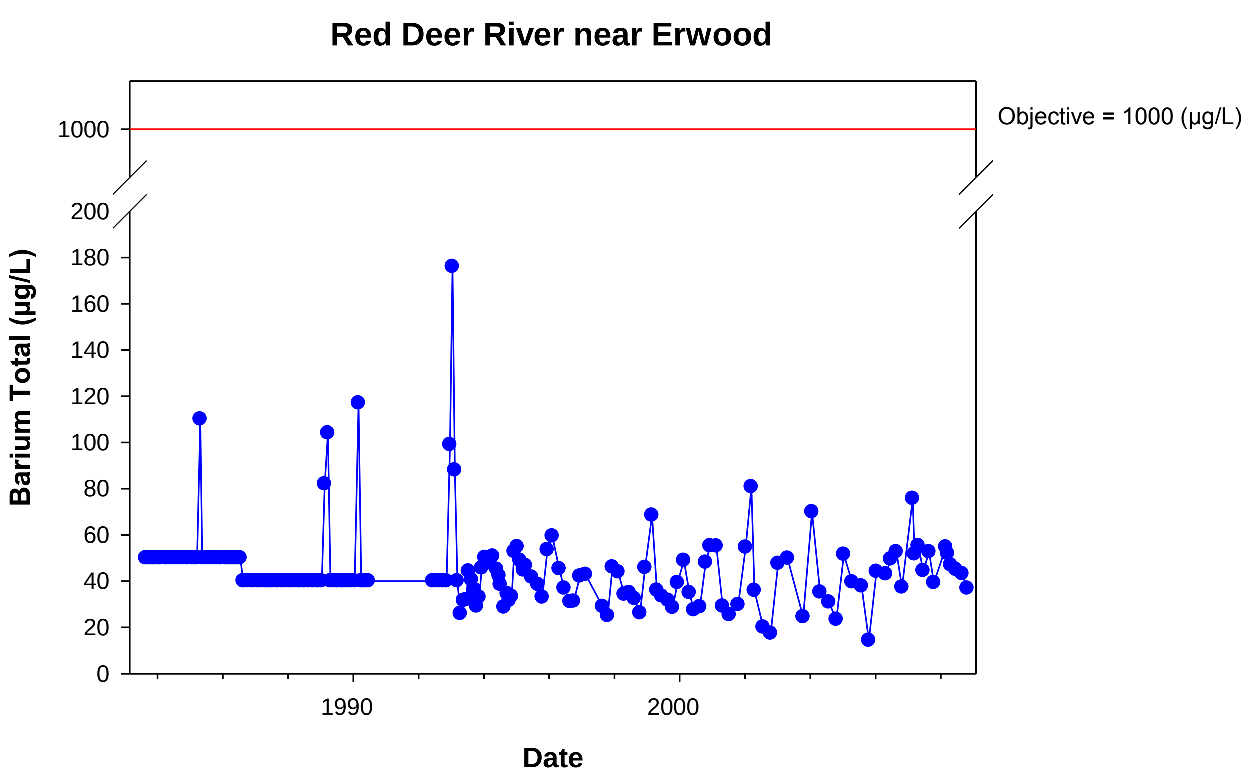

Figure 6-k8: Red Deer River (SK-MB) Barium Total

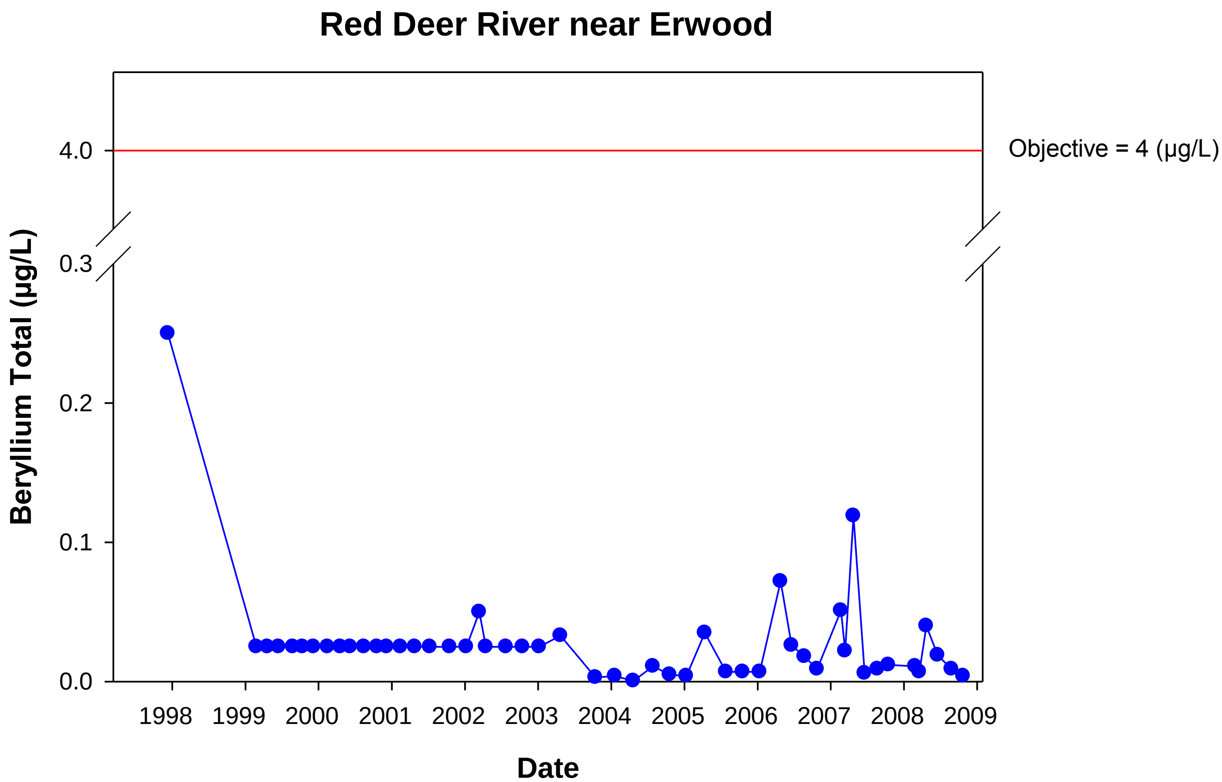

Figure 6-k9: Red Deer River (SK-MB) Beryllium Total

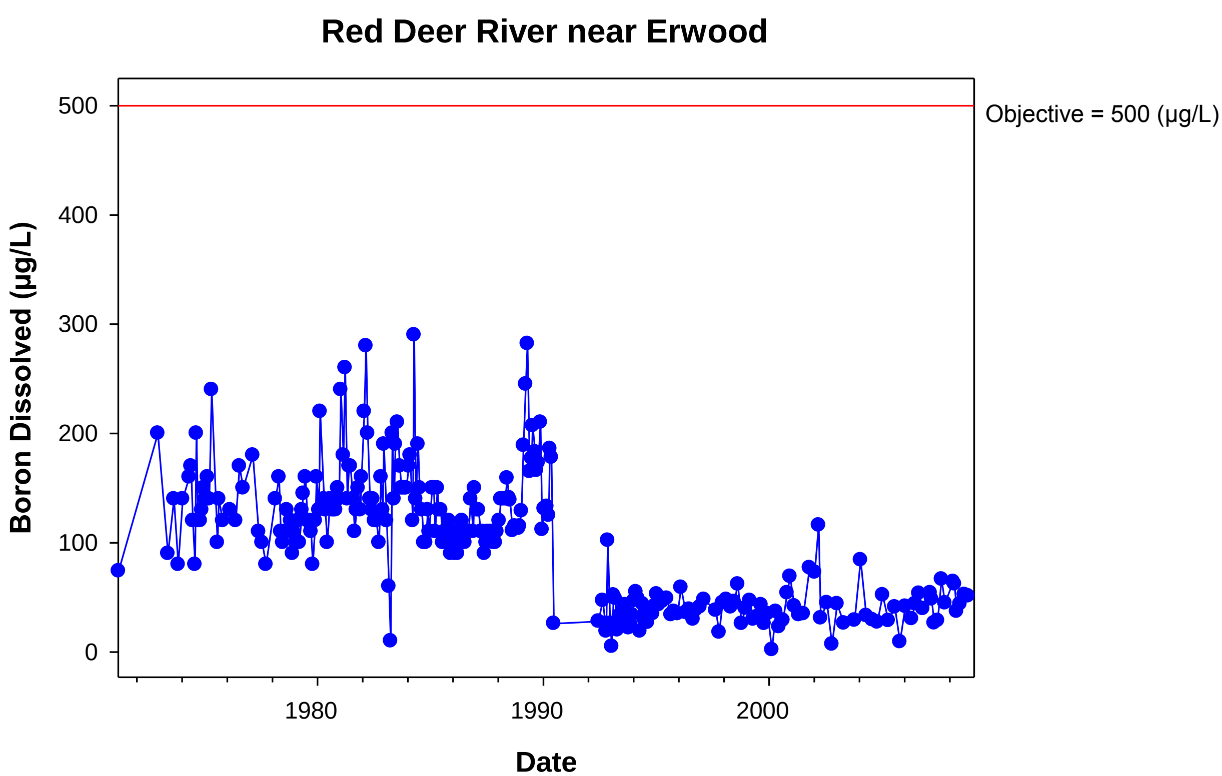

Figure 6-k10: Red Deer River (SK-MB) Boron Dissolved

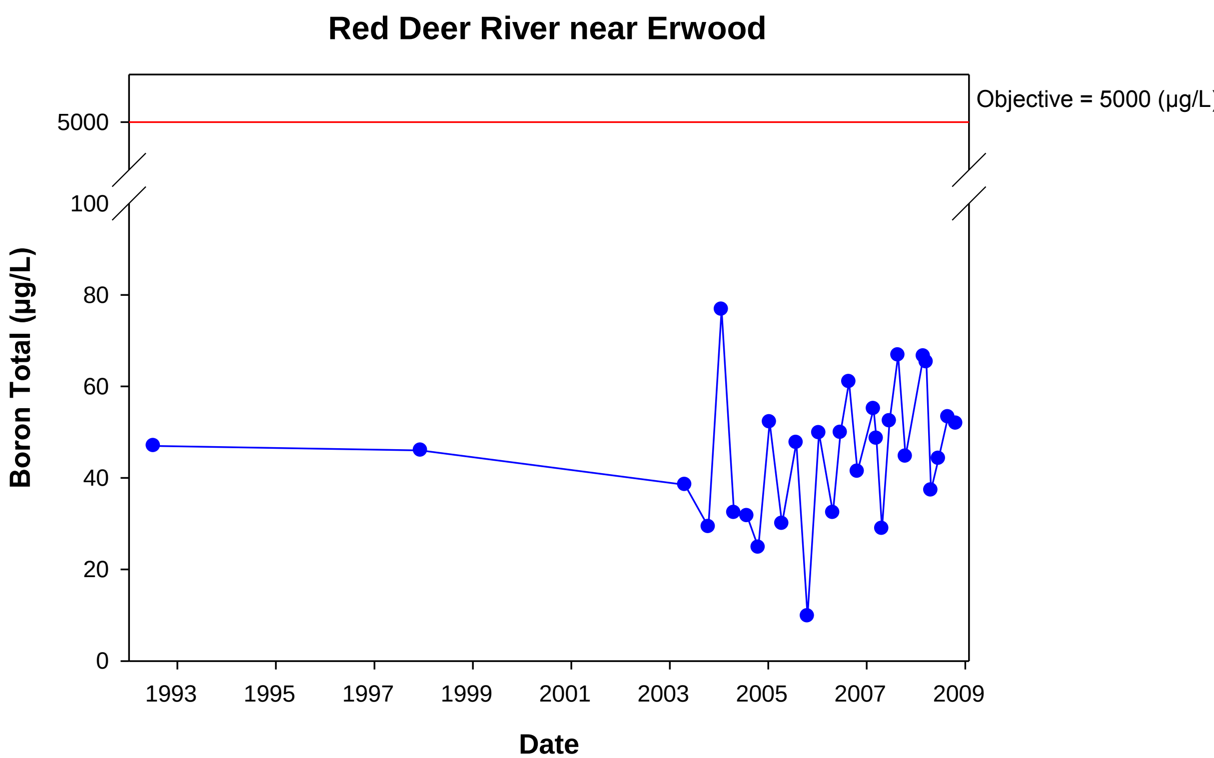

Figure 6-k11: Red Deer River (SK-MB) Boron Total

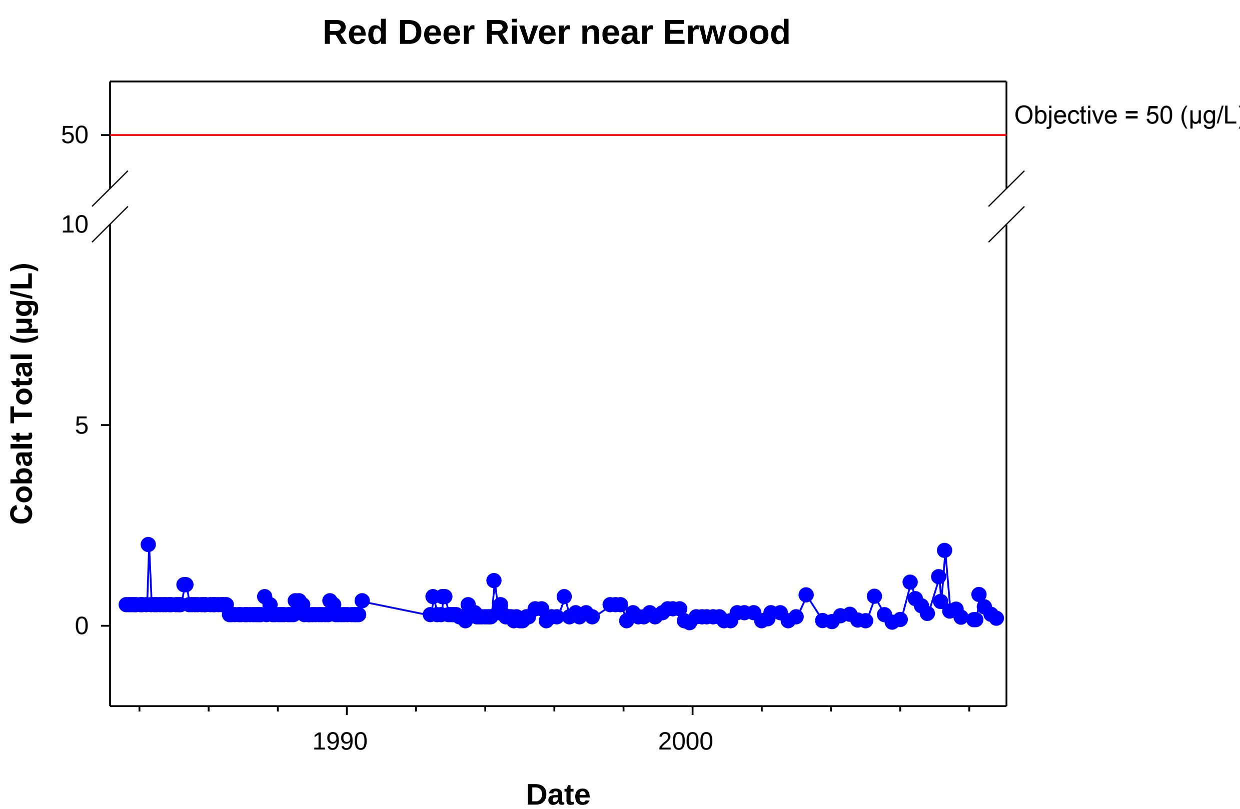

Figure 6-k12: Red Deer River (SK-MB) Cobalt Total

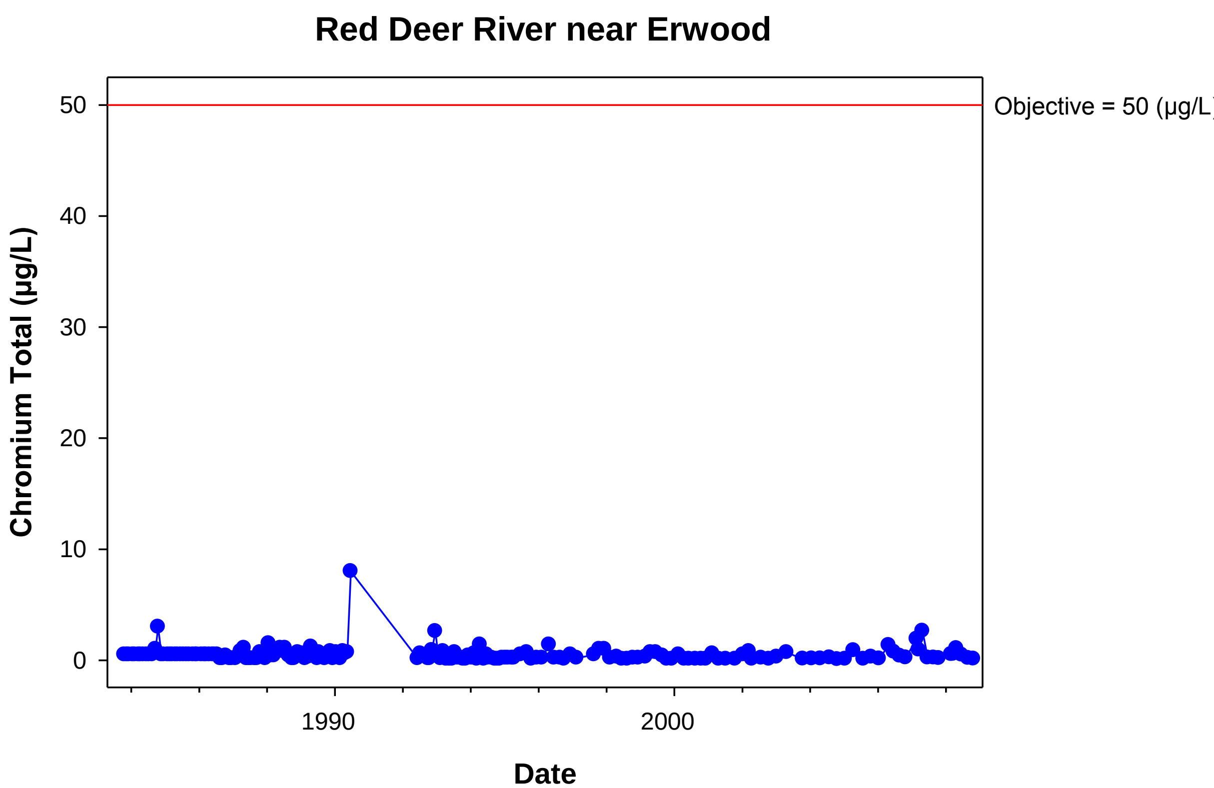

Figure 6-k13: Red Deer River (SK-MB) Chromium Total

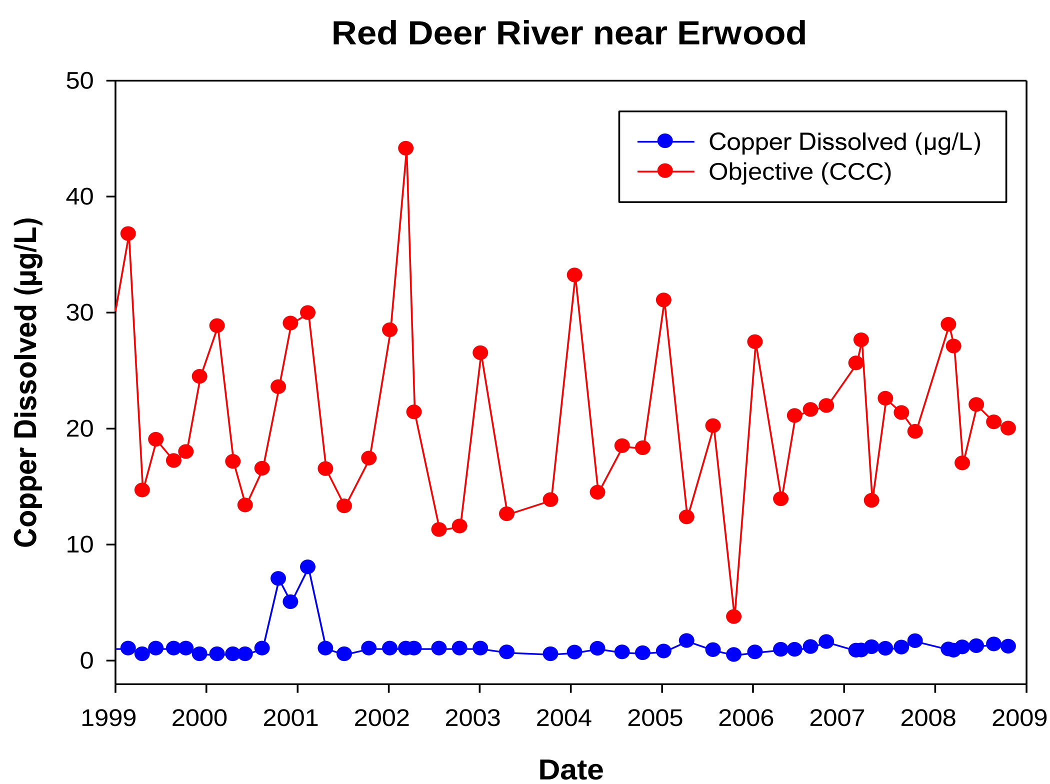

Figure 6-k14: Red Deer River (SK-MB) Copper Dissolved

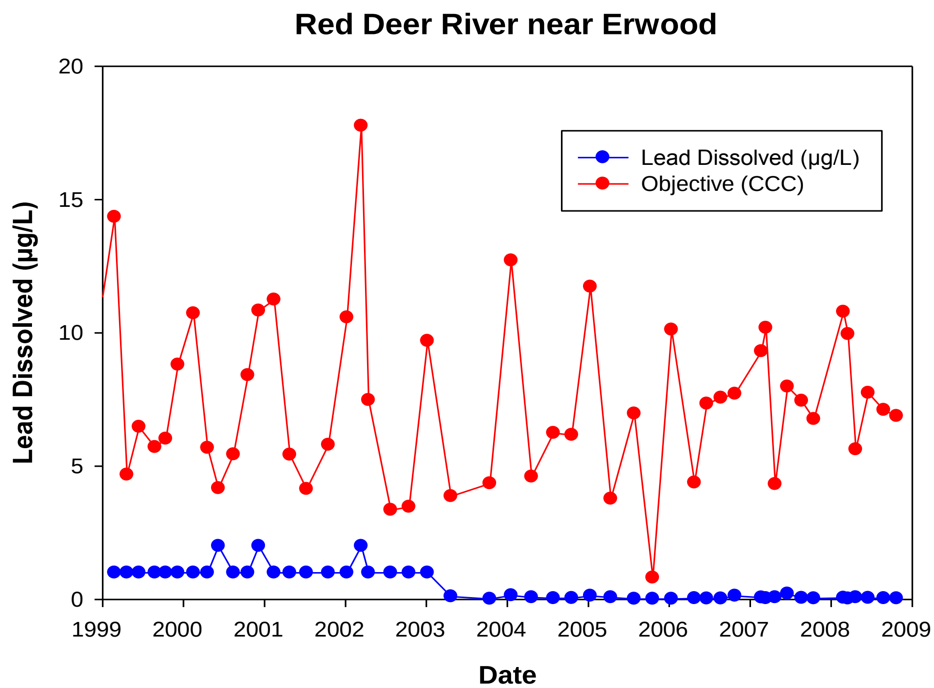

Figure 6-k15: Red Deer River (SK-MB) Lead Dissolved

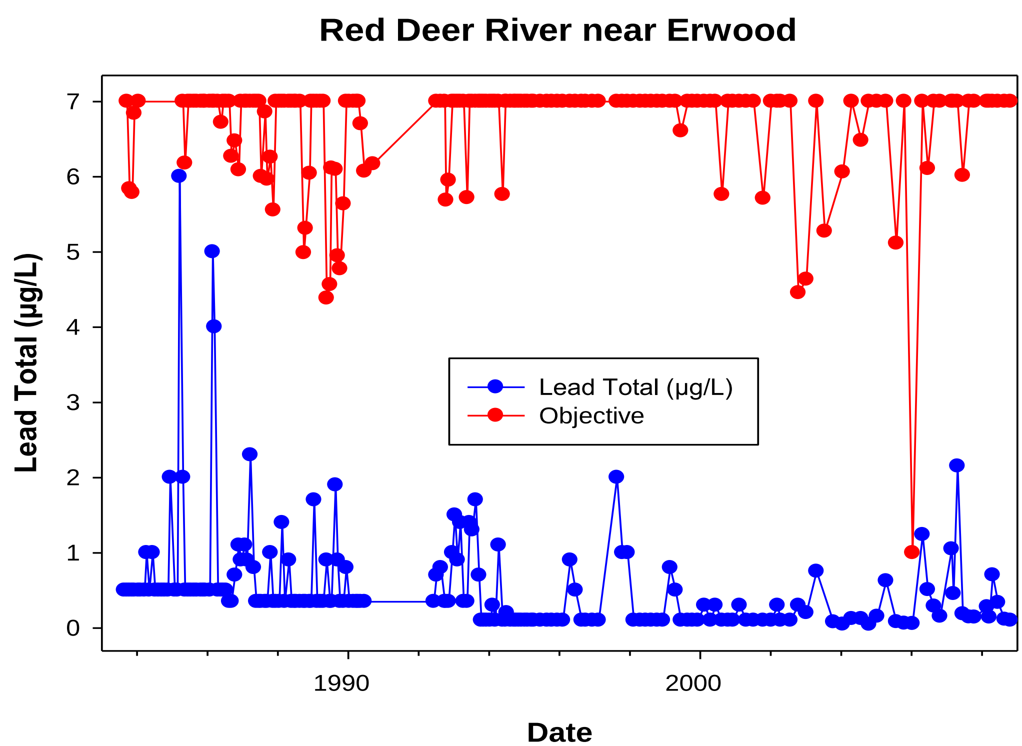

Figure 6-k16: Red Deer River (SK-MB) Lead Total

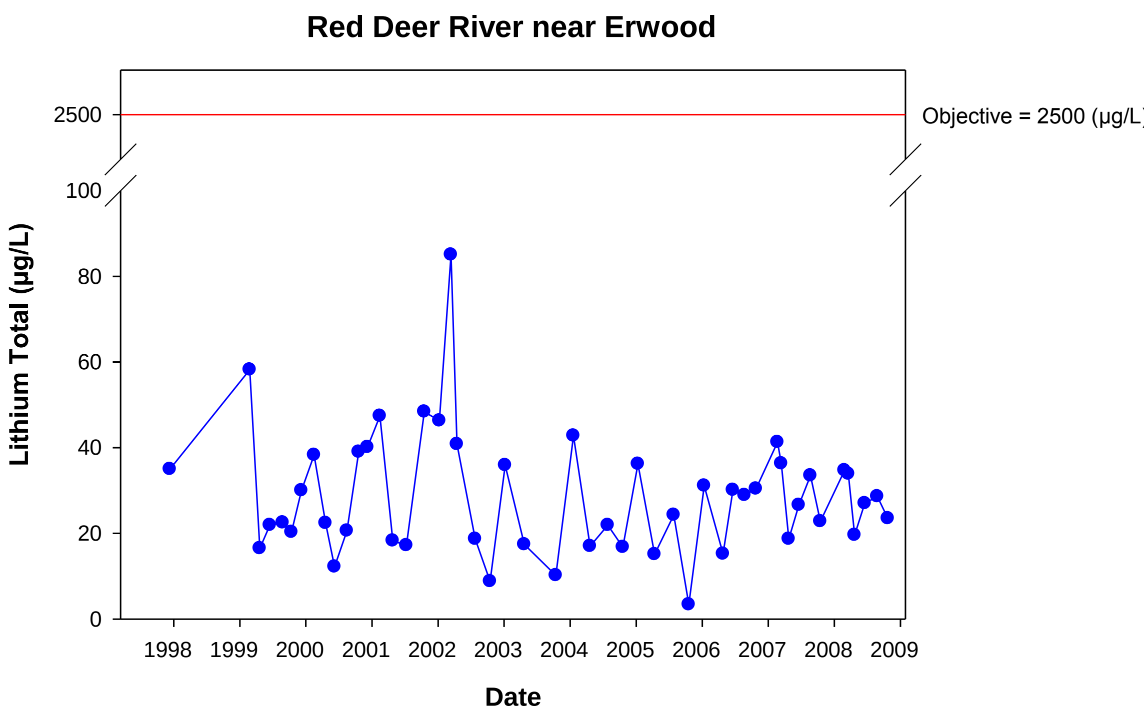

Figure 6-k17: Red Deer River (SK-MB) Lithium Total

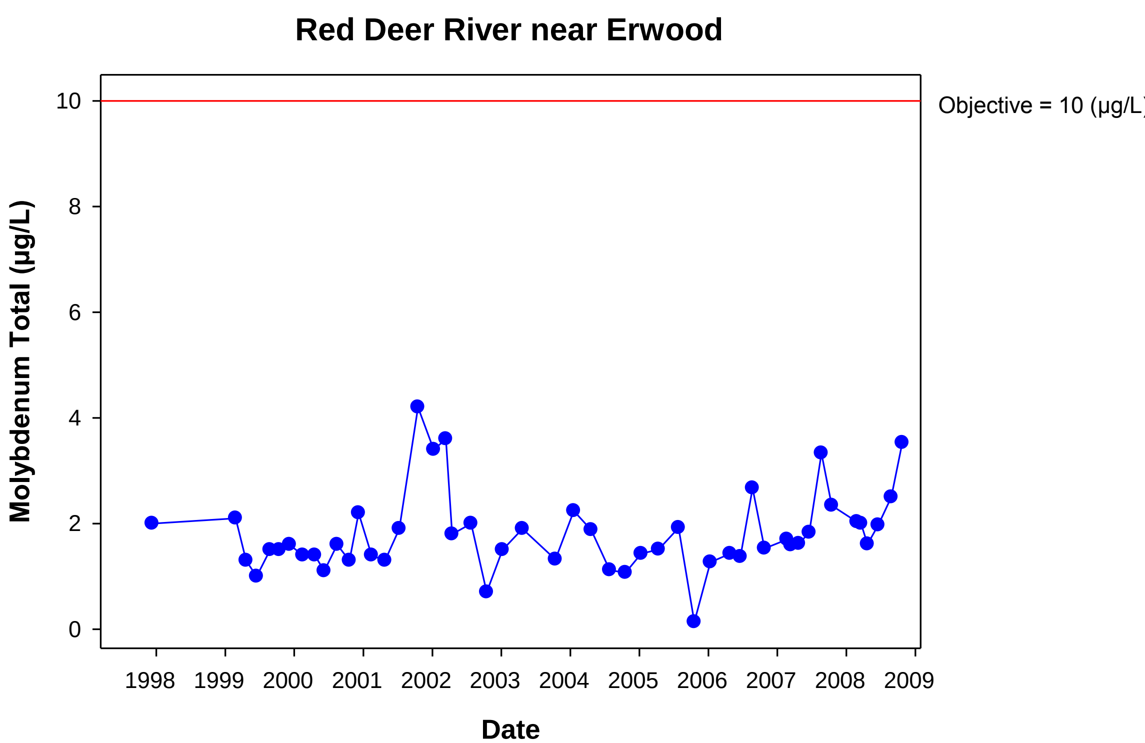

Figure 6-k18: Red Deer River (SK-MB) Molybdenum Total

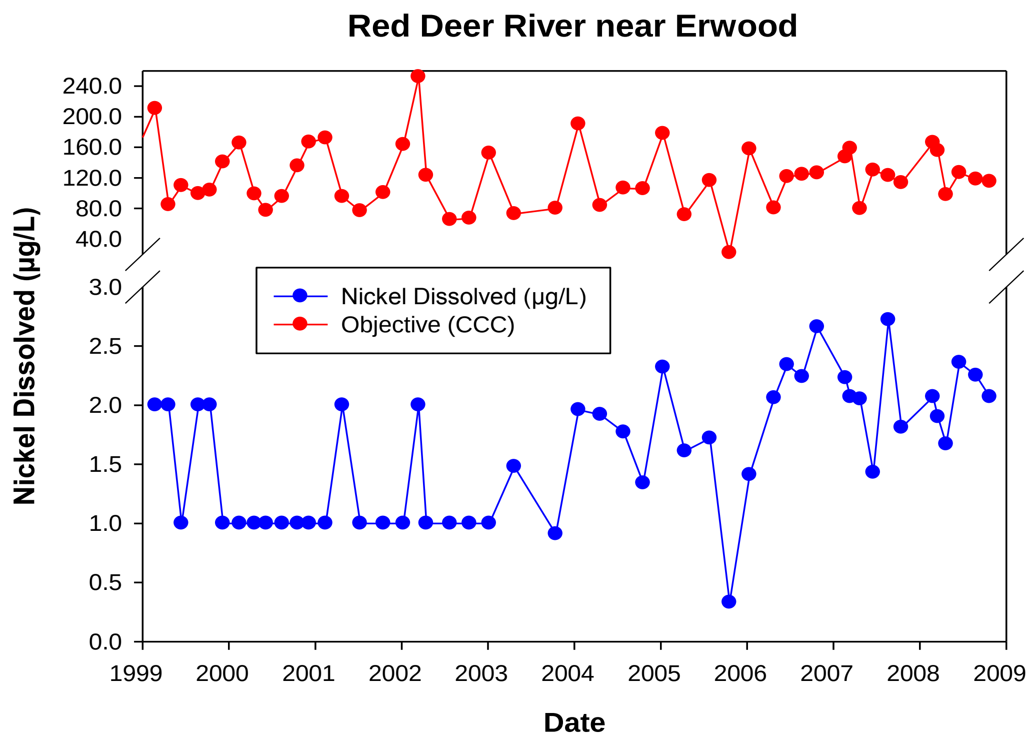

Figure 6-k19: Red Deer River (SK-MB) Nickel Dissolved

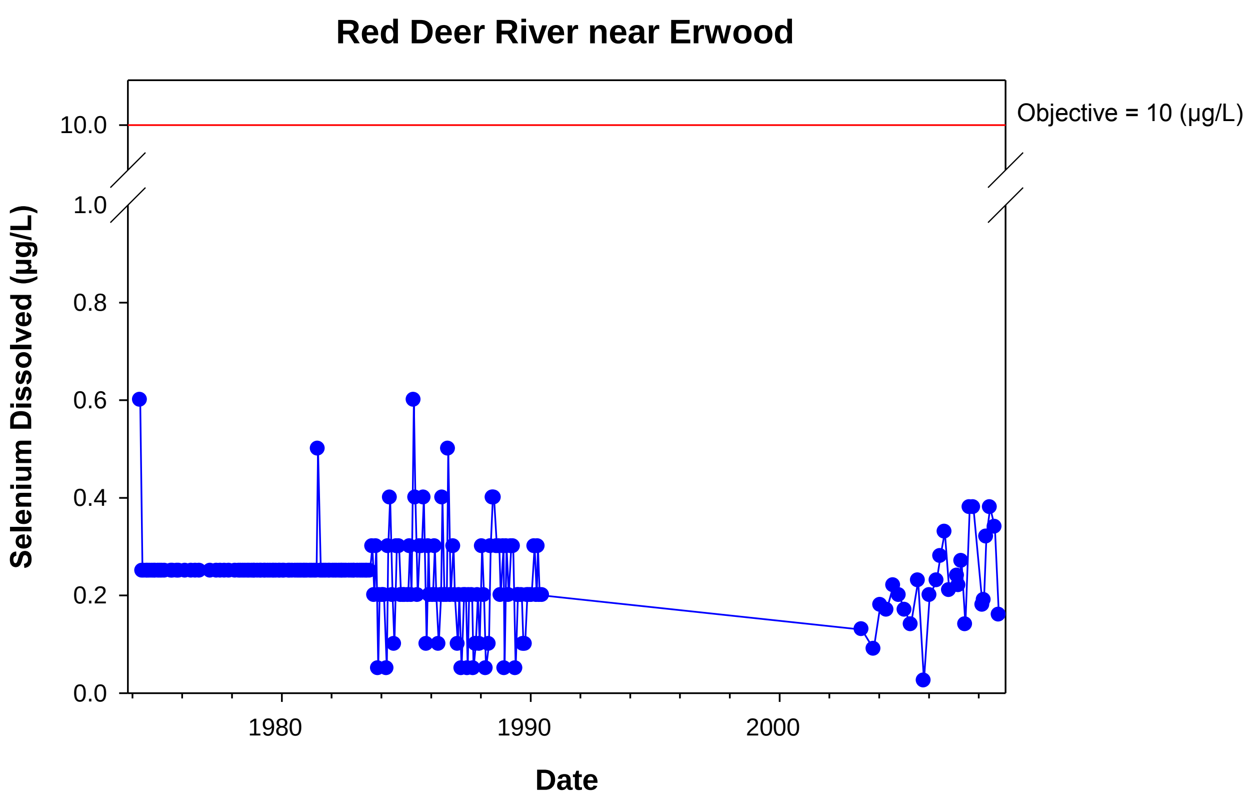

Figure 6-k20: Red Deer River (SK-MB) Selenium Dissolved

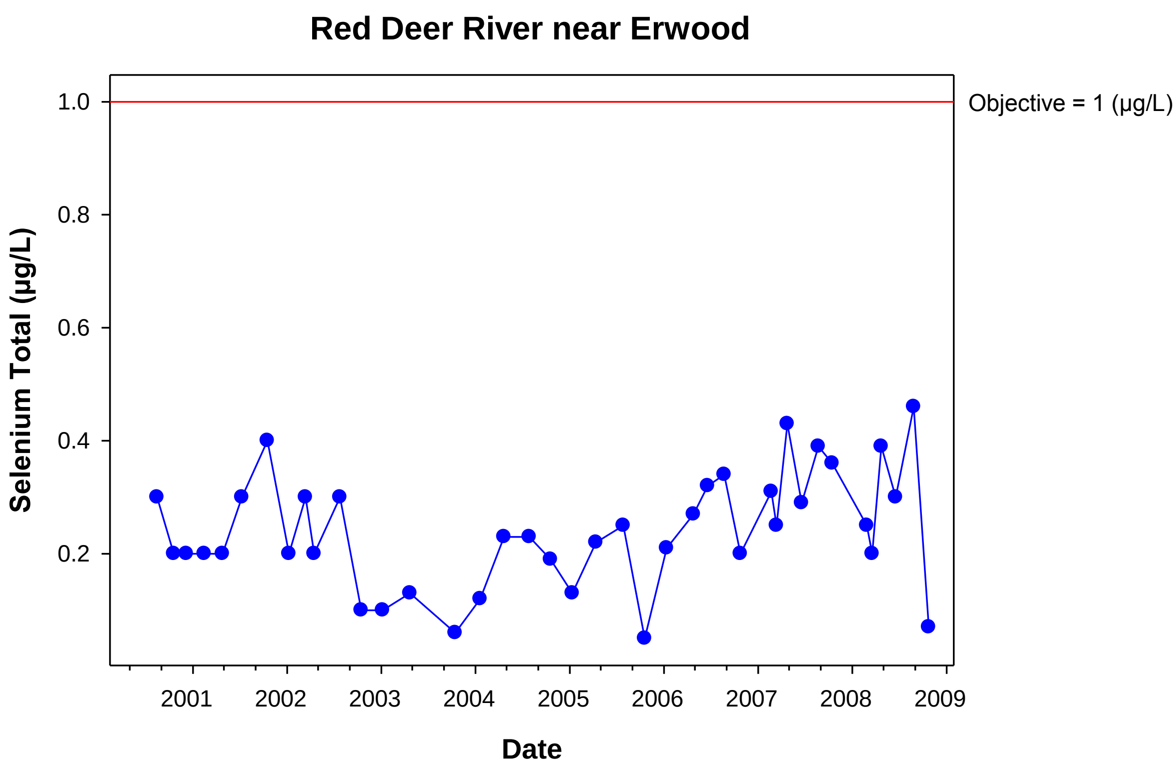

Figure 6-k21: Red Deer River (SK-MB) Selenium Total

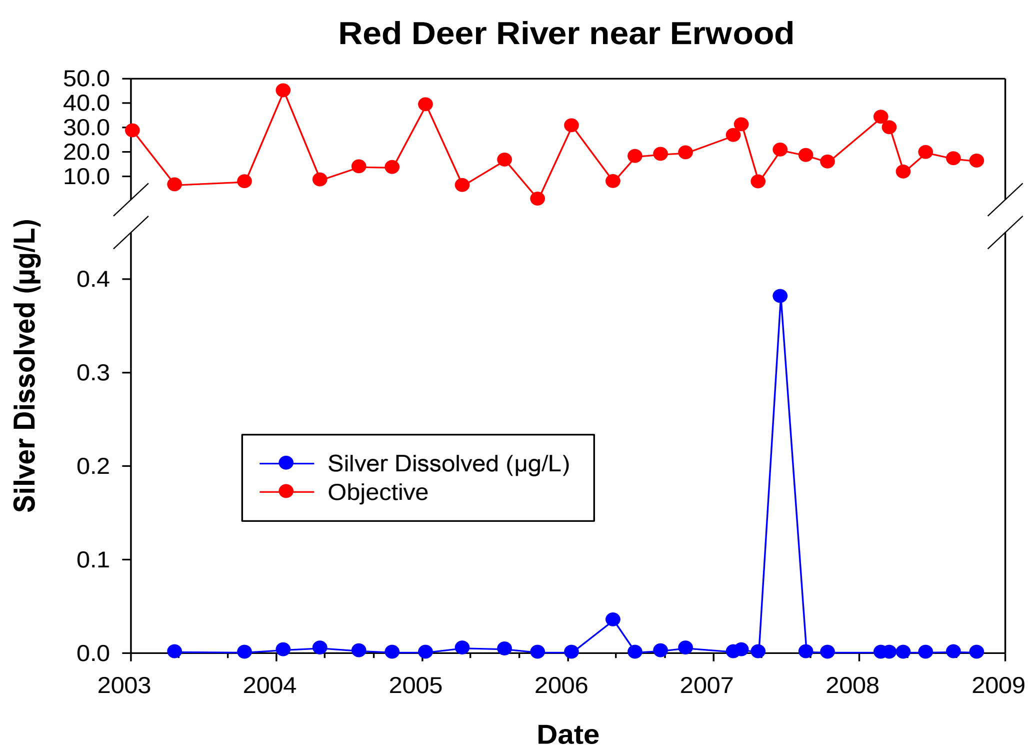

Figure 6-k22: Red Deer River (SK-MB) Silver Dissolved

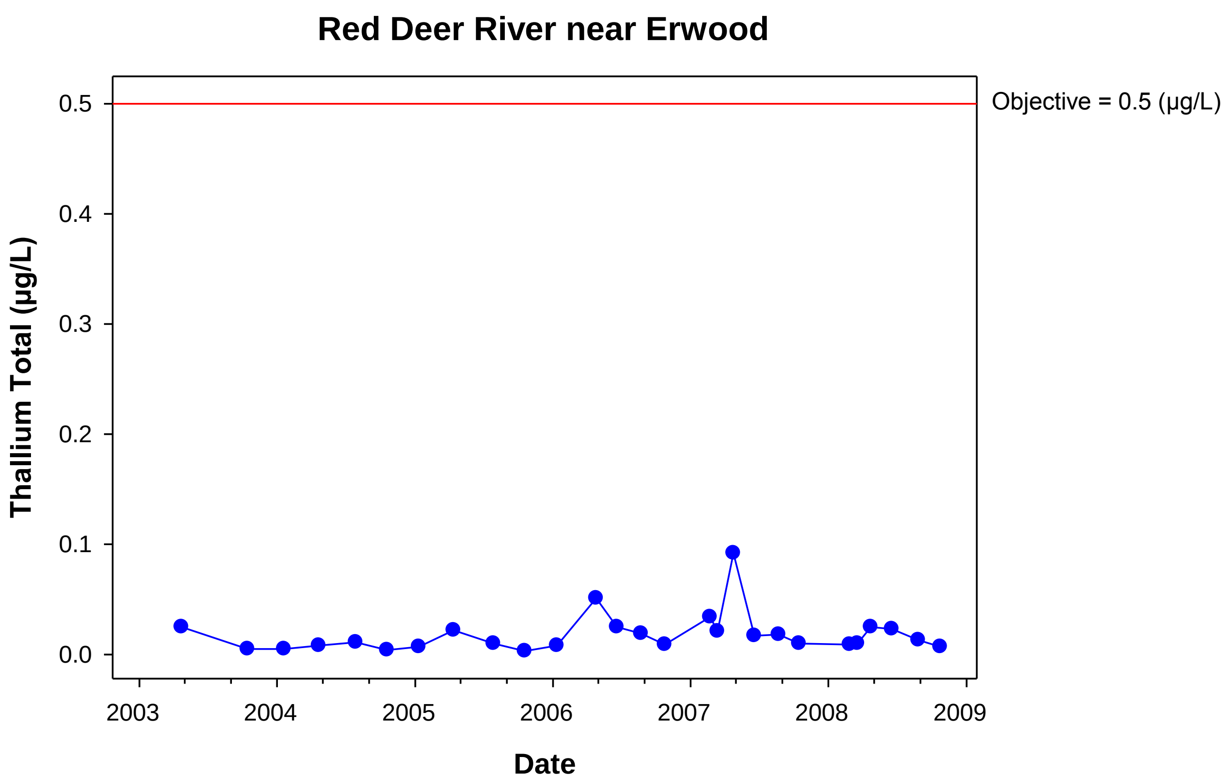

Figure 6-k23: Red Deer River (SK-MB) Thallium Total

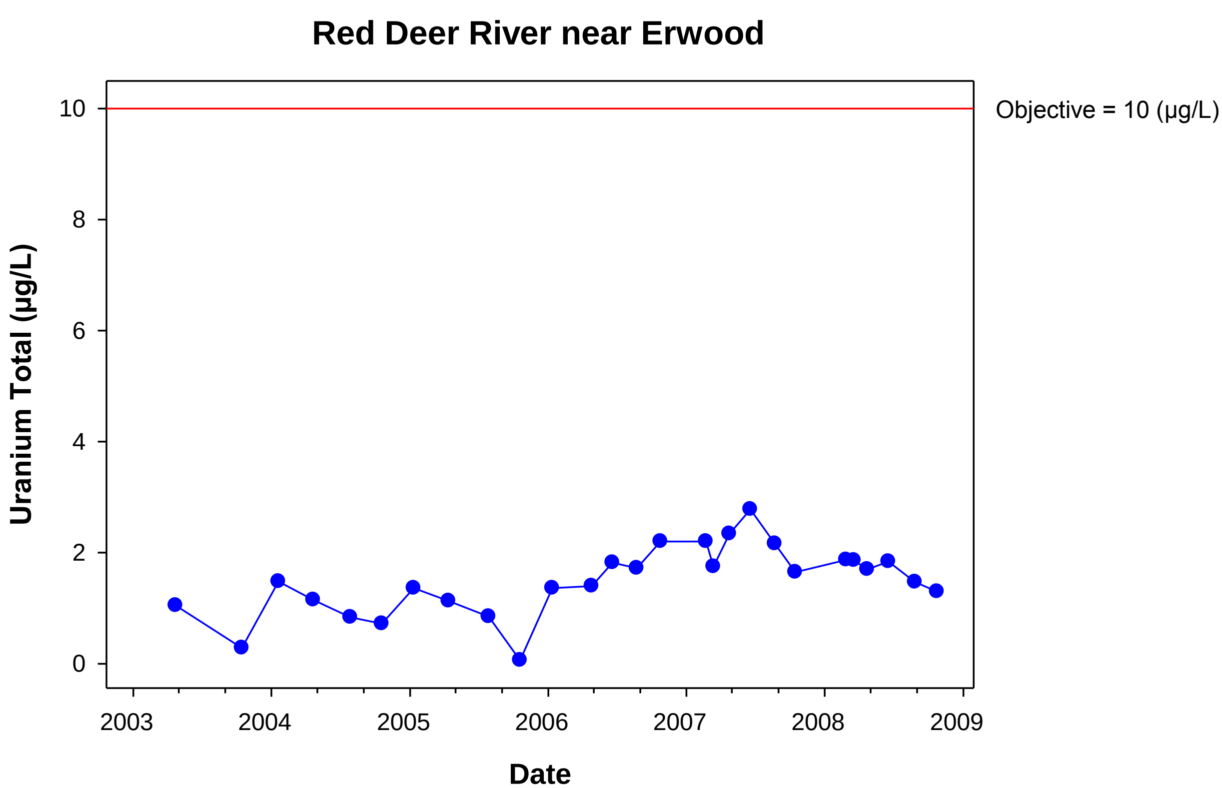

Figure 6-k24: Red Deer River (SK-MB) Uranium Total

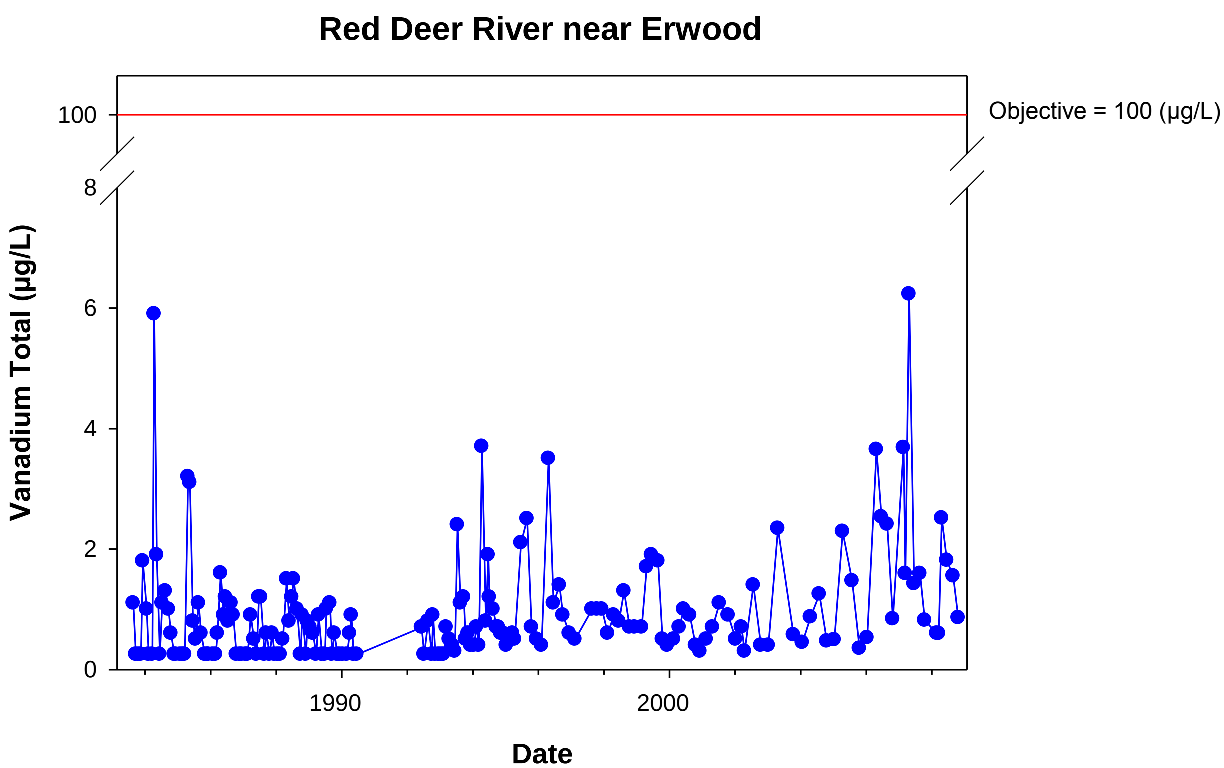

Figure 6-k25: Red Deer River (SK-MB) Vanadium Total

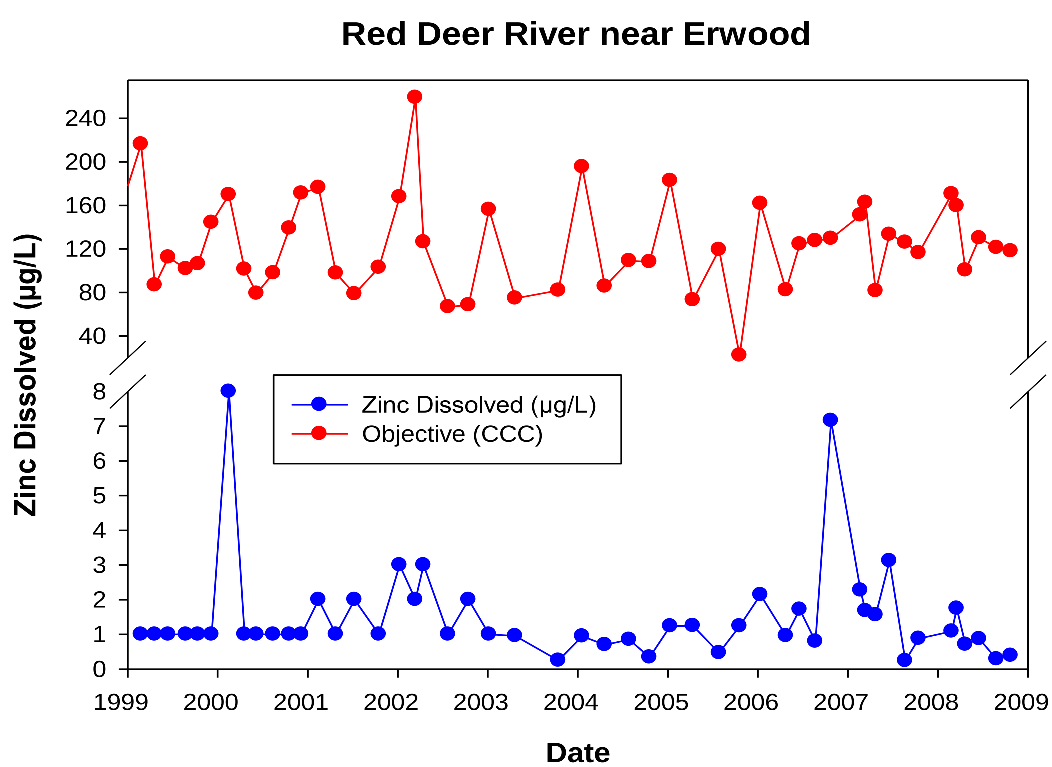

Figure 6-k26: Red Deer River (SK-MB) Zinc Dissolved

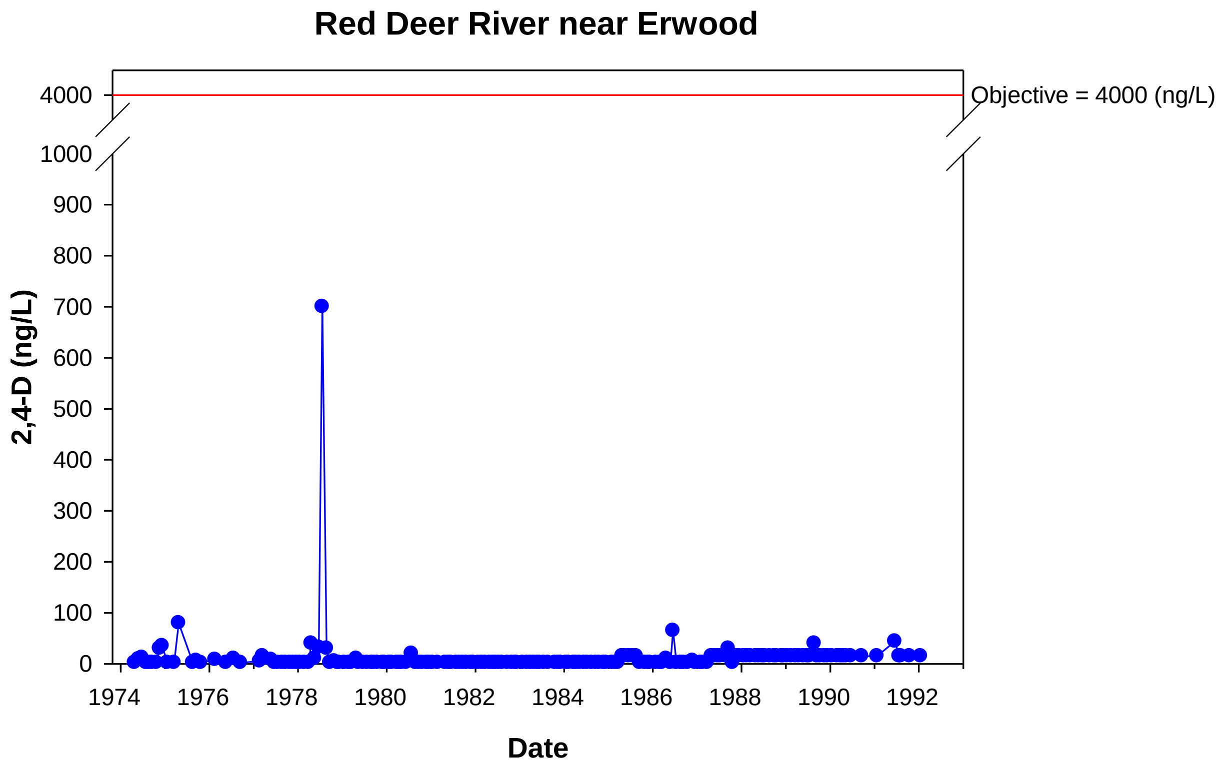

Figure 6-k27: Red Deer River (SK-MB) 2,4-D

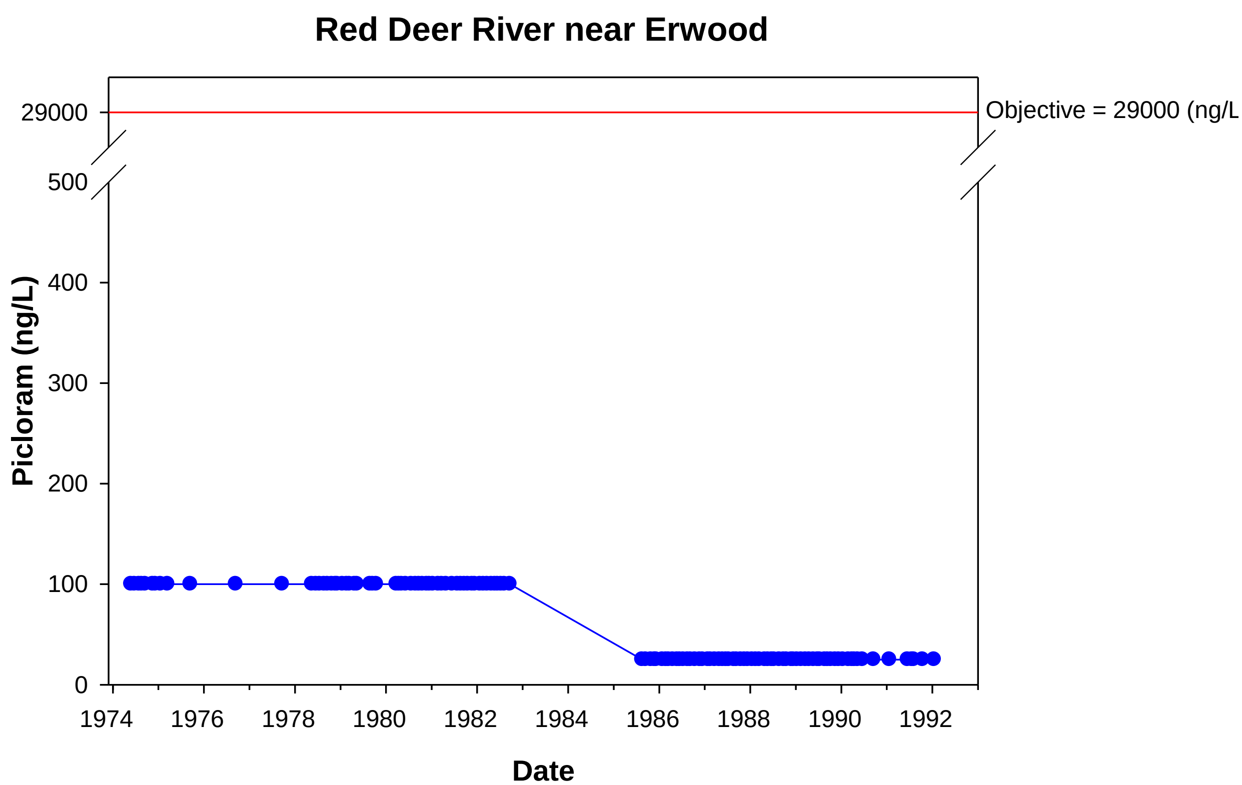

Figure 6-k28: Red Deer River (SK-MB) Picloram

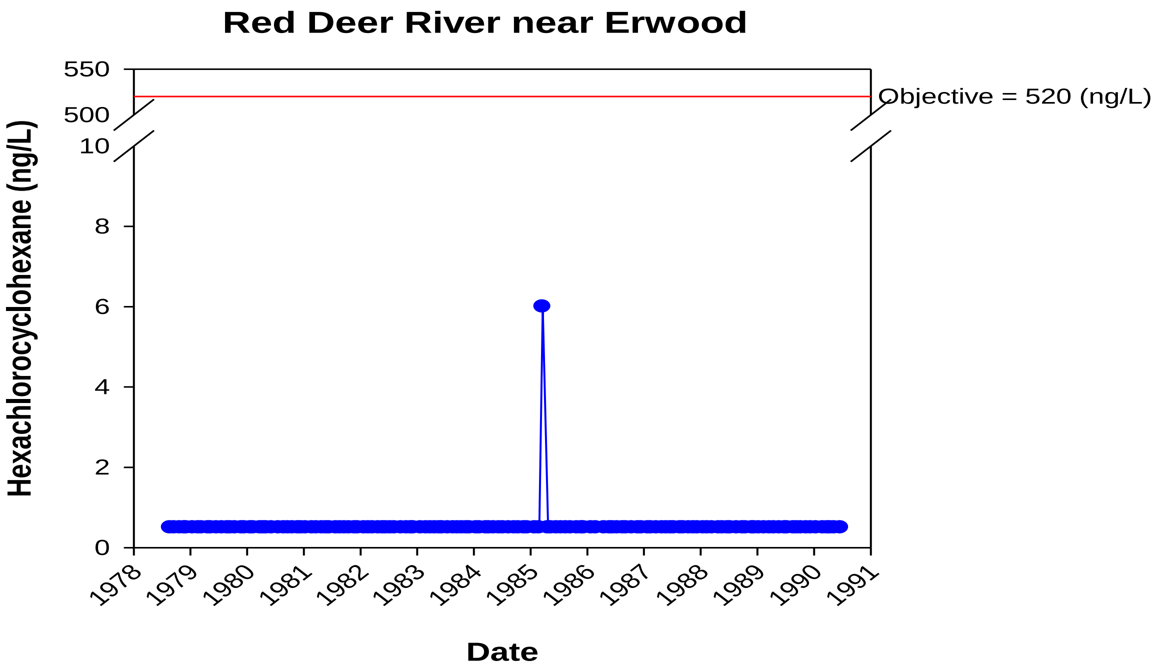

Figure 6-k29: Red Deer River (SK-MB) Hexachlorocyclohexane

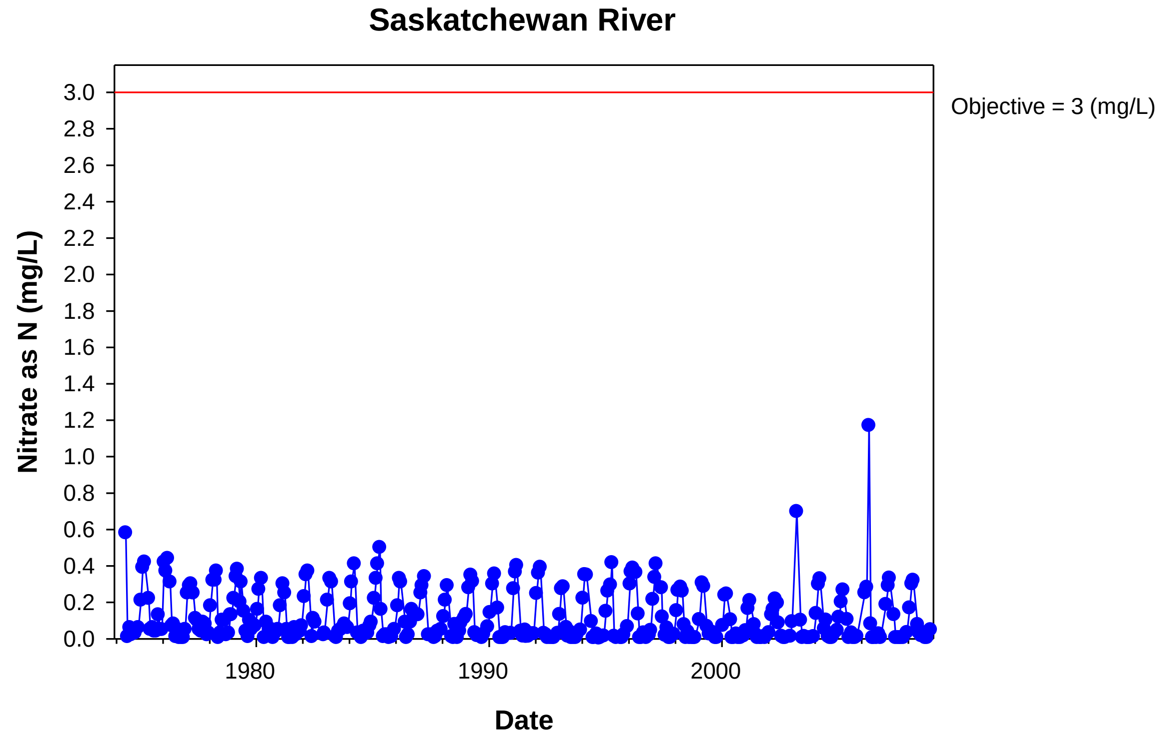

Figure 6-l1: Saskatchewan River Nitrate as N

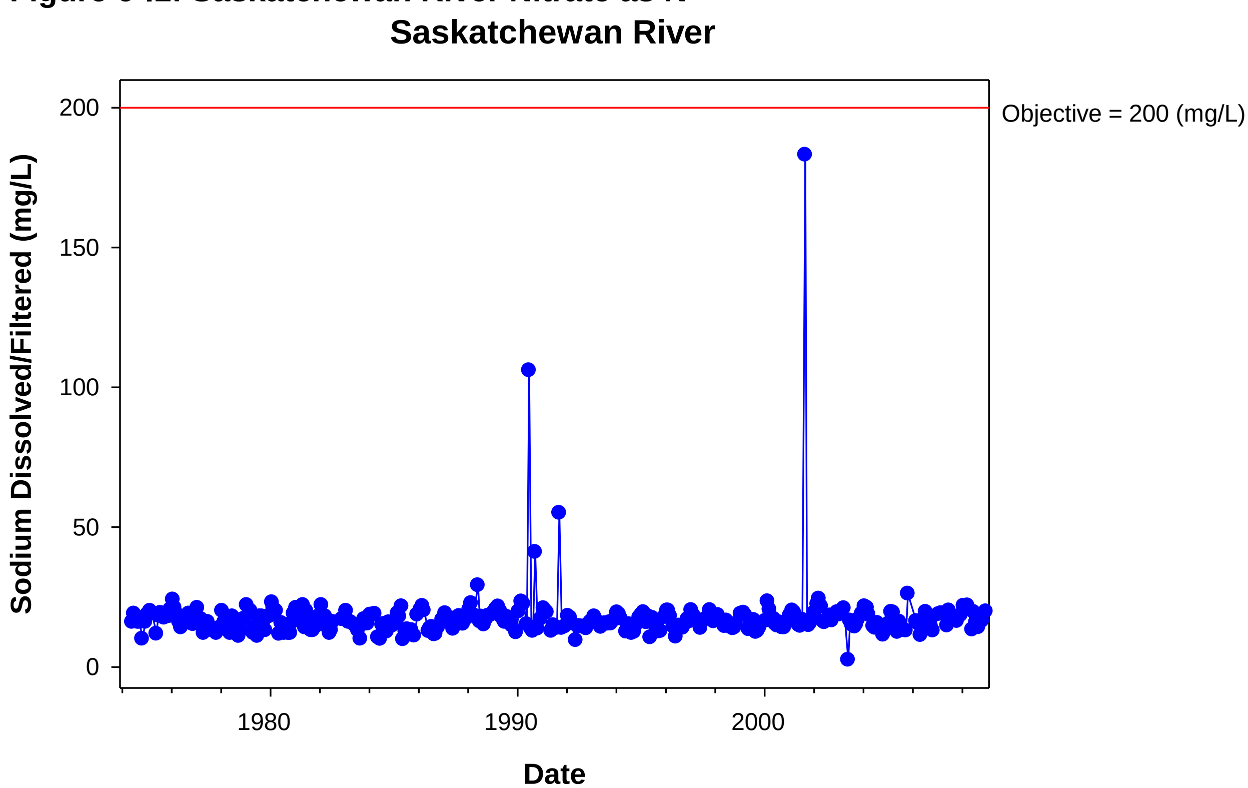

Figure 6-l2: Saskatchewan River Sodium Dissolved/Filtered

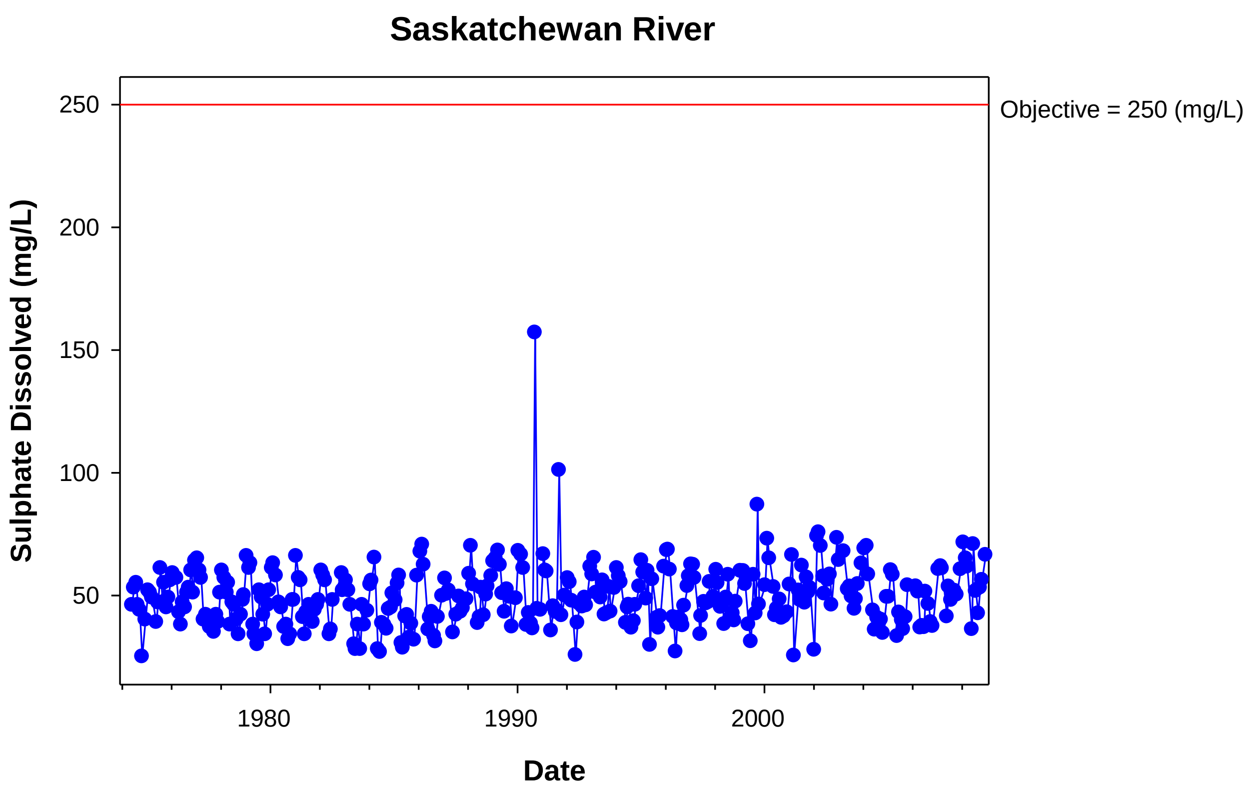

Figure 6-I3: Saskatchewan River Sulphate Dissolved

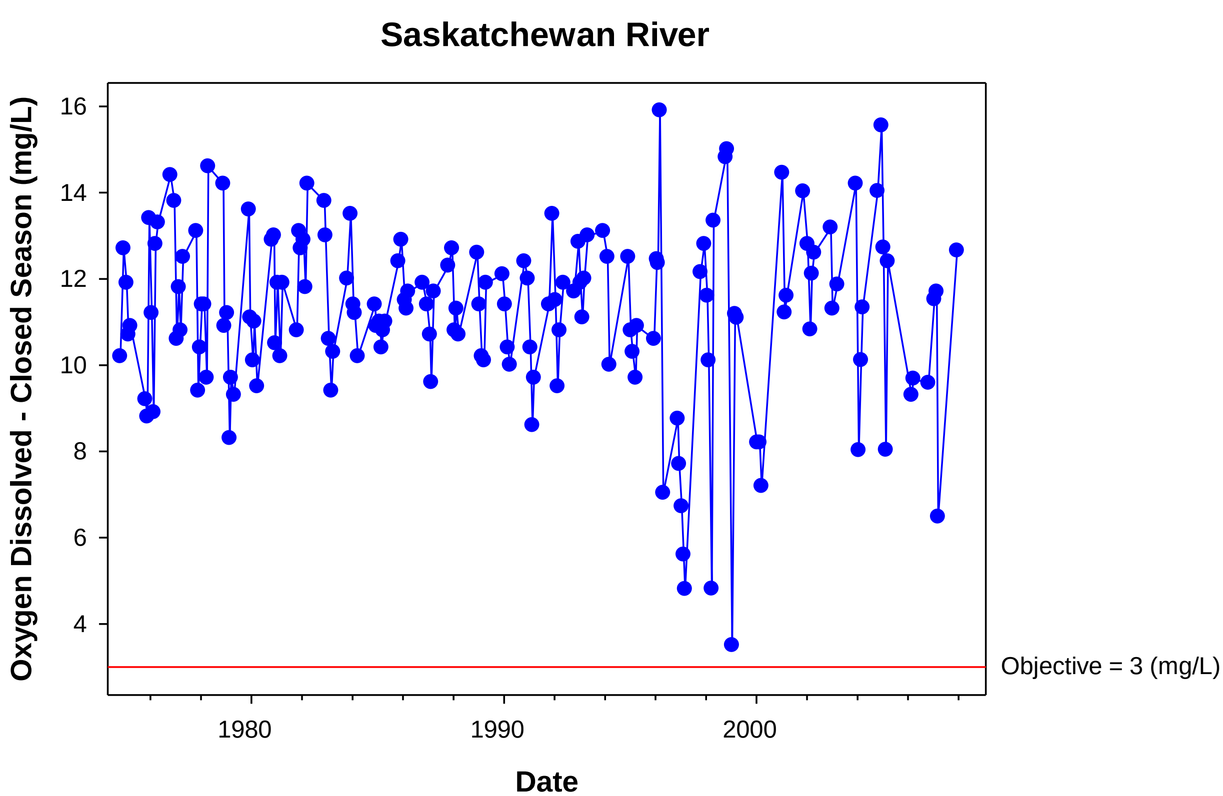

Figure 6-I4: Saskatchewan River Oxygen Dissolved (Closed Season)

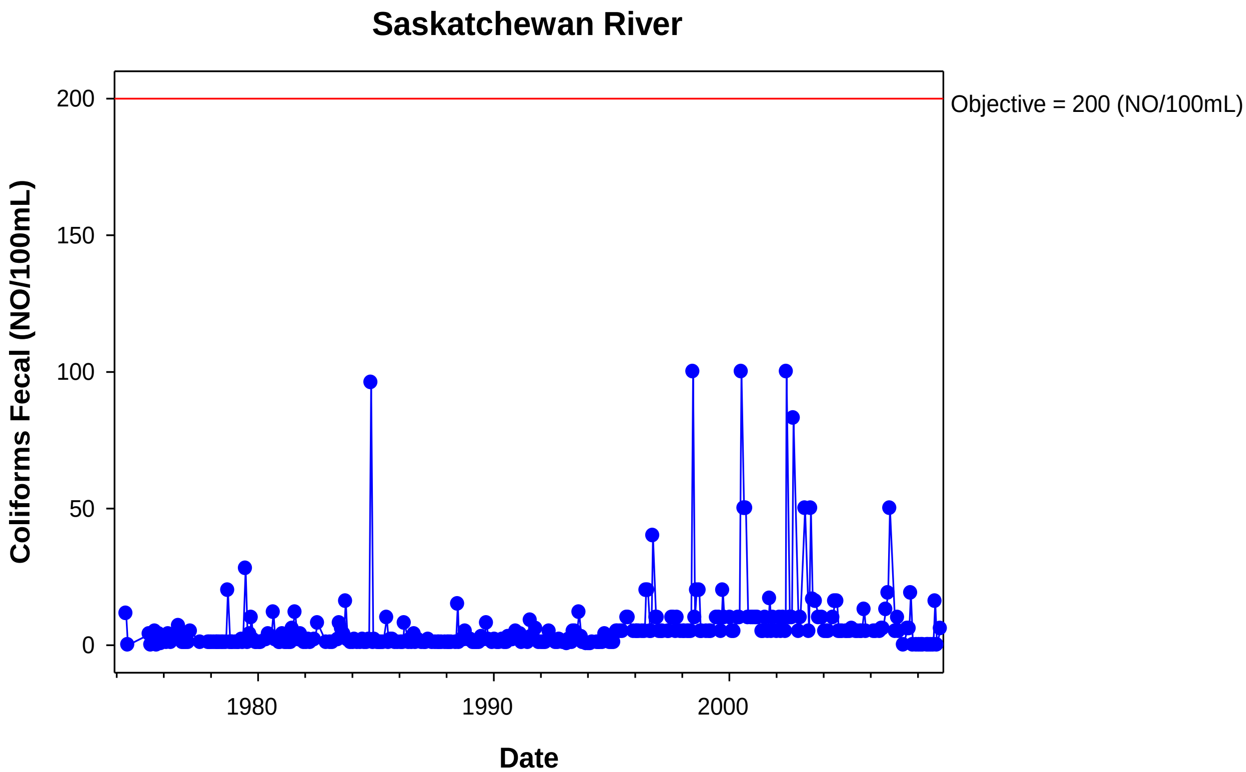

Figure 6-I5: Saskatchewan River Coliforms Fecal

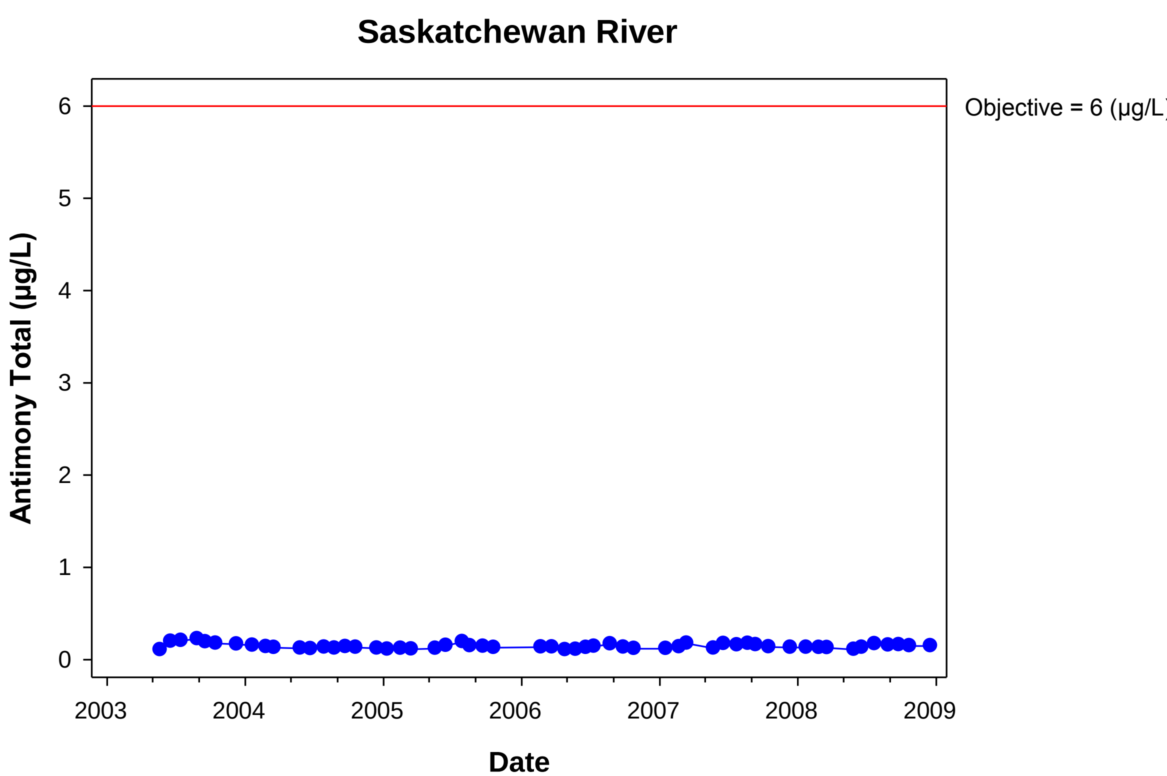

Figure 6-I6: Saskatchewan River Antimony Total

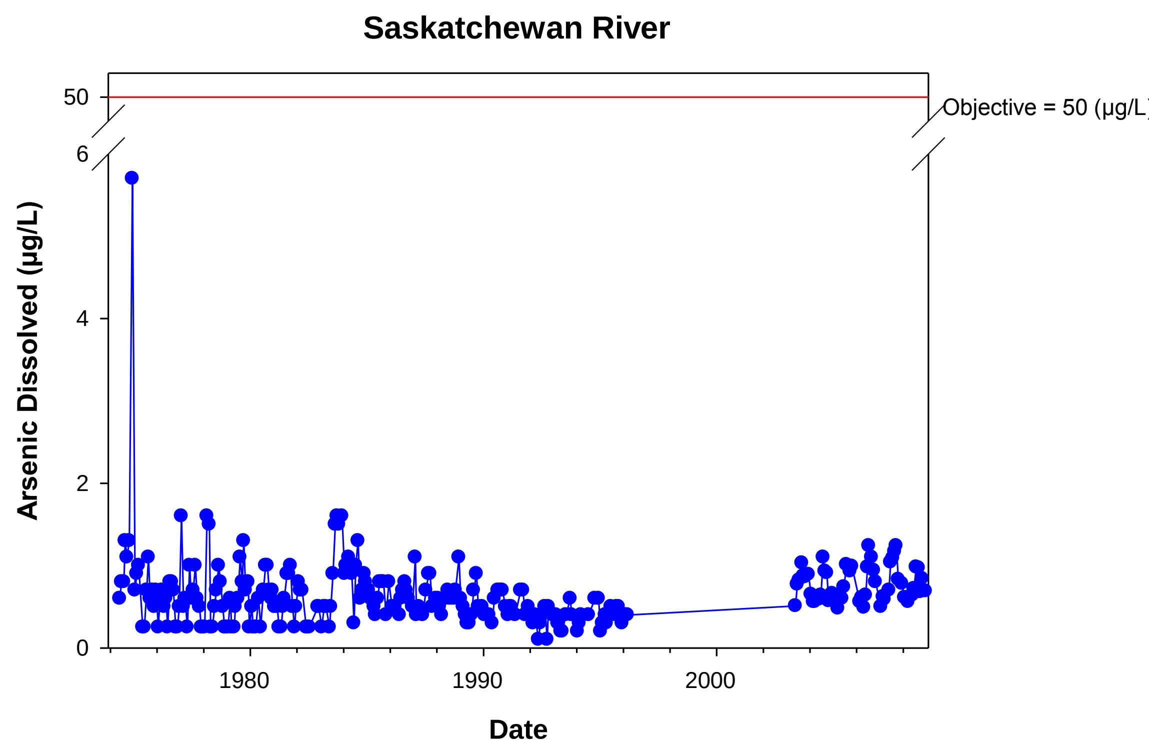

Figure 6-I7: Saskatchewan River Arsenic Dissolved

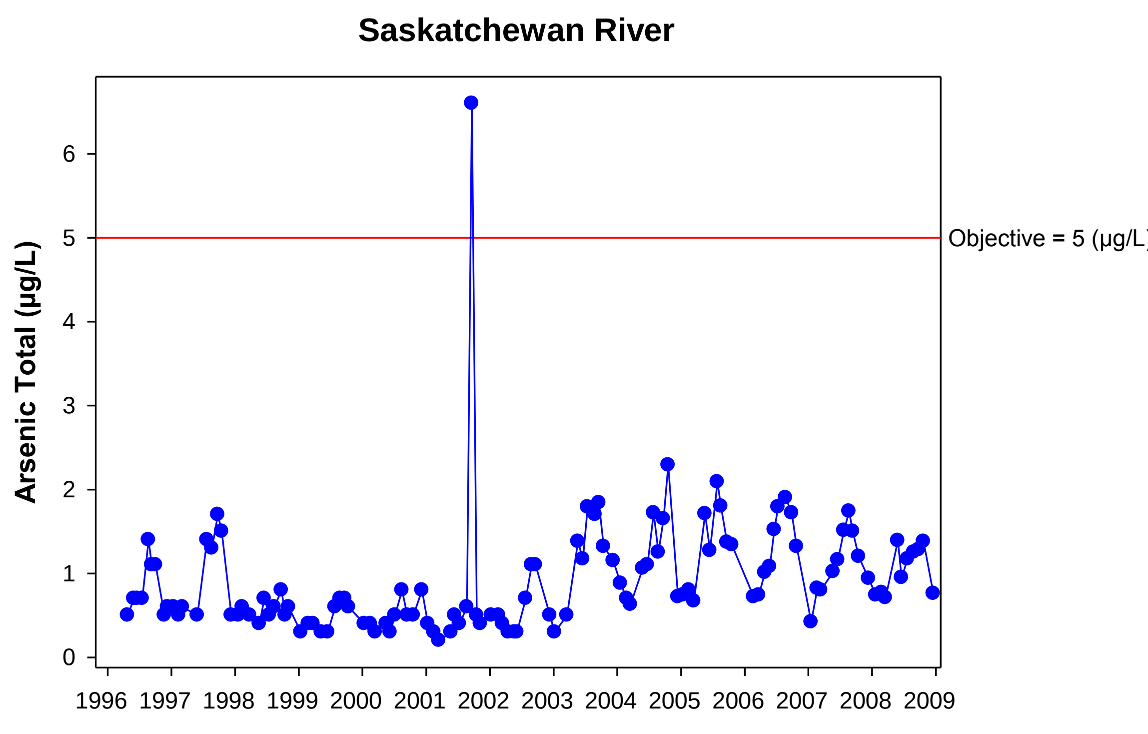

Figure 6-I8: Saskatchewan River Arsenic Total

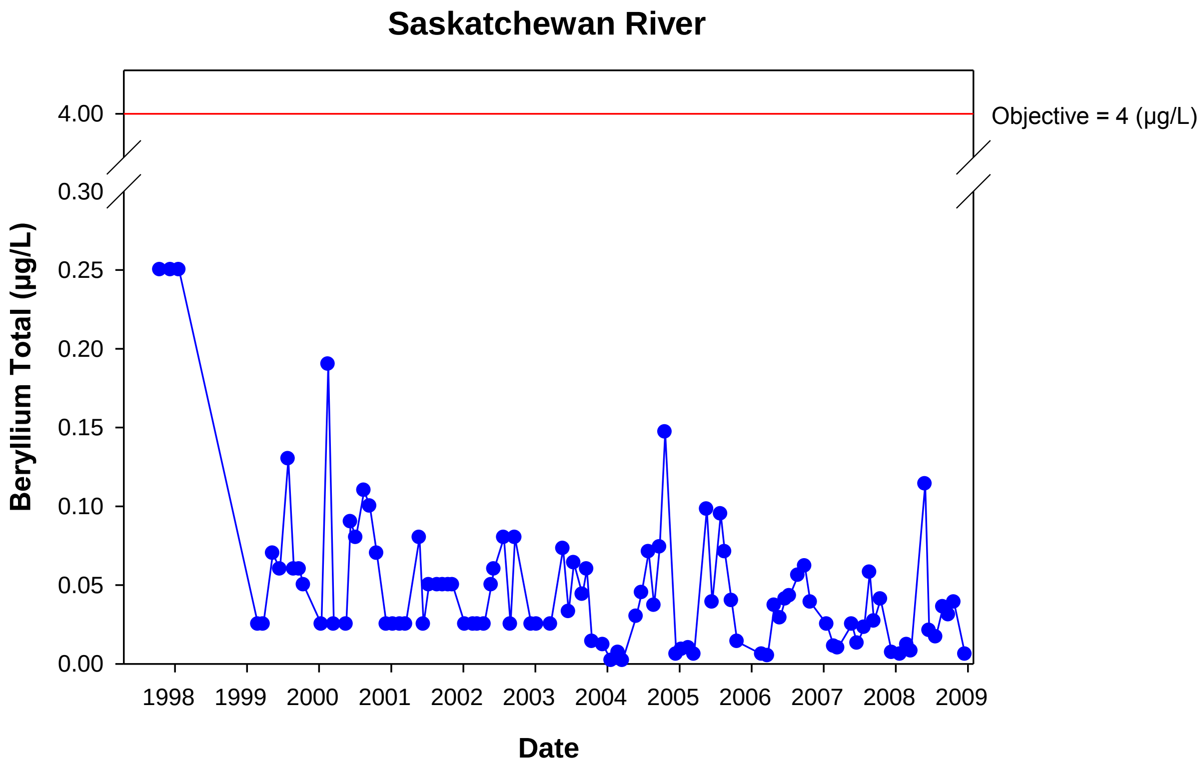

Figure 6-I9: Saskatchewan River Beryllium Total

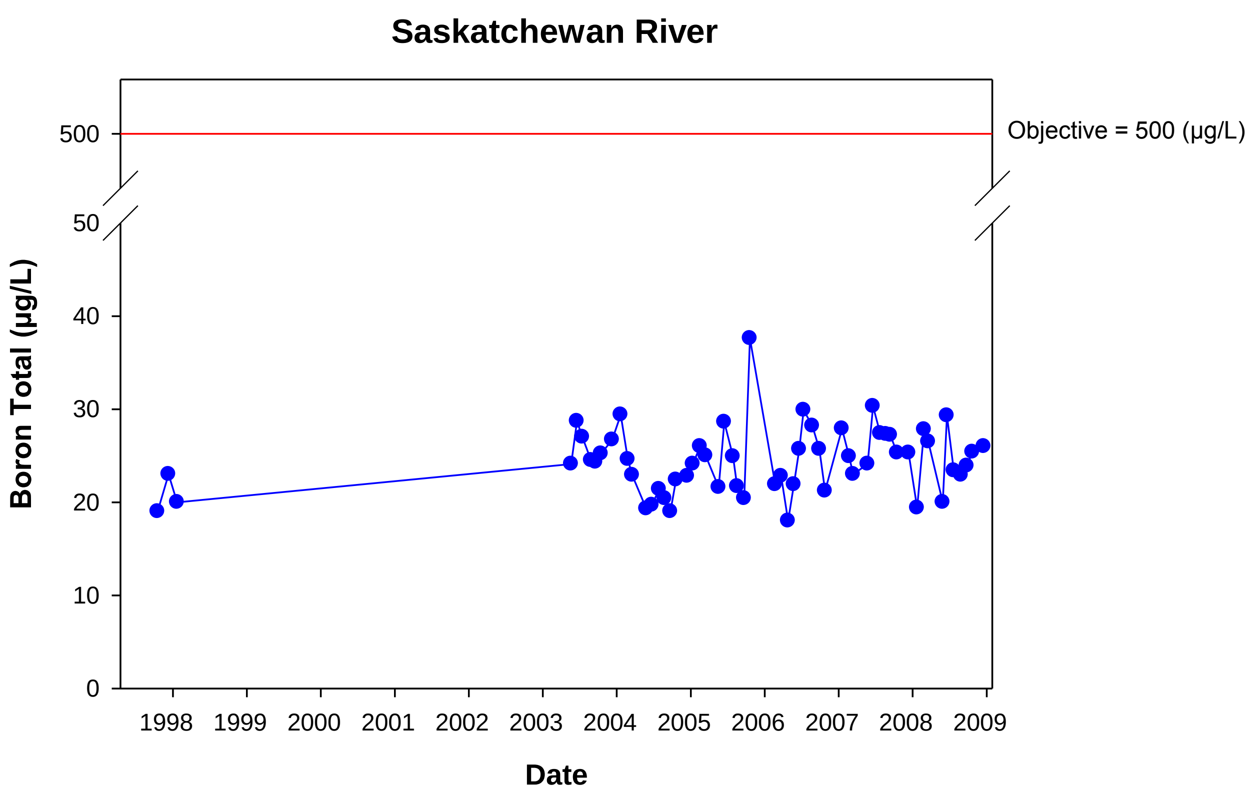

Figure 6-I10: Saskatchewan River Boron Total

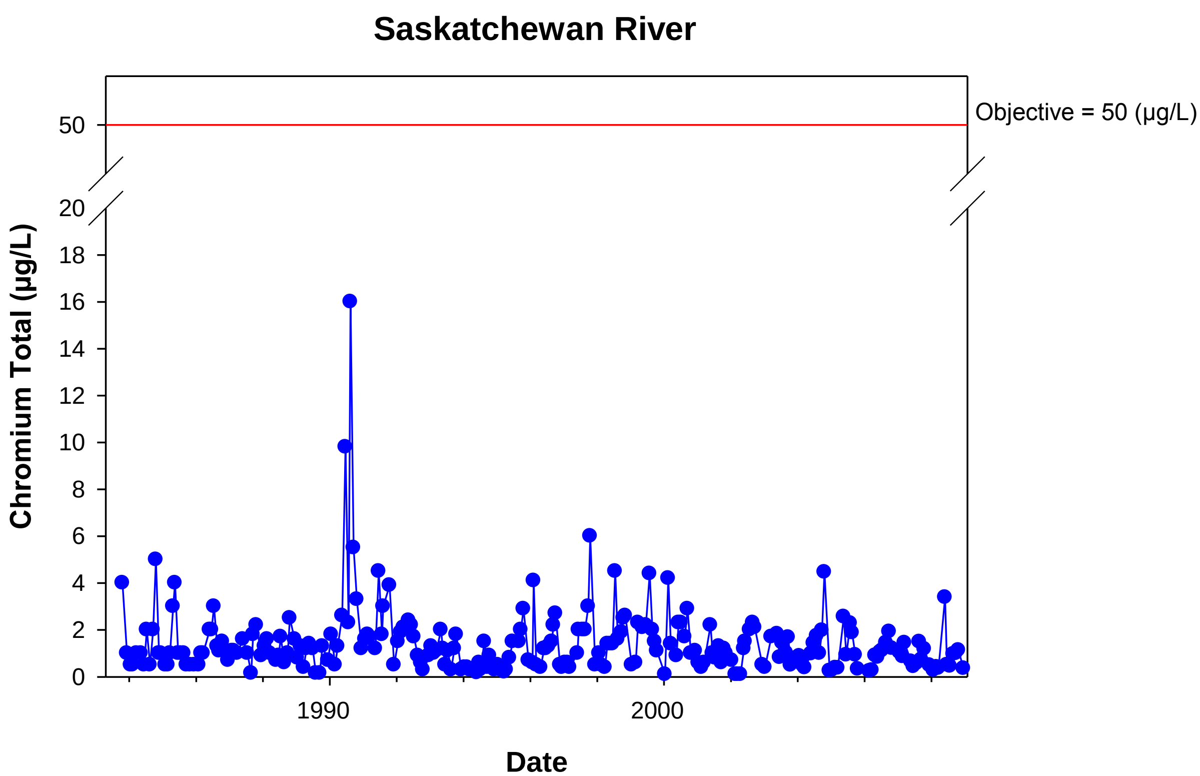

Figure 6-l11: Saskatchewan River Chromium Total

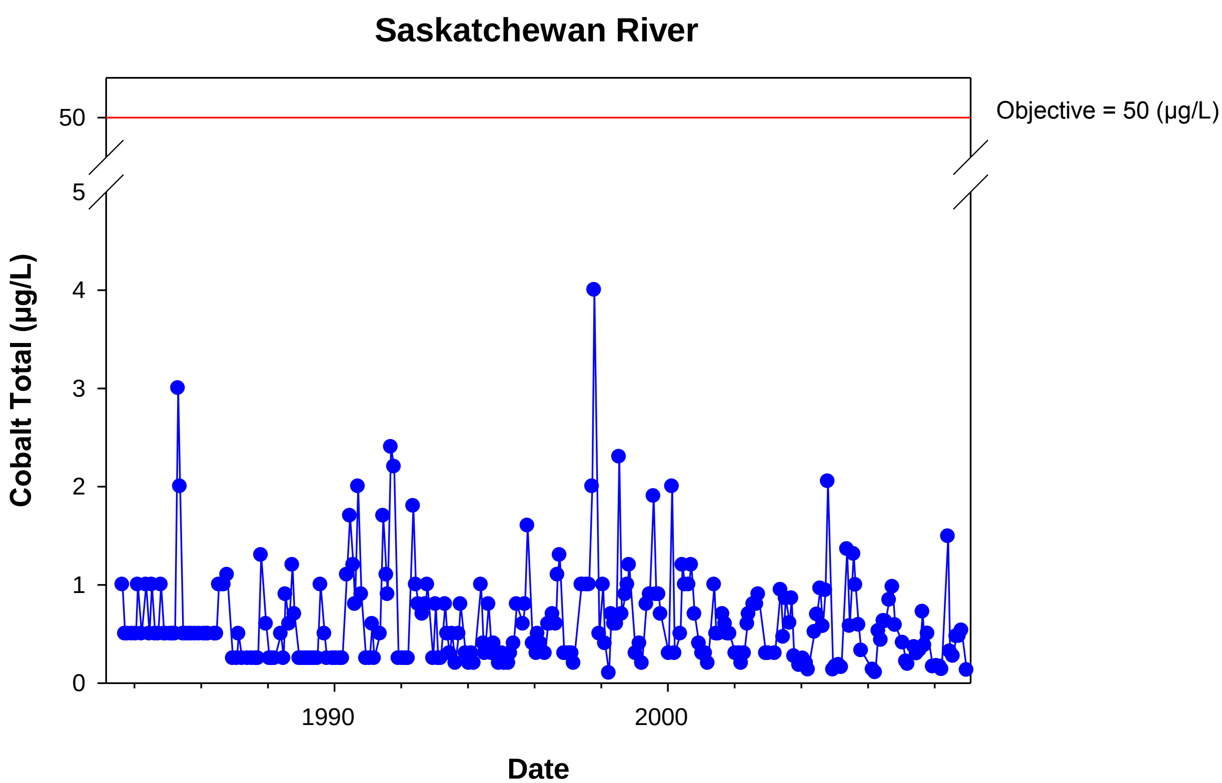

Figure 6-l12: Saskatchewan River Cobalt Total

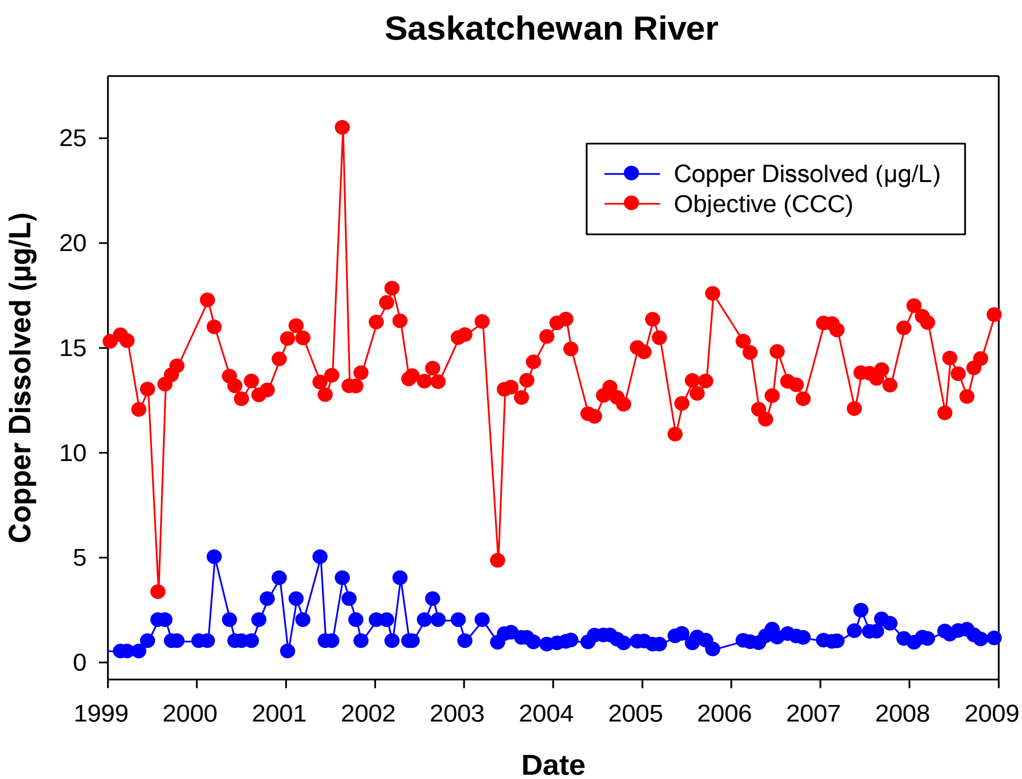

Figure 6-I13: Saskatchewan River Copper Dissolved

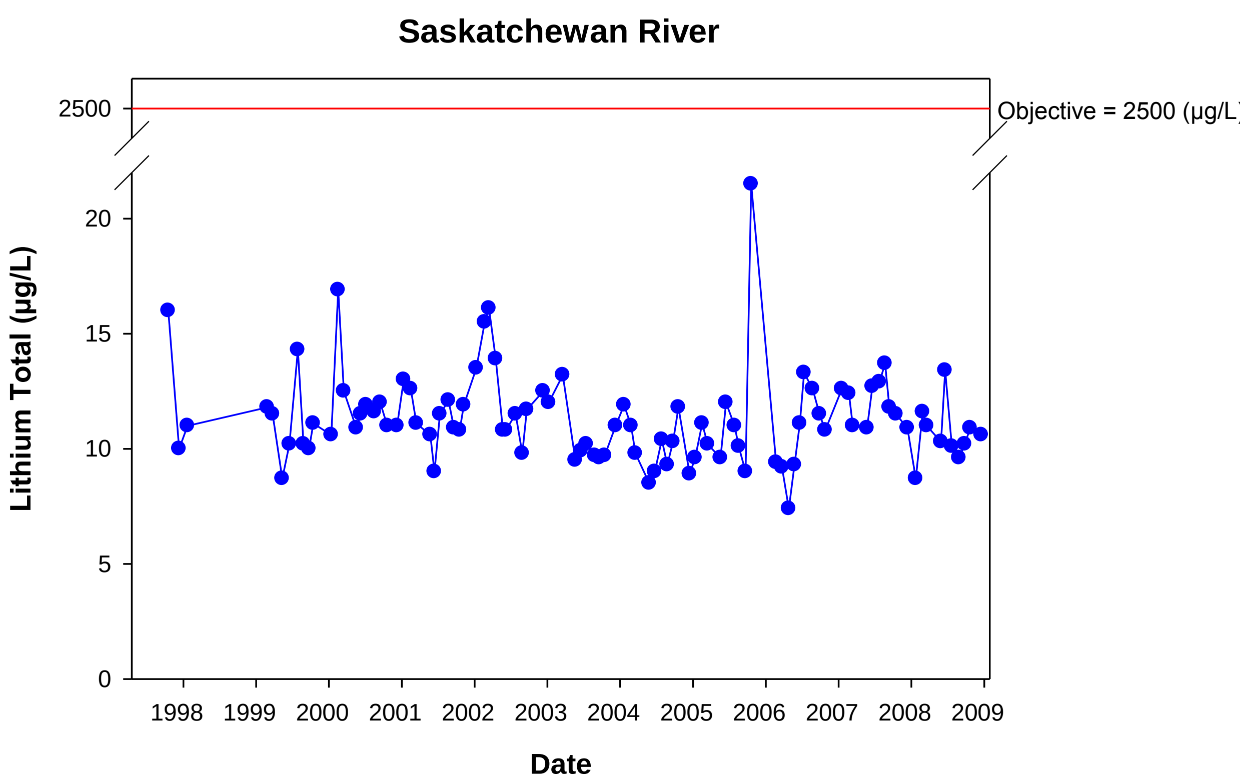

Figure 6-I14: Saskatchewan River Lithium Total

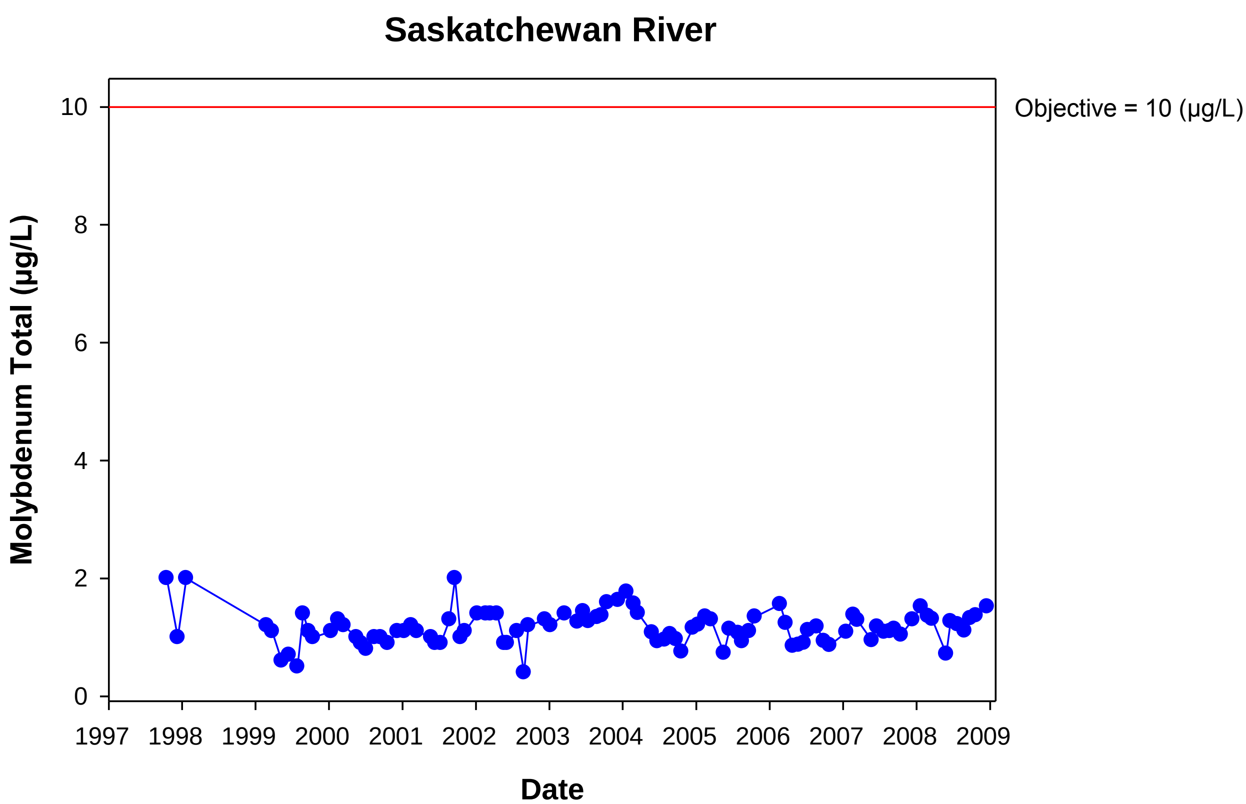

Figure 6-I15: Saskatchewan River Molybdenum Total

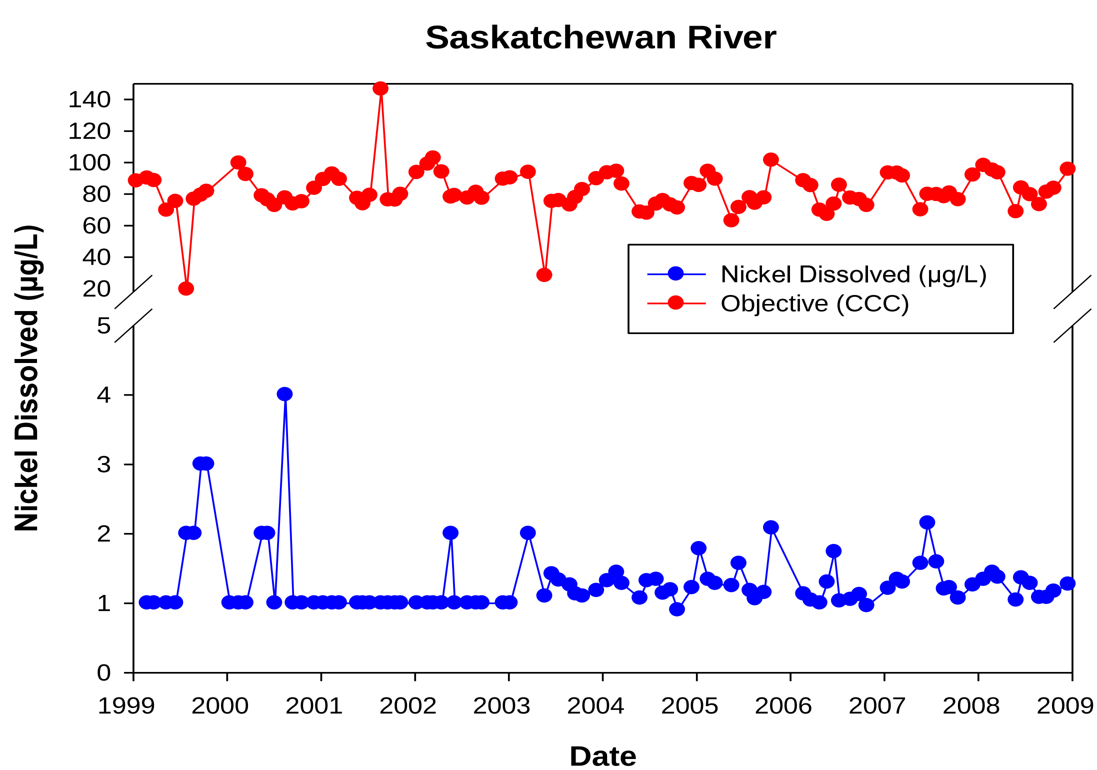

Figure 6-I16: Saskatchewan River Nickel Dissolved

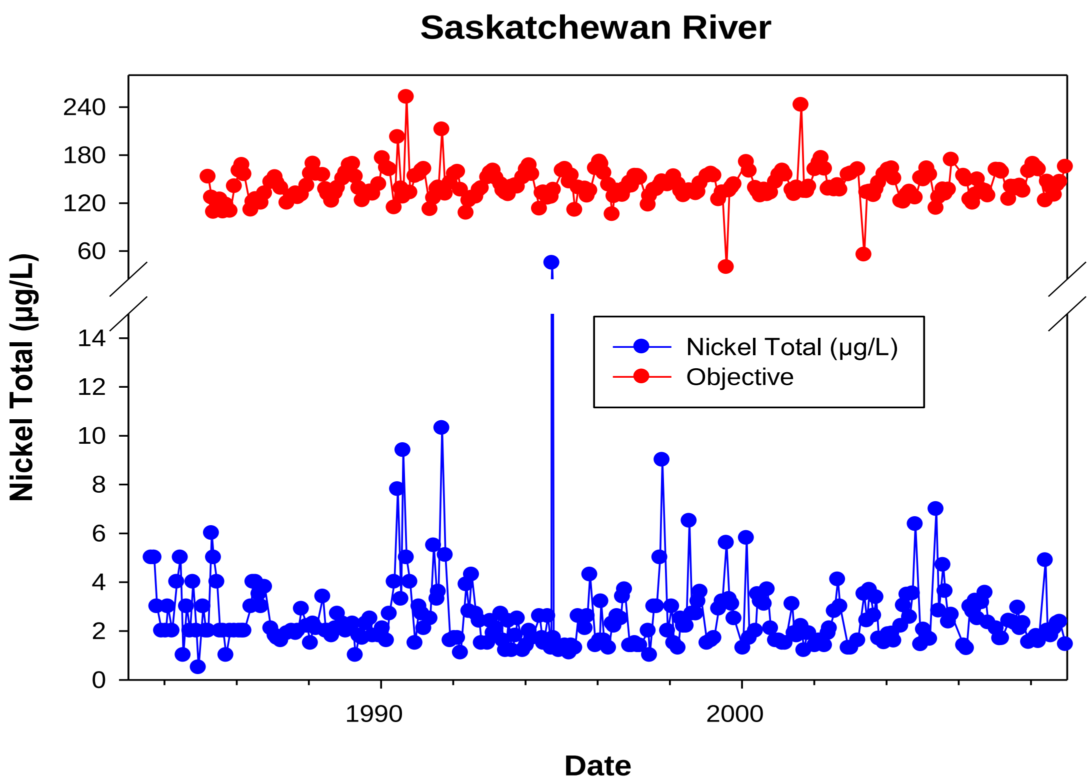

Figure 6-I17: Saskatchewan River Nickel Total

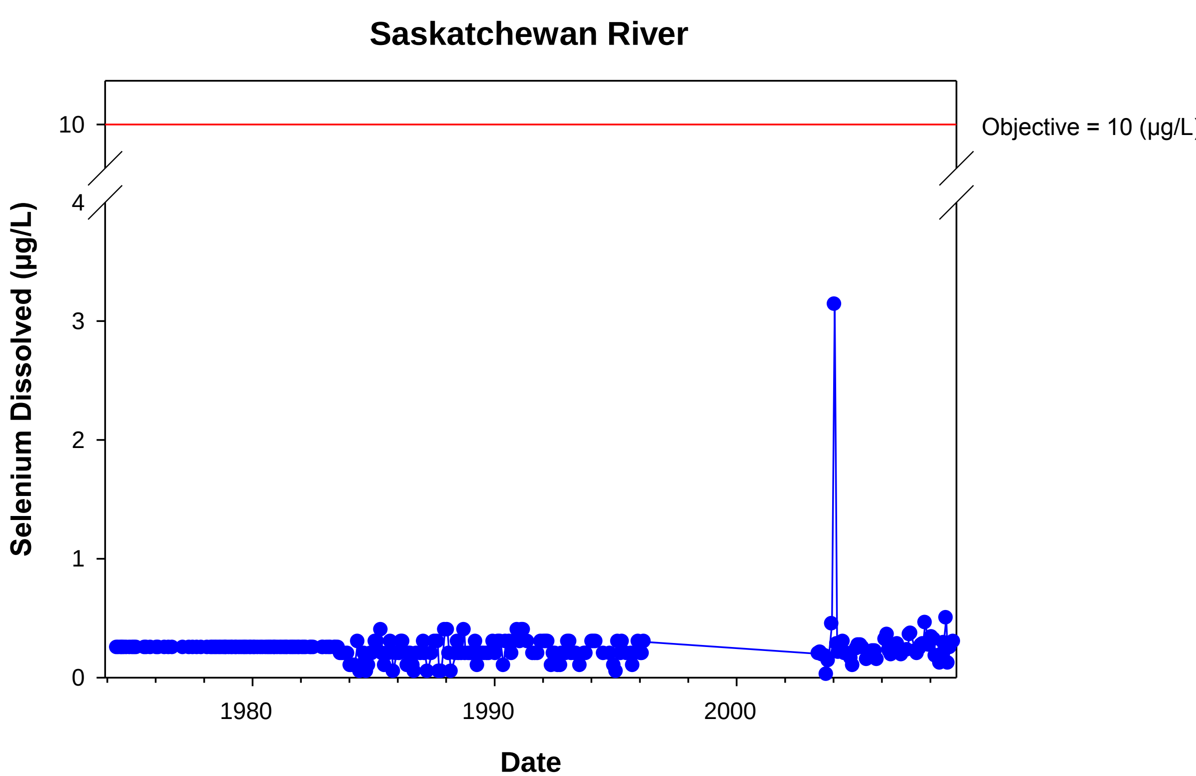

Figure 6-I18: Saskatchewan River Selenium Dissolved

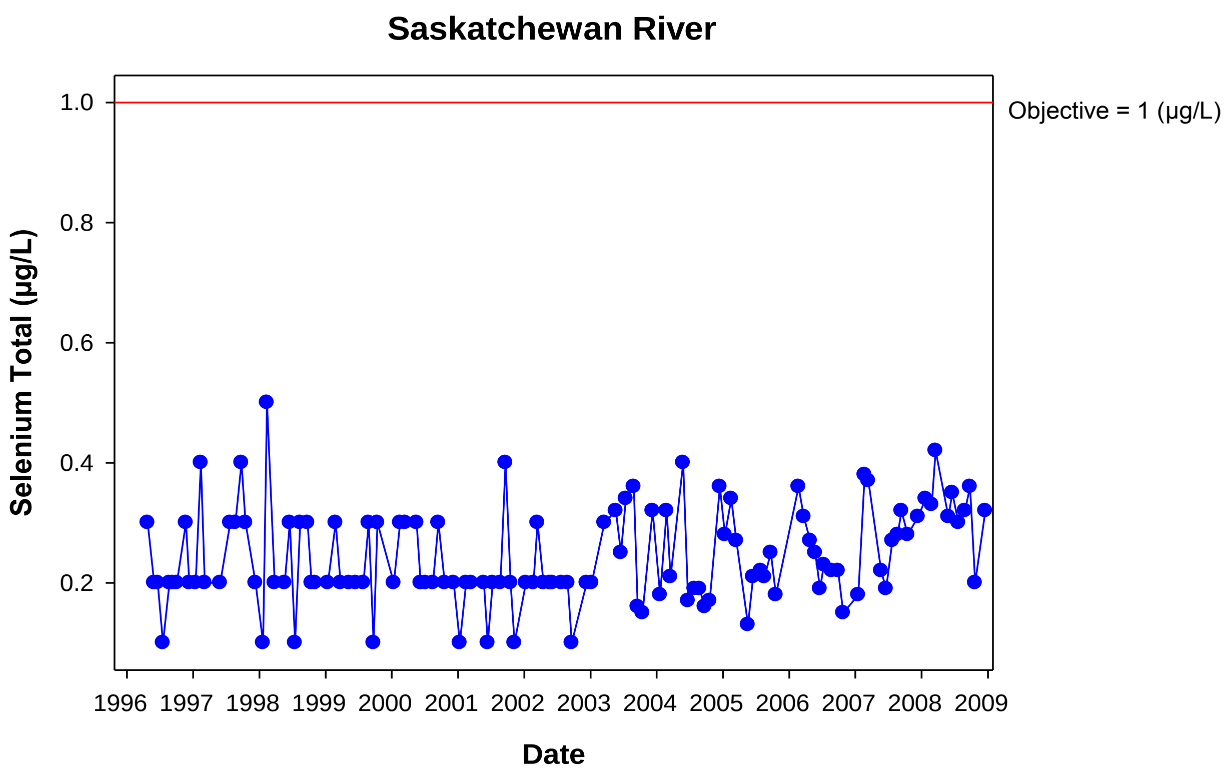

Figure 6-I19: Saskatchewan River Selenium Total

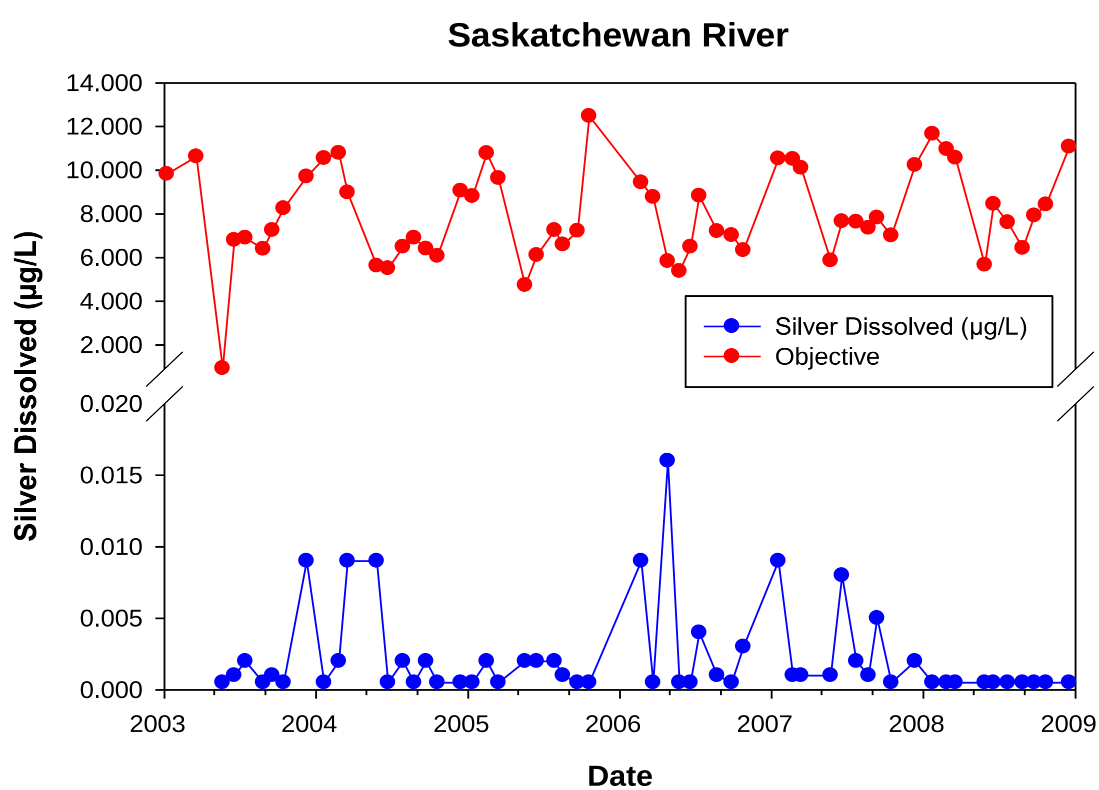

Figure 6-I20: Saskatchewan River Silver Dissolved

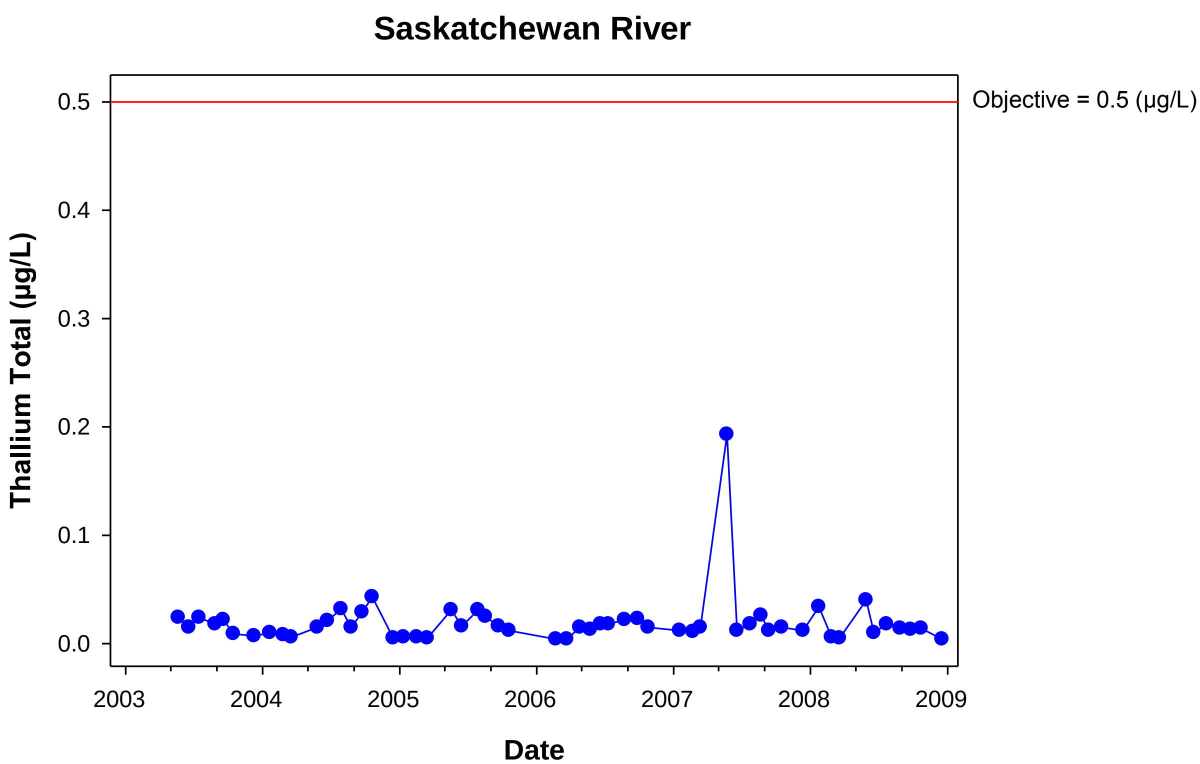

Figure 6-I21: Saskatchewan River Thallium Total

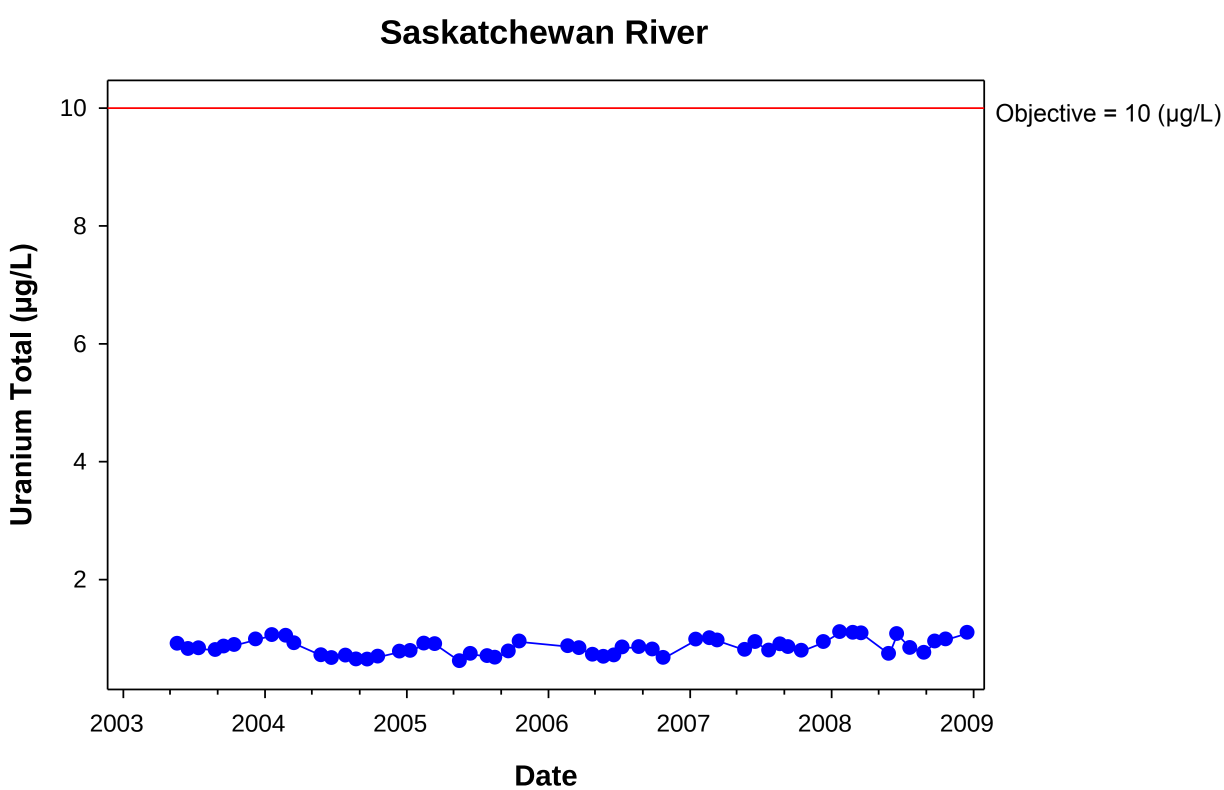

Figure 6-I22: Saskatchewan River Uranium Total

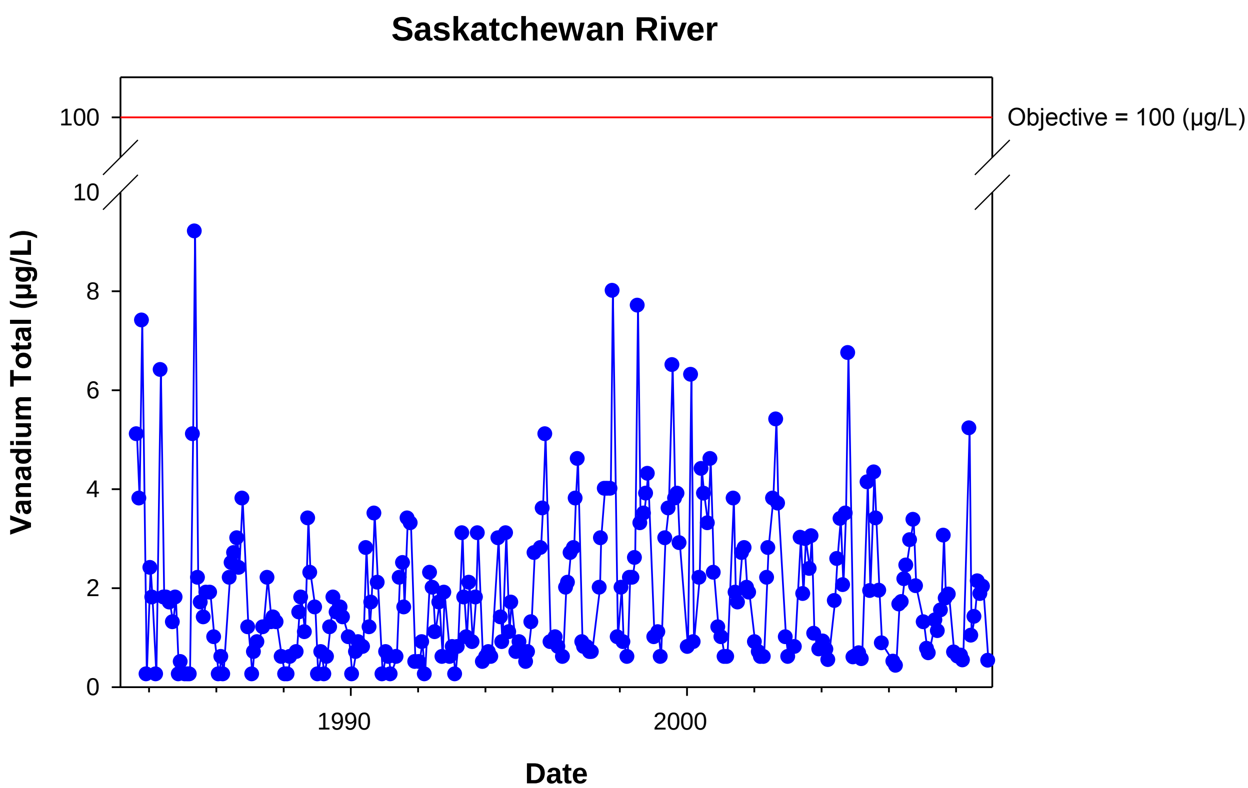

Figure 6-I23: Saskatchewan River Vanadium Total

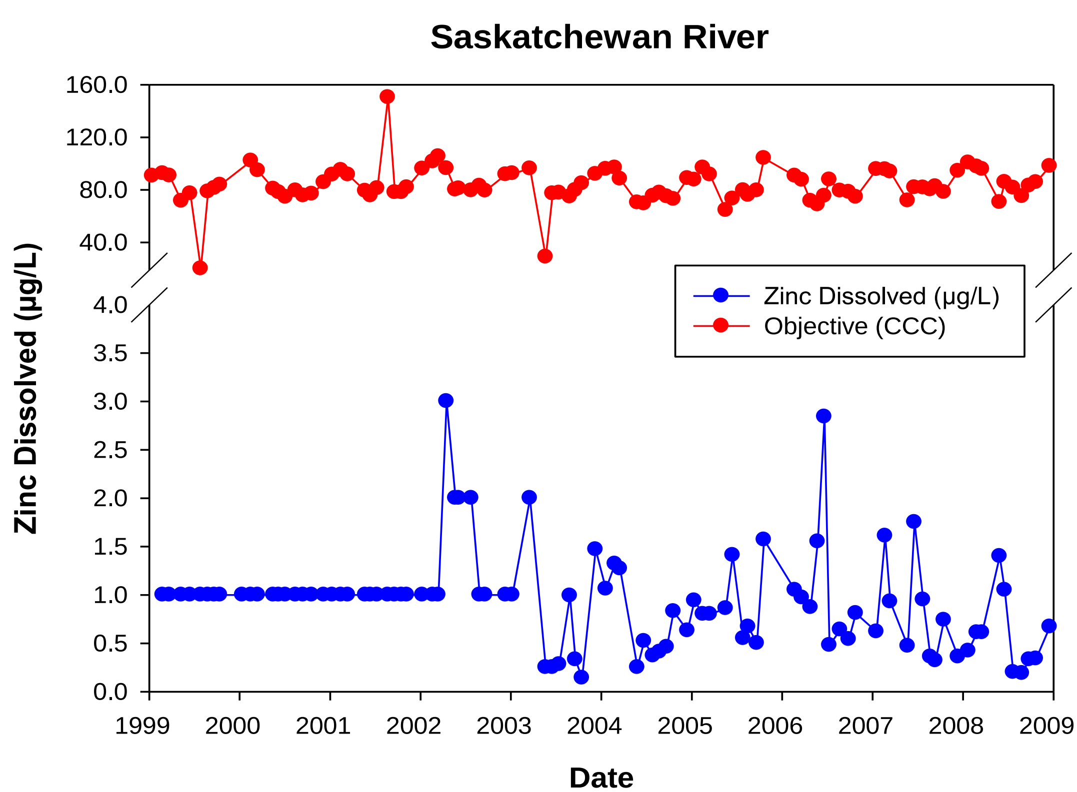

Figure 6-I24: Saskatchewan River Zinc Dissolved

Saskatchewan River

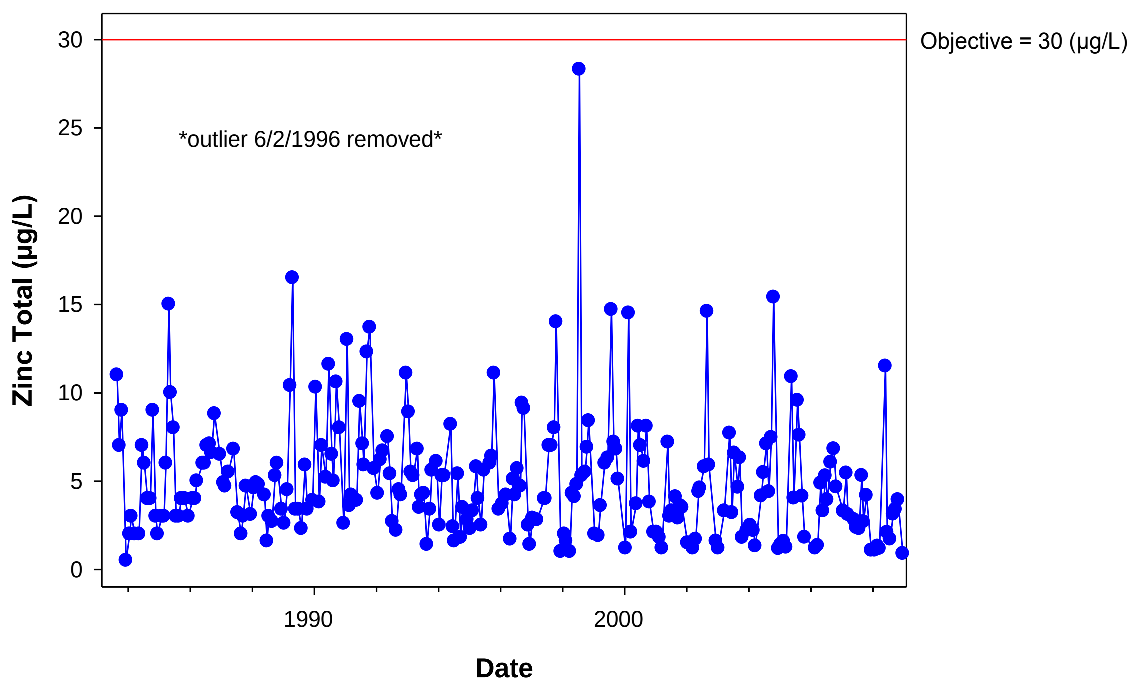

Figure 6-I25: Saskatchewan River Zinc Total

Saskatchewan River

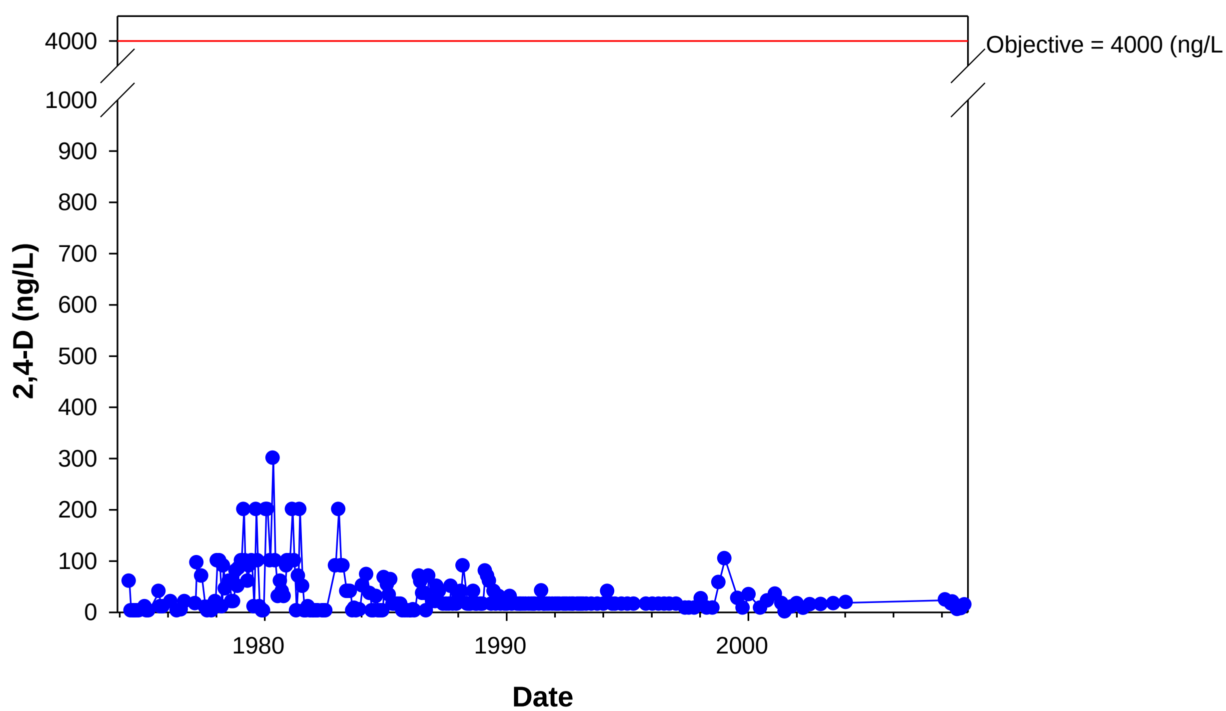

Figure 6-I26: Saskatchewan River 2,4-D

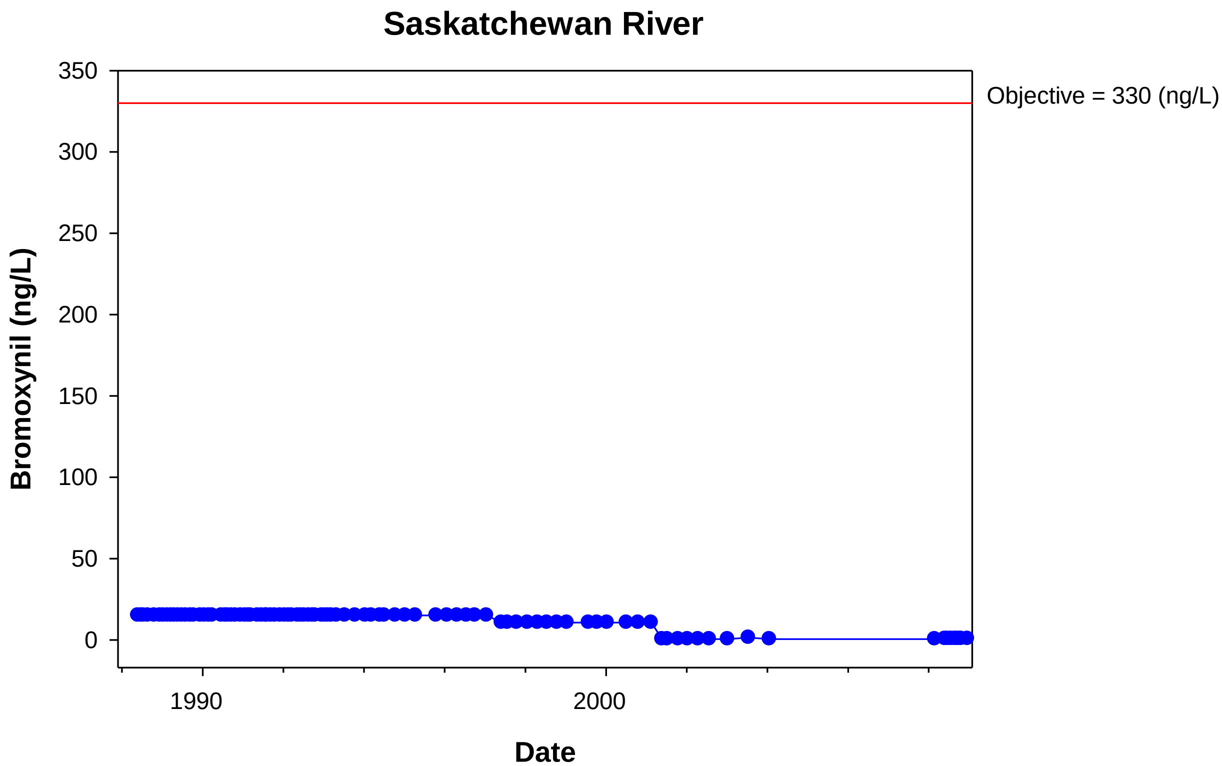

Figure 6-I27: Saskatchewan River Bromoxynil

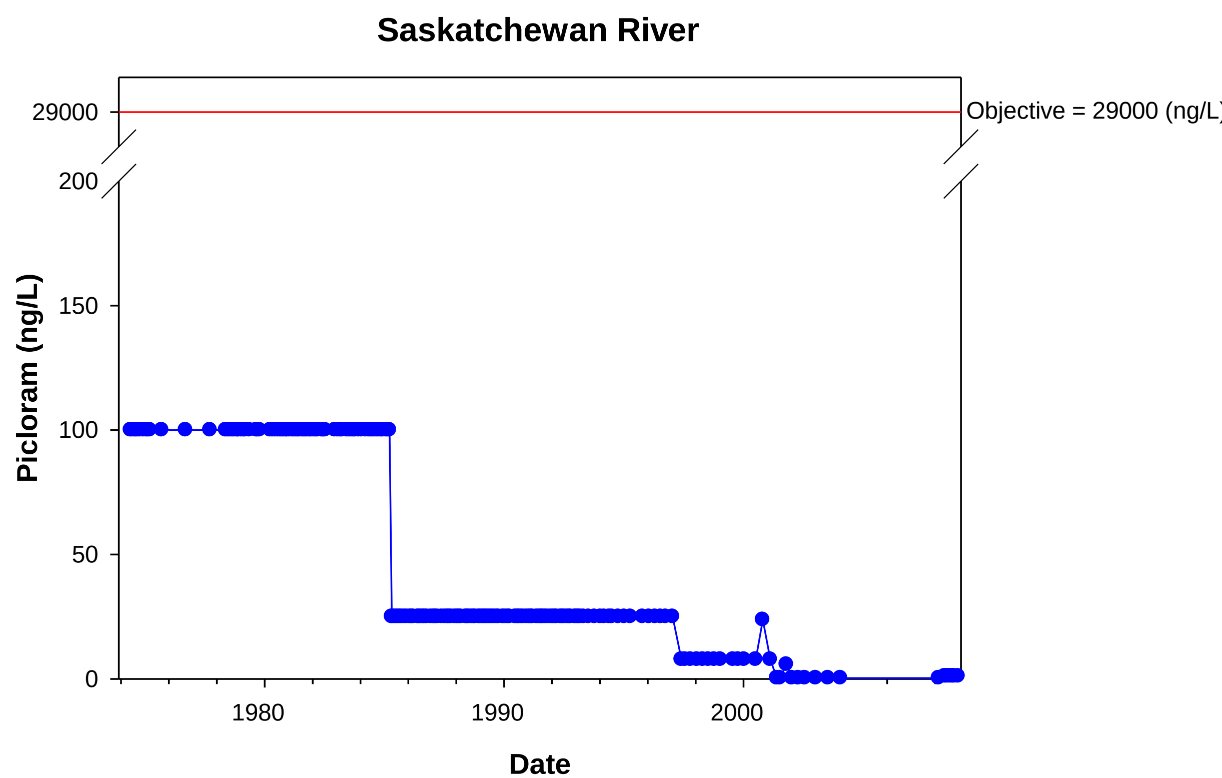

Figure 6-I28: Saskatchewan River Picloram

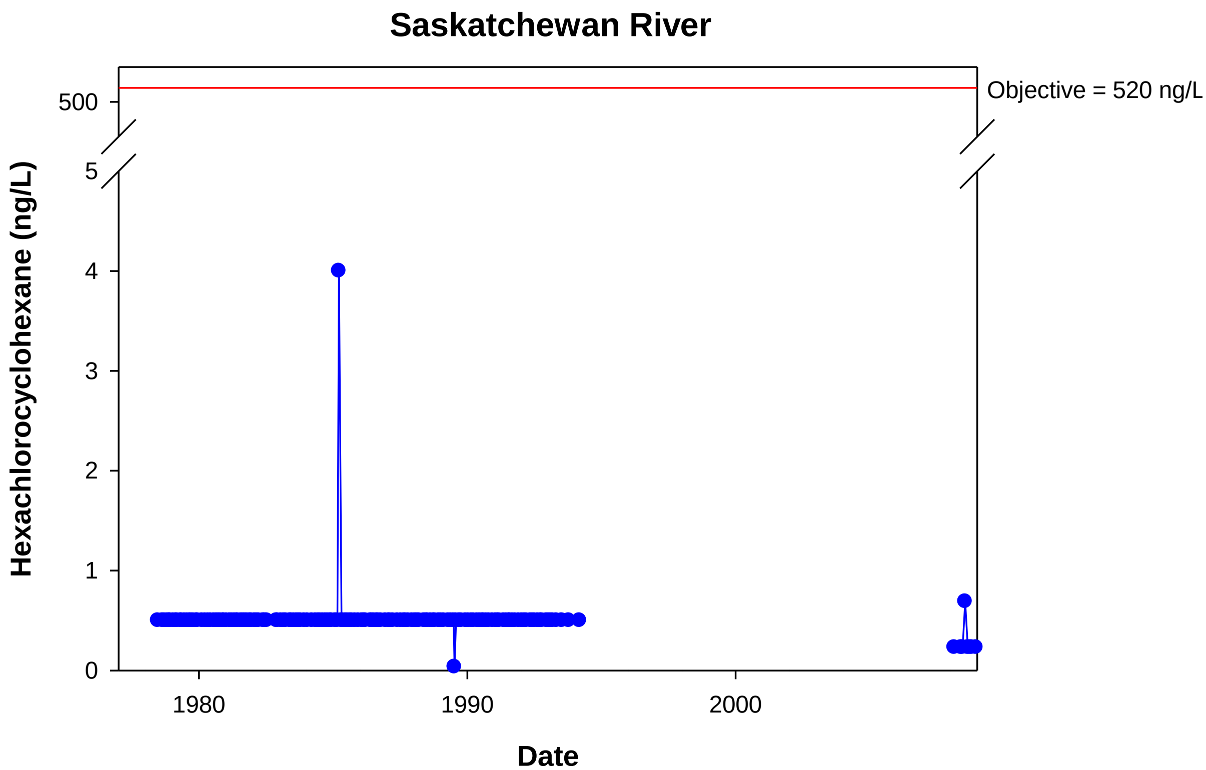

Figure 6-I29: Saskatchewan River Hexachlorocyclohexane

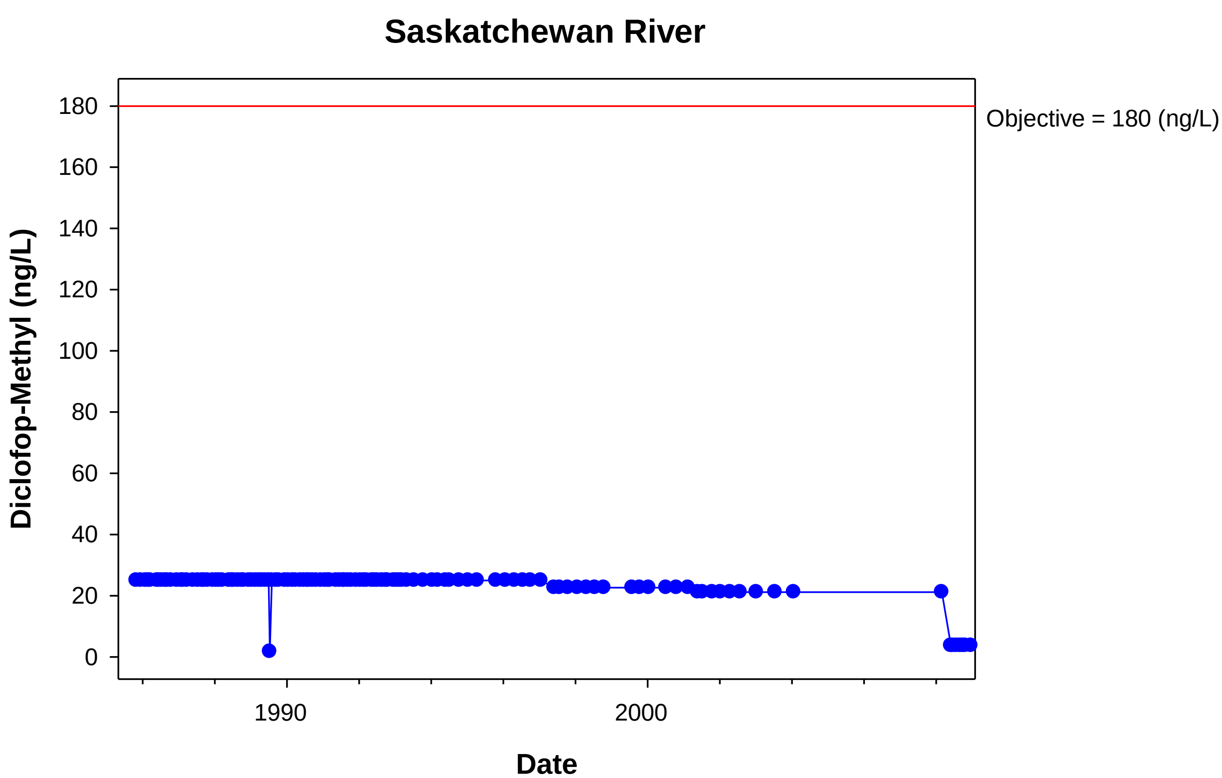

Figure 6-I30: Saskatchewan River Diclofop-Methyl

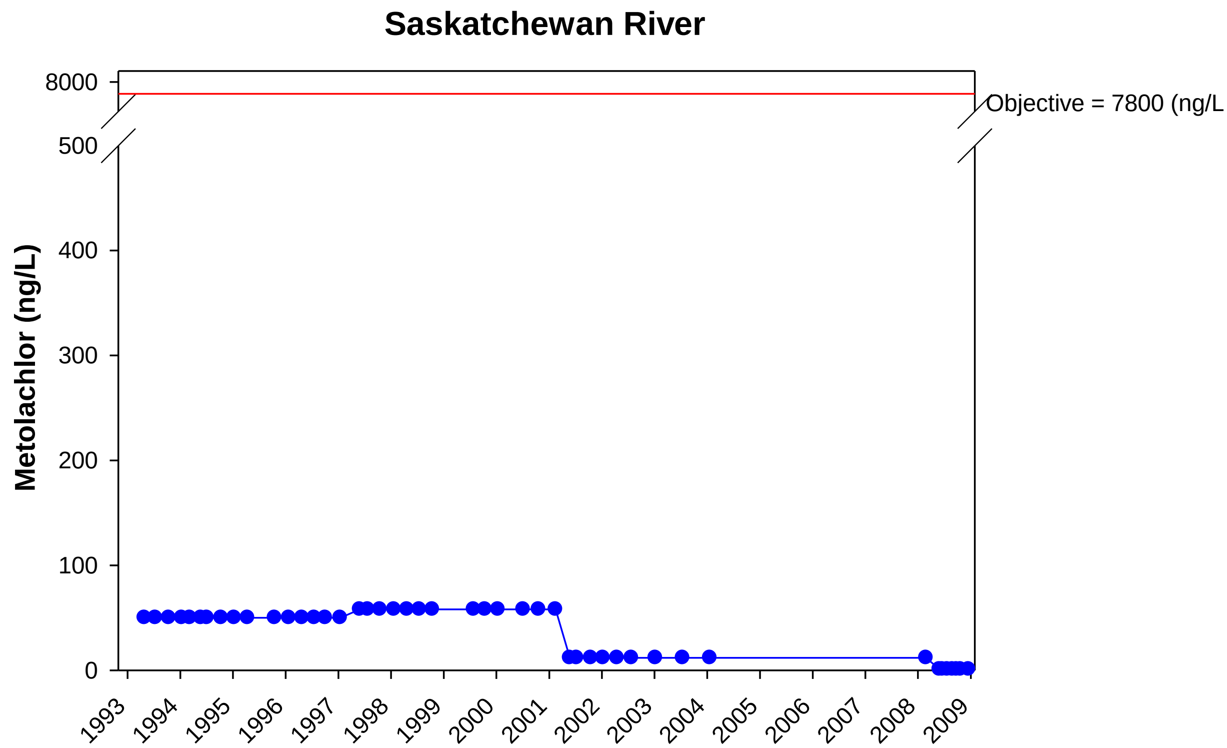

Figure 6-I31: Saskatchewan River Metolachlor

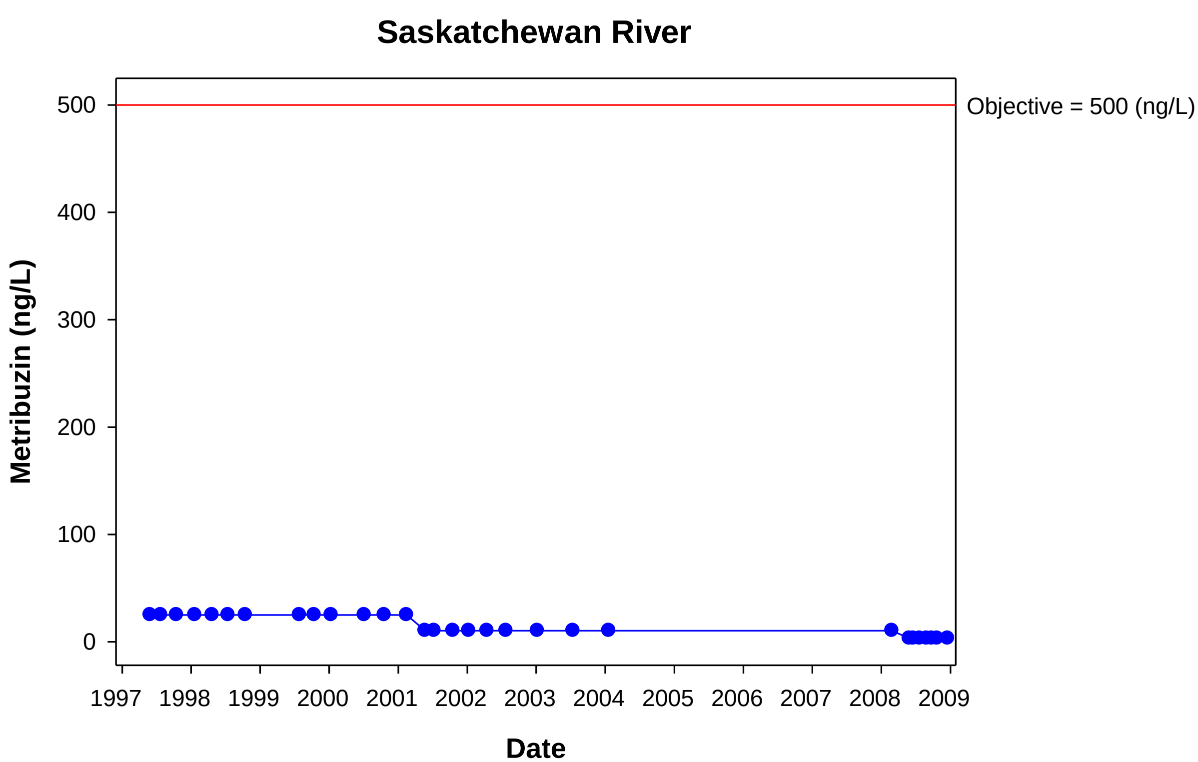

Figure 6-I32: Saskatchewan River Metribuzin

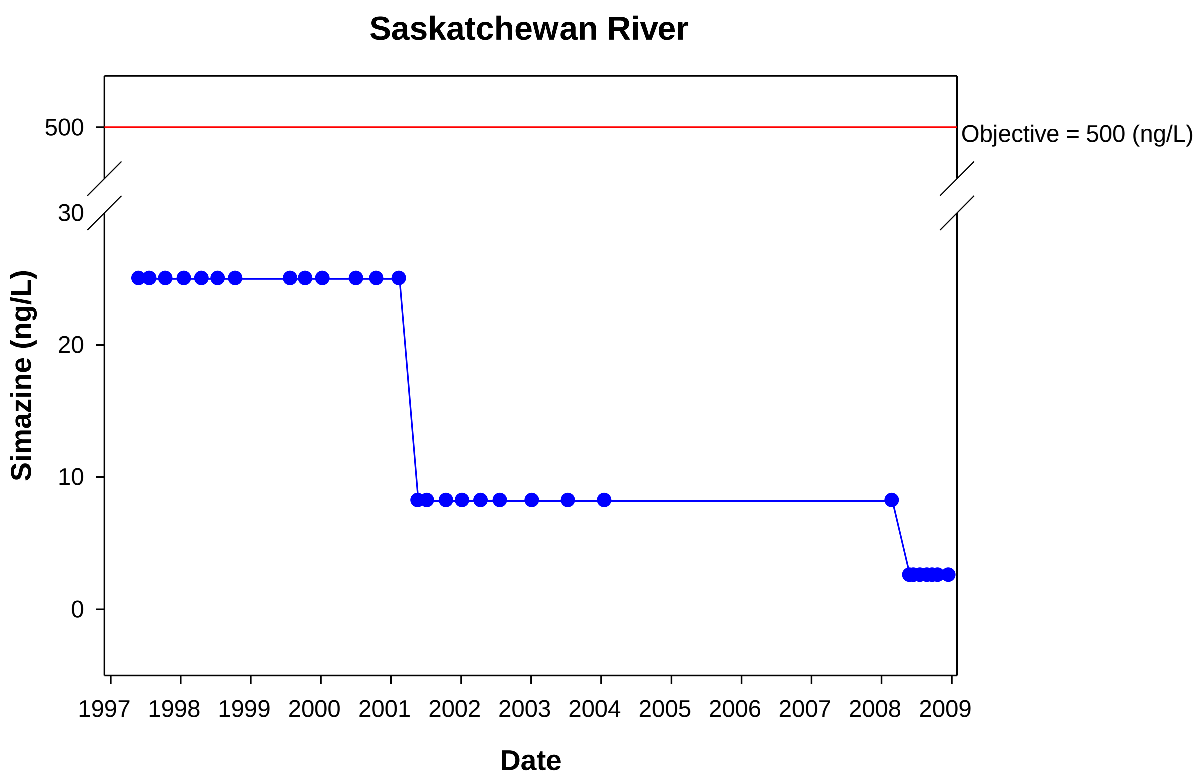

Figure 6-I33: Saskatchewan River Simazine

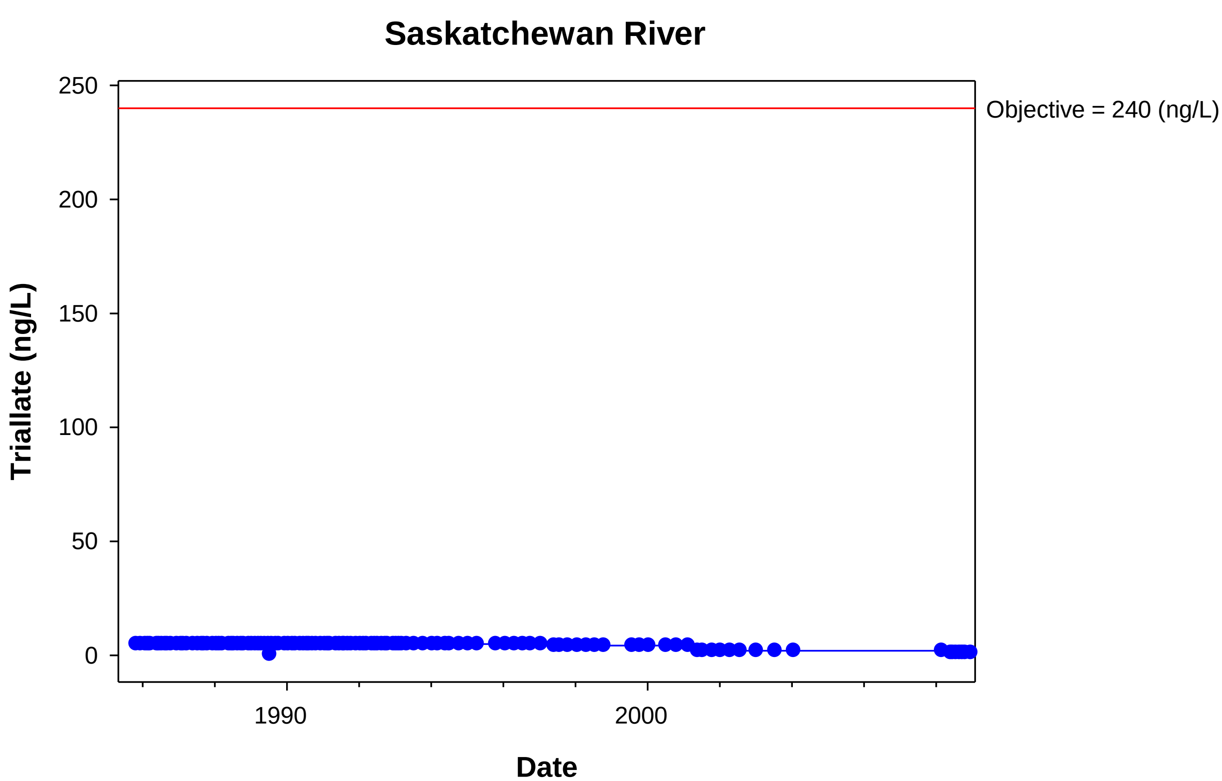

Figure 6-I34: Saskatchewan River Triallate

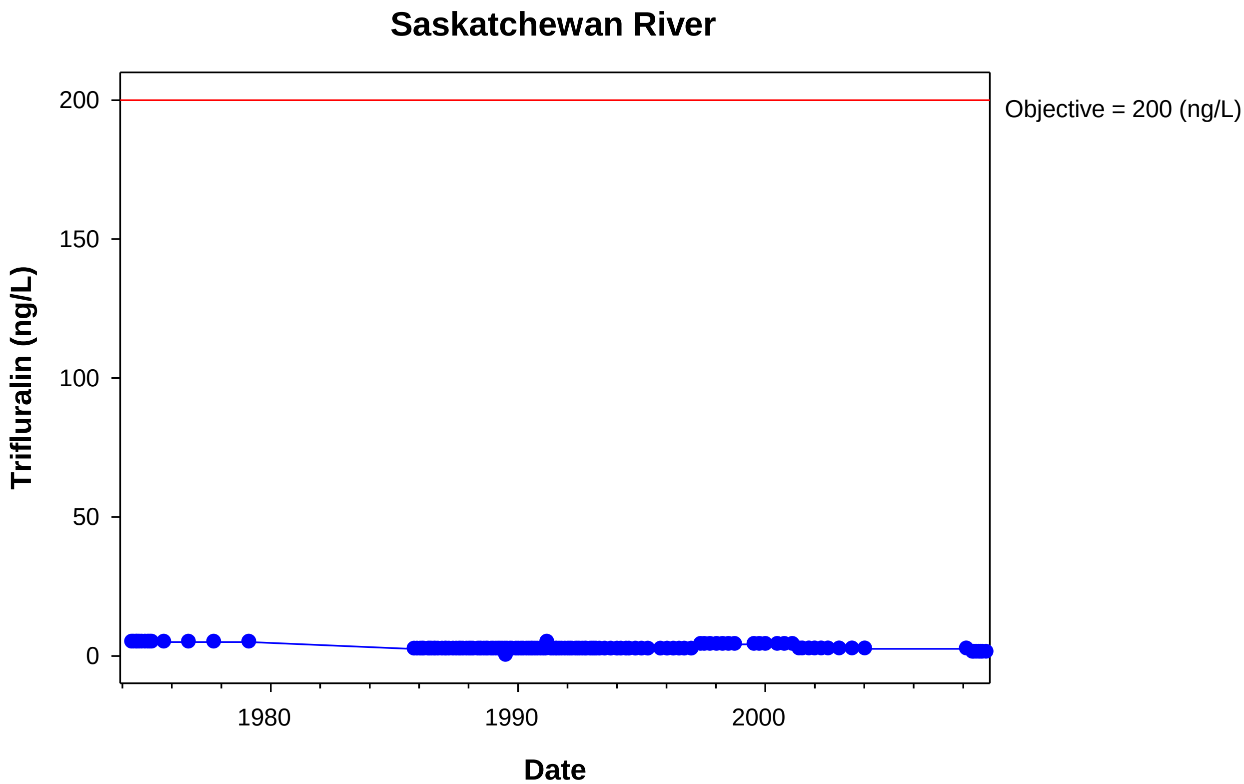

Figure 6-I35: Saskatchewan River Trifluralin

Appendix 7: Exceedance Summary Tables

Exceedance Summary Table – Non-metals - Alberta/Saskatchewan Border							
Parameter	**Objective (mg/L)**	**River**					
Nutrients		**Battle River**	**Beaver River**	**Cold River**	**North Saskatchewan River**	**Red Deer River (Bindloss)**	**South Saskatchewan River**
Nitrate & Nitrite (as N)	2.9	2.9	2.9	2.9	2.9	e	2.9
Ammonia (un-ionized)							
Field	0.019 [a]	e	e	0.019[a]	e	0.019 [a]	e
Lab	0.019 [a]	e	e	0.019[a]	e	0.019 [a]	e
Major Ions							
Chloride	100	e	100	100	100	100	100
Fluoride (dissolved)	0.12	e	e	e	e	e	e
Sodium (dissolved/filtered)	200	e	200	200	200	200	200
Sulphate (dissolved)	250	e	250	250	250	250	250
Total Dissolved Solids	500	e	e	500	500	e	500
Physicals							
pH (pH units)							
Field	6.5-8.5	e	e	e	e	e	e
Lab	6.5-8.5	e	e	e	e	e	e
Oxygen (dissolved)							
Open Season (>5°C)	5	e	5	5	5	e	5
Closed Season (<5°C)	3	e	e	3	3	e	3
Sodium Adsorption Ratio	3 [b]	e	3 [b]	3 [b]	3 [b]	3 [b]	3 [b]
Biota							
Fecal Coliforms (No./100 mL)	100	e	e	N/A	e	e	e
Escherichia Coli (No./100 mL)	200	e	e	N/A	e	e	e

e ≥ 1 Exceedance

Superscripts

a. Ammonia objective: Expressed as mg unionized ammonia/L. This would be equivalent to 0.0156 mg ammonia-nitrogen/L (0.019*14.0067/17.031).
b. No units for SAR.

Legend

Protection of Aquatic Life	Ag-Livestock	Ag-Irrigation	Recreation	Treatability	Ag-Irrigation + Treatability

Exceedance Summary Table – Metals – Alberta/Saskatchewan Border							
Parameter	**Objective (µg/L)**	**River**					
Metals		**Battle River**	**Beaver River**	**Cold River**	**North Saskatchewan River**	**Red Deer River (Bindloss)**	**South Saskatchewan River**
Aluminum (total)	100 [a]	e	e	100 [a]	e	e	e
Antimony (total)	6	6	6	6	6	6	6
Arsenic (total)	5	e	5	5	e	e	e
Arsenic (dissolved)	50	50	50	50	50	50	50
Barium (total)	1000	1000	1000	1000	1000	e	1000
Beryllium (total)	4	4	4	4	4	4	4
Boron (total)	500-6000 [b]	500-6000 [b]	500-6000 [b]	500-6000 [b]	500-6000 [b]	500-6000 [b]	500-6000 [b]
Boron (dissolved)	5000	5000	5000	5000	5000	5000	5000
Cadmium (total)	Calculated	e	e	e	e	e	e
Cadmium (dissolved)	Calculated	Calculated	e	e	e	e	Calculated
Chromium (total)	50	e	50	50	50	e	50
Cobalt (total)	50	e	50	50	50	50	50
Copper (total)	Calculated	e	e	e	e	e	e
Copper (dissolved)	Calculated	Calculated	e	Calculated	Calculated	Calculated	Calculated
Iron (total)	300	e	e	300	e	e	e
Iron (dissolved)	300	e	e	300	300	e	e
Lead (total)	Calculated	e	e	Calculated	e	e	e
Lead (dissolved)	Calculated	Calculated	e	e	e	e	e
Lithium (total)	2500	2500	2500	2500	2500	2500	2500
Manganese (total)	50	e	e	50	e	e	e
Manganese(dissolved)	50	e	e	50	e	e	e
Mercury (total) [c]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Molybdenum (total)	10 [d]	10 [d]	10 [d]	10 [d]	e	10 [d]	10 [d]
Nickel (total)	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated
Nickel (dissolved)	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated
Selenium (total)	1	1	1	1	1	e	e
Selenium (dissolved)	1 [e]	1 [e]	1 [e]	1 [e]	1 [e]	e	e
Silver (total)	0.1	e	e	e	e	e	e
Silver (dissolved)	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated
Thallium (total)	0.5	0.5	0.5	0.5	0.5	e	0.5
Uranium (total)	10	10	10	10	10	10	10
Vanadium (total)	100	100	100	100	100	e	100
Zinc (total)	30	e	30	30	e	e	e
Zinc (dissolved)	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated

e ≥ 1 Exceedance

Superscripts

a. Aluminum guideline = 5 µg·L^{-1} at pH <6.5
= 100 µg·L^{-1} at pH ≥6.5

b. Guideline is crop-specific.

c. Total Mercury has not been measured on the Alberta Border.

d. Molybdenum guideline = 50 µg·L-1 for short-term use on acidic soils.

e. Objective = 1 µg/L except on South Saskatchewan where it is 2 µg/L.

Legend

Protection of Aquatic Life	Ag-Livestock	Ag-Irrigation	Recreation	Treatability	Ag-Irrigation + Treatability

Exceedance Summary Table – Pesticides - Alberta/Saskatchewan Border							
Parameter	**Objective (µg/L)**	**River**					
Acid Herbicides		**Battle River**	**Beaver River**	**Cold River**	**North Saskatchewan River**	**Red Deer River (Bindloss)**	**South Saskatchewan River**
2,4-D	4	4	4	N/A	4	4	4
Bromoxynil	0.33	0.33	0.33	N/A	e	0.33	0.33
Dicamba	0.006	e	e	N/A	e	e	e
MCPA	0.025	e	e	N/A	e	e	e
Picloram	29	29	29	N/A	29	29	29
Organochlorine Pesticides in Water							
Endosulfan	0.003	e	e	N/A	e	e	0.003
Hexachlorocyclohexane	0.52	e	0.01	N/A	e	0.01	e
Hexachlorocyclohexane (gamma-HCH) (Lindane)	0.01	0.52	0.52	N/A	0.52	0.52	0.52
Neutral Herbicides in Water							
Atrazine	1.8	1.8	1.8	N/A	1.8	1.8	1.8
Diclofopmethyl (Hoegrass)*	0.18	0.18	0.18	N/A	0.18	0.18	0.18
Metolachlor	7.8	7.8	N/A	N/A	7.8	7.8	7.8
Metribuzin	0.5	0.5	N/A	N/A	0.5	0.5	0.5
Simazine	0.5	0.5	N/A	N/A	0.5	0.5	0.5
Triallate	0.24	0.24	0.24	N/A	0.24	0.24	0.24
Trifluralin	0.2	e	0.2	N/A	0.2	0.2	0.2
Other							
Glyphosate	N/A	N/A	N/A	N/A	N/A	N/A	N/A

e ≥ 1 Exceedance

Legend

Protection of Aquatic Life	Ag-Livestock	Ag-Irrigation	Recreation	Treatability	Ag-Irrigation + Treatability

Exceedance Summary Table – Non-Metals – Saskatchewan/Manitoba Border							
Parameter		River					
Nutrients	**Objective (mg/L)**	**Assiniboine River**	**Carrot River**	**Churchill River**	**Qu'Appelle River**	**Red Deer River (Erwood)**	**Saskatchewan River**
Nitrate & Nitrite (as N)	2.9	e	2.9	2.9	2.9	2.9	2.9
Ammonia (un-ionized)							
Field	0.019[a]	e	0.019[a]	0.019[a]	0.019[a]	e	e
Lab	0.019[a]	e	0.019[a]	0.019[a]	0.019[a]	e	e
Major Ions							
Chloride	100	e	e	100	e	100	e
Fluoride (dissolved)	0.12	e	e	e	e	e	e
Sodium (dissolved/filtered)	100-200	e	e	100-200	e	100-200	100-200
Sulphate (dissolved)	250	e	250	250	e	e	250
Total Dissolved Solids	500	e	e	500	e	e	e
Physicals							
pH (pH Units)							
Field	6.5-8.5	e	e	e	e	e	e
Lab	6.5-8.5	e	e	6.5-8.5	e	e	6.5-8.5
Oxygen (dissolved)							
Open Season (>5°C)	5	e	e	5	e	5	e
Closed Season (<5°C)	3	e	e	3	e	e	3
Sodium Adsorption Ratio	3[b]	e	e	3[b]	e	3[b]	e
Biota							
Coliforms Fecal (No./100 mL)	200	e	e	200	e	e	200
Escherichia Coli (No./100 mL)	100	e	e	n/a	e	e	e

e ≥ 1 Exceedance

Superscripts

a. Ammonia objective: Expressed as mg unionized ammonia/L. This would be equivalent to 0.0156 mg ammonia-nitrogen/L (0.019*14.0067/17.031).

b. No Units for SAR.

Legend

Protection of Aquatic Life	Ag-Livestock	Ag-Irrigation	Recreation	Treatability	Ag-Irrigation + Treatability

Exceedance Summary Table – Metals – Saskatchewan/Manitoba Border							
Parameter		**River**					
Metals	**Objective (µg/L)**	**Assiniboine River**	**Carrot River**	**Churchill River**	**Qu'Appelle River**	**Red Deer River (Erwood)**	**Saskatchewan River**
Aluminum (total)	100 [a]	e	e	e	e	e	e
Antimony (total)	6	6	6	6	6	6	6
Arsenic (total)	5	e	e	5	e	5	e
Arsenic (dissolved)	150	150	150	150	150	150	150
Barium (total)	1000	1000	1000	1000	1000	1000	1000
Beryllium (total)	4	4	4	4	4	4	4
Boron (total)	500-6000[b]	500-6000[b]	500-6000[b]	500-6000[b]	500-6000[b]	500-6000[b]	500-6000[b]
Boron (dissolved)	2000-5000	2000	2000	5000	2000	5000	e
Cadmium (total)	Calculated	e	e	e	e	e	e
Cadmium (dissolved)	Calculated	e	e	e	e	e	e
Chromium (total)	50	50	50	50	50	50	50
Cobalt (total)	50	50	50	50	50	50	50
Copper (total)	Calculated	e	e	e	e	e	e
Copper (dissolved)	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated
Iron (total)	300	e	e	e	e	e	e
Iron (dissolved)	300	e	e	300	300	e	e
Lead (total)	Calculated	e	e	e	e	e	e
Lead (dissolved)	Calculated	Calculated	Calculated	e	Calculated	Calculated	e
Lithium (total)	2500	2500	2500	2500	2500	2500	2500
Manganese (total)	50	e	e	50	e	e	e
Manganese(dissolved)	50	e	e	e	e	e	e
Mercury (total) [c]	0.026	n/a	e	n/a	n/a	n/a	n/a
Molybdenum (total)	10 [d]	10 [d]	10 [d]	10 [d]	10 [d]	10 [d]	10 [d]
Nickel (total)	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated
Nickel (dissolved)	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated
Selenium (total)	1	e	1	1	1	1	1
Selenium (dissolved)	10 [e]	10 [e]	10 [e]	10 [e]	10 [e]	10 [e]	10 [e]
Silver (total)	0.1	e	e	e	e	e	e
Silver (dissolved)	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated
Thallium (total)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Uranium (total)	10	10	10	10	10	10	10
Vanadium (total)	100	100	100	100	100	100	100
Zinc (total)	30	e	30	30	30	e	30
Zinc (dissolved)	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated

e ≥ 1 Exceedance

Superscripts

a. Aluminum guideline = 5 µg·L-1 at pH <6.5
= 100 µg·L-1 at pH ≥6.5
b. Guideline is crop-specific.
c. May not prevent accumulation of methylmercury in aquatic life, therefore, may not protect wildlife that consume aquatic life.
d. Molybdenum guideline = 50 µg·L-1 for short-term use on acidic soils.
e. PPWB Objective is 10 µg/L for the MB-SK Border, & 1 µg/L for the AB-SK Border.

Legend

Protection of Aquatic Life	Ag-Livestock	Ag-Irrigation	Recreation	Treatability	Ag-Irrigation + Treatability

Exceedance Summary Table – Pesticides –Saskatchewan/Manitoba Border							
Parameter		**River**					
Acid Herbicides	**Objective (µg/L)**	**Assiniboine River**	**Carrot River**	**Churchill River**	**Qu'Appelle River**	**Red Deer River (Erwood)**	**Saskatchewan River**
2,4-D	4	4	4	4	4	4	4
Bromoxynil	0.33	0.33	0.33	0.33	0.33	N/A	0.33
Dicamba	0.006	e	e	e	e	e	e
MCPA	0.025	e	e	e	e	e	e
Picloram	29	29	29	29	29	29	29
Organochlorine Pesticides in Water							
Endosulfan	0.003	e	0.003	0.003	e	e	0.003
Hexachlorocyclohexane	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Hexachlorocyclohexane (gamma-HCH) (Lindane)	0.01	e	0.01	0.01	0.01	e	e
Neutral Herbicides in Water							
Atrazine	1.8	1.8	1.8	N/A	1.8	N/A	1.8
Diclofopmethyl (Hoegrass)	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Metolachlor	7.8	7.8	7.8	N/A	7.8	N/A	7.8
Metribuzin	0.5	0.5	0.5	N/A	0.5	N/A	0.5
Simazine	0.5	0.5	0.5	N/A	0.5	N/A	e
Triallate	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Trifluralin	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Other							
Glyphosate	N/A	N/A	N/A	N/A	N/A	N/A	N/A

e ≥ 1 Exceedance

Legend

Protection of Aquatic Life	Ag-Livestock	Ag-Irrigation	Recreation	Treatability	Ag-Irrigation + Treatability

Appendix 8: Nutrient Background Objectives

Appendix 8-a: Time Series Graphs

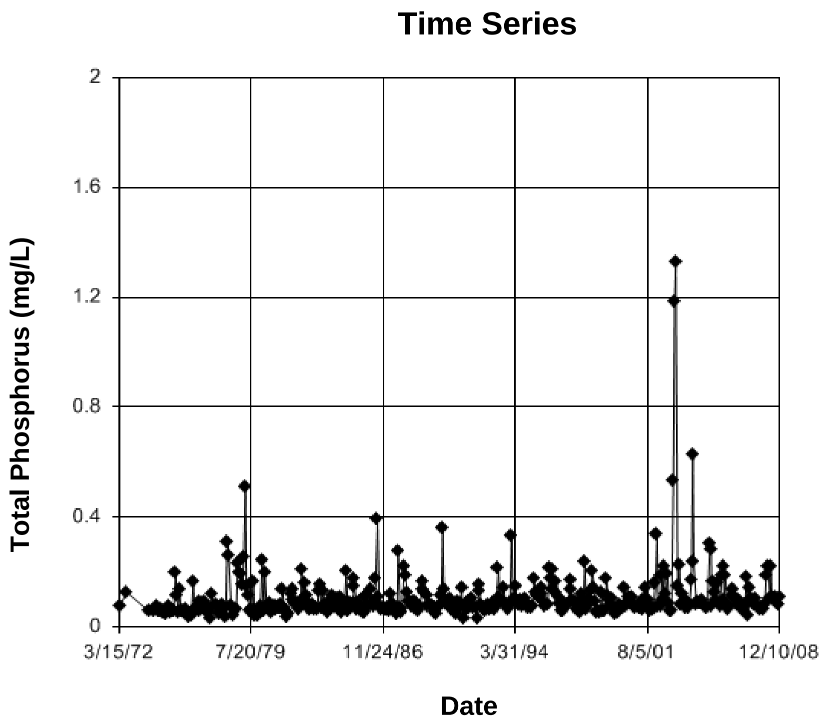

Figure 8-a1: Battle River Total Phosphorus

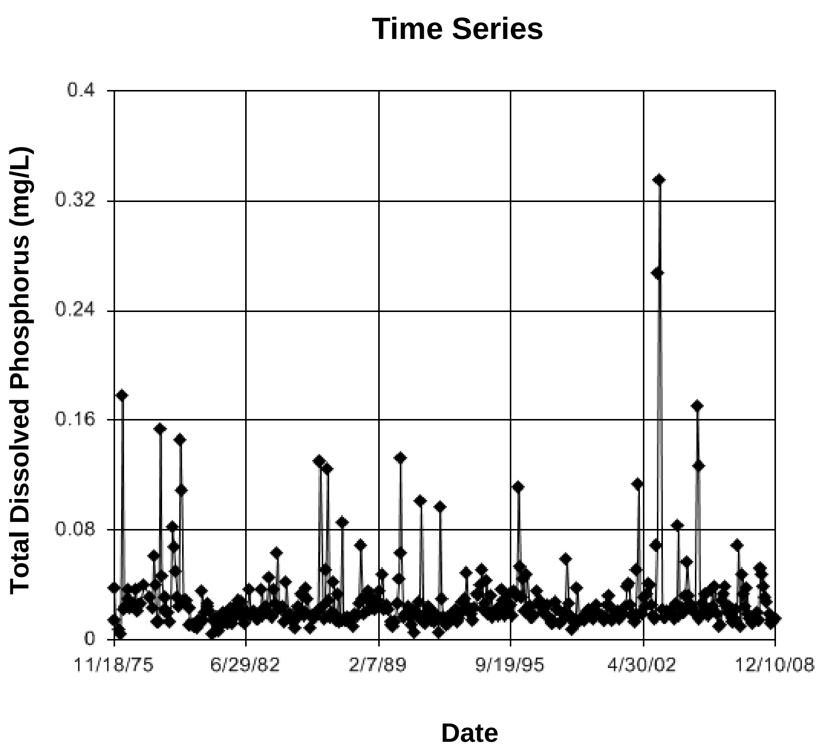

Figure 8-a2: Battle River Total Dissolved Phosphorus

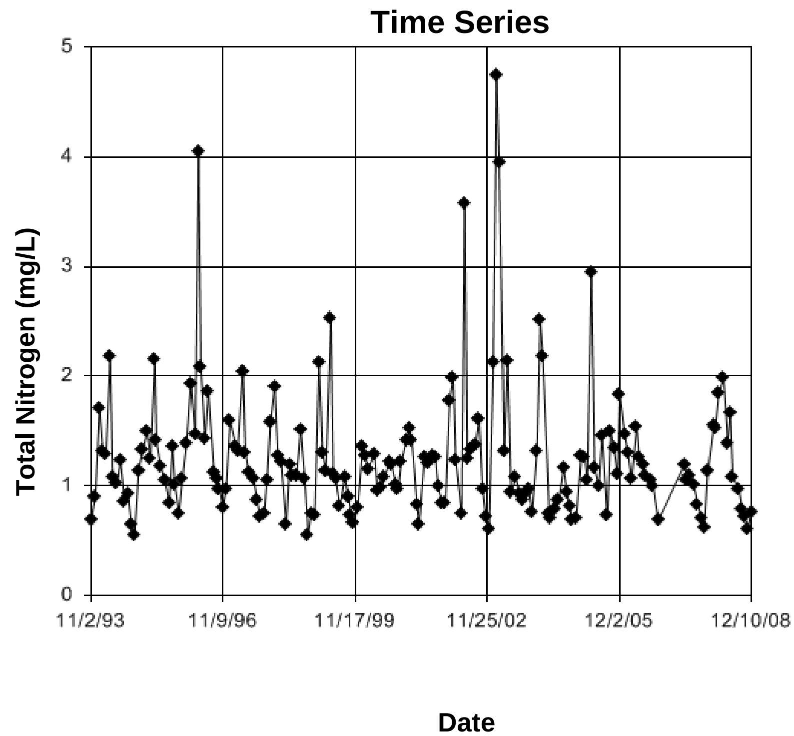

Figure 8-a3: Battle River Total Nitrogen

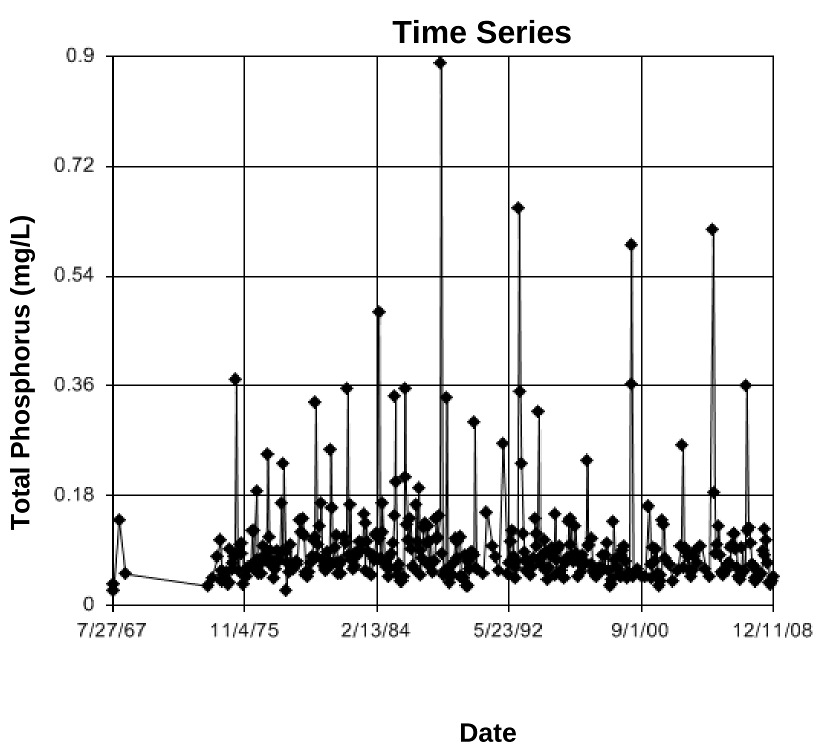

Figure 8-a4: Beaver River Total Phosphorus

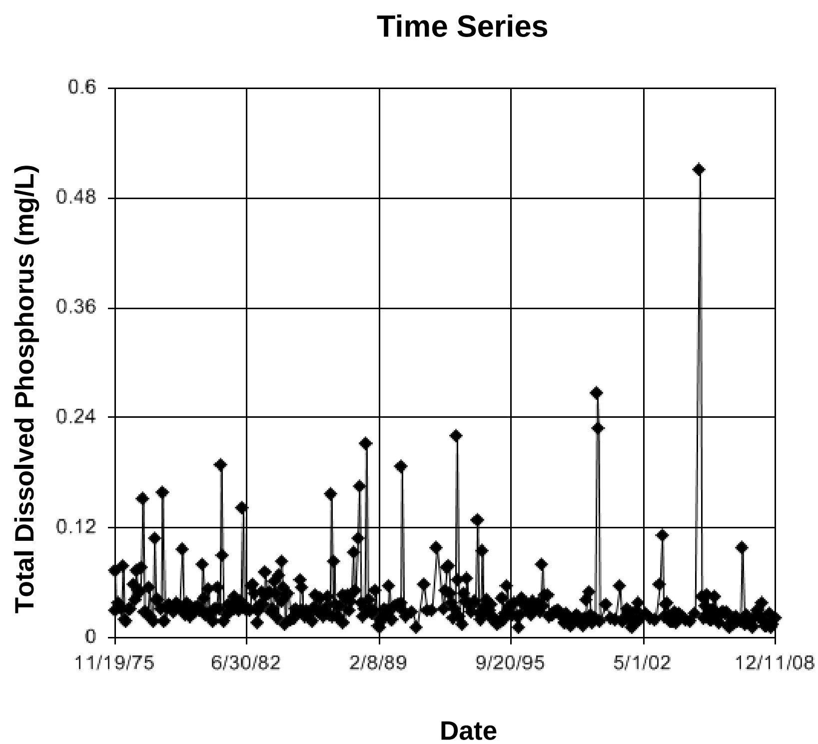

Figure 8-a5: Beaver River Total Dissolved Phosphorus

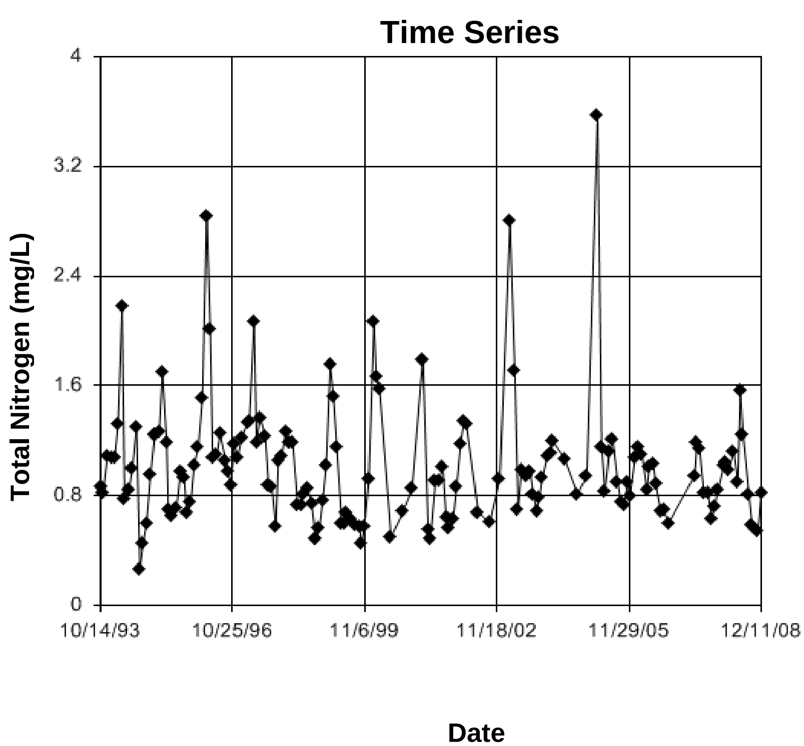

Figure 8-a6: Beaver River Total Nitrogen

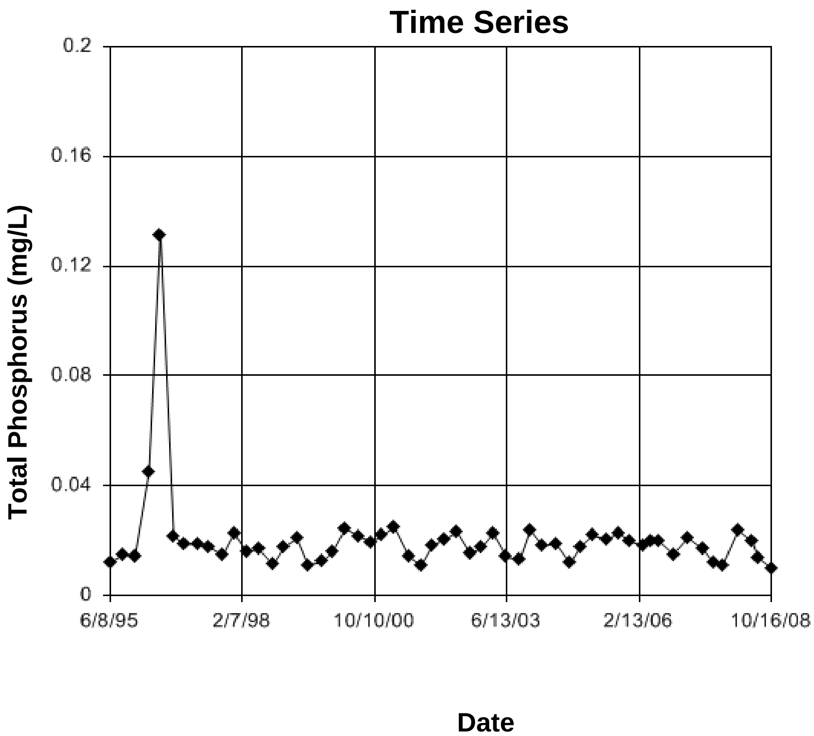

Figure 8-a7: Cold River Total Phosphorus

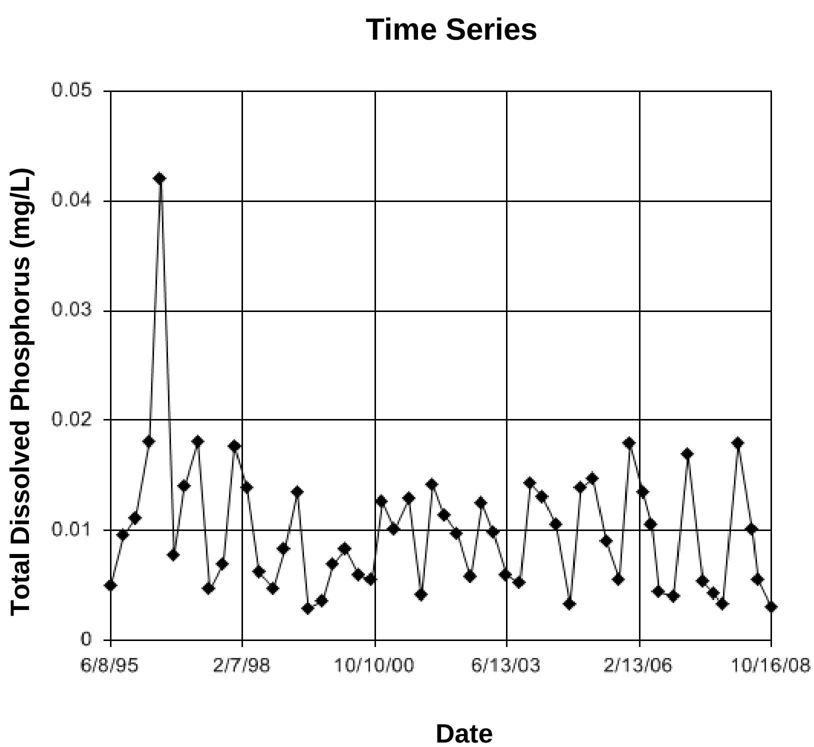

Figure 8-a8: Cold River Total Dissolved Phosphorus

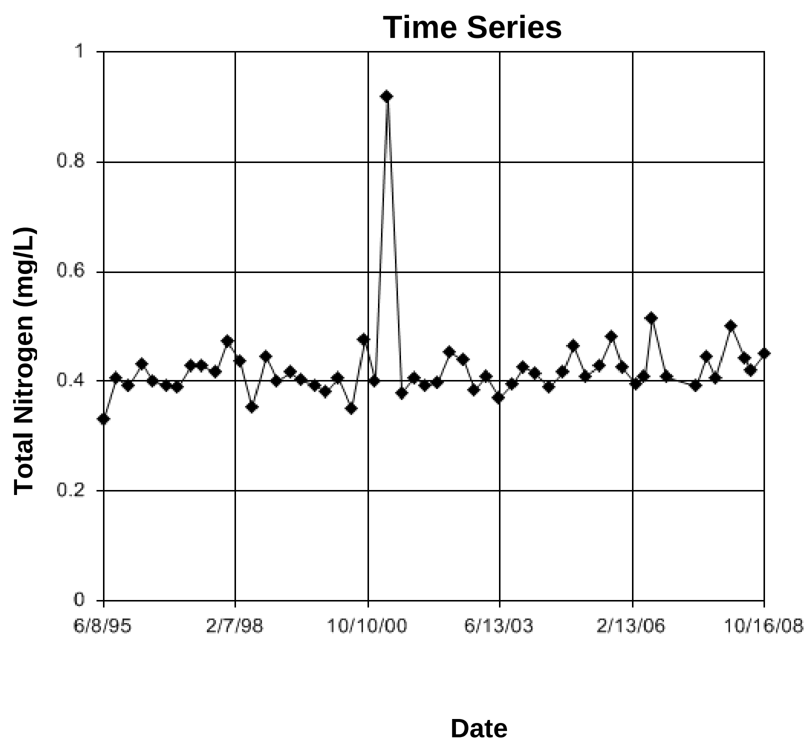

Figure 8-a9: Cold River Total Nitrogen

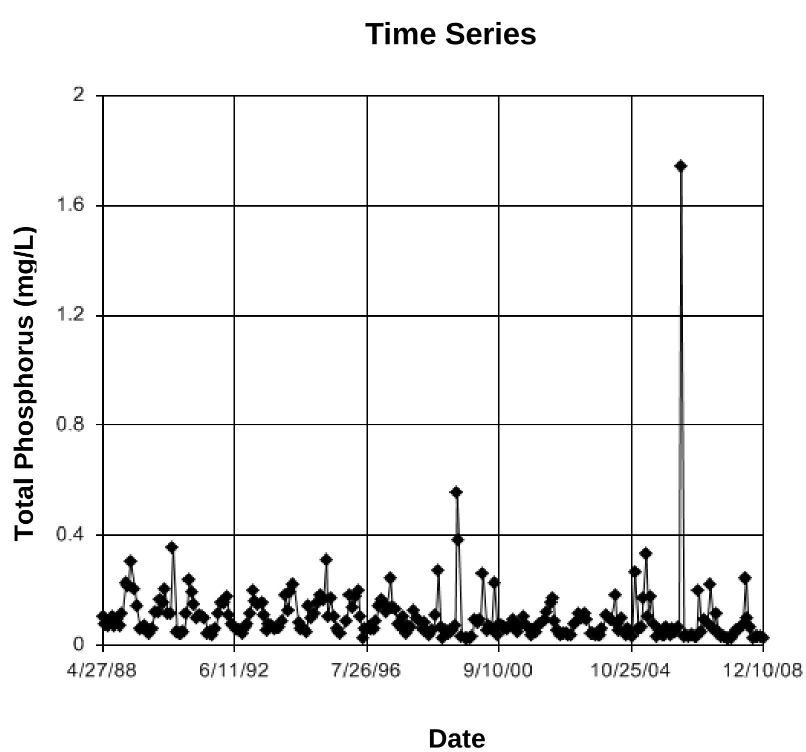

Figure 8-a10: North Saskatchewan River Total Phosphorus

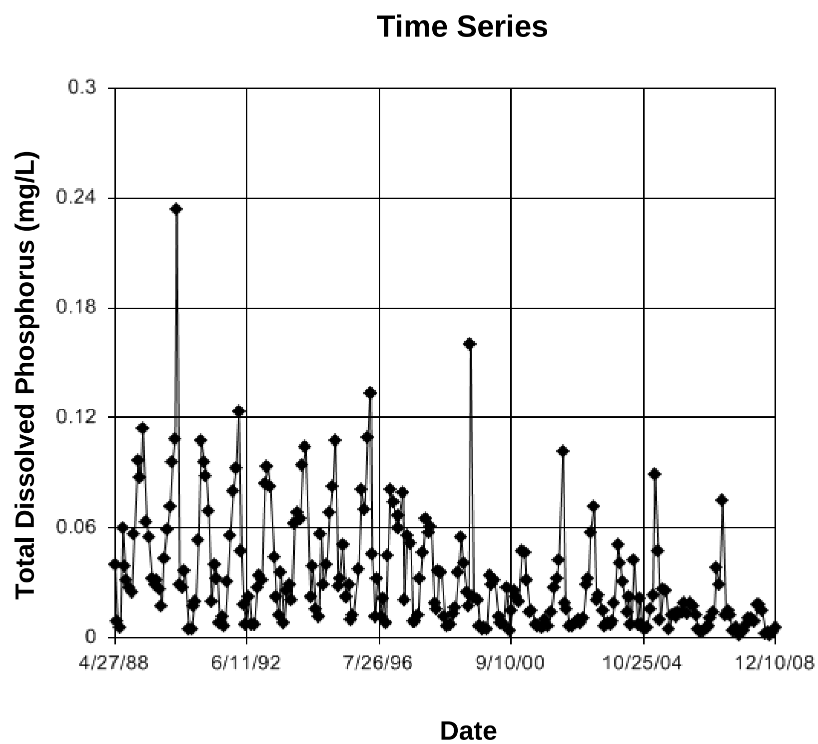

Figure 8-a11: North Saskatchewan River Total Dissolved Phosphorus

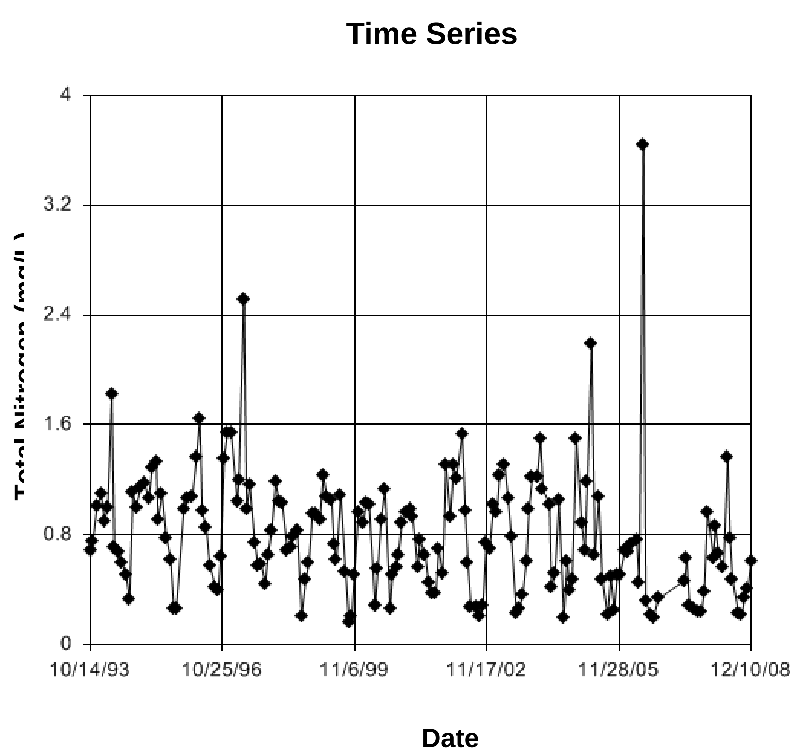

Figure 8-a12: North Saskatchewan River Total Nitrogen

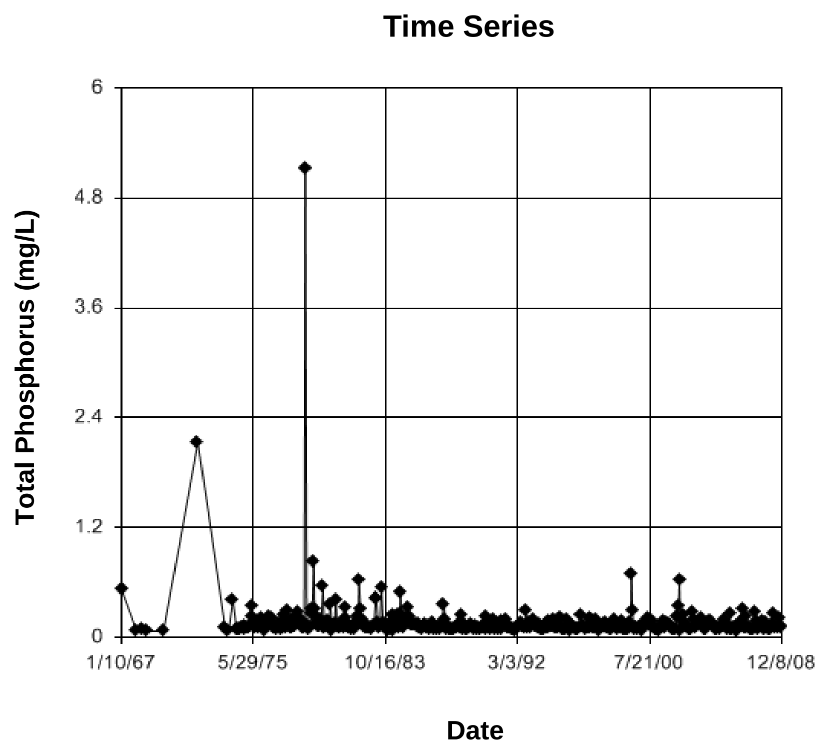

Figure 8-a13: Red Deer River (AB-SK) Total Phosphorus

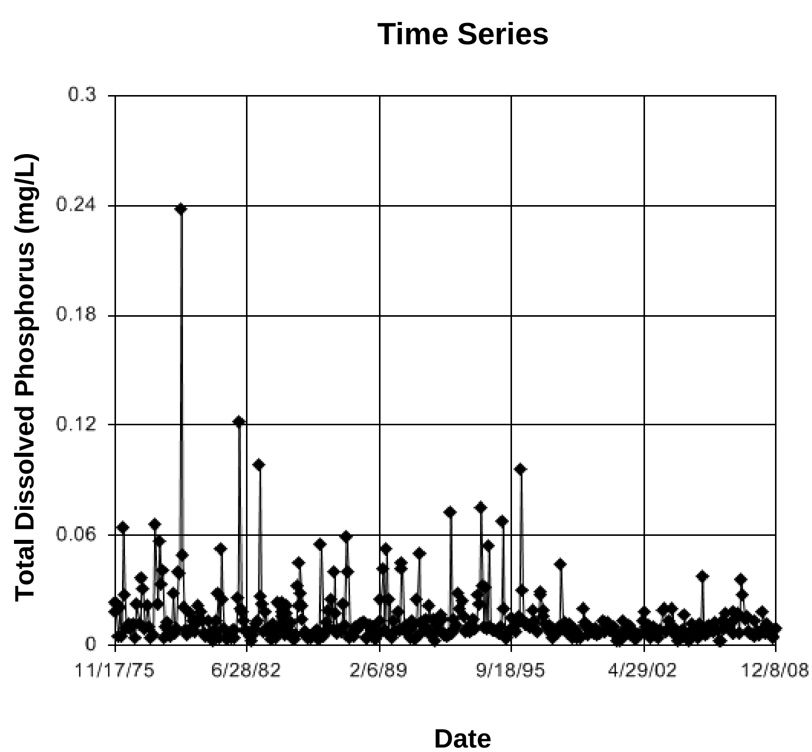

Figure 8-a14: Red Deer River (AB-SK) Total Dissolved Phosphorus

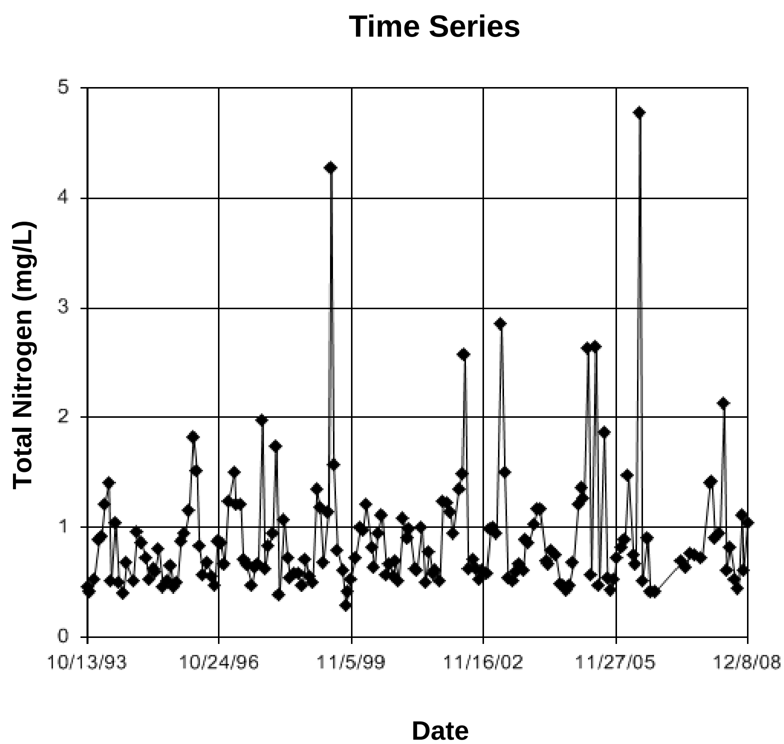

Figure 8-a15: Red Deer River (AB-SK) Total Nitrogen

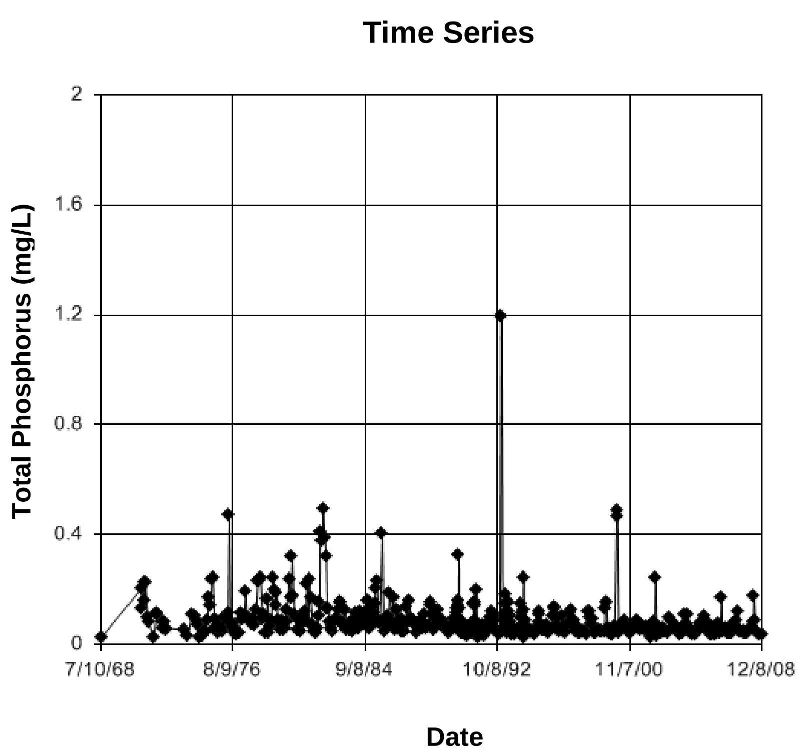

Figure 8-a16: South Saskatchewan River Total Phosphorus

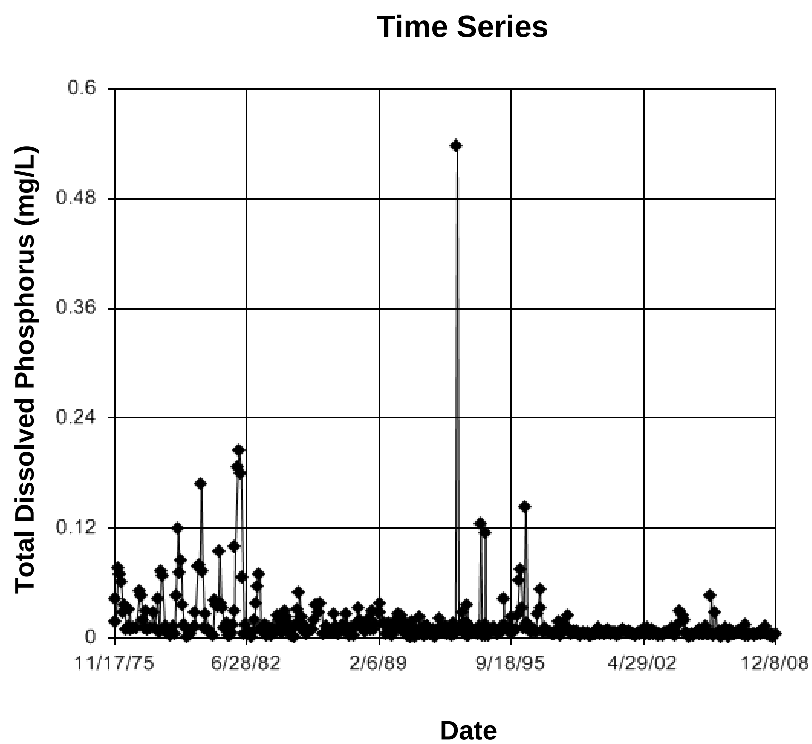

Figure 8-a17: South Saskatchewan River Total Dissolved Phosphorus

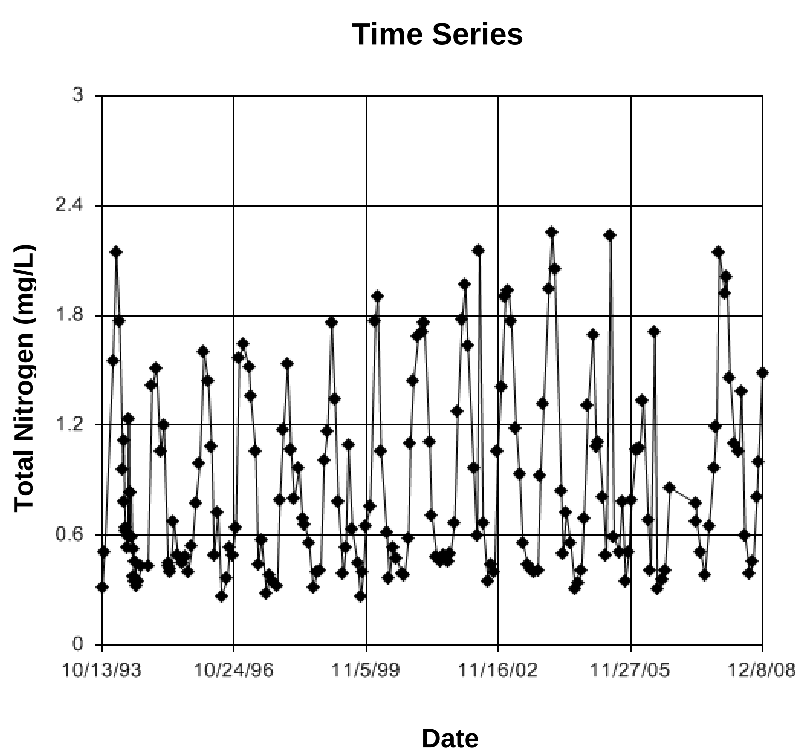

Figure 8-a18: South Saskatchewan River Total Nitrogen

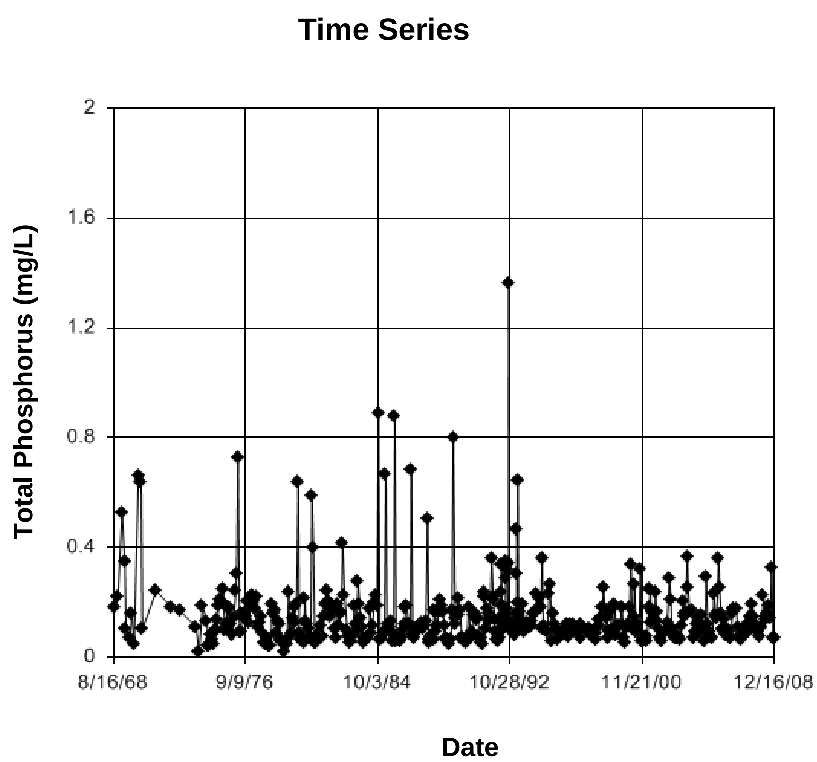

Figure 8-a19: Assiniboine River Total Phosphorus

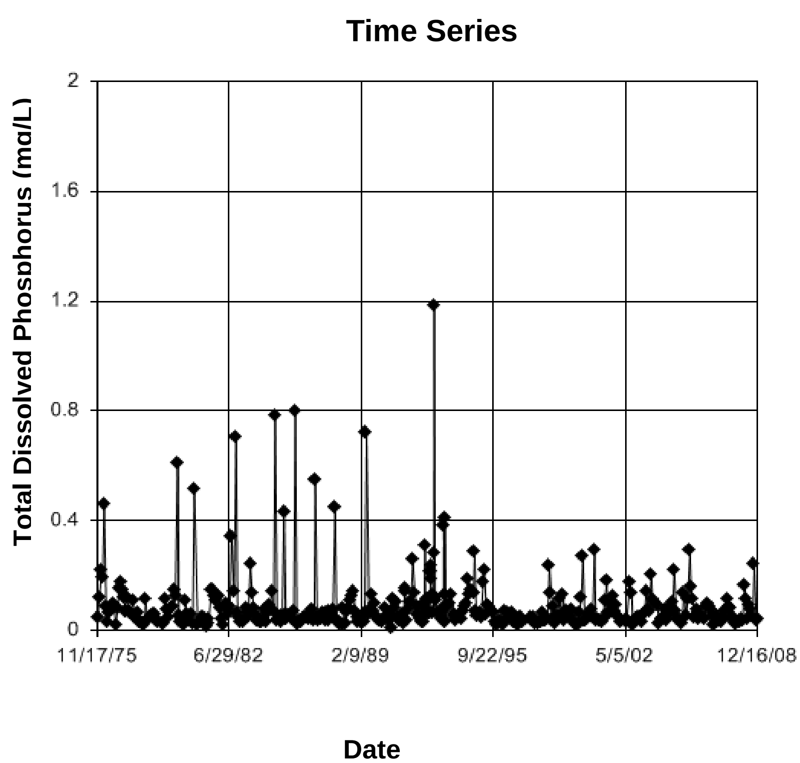

Figure 8-a20: Assiniboine River Total Dissolved Phosphorus

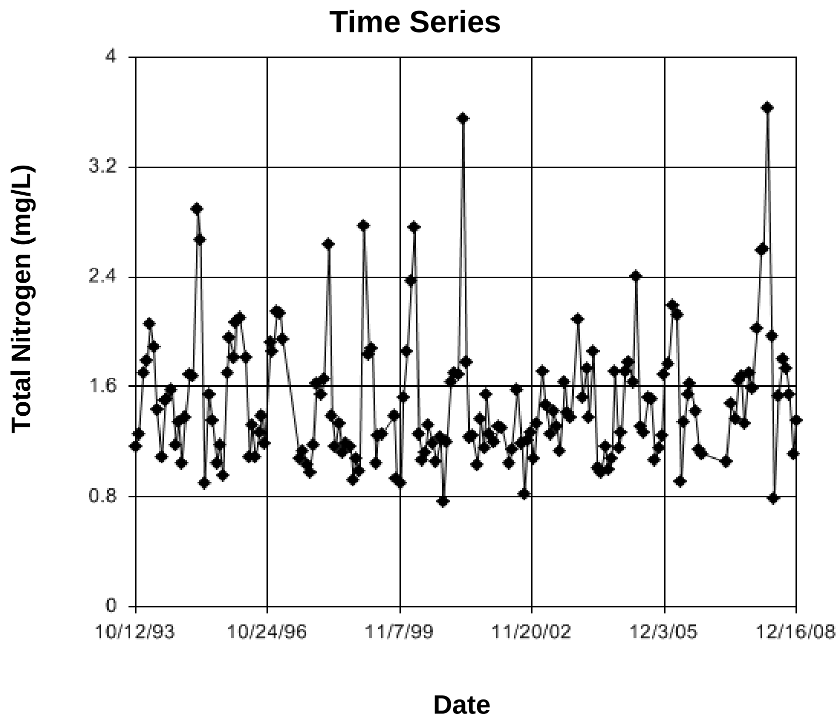

Figure 8-a21: Assiniboine River Total Nitrogen

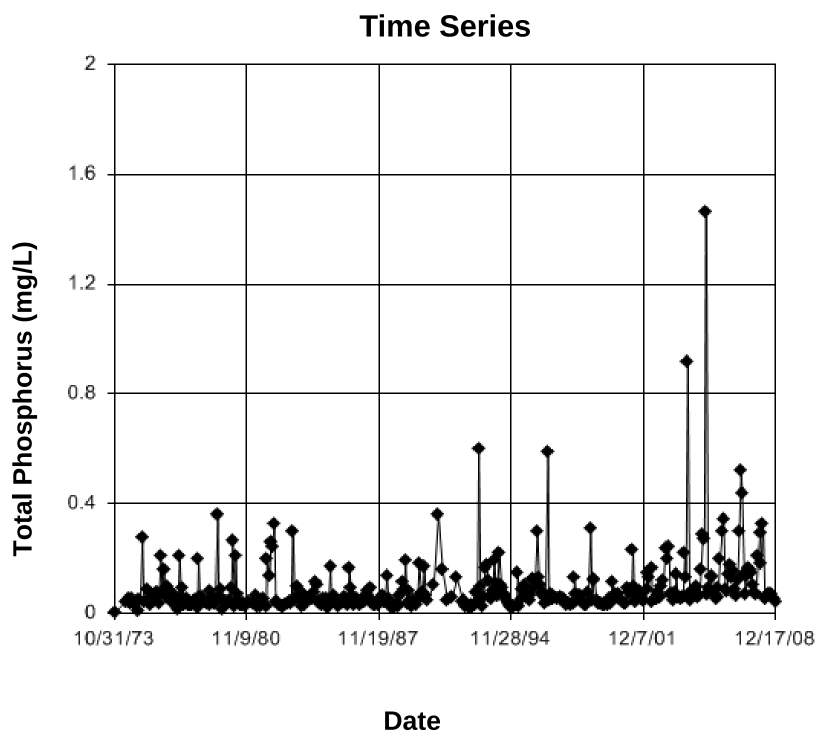

Figure 8-a22: Carrot River Total Phosphorus

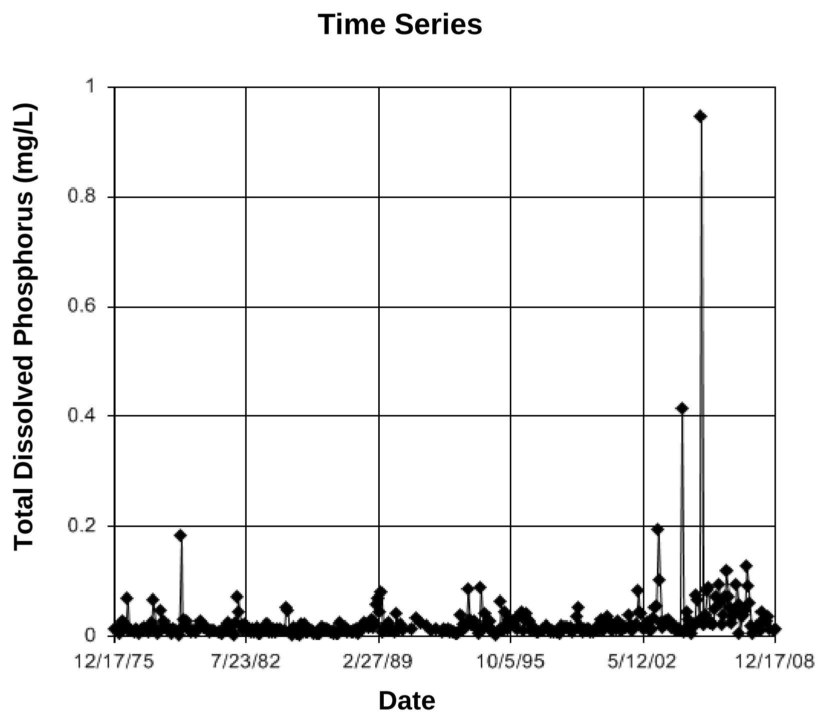

Figure 8-a23: Carrot River Total Dissolved Phosphorus

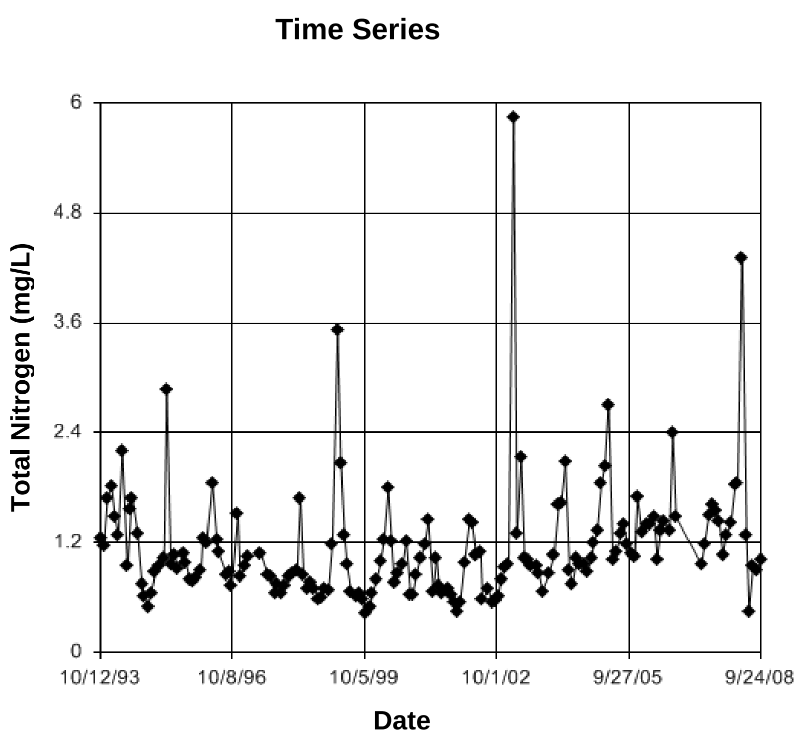

Figure 8-a24: Carrot River Total Nitrogen

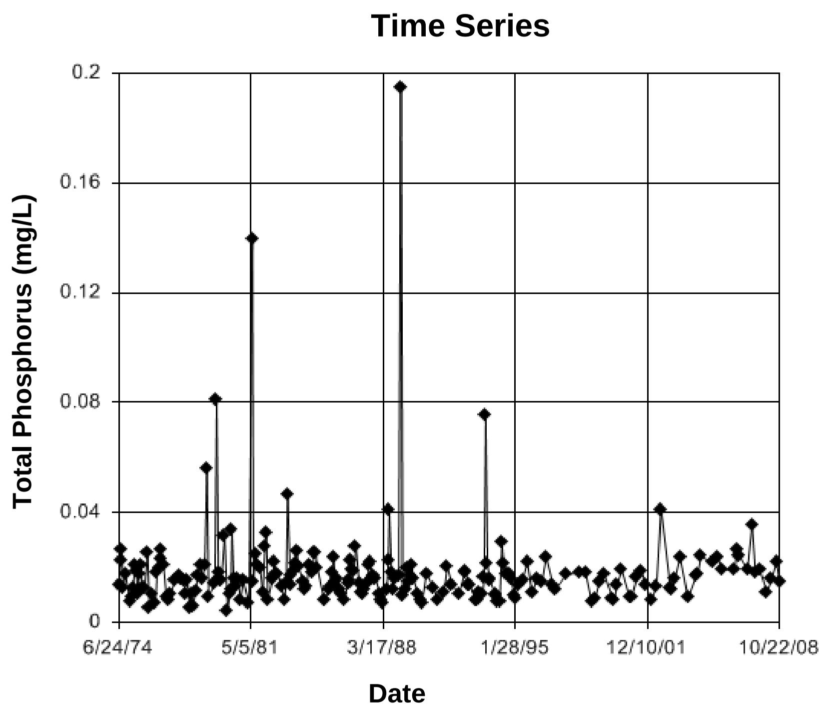

Figure 8-a25: Churchill River Total Phosphorus

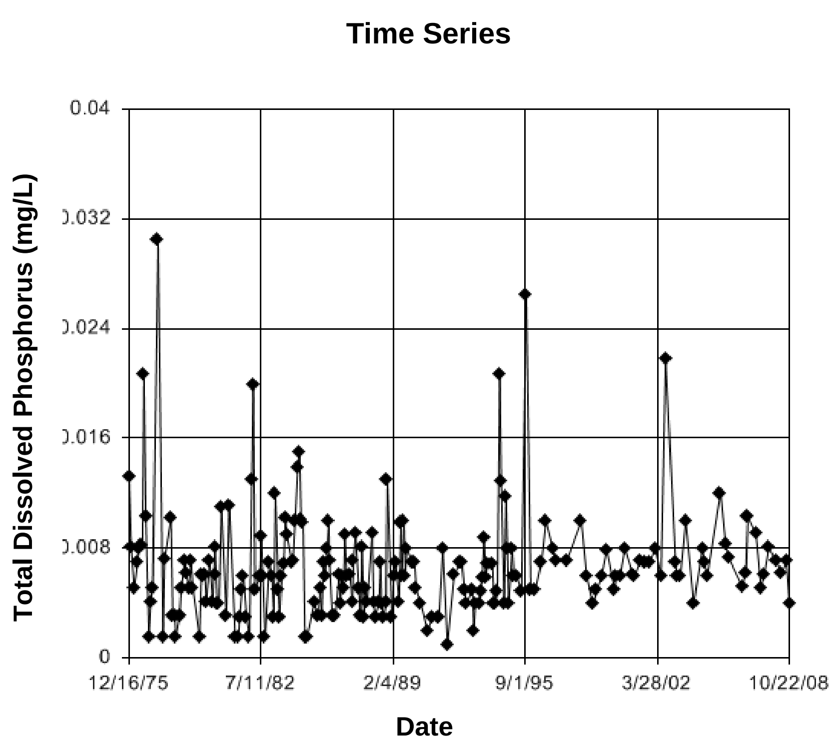

Figure 8-a26: Churchill River Total Dissolved Phosphorus

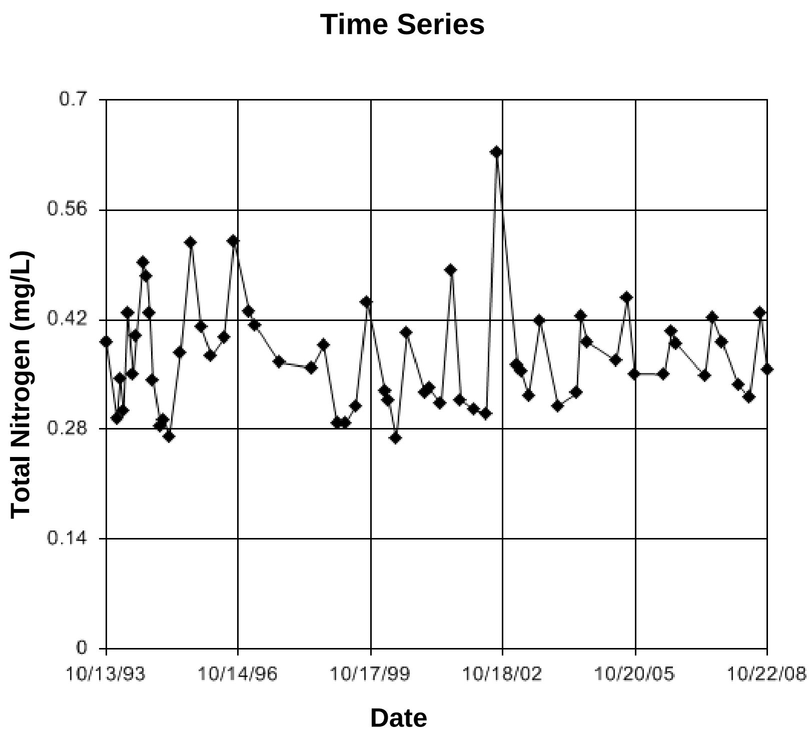

Figure 8-a27: Churchill River Total Nitrogen

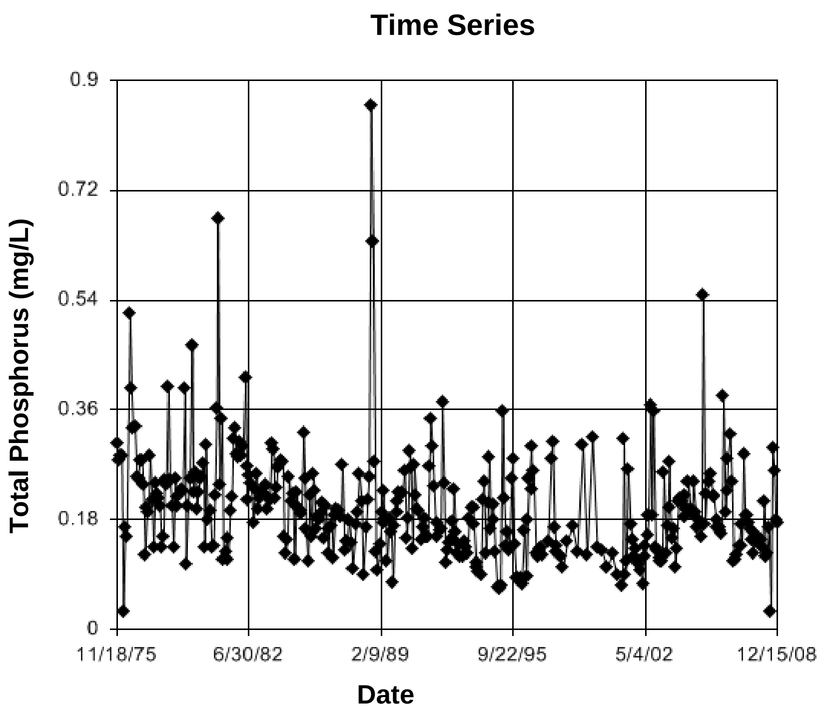

Figure 8-a28: Qu'Appelle River Total Phosphorus

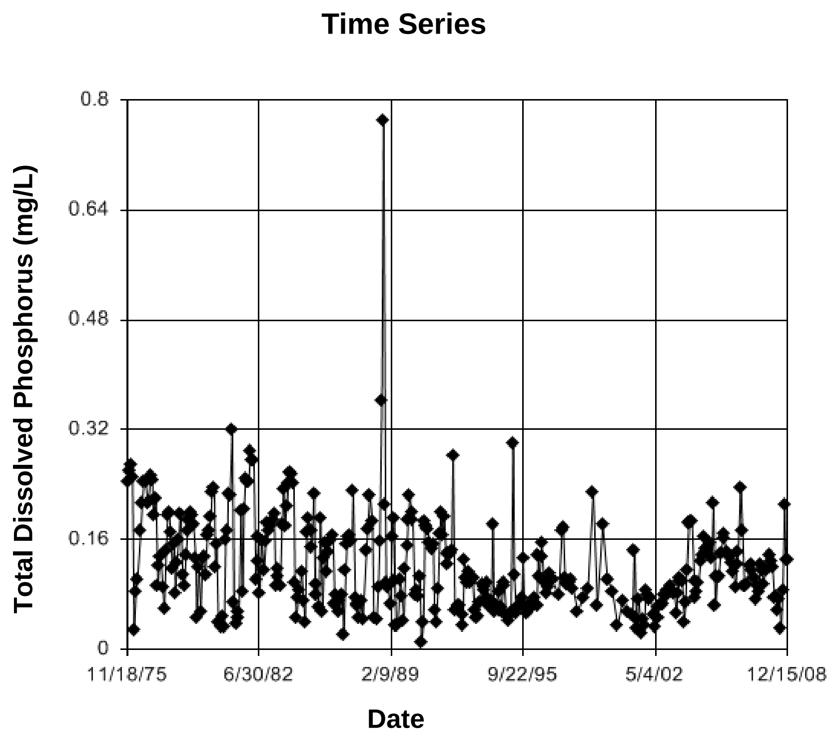

Figure 8-a29: Qu'Appelle River Total Dissolved Phosphorus

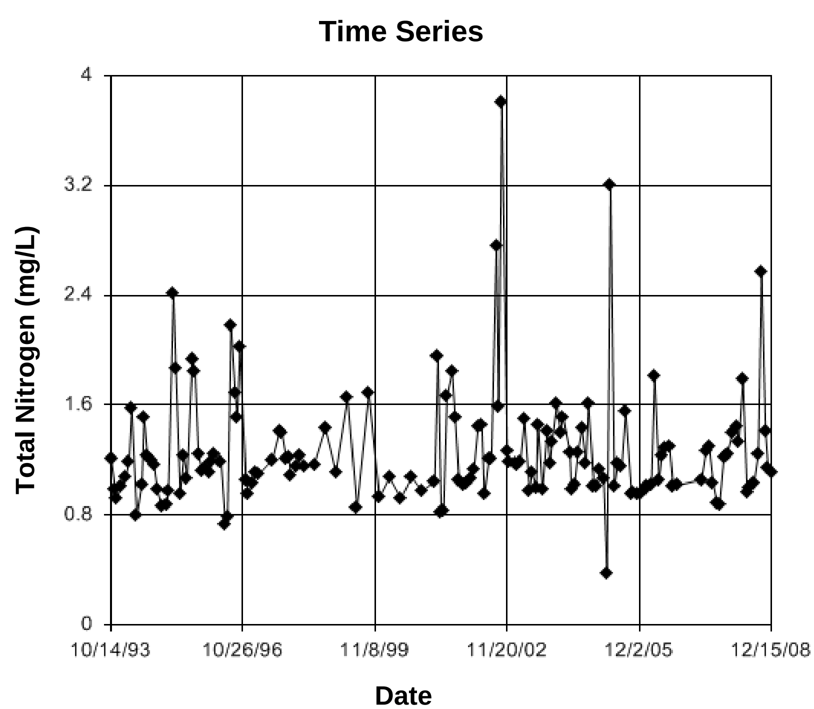

Figure 8-a30: Qu'Appelle River Total Nitrogen

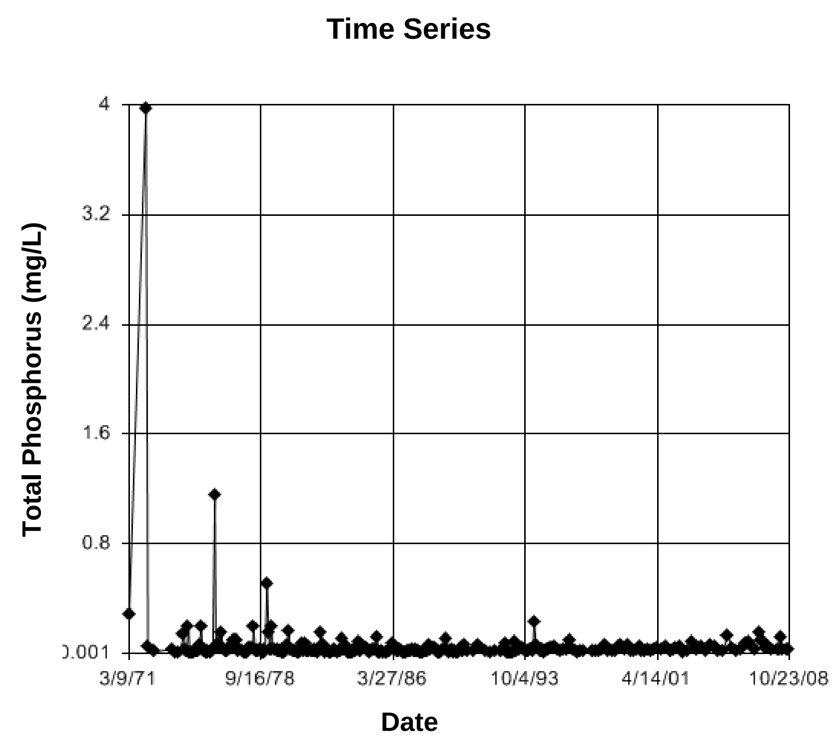

Figure 8-a31: Red Deer River (SK-MB) Total Phosphorus

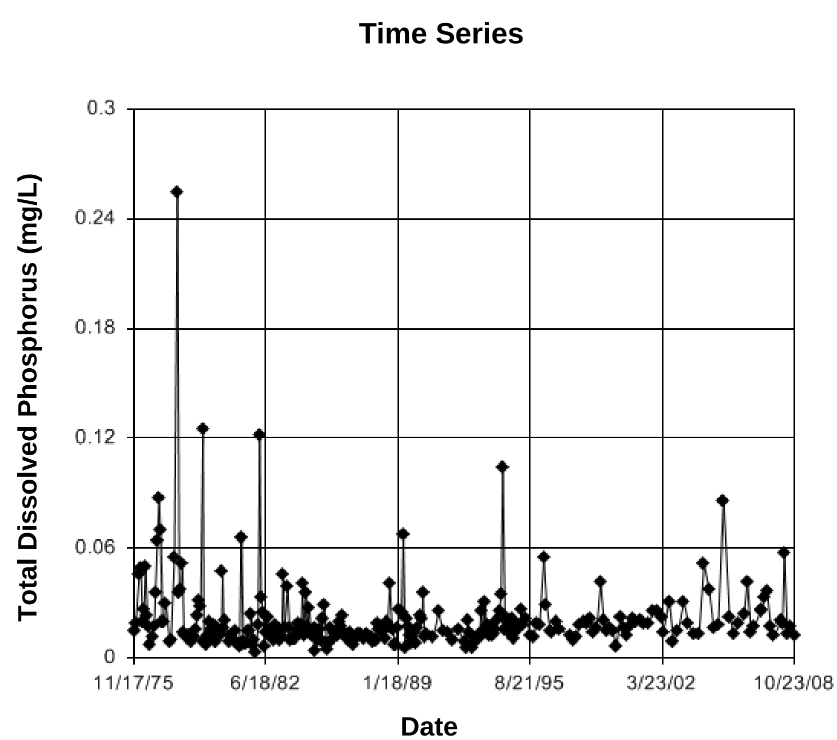

Figure 8-a32: Red Deer River (SK-MB) Total Dissolved Phosphorus

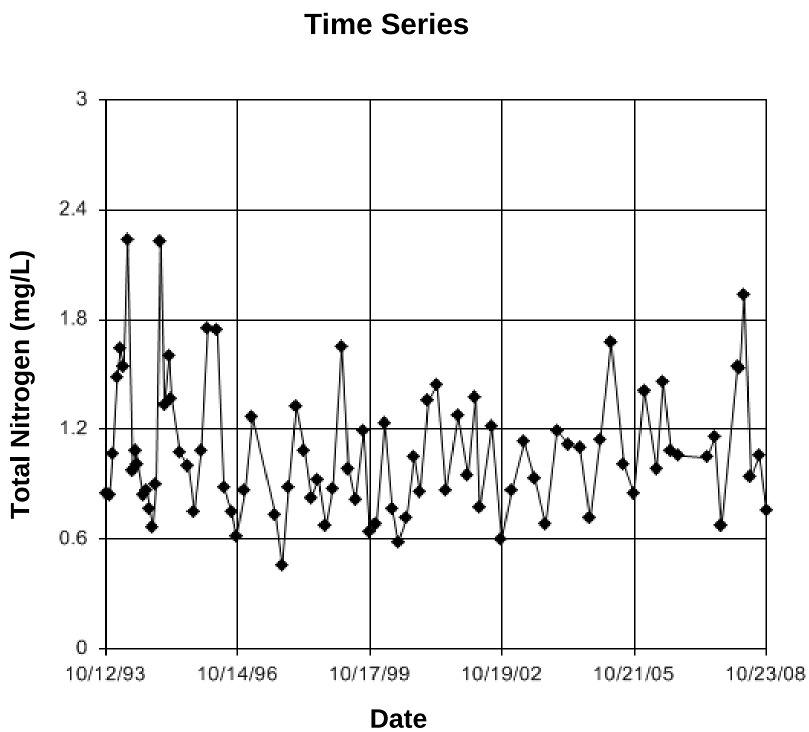

Figure 8-a33: Red Deer River (SK-MB) Total Nitrogen

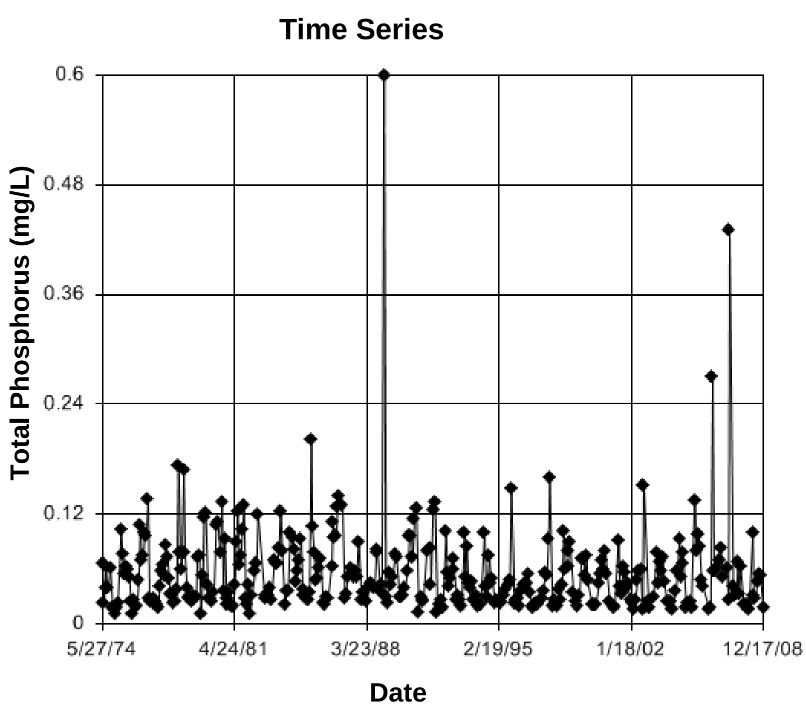

Figure 8-a34: Saskatchewan River Total Phosphorus

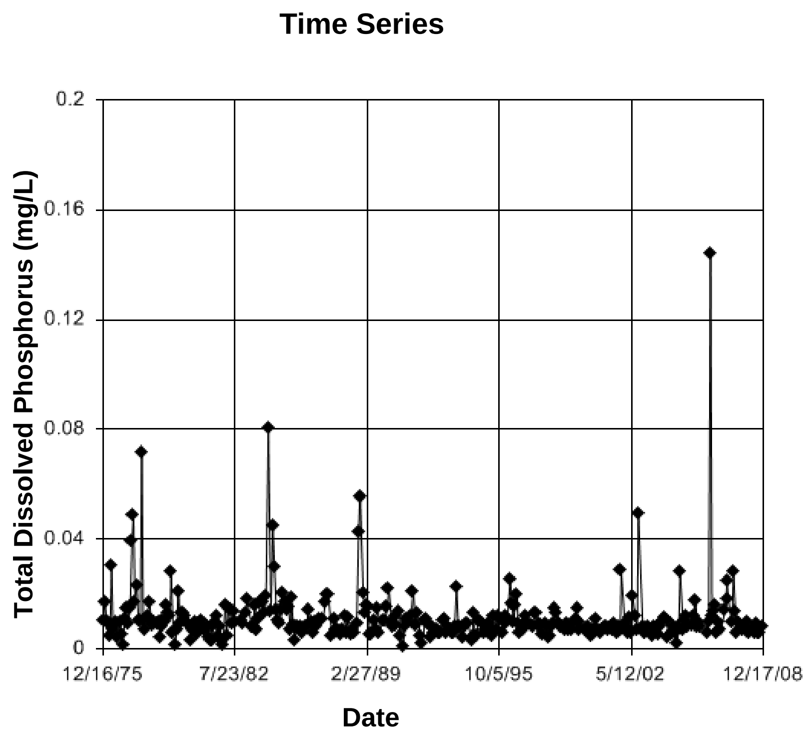

Figure 8-a35: Saskatchewan River Total Dissolved Phosphorus

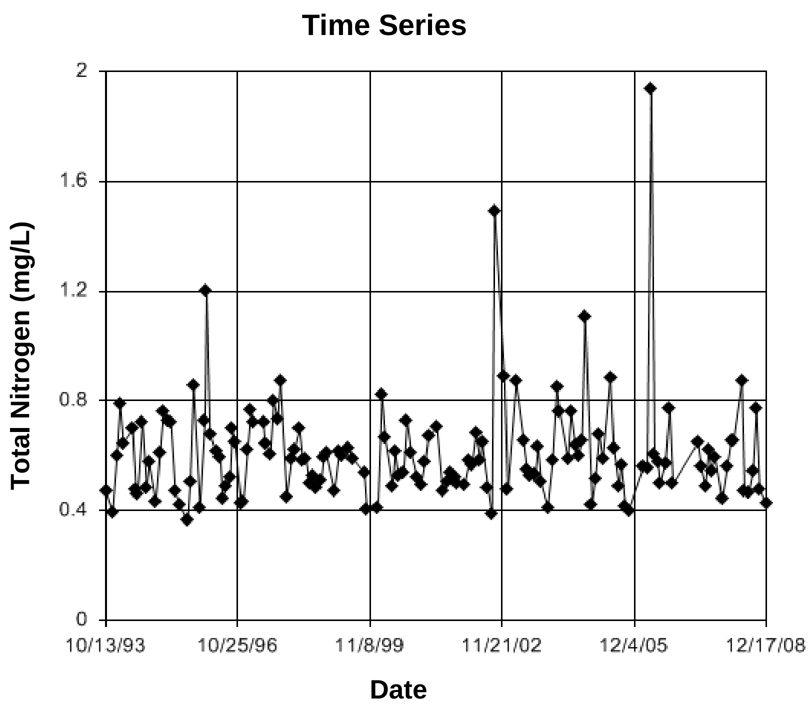

Figure 8-a36: Saskatchewan River Total NitrogenAppendix 8-b: Seasonality Graphs

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 9.654
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 15 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 9.654
Adjusted Kruskal-Wallis statistic (H') = 9.654

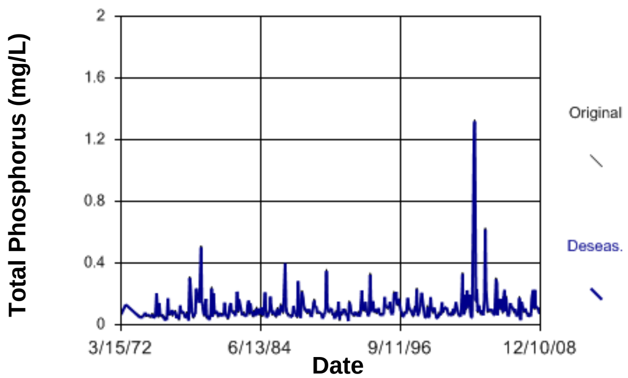

Figure 8-b1: Battle River Total Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 3.123
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 22 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 3.123
Adjusted Kruskal-Wallis statistic (H') = 3.123

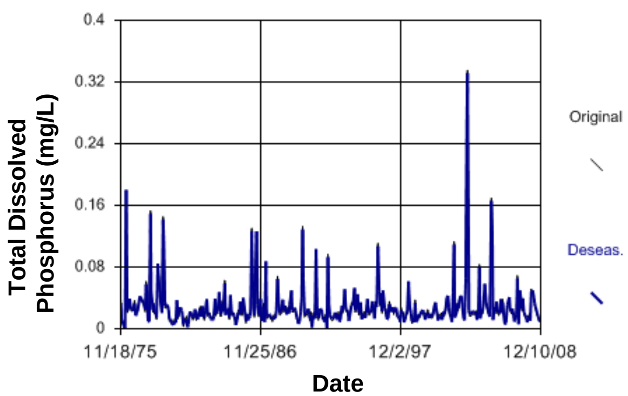

Figure 8-b2: Battle River Total Dissolved Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 3.014
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 6 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 3.014
Adjusted Kruskal-Wallis statistic (H') = 3.014

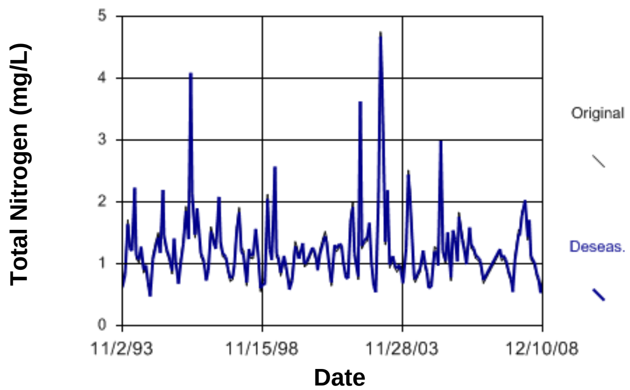

Figure 8-b3: Battle River Total Nitrogen

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 0.7976
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 11 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.7975
Adjusted Kruskal-Wallis statistic (H') = 0.7976

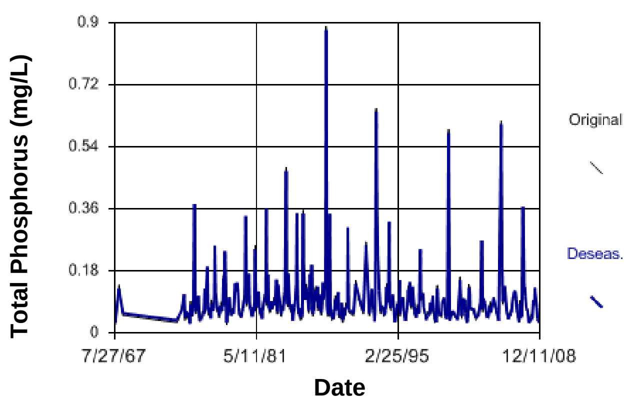

Figure 8-b4: Beaver River Total Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 0.3131
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 13 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.3131
Adjusted Kruskal-Wallis statistic (H') = 0.3131

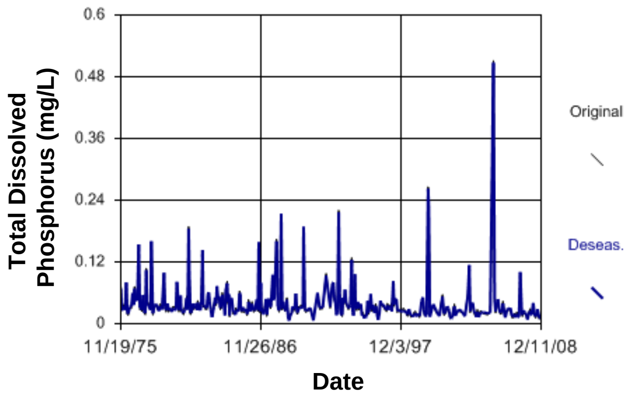

Figure 8-b5: Beaver River Total Dissolved Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 24.71
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 24.71
Adjusted Kruskal-Wallis statistic (H') = 24.71

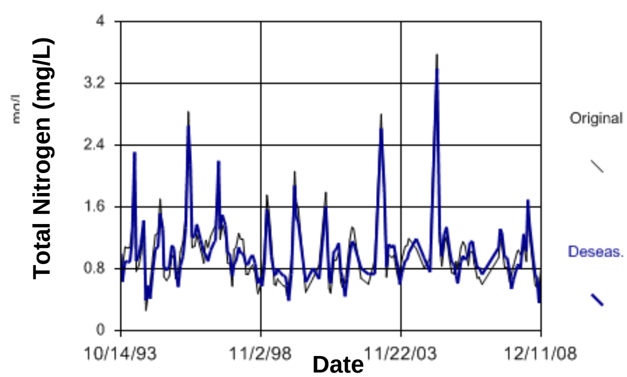

Figure 8-b6: Beaver River Total Nitrogen

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 11.29
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.

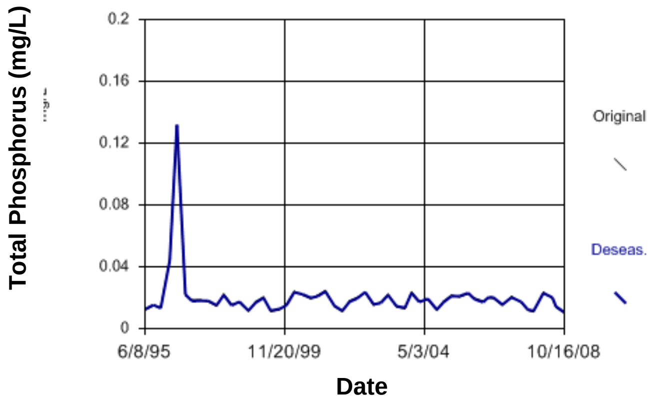

Figure 8-b7: Cold River Total Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 28.4
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 28.4
Adjusted Kruskal-Wallis statistic (H') = 28.4

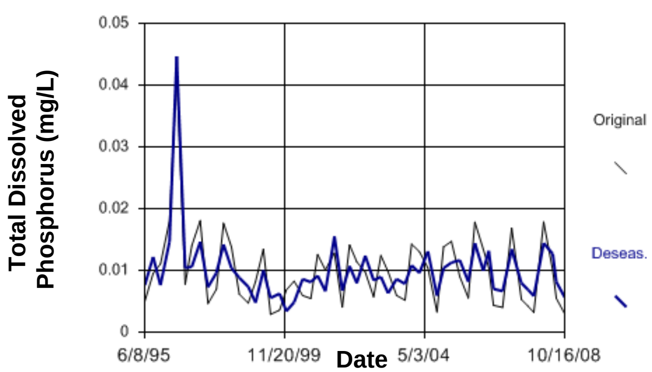

Figure 8-b8: Cold River Total Dissolved Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 0.09915
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.09915
Adjusted Kruskal-Wallis statistic (H') = 0.09915

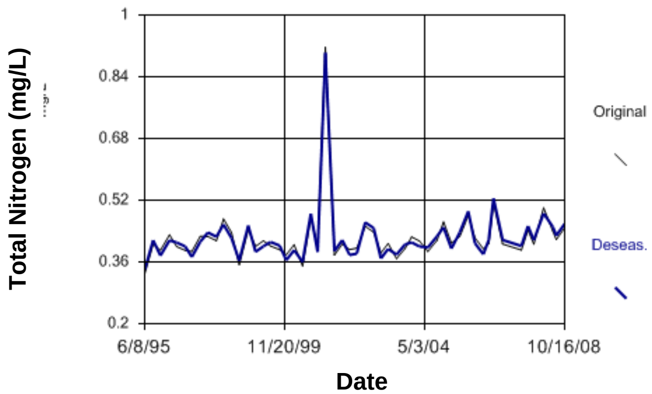

Figure 8-b9: Cold River Total Nitrogen

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 11.95
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 11.95
Adjusted Kruskal-Wallis statistic (H') = 11.95

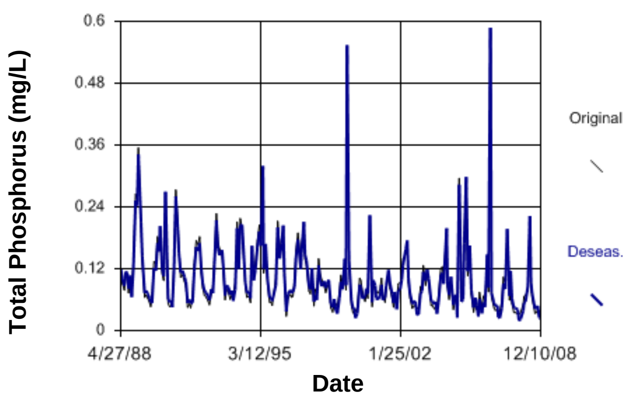

Figure 8-b10: North Saskatchewan River Total Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 30.92
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 5 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 30.92
Adjusted Kruskal-Wallis statistic (H') = 30.92

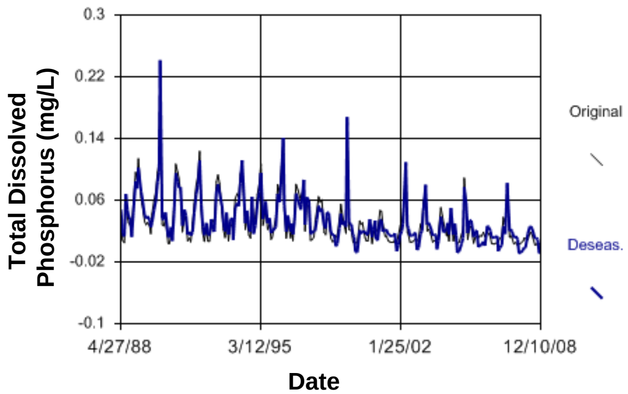

Figure 8-b11: North Saskatchewan River Total Dissolved Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 36.52
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 36.52
Adjusted Kruskal-Wallis statistic (H') = 36.52

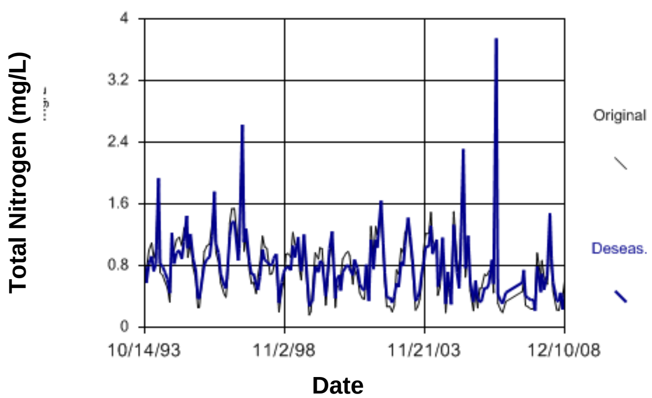

Figure 8-b12: North Saskatchewan River Total Nitrogen

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 13.46
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 51 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 13.46
Adjusted Kruskal-Wallis statistic (H') = 13.46

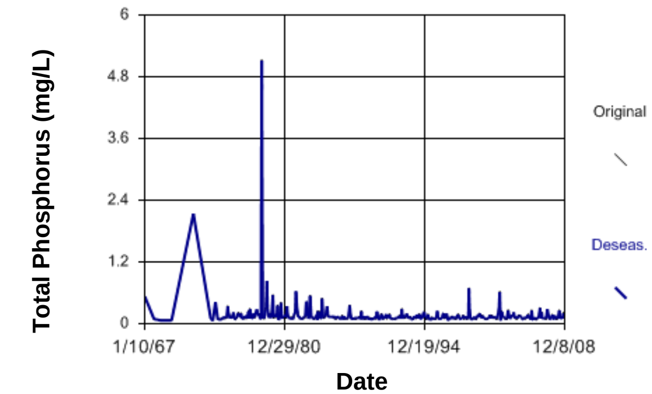

Figure 8-b13: Red Deer River (AB-SK) Total Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 0.1615
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 18 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.1615
Adjusted Kruskal-Wallis statistic (H') = 0.1615

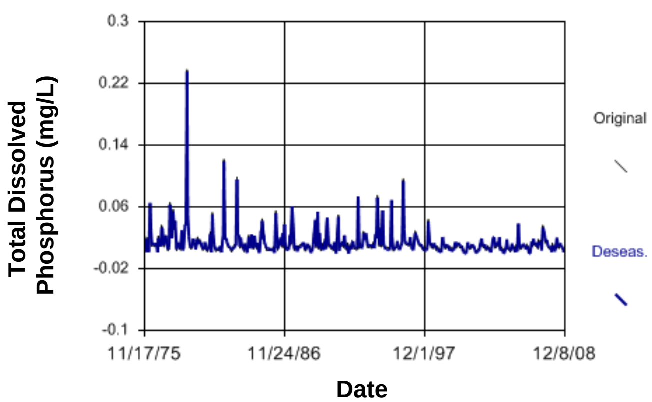

Figure 8-b14: Red Deer River (AB-SK) Total Dissolved Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 11.05
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 5 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 11.05
Adjusted Kruskal-Wallis statistic (H') = 11.05

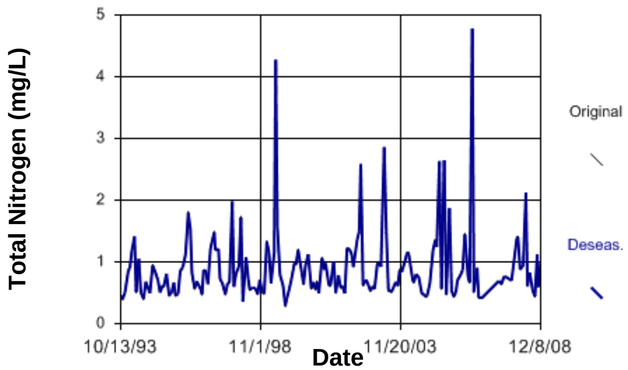

Figure 8-b15: Red Deer River (AB-SK) Total Nitrogen

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 3.343
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 15 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 3.343
Adjusted Kruskal-Wallis statistic (H') = 3.343

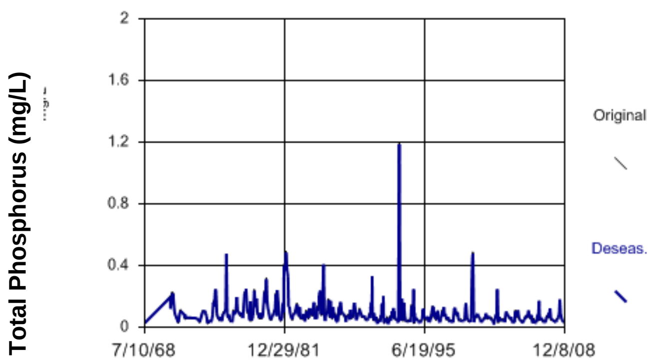

Figure 8-b16: South Saskatchewan River Total Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 12.44
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 14 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 12.44
Adjusted Kruskal-Wallis statistic (H') = 12.44

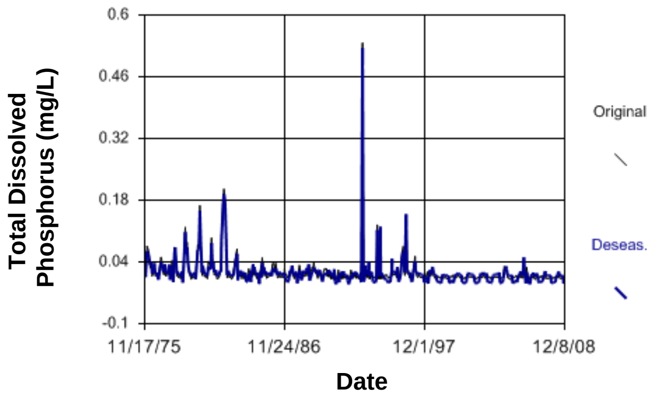

Figure 8-b17: South Saskatchewan River Total Dissolved Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 85.82
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 85.82
Adjusted Kruskal-Wallis statistic (H') = 85.82

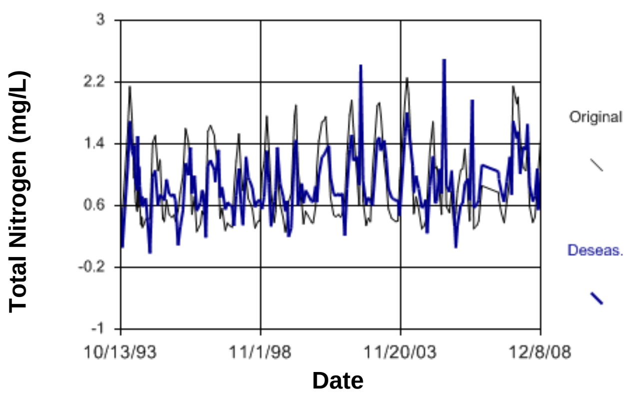

Figure 8-b18: South Saskatchewan River Total Nitrogen

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 91.35
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 26 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 91.35
Adjusted Kruskal-Wallis statistic (H') = 91.35

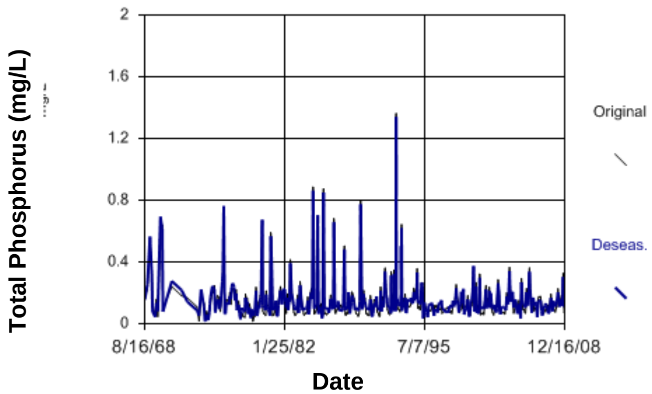

Figure 8-b19: Assiniboine River Total Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 74.35
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 8 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 74.35
Adjusted Kruskal-Wallis statistic (H') = 74.35

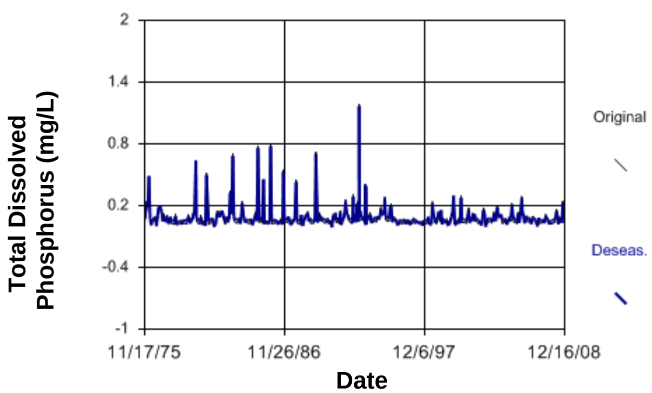

Figure 8-b20: Assiniboine River Total Dissolved Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 31.7
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 7 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 31.7
Adjusted Kruskal-Wallis statistic (H') = 31.7

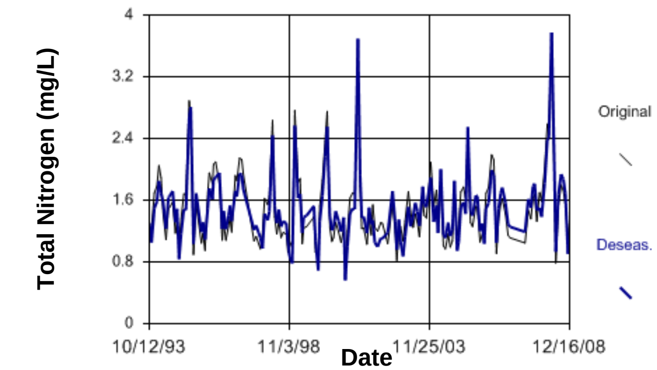

Figure 8-b21: Assiniboine River Total Nitrogen

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 6.924
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 16 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 6.924
Adjusted Kruskal-Wallis statistic (H') = 6.924

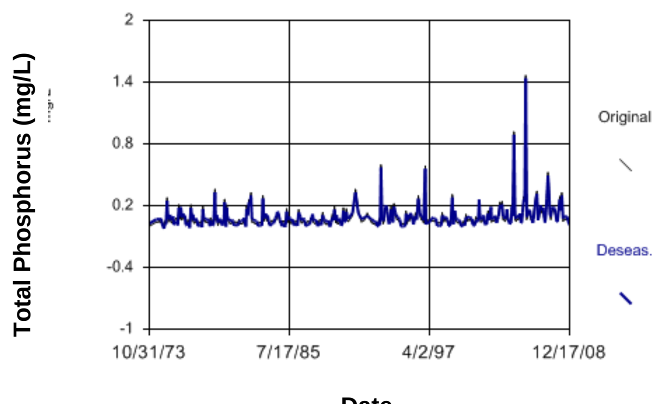

Figure 8-b22: Carrot River Total Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 4.397
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 9 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 4.397
Adjusted Kruskal-Wallis statistic (H') = 4.397

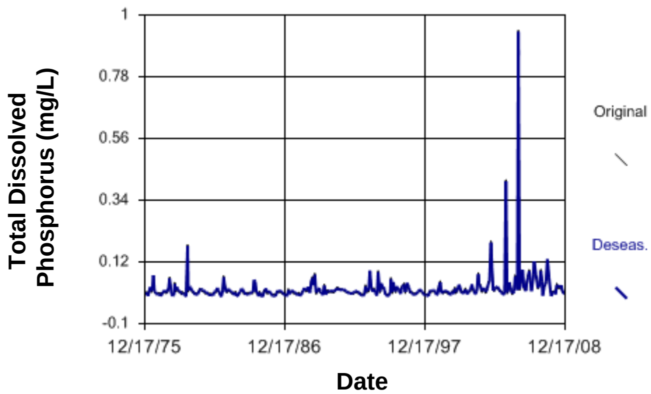

Figure Carrot 8-b23: River Total Dissolved Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 15.52
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 5 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 15.52
Adjusted Kruskal-Wallis statistic (H') = 15.52

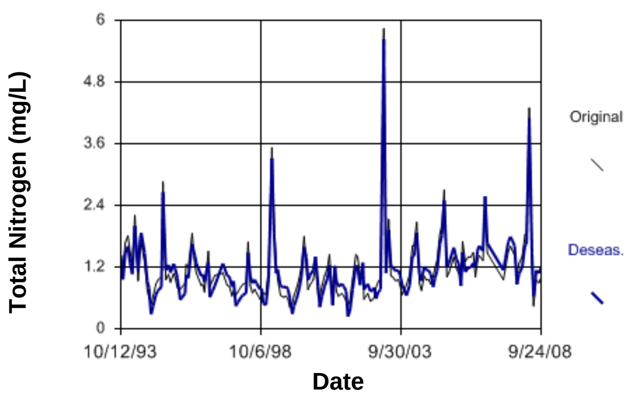

Figure 8-b24: Carrot River Total Nitrogen

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 74.21
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 11 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 74.21
Adjusted Kruskal-Wallis statistic (H') = 74.21

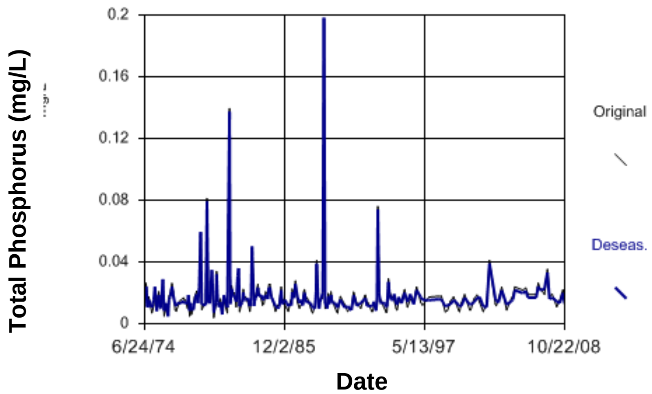

Figure 8-b25: Churchill River Total Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 1.224
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 15 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 1.224
Adjusted Kruskal-Wallis statistic (H') = 1.224

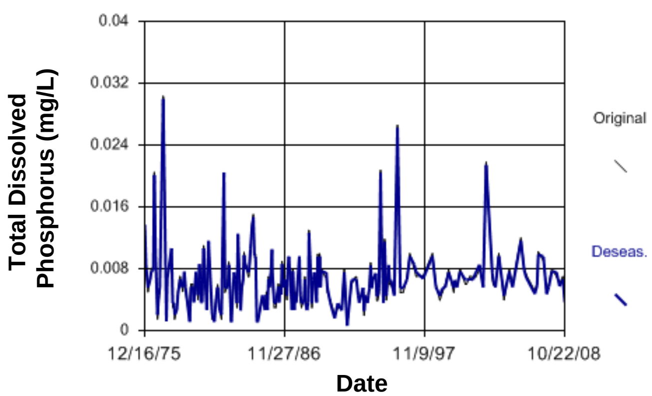

Figure 8-b26: Churchill River Total Dissolved Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 12.43
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.

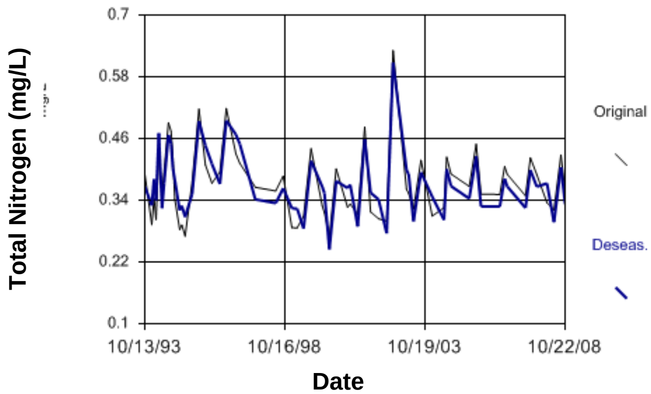

Figure 8-b27: Churchill River Total Nitrogen

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 3.694
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 31 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 3.694
Adjusted Kruskal-Wallis statistic (H') = 3.694

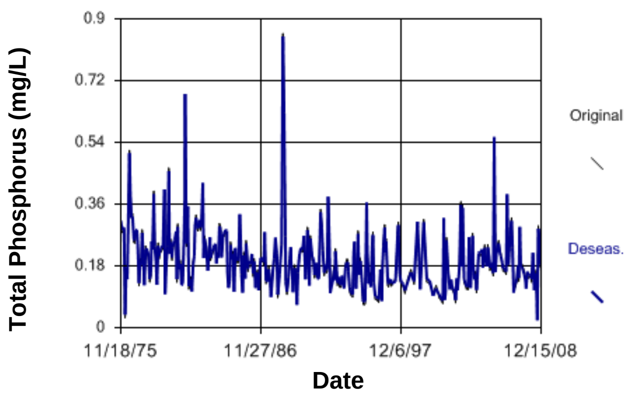

Figure 8-b28: Qu'Appelle River Total Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 35.12
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 15 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 35.12
Adjusted Kruskal-Wallis statistic (H') = 35.12

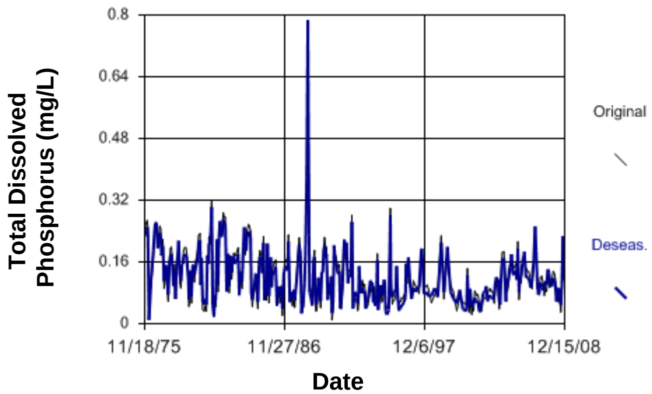

Figure 8-b29: Qu'Appelle River Total Dissolved Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 0.3419
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 9 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.3419
Adjusted Kruskal-Wallis statistic (H') = 0.3419

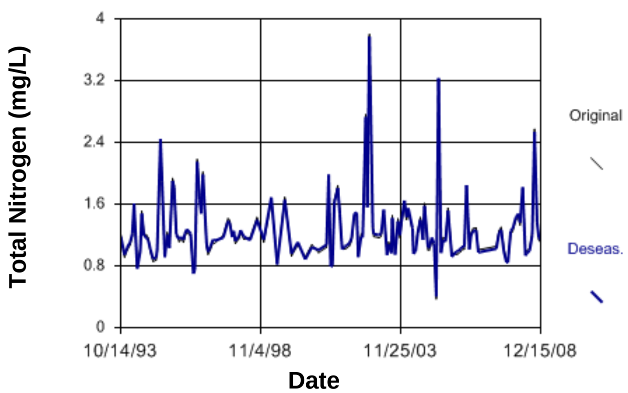

Figure 8-b30: Qu'Appelle River Total Nitrogen

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 13.96
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 8 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 13.96
Adjusted Kruskal-Wallis statistic (H') = 13.96

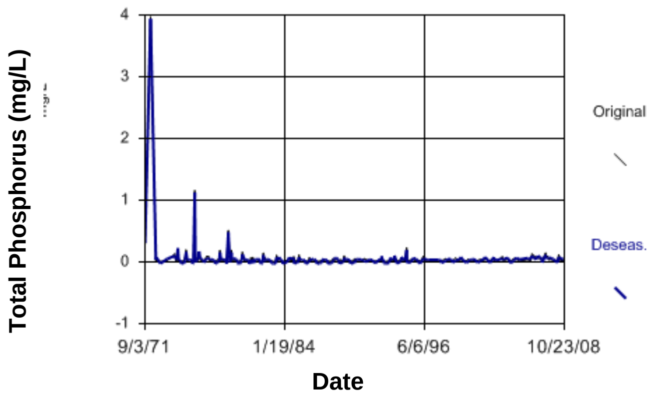

Figure 8-b31: Red Deer River (SK-MB) Total Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 20.56
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 9 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 20.56
Adjusted Kruskal-Wallis statistic (H') = 20.56

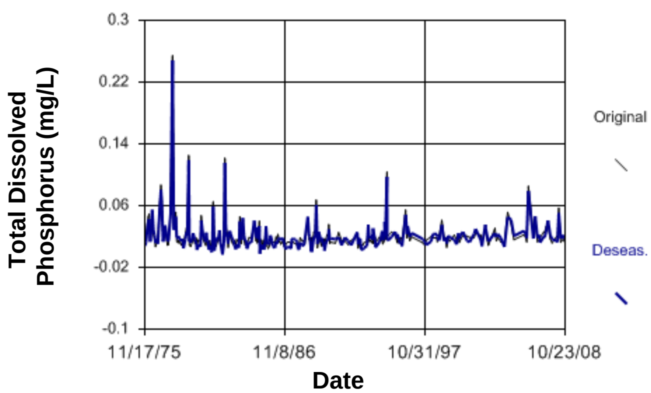

Figure 8-b32: Red Deer River (SK-MB) Total Dissolved Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 13.77
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 13.77
Adjusted Kruskal-Wallis statistic (H') = 13.77

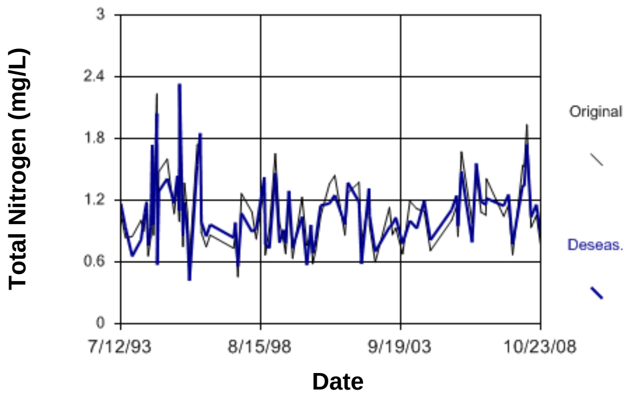

Figure 8-b33: Red Deer River (SK-MB) Total Nitrogen

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 181.8
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 8 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 181.8
Adjusted Kruskal-Wallis statistic (H') = 181.8

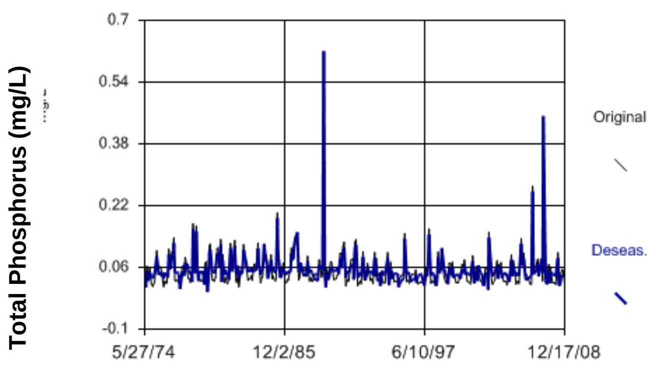

Figure 8-b34: Saskatchewan River Total Phosphorus

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 5.214
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 27 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 5.214
Adjusted Kruskal-Wallis statistic (H') = 5.214

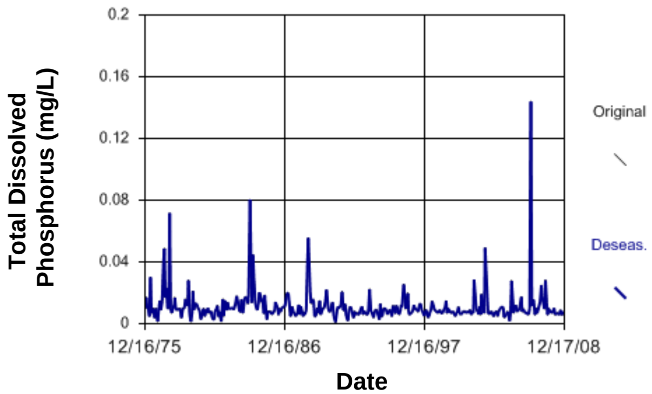

Figure 8-b35: Saskatchewan River Total Dissolved Phosphorus

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 0.2174
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.2174
Adjusted Kruskal-Wallis statistic (H') = 0.2174

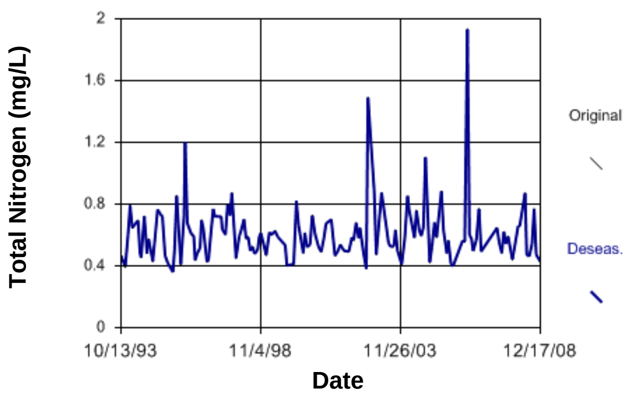

Figure 8-b36: Saskatchewan River Total Nitrogen

Appendix 8-c: Seasonal Kendall/Sen's Slope Graphs

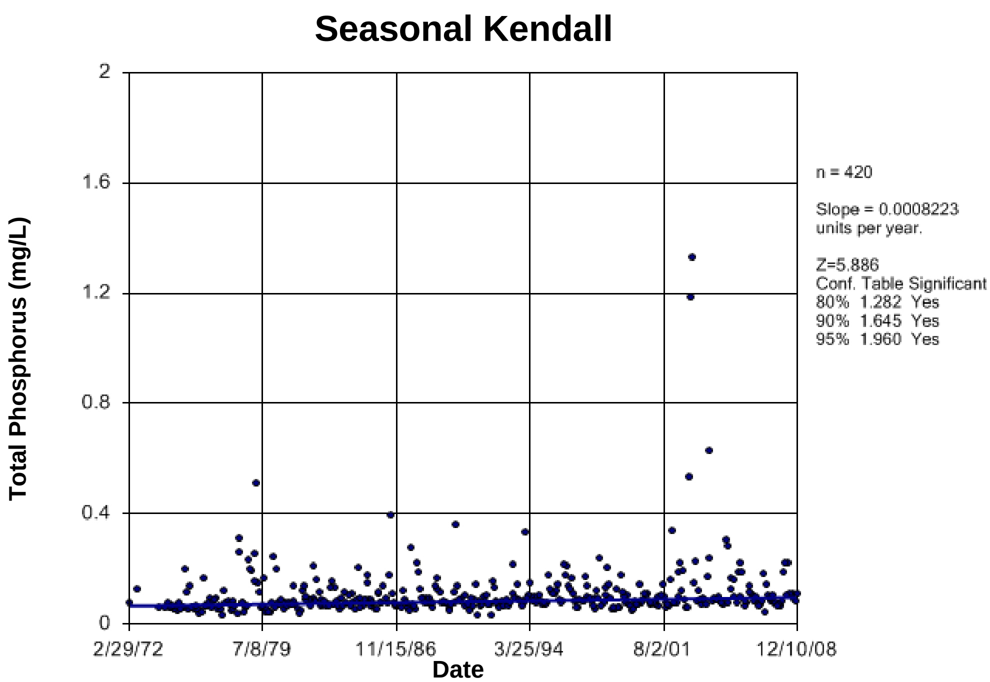

Figure 8-c1: Battle River Total Phosphorus

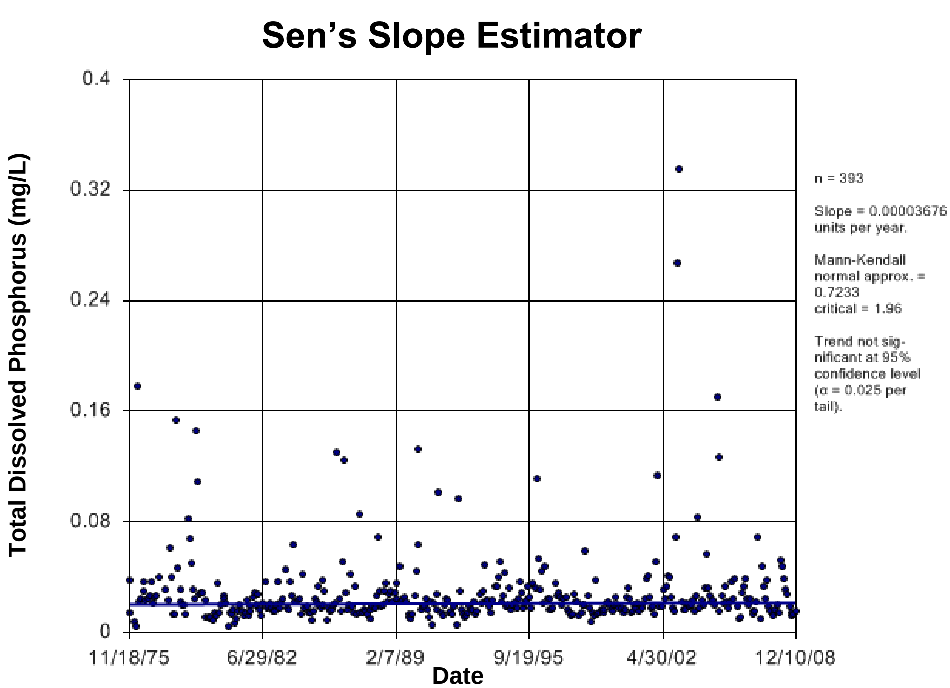

Figure 8-c2: Battle River Total Dissolved Phosphorus

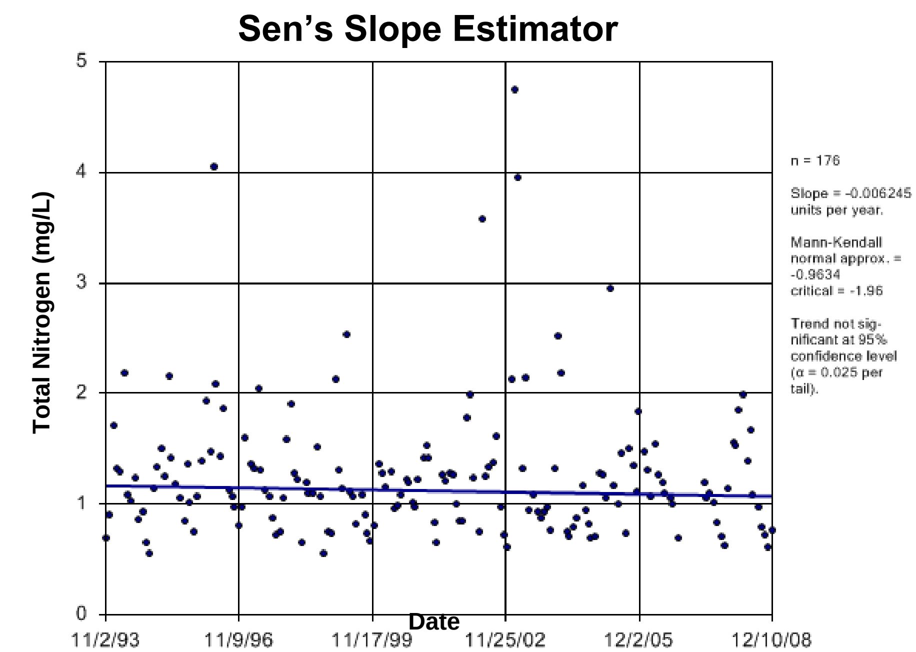

Figure 8-c3: Battle River Total Nitrogen

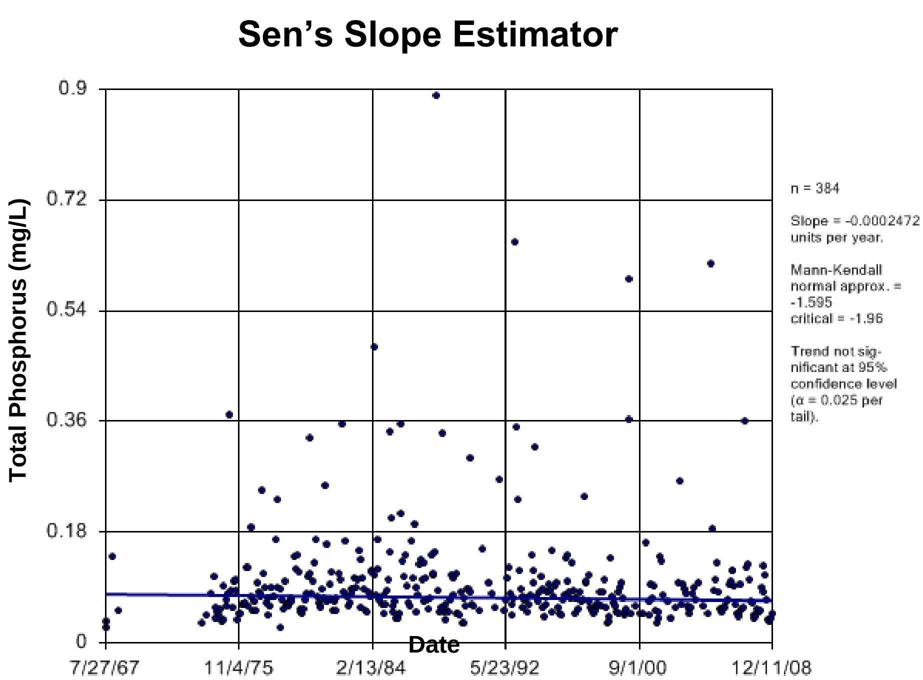

Figure 8-c4: Beaver River Total Phosphorus

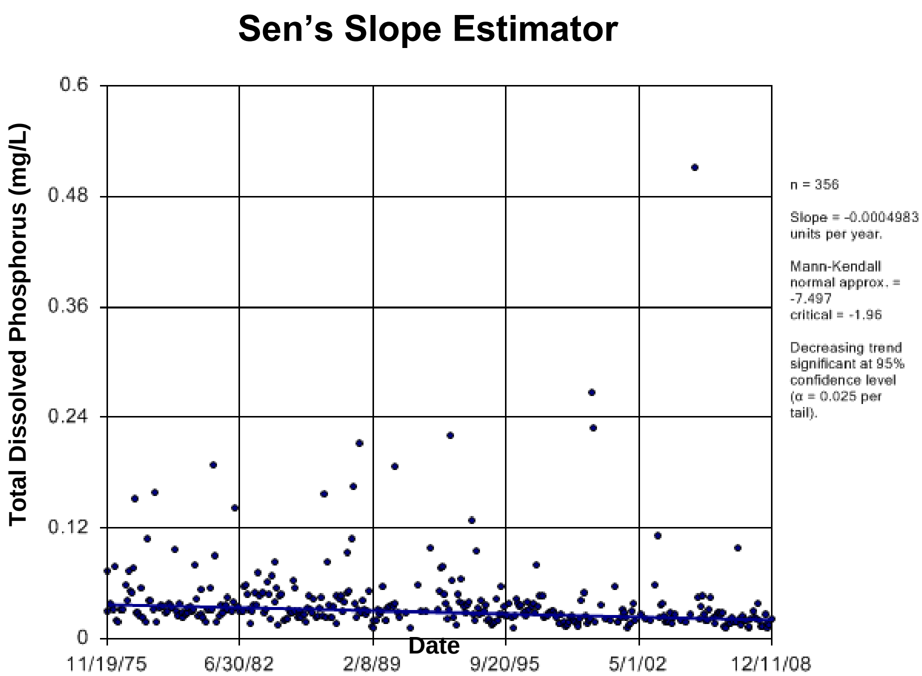

Figure 8-c5: Beaver River Total Dissolved Phosphorus

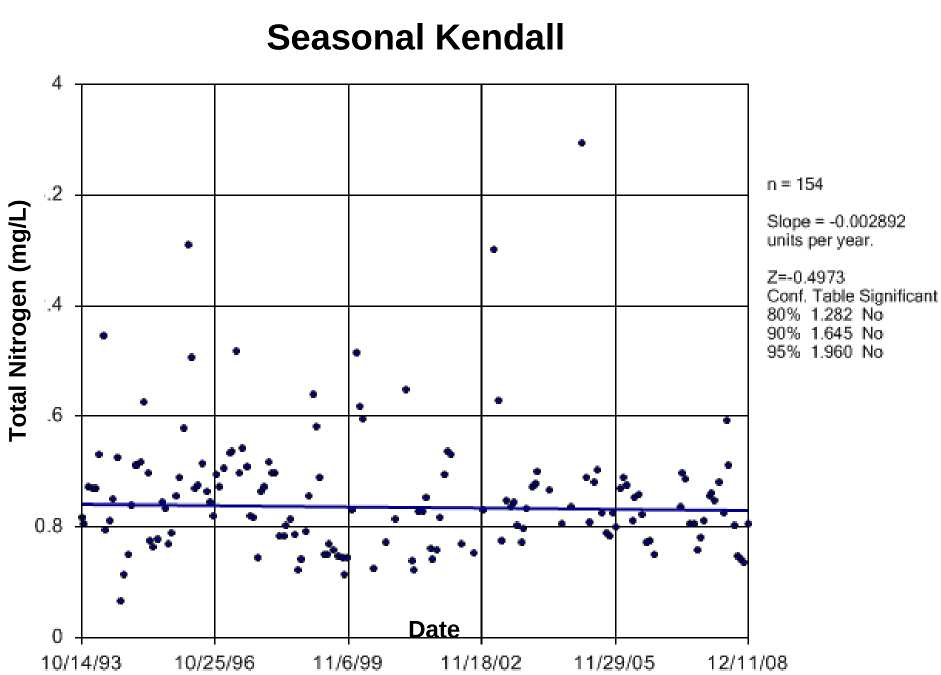

Figure 8-c6: Beaver River Total Nitrogen

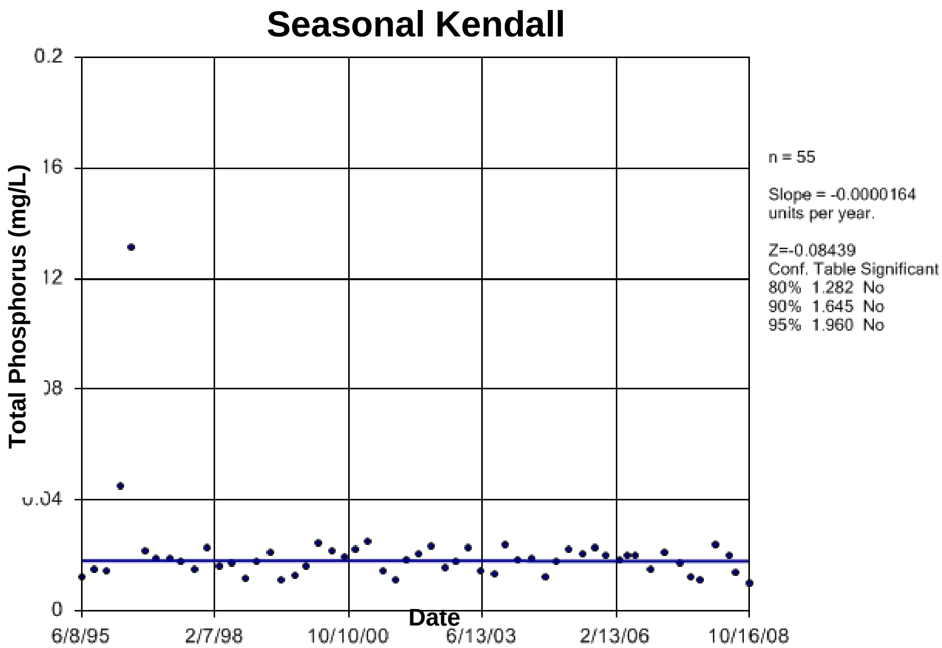

Figure 8-c7: Cold River Total Phosphorus

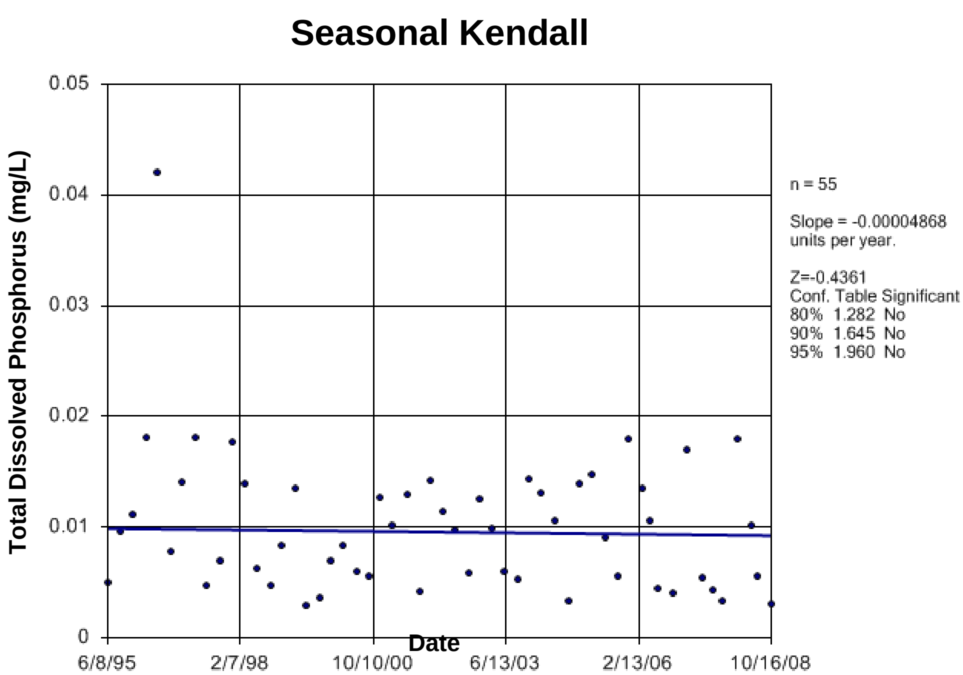

Figure 8-c8: Cold River Total Dissolved Phosphorus

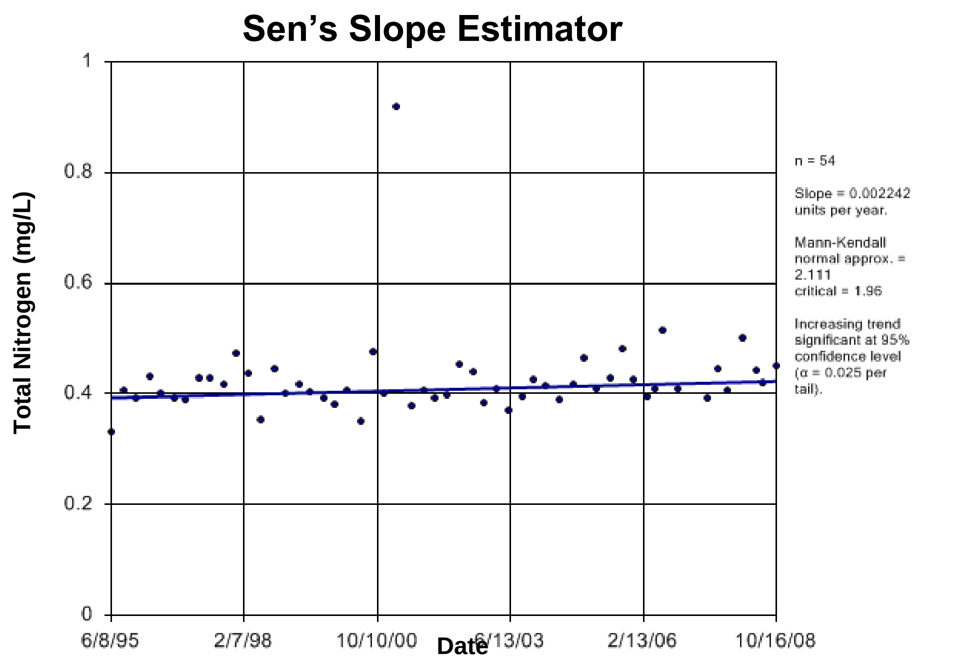

Figure 8-c9: Cold River Total Nitrogen

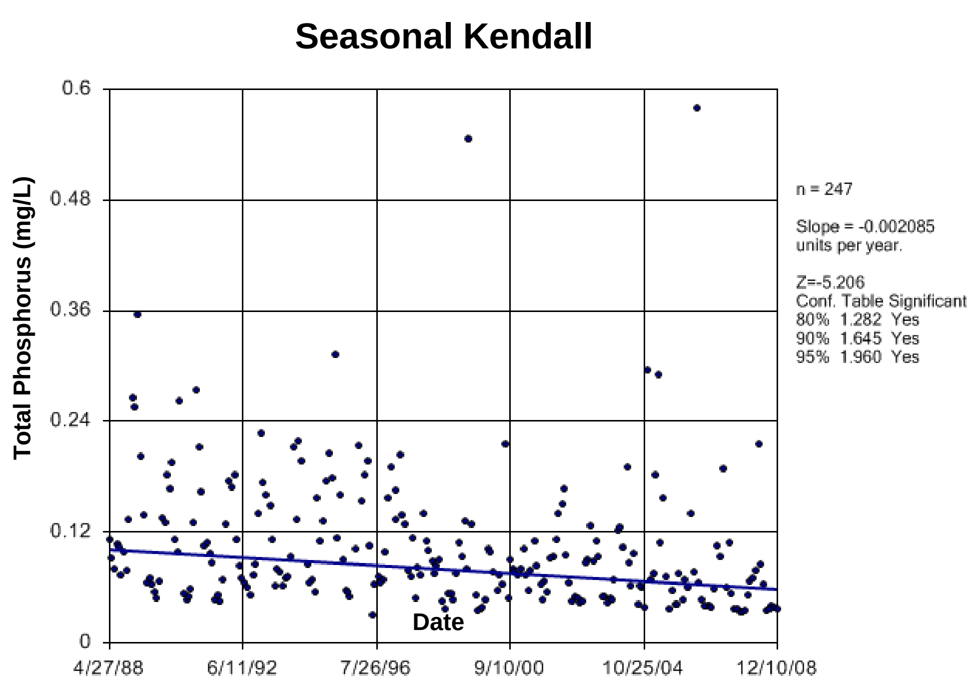

Figure 8-c10: North Saskatchewan River Total Phosphorus

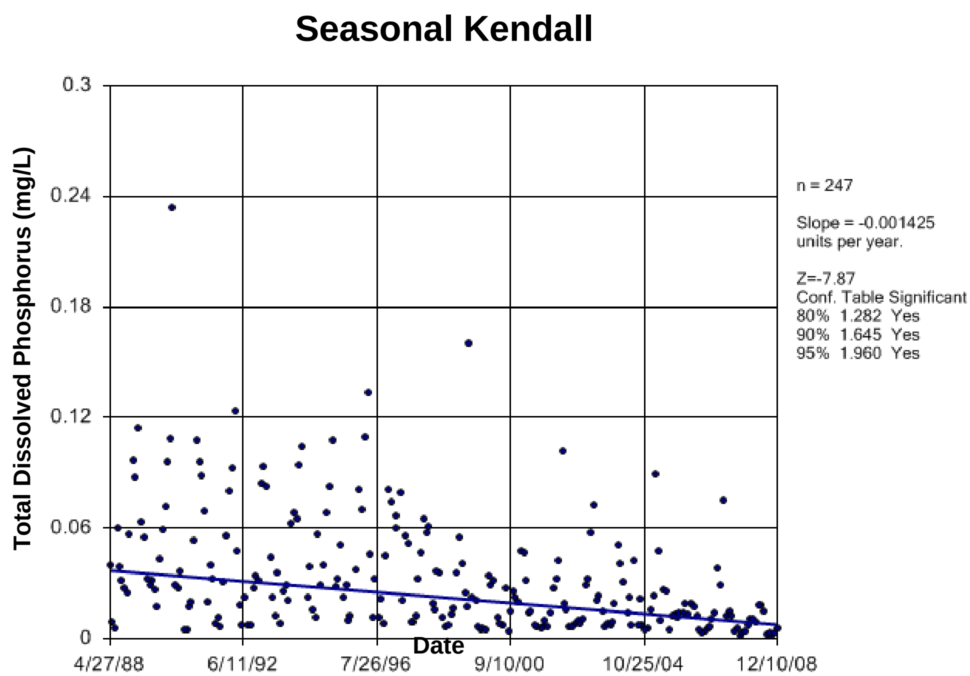

Figure 8-c11: North Saskatchewan Total Dissolved Phosphorus

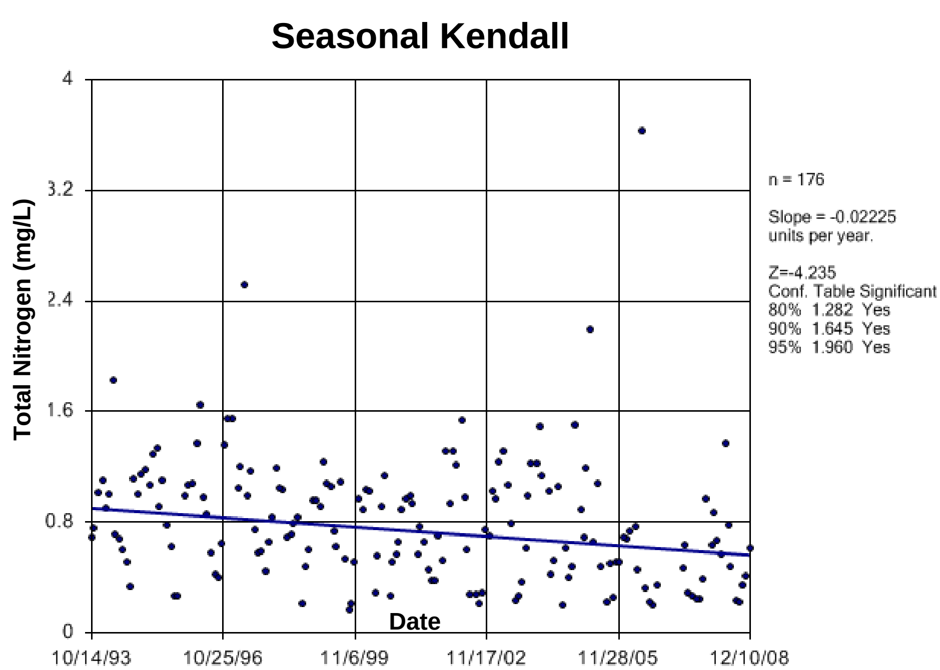

Figure 8-c12: North Saskatchewan Total Nitrogen

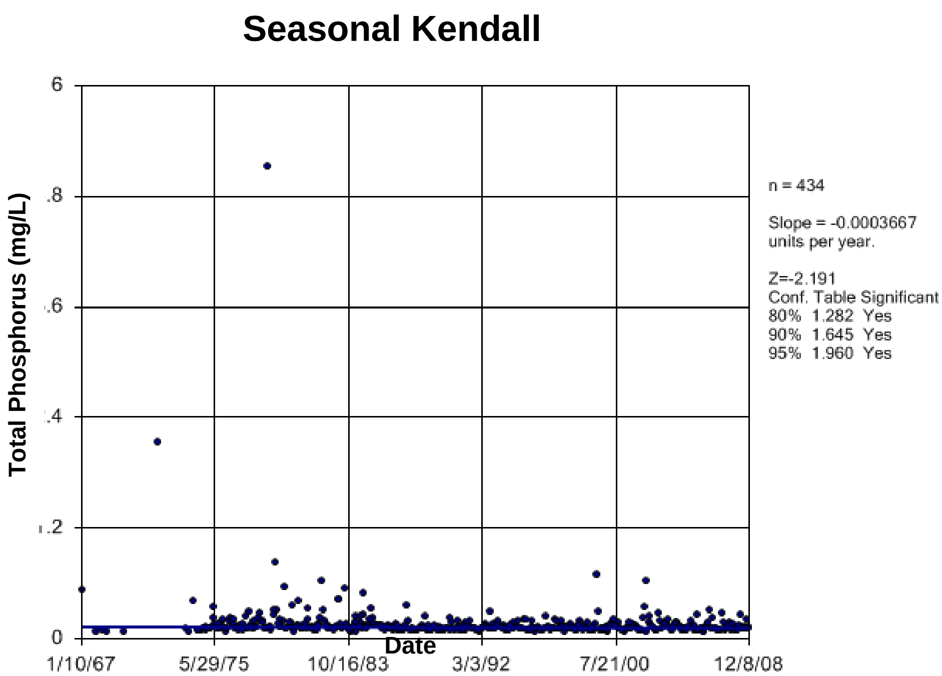

Figure 8-c13: Red Deer River (AB-SK) Total Phosphorus

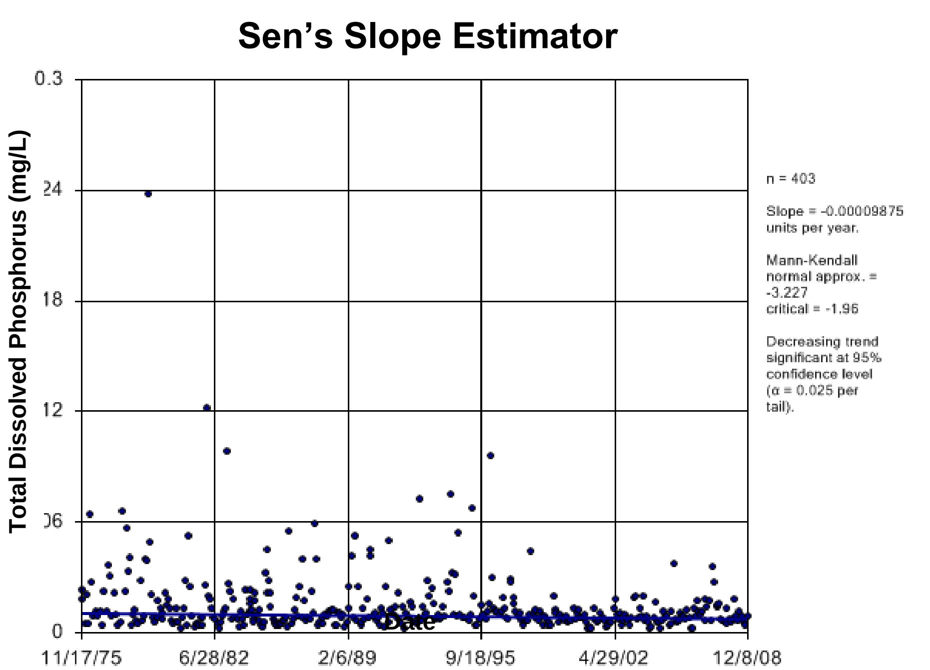

Figure 8-c14: Red Deer River (AB-SK) Total Dissolved Phosphorus

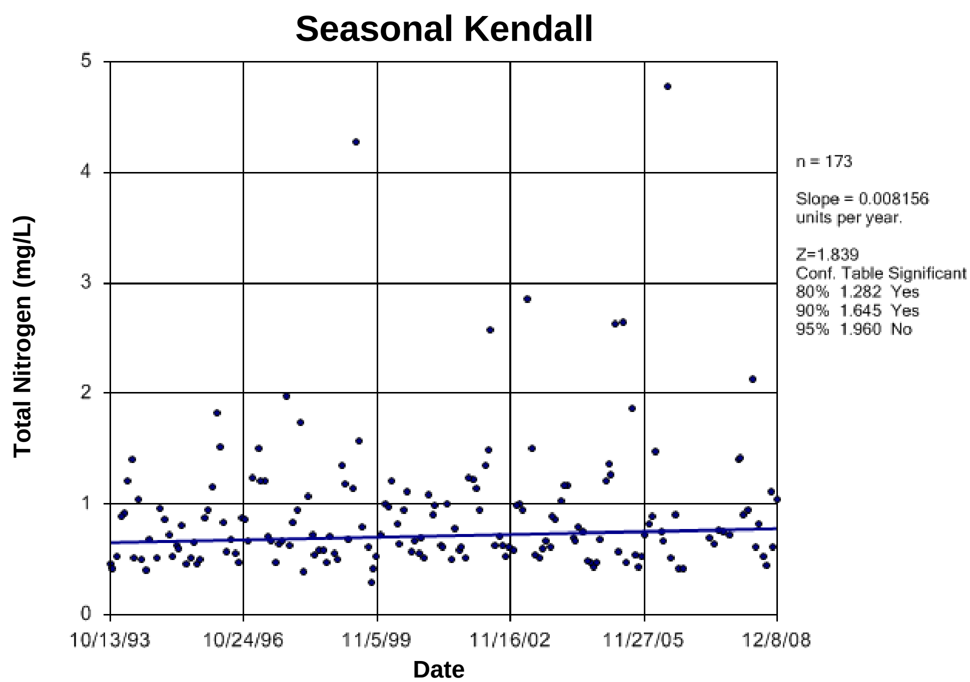

Figure 8-c15: Red Deer River (AB-SK) Total Nitrogen

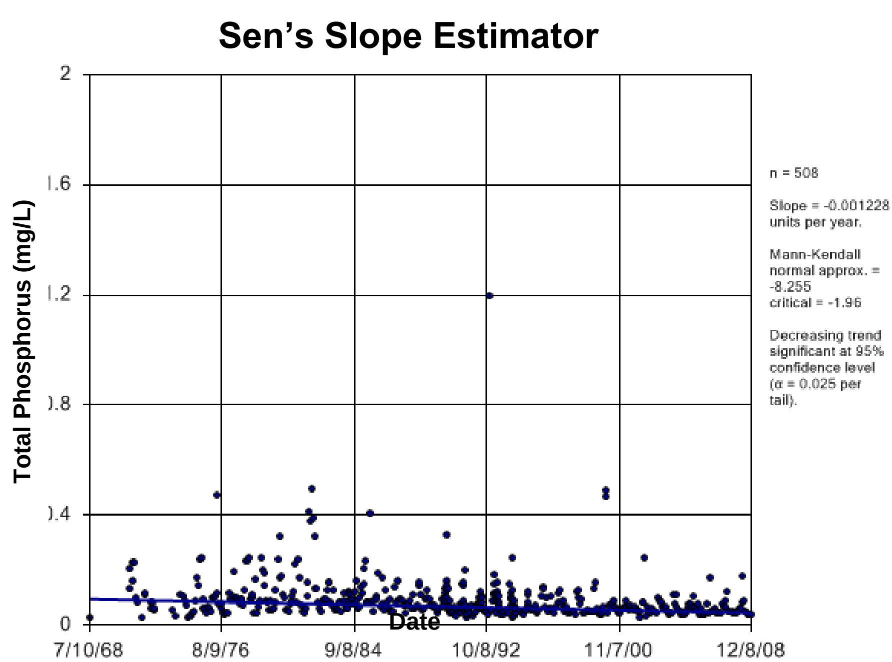

Figure 8-c16: South Saskatchewan River Total Phosphorus

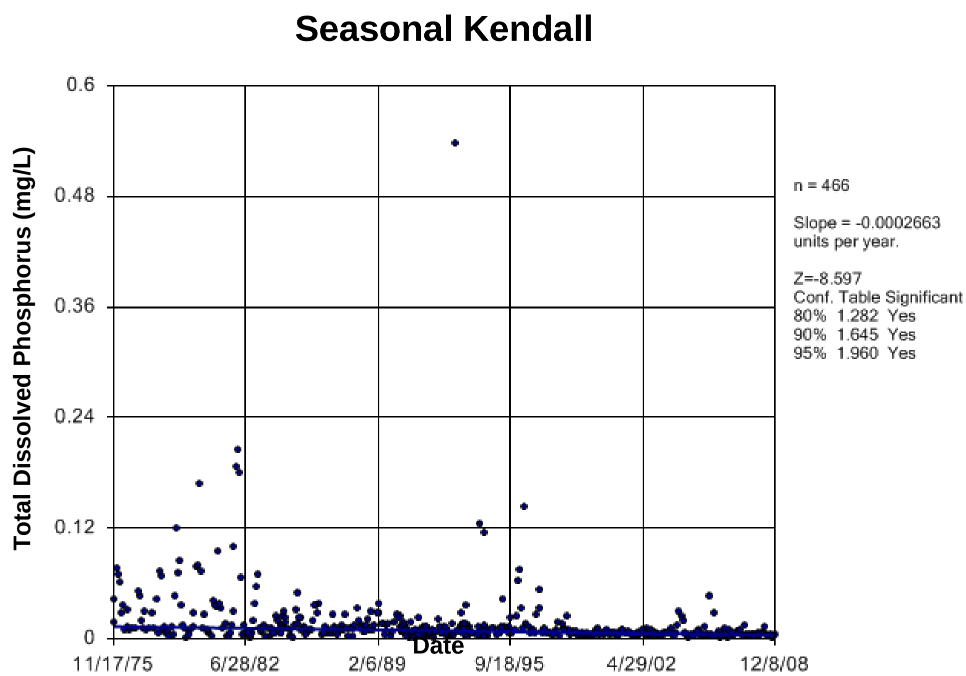

Figure 8-c17: South Saskatchewan River Total Dissolved Phosphorus

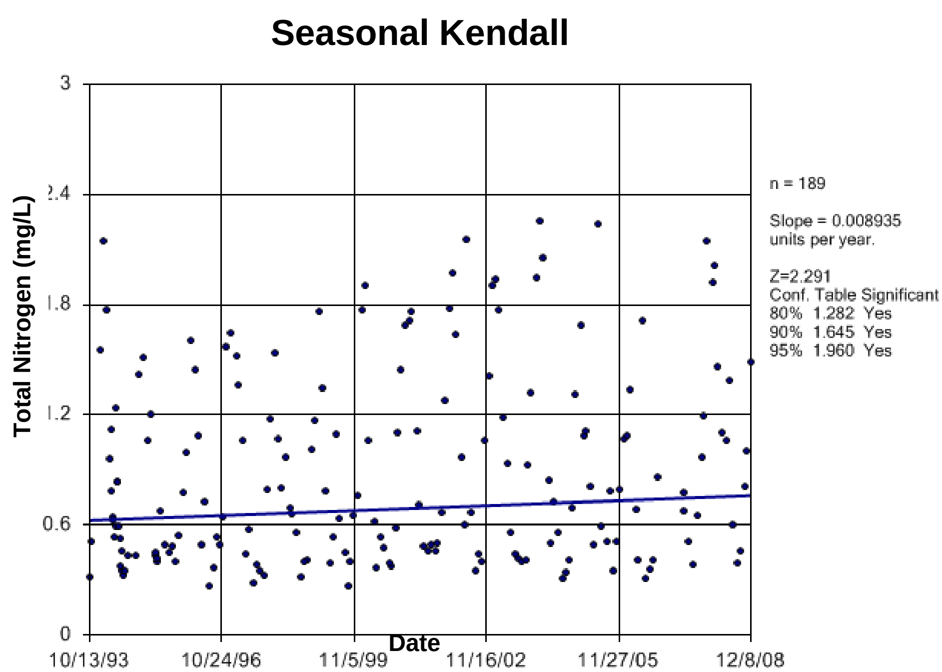

Figure 8-c18: South Saskatchewan River Total Nitrogen

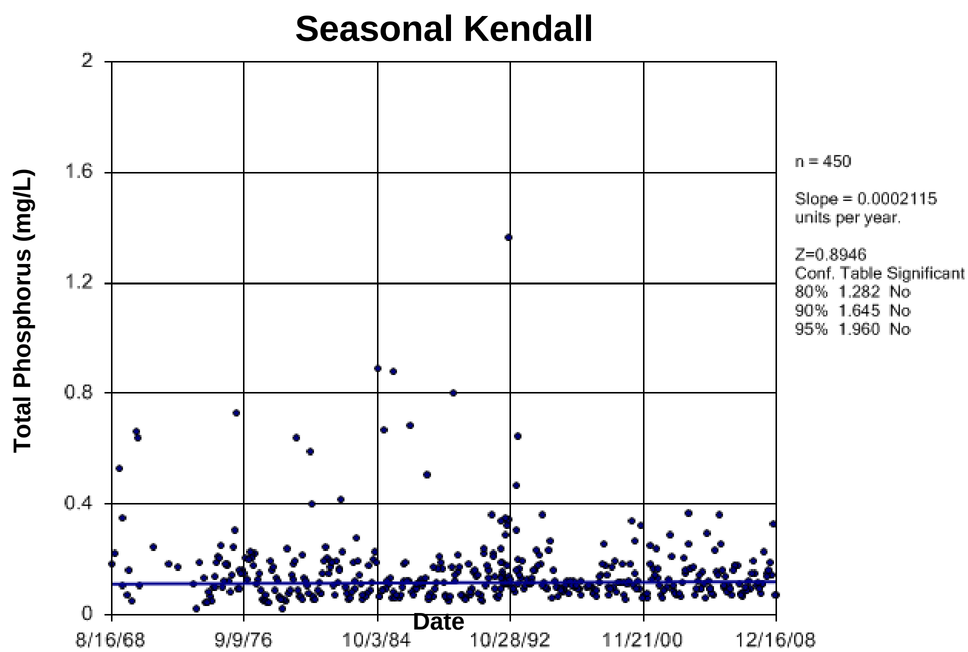

Figure 8-c19: Assiniboine River Total Phosphorus

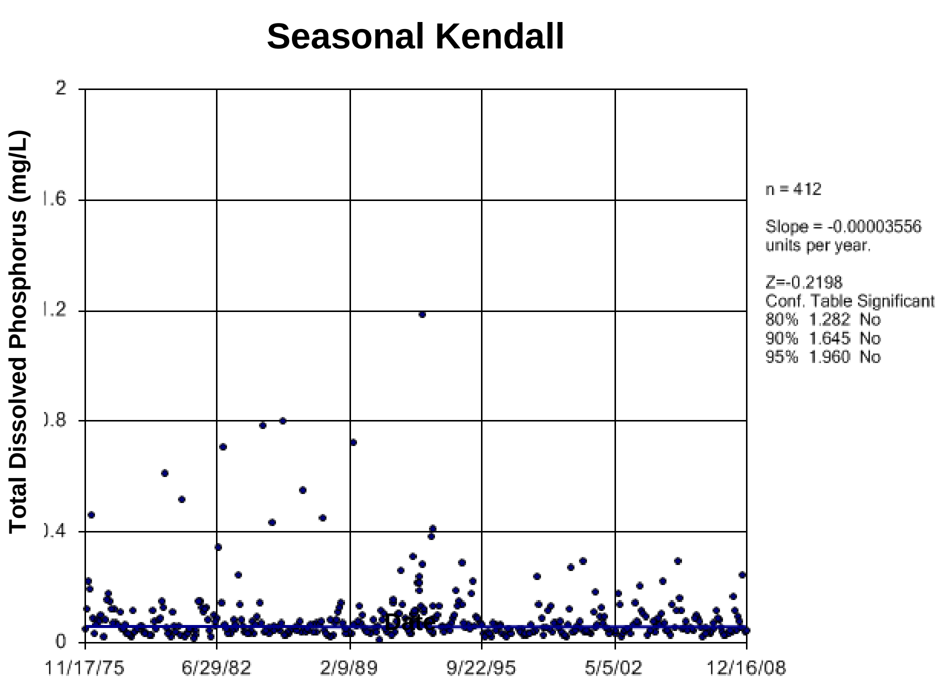

Figure 8-c20: Assiniboine River Total Dissolved Phosphorus

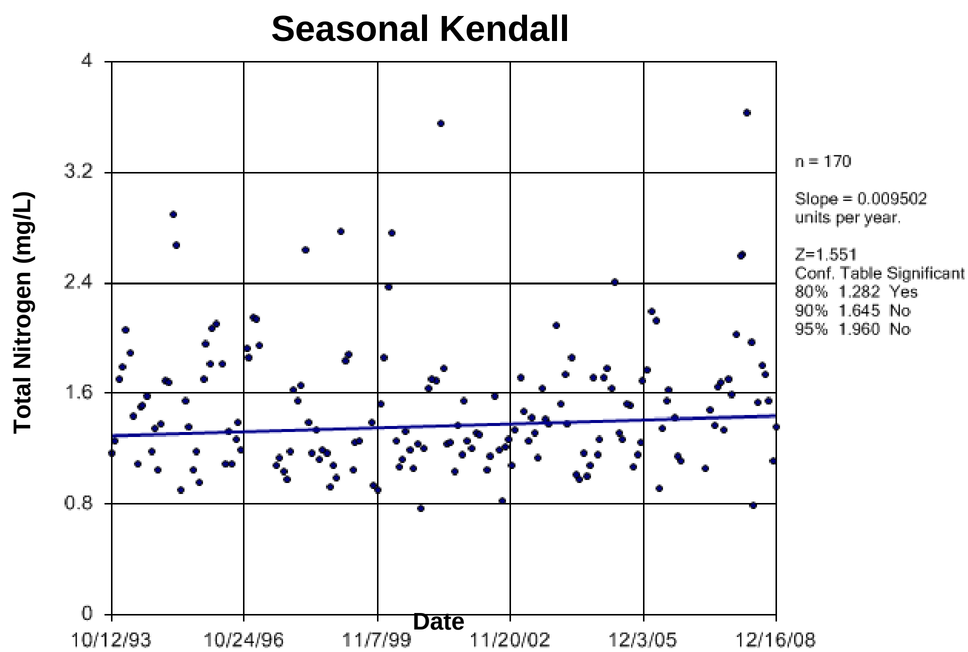

Figure 8-c21: Assiniboine River Total Nitrogen

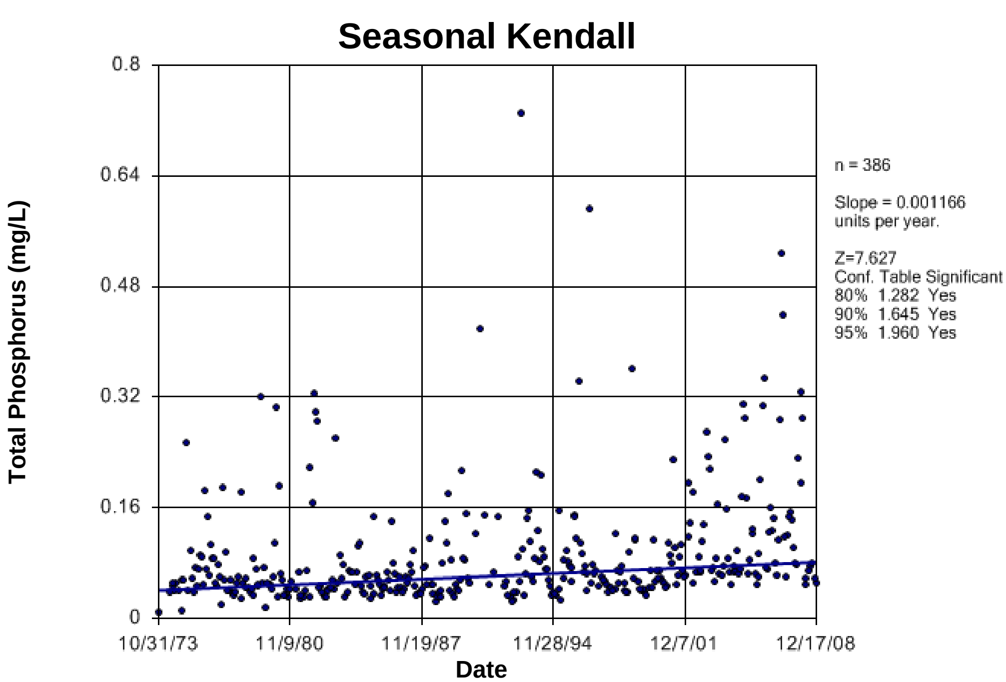

Figure 8-c22: Carrot River Total Phosphorus

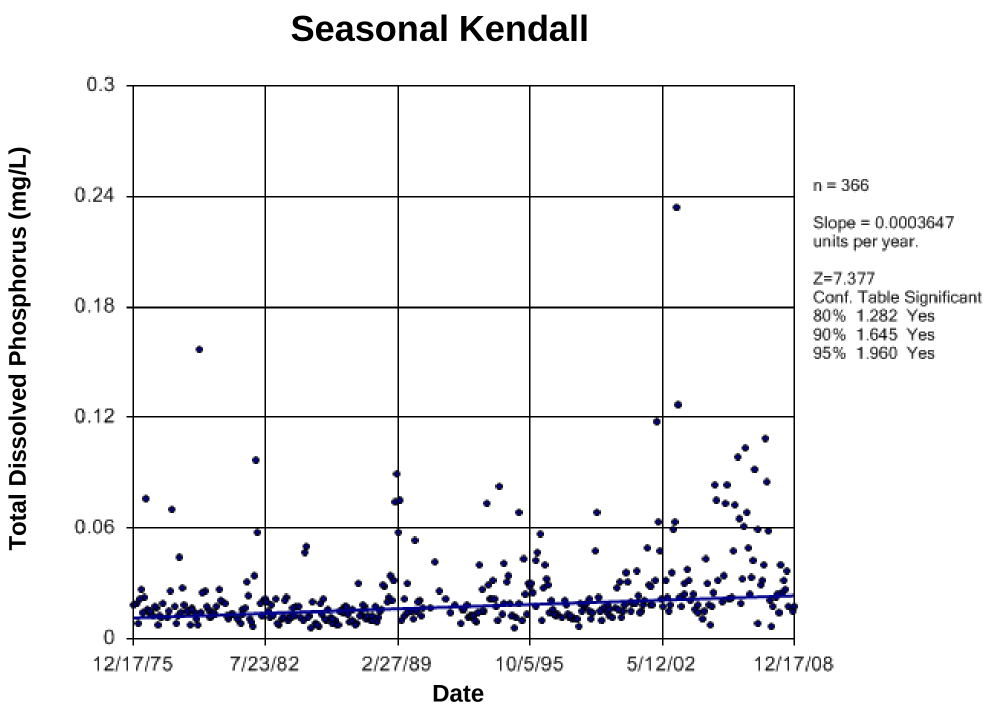

Figure 8-c23: Carrot River Total Dissolved Phosphorus

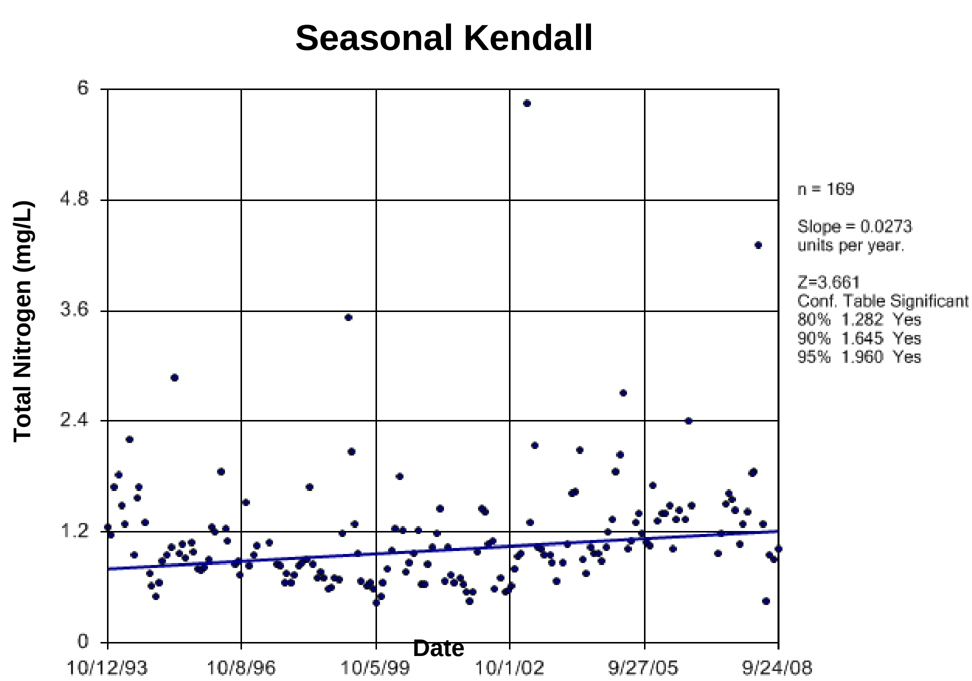

Figure 8-c24: Carrot River Total Nitrogen

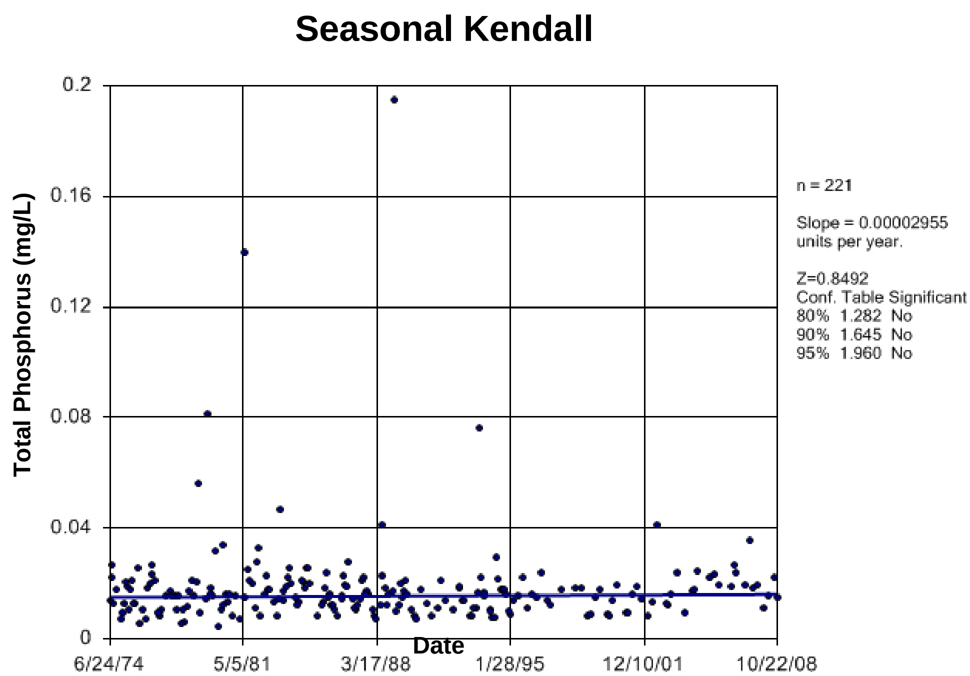

Figure 8-c25: Churchill River Total Phosphorus

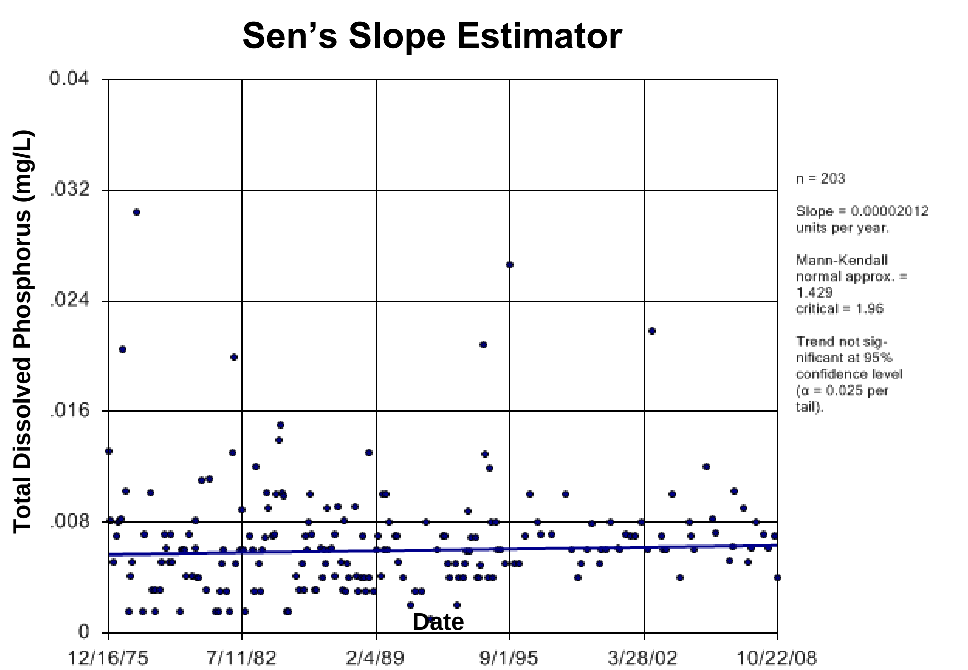

Figure 8-c26: Churchill River Total Dissolved Phosphorus

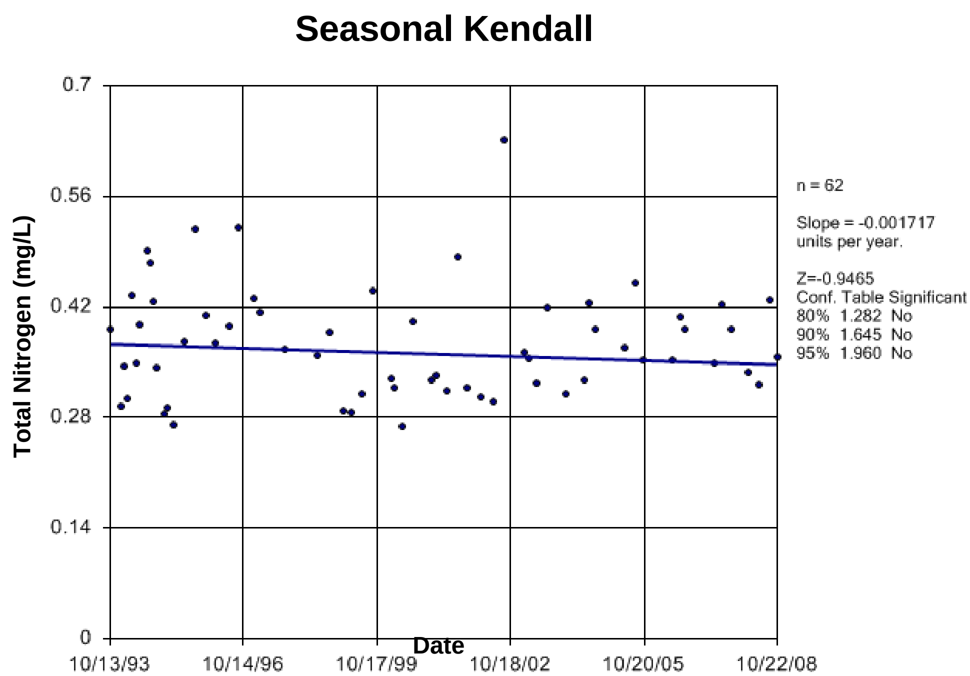

Figure 8-c27: Churchill River Total Nitrogen

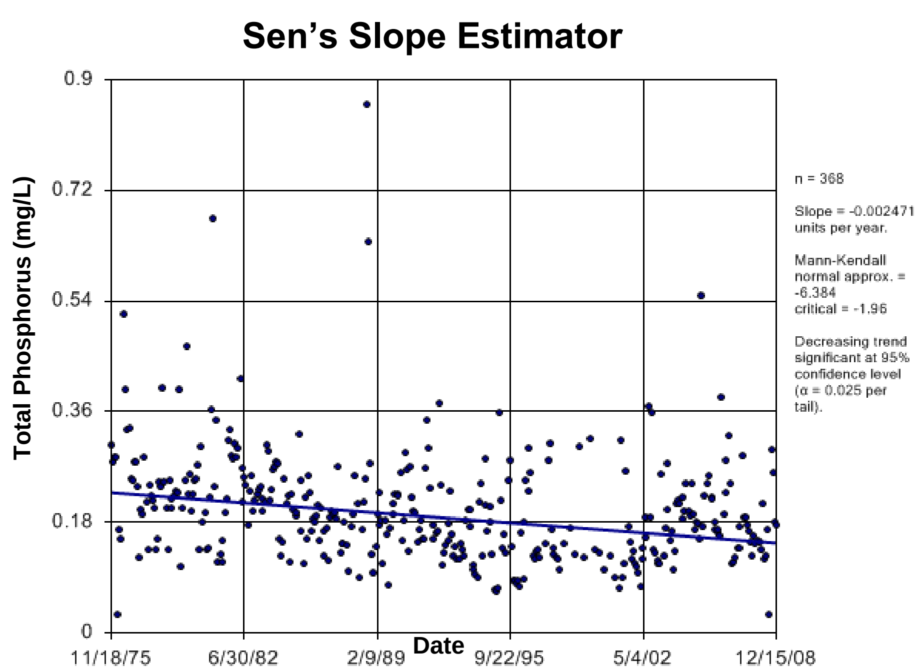

Figure 8-c28: Qu'Appelle River Total Phosphorus

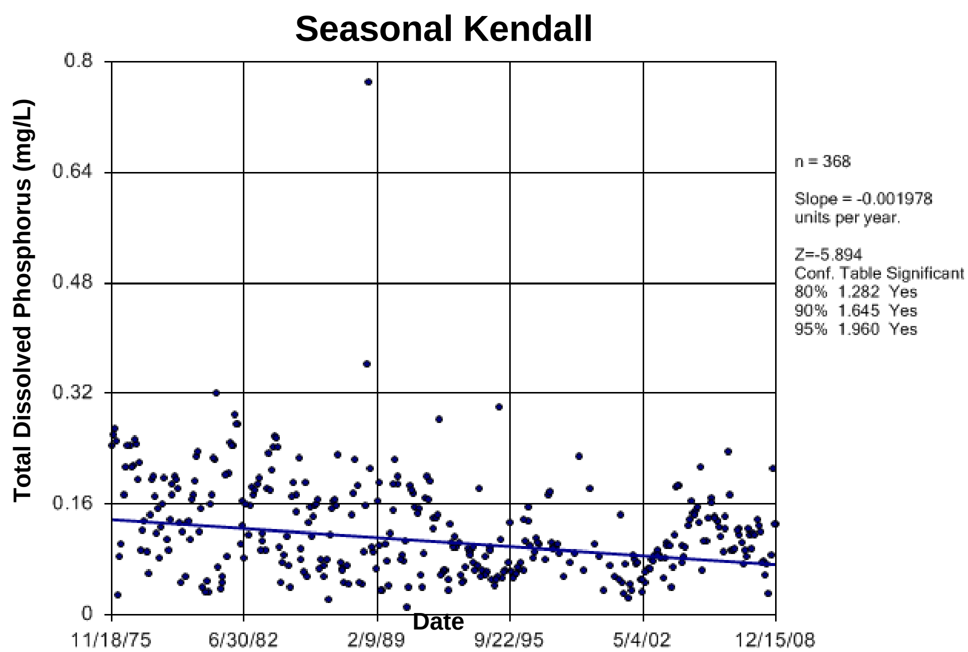

Figure 8-c29: Qu'Appelle River Total Dissolved Phosphorus

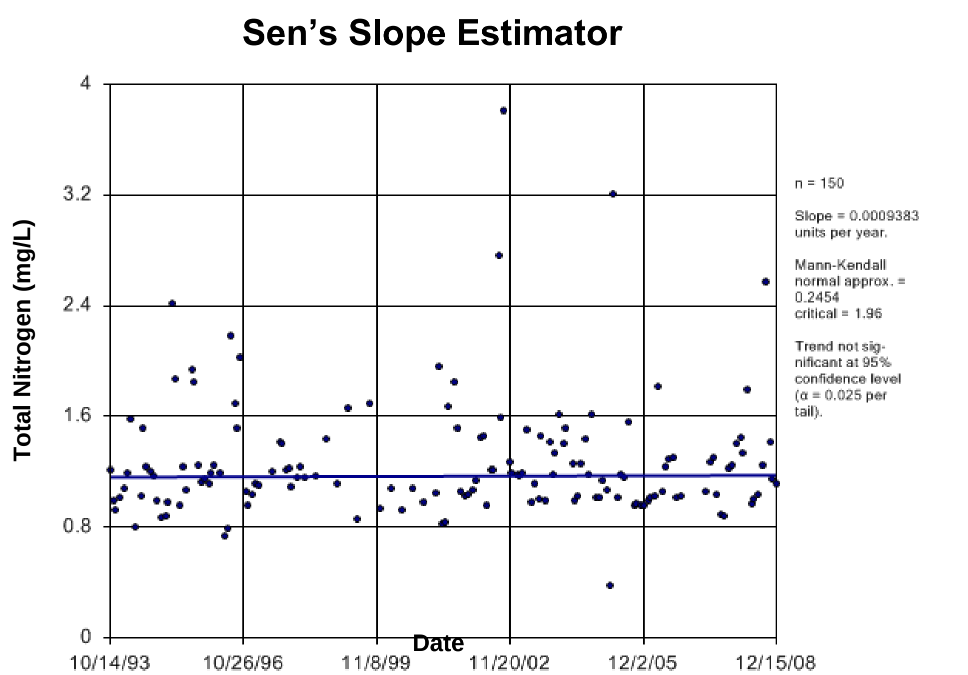

Figure 8-c30: Qu'Appelle River Total Nitrogen

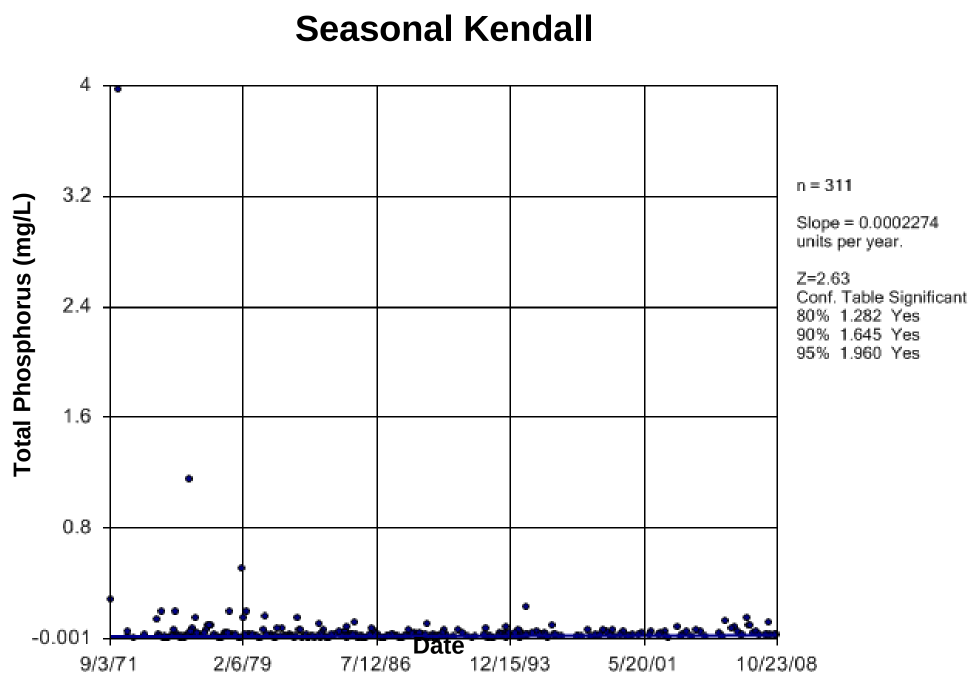

Figure 8-c31: Red Deer River (SK-MB) Total Phosphorus

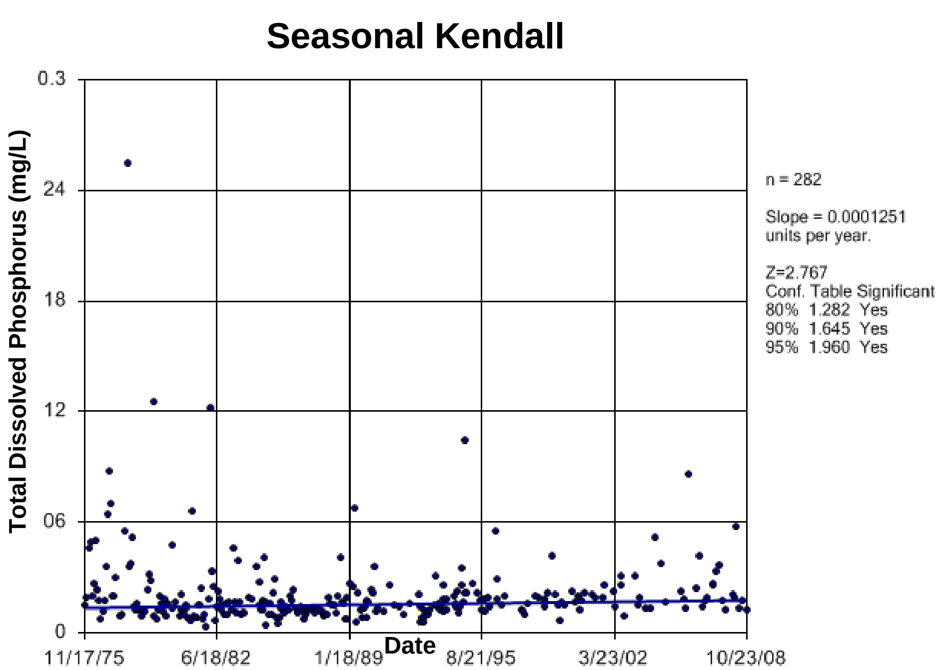

Figure 8-c32: Red Deer River (SK-MB) Total Dissolved Phosphorus

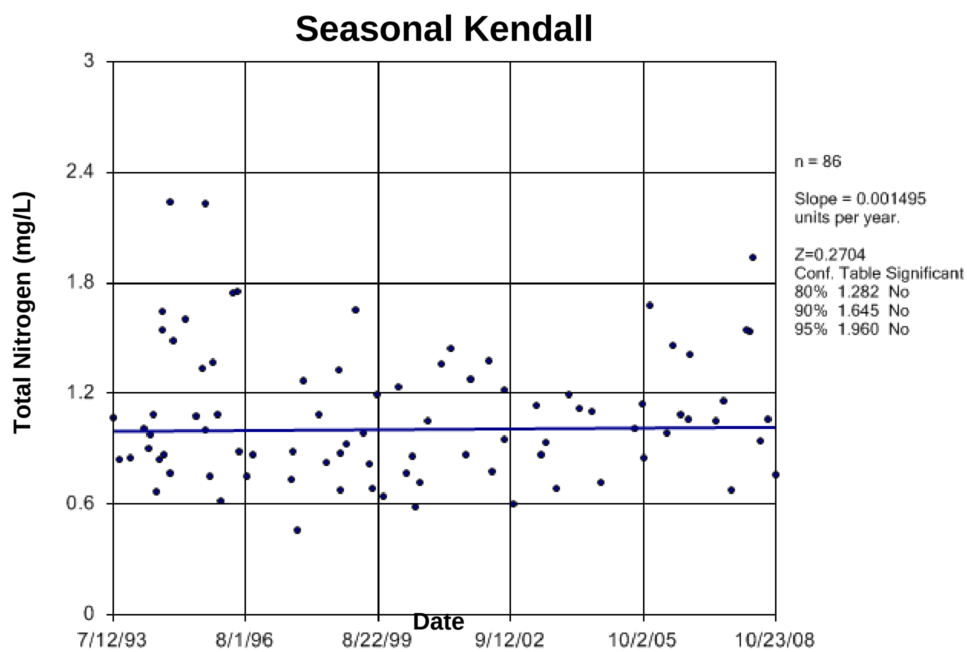

Figure 8-c33: Red Deer River (SK-MB) Total Nitrogen

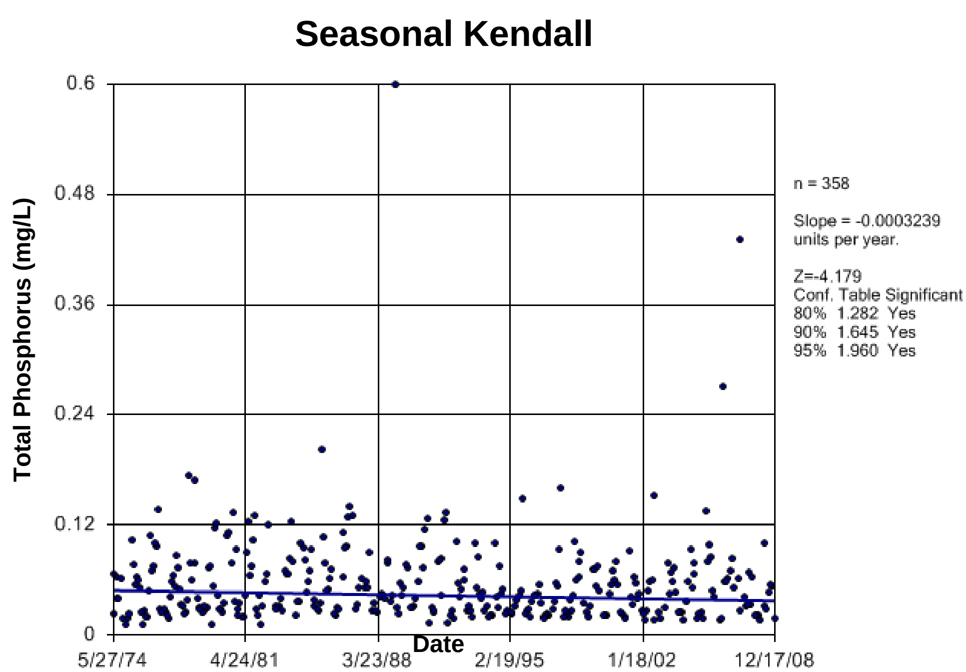

Figure 8-c34: Saskatchewan River Total Phosphorus

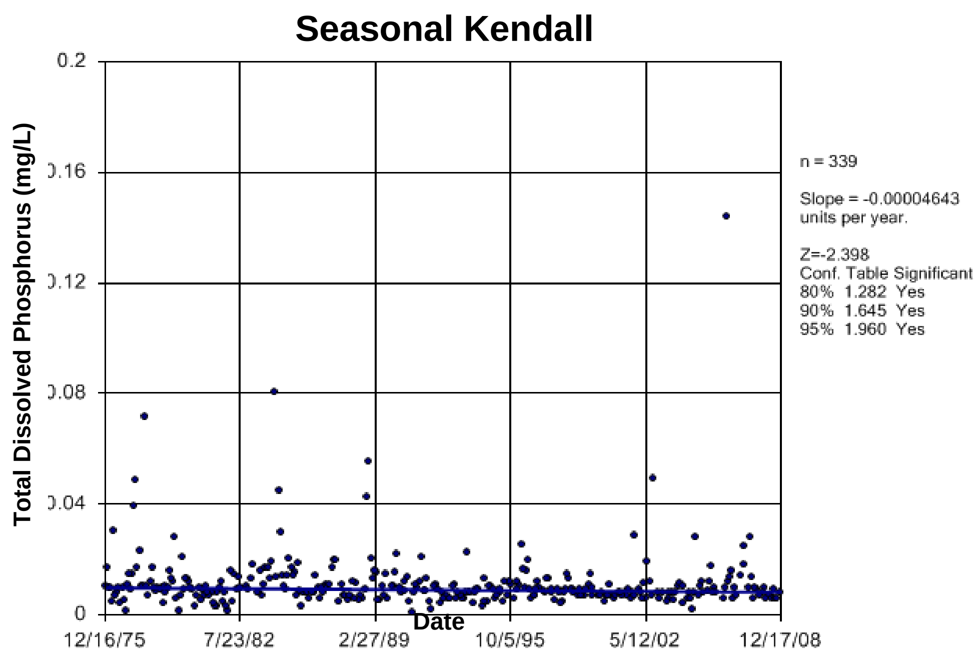

Figure 8-c35: Saskatchewan River Total Dissolved Phosphorus

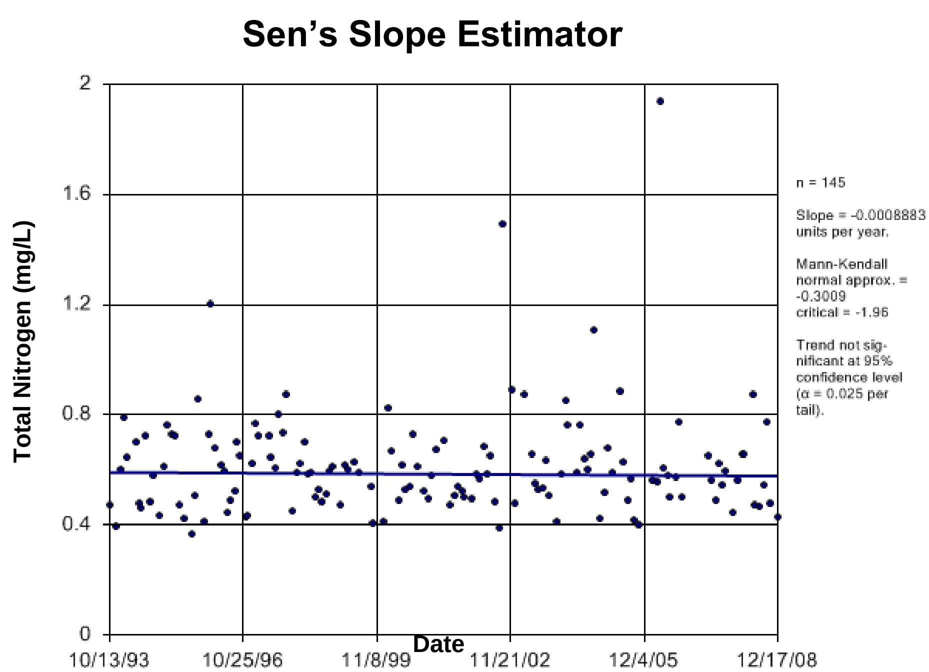

Figure 8-c36: Saskatchewan River Total Nitrogen

Appendix 8-d: Trending Summary Tables

Table 8-d1: Total Phosphorus Trend Analysis Summary

Trend Analysis Summary – Flow Weighted Concentration Trend				
Total Phosphorus				
	Z Critical = 1.960			
River	n	Z Calc	p<0.05	Slope units/yr
Battle	420	5.886	Sig	0.0008223
Beaver	384	-1.595	Not Sig	-0.0002472
Cold	55	-0.08439	Not Sig	-0.0000164
North Saskatchewan	247	-5.206	Sig	-0.002085
Red Deer (AB-SK)	434	-2.191	Sig	-0.0003667
South Saskatchewan	508	-8.255	Sig	-0.001228
Assiniboine	450	0.8946	Not Sig	0.0002115
Carrot	386	7.627	Sig	0.001166
Churchill	221	0.8492	Not Sig	0.00002955
Qu'Appelle	368	-6.384	Sig	-0.002471
Red Deer (SK-MB)	311	2.63	Sig	0.0002274
Saskatchewan	358	-4.179	Sig	-0.0003239

Value: no seasonality

Table 8-d2: Total Dissolved Phosphorus Trend Analysis Summary

Trend Analysis Summary – Flow Weighted Concentration Trend				
Total Dissolved Phosphorus				
	Z Critical = 1.960			
River	n	Z Calc	p<0.05	Slope units/yr
Battle	393	0.7233	Not Sig	0.00003676
Beaver	356	-7.497	Sig	-0.0004983
Cold	55	-0.4361	Not Sig	-0.0004868
North Saskatchewan	247	-7.87	Sig	-0.001425
Red Deer (AB-SK)	403	-3.227	Sig	-0.00009875
South Saskatchewan	466	-8.597	Sig	-0.0002663
Assiniboine	412	-0.2198	Not Sig	-0.00003556
Carrot	368	7.377	Sig	0.0003647
Churchill	203	1.429	Not Sig	0.00002012
Qu'Appelle	368	-5.894	Sig	-0.001978
Red Deer (SK-MB)	282	2.767	Sig	0.0001251
Saskatchewan	339	-2.398	Sig	-0.00004643

Value: no seasonality

Table 8-d3: Total Nitrogen Trend Analysis Summary

Trend Analysis Summary – Flow Weighted Concentration Trend				
Total Nitrogen				
	Z Critical = 1.960			
River	n	Z Calc	p<0.05	Slope units/yr
Battle	176	-0.9634	Not Sig	-0.006245
Beaver	154	-0.4973	Not Sig	-0.002892
Cold	54	2.111	Sig	0.002242
North Saskatchewan	176	-4.235	Sig	-0.02225
Red Deer (AB-SK)	173	1.839	Not Sig	0.008156
South Saskatchewan	189	2.291	Sig	0.008935
Assiniboine	170	1.551	Not Sig	0.009502
Carrot	169	3.661	Sig	0.0273
Churchill	62	-0.9465	Not Sig	-0.001717
Qu'Appelle	150	0.2454	Not Sig	0.0009383
Red Deer (SK-MB)	86	0.2704	Not Sig	0.001495
Saskatchewan	145	-0.3009	Not Sig	-0.0008883

Value: no seasonality

Appendix 8-e: Rolling 10-Year 90th Percentiles of Nutrient Data

Table 8-e1: Battle River 90th Percentiles

Battle River - 90th Percentiles						
Date	Total Phosphorus (mg/L)		Total Dissolved Phosphorus (mg/L)		Total Nitrogen (mg/L)	
	Summer	Winter	Summer	Winter	Summer	Winter
1974-1983	0.366	0.097	-	-	-	-
1975-1984	0.358	0.096	0.055	0.050	-	-
1976-1985	0.375	0.096	0.054	0.049	-	-
1977-1986	0.435	0.118	0.055	0.051	-	-
1978-1987	0.432	0.118	0.056	0.049	-	-
1979-1988	0.394	0.087	0.054	0.041	-	-
1980-1989	0.394	0.077	0.054	0.034	-	-
1981-1990	0.394	0.082	0.054	0.041	-	-
1982-1991	0.394	0.075	0.056	0.041	-	-
1983-1992	0.344	0.076	0.056	0.048	-	-
1984-1993	0.326	0.076	0.057	0.048	-	-
1985-1994	0.326	0.081	0.064	0.040	-	-
1986-1995	0.310	0.081	0.065	0.040	-	-
1987-1996	0.320	0.081	0.063	0.039	-	-
1988-1997	0.327	0.081	0.054	0.039	-	-
1989-1998	0.327	0.094	0.060	0.035	-	-
1990-1999	0.335	0.094	0.053	0.035	-	-
1991-2000	0.327	0.077	0.047	0.031	-	-
1992-2001	0.327	0.076	0.046	0.031	-	-
1993-2002	0.308	0.076	0.046	0.033	2.770	1.470
1994-2003	0.308	0.125	0.044	0.040	2.875	1.574
1995-2004	0.289	0.098	0.041	0.042	2.555	1.574
1996-2005	0.315	0.140	0.041	0.088	2.740	1.615
1997-2006	0.267	0.140	0.041	0.064	1.820	1.588
1998-2007	0.267	0.140	0.042	0.070	1.652	1.610
1999-2008	0.294	0.136	0.045	0.070	2.041	1.579
MIN	**0.267**	**0.075**	**0.041**	**0.031**	**1.652**	**1.470**

Table 8-e2: Beaver River 90th Percentiles

Beaver River - 90th Percentiles						
Date	Total Phosphorus (mg/L)		Total Dissolved Phosphorus (mg/L)		Total Nitrogen (mg/L)	
	Summer	Winter	Summer	Winter	Summer	Winter
1974-1983	0.190	0.093	-	-	-	-
1975-1984	0.205	0.100	0.091	0.069	-	-
1976-1985	0.218	0.151	0.080	0.067	-	-
1977-1986	0.210	0.151	0.085	0.071	-	-
1978-1987	0.204	0.151	0.079	0.059	-	-
1979-1988	0.204	0.158	0.077	0.071	-	-
1980-1989	0.204	0.154	0.066	0.069	-	-
1981-1990	0.201	0.162	0.068	0.072	-	-
1982-1991	0.210	0.138	0.064	0.064	-	-
1983-1992	0.186	0.182	0.067	0.077	-	-
1984-1993	0.186	0.277	0.064	0.082	-	-
1985-1994	0.186	0.226	0.067	0.085	-	-
1986-1995	0.160	0.182	0.068	0.084	-	-
1987-1996	0.159	0.182	0.061	0.084	-	-
1988-1997	0.159	0.182	0.061	0.084	-	-
1989-1998	0.145	0.140	0.059	0.045	-	-
1990-1999	0.145	0.140	0.059	0.045	-	-
1991-2000	0.137	0.215	0.058	0.086	-	-
1992-2001	0.135	0.206	0.056	0.079	-	-
1993-2002	0.137	0.166	0.050	0.050	1.147	1.862
1994-2003	0.149	0.118	0.050	0.043	1.175	1.890
1995-2004	0.139	0.113	0.050	0.042	1.140	1.897
1996-2005	0.158	0.122	0.052	0.045	1.112	2.090
1997-2006	0.136	0.122	0.052	0.044	1.070	1.934
1998-2007	0.137	0.122	0.043	0.044	1.025	1.957
1999-2008	0.137	0.118	0.043	0.044	1.080	1.957
MIN	**0.135**	**0.093**	**0.043**	**0.0421**	**1.025**	**1.862**

Table 8-e3: Cold River 90th Percentiles

Cold River - 90th Percentiles						
Date	Total Phosphorus (mg/L)		Total Dissolved Phosphorus (mg/L)		Total Nitrogen (mg/L)	
	Summer	Winter	Summer	Winter	Summer	Winter
1995-2004	0.023	0.024	0.012	0.017	0.453	0.459
1996-2005	0.023	0.024	0.012	0.017	0.462	0.459
1997-2006	0.022	0.024	0.010	0.017	0.475	0.459
1998-2007	0.022	0.024	0.010	0.017	0.473	0.452
1999-2008	0.022	0.024	0.010	0.017	0.471	0.490
MIN	**0.022**	**0.024**	**0.010**	**0.017**	**0.453**	**0.452**

Table 8-e4: North Saskatchewan River 90th Percentiles

North Saskatchewan River - 90th Percentiles						
Date	Total Phosphorus (mg/L)		Total Dissolved Phosphorus (mg/L)		Total Nitrogen (mg/L)	
	Summer	Winter	Summer	Winter	Summer	Winter
1988-1997	0.269	0.125	0.060	0.111	-	-
1989-1998	0.278	0.124	0.056	0.111	-	-
1990-1999	0.301	0.121	0.056	0.107	-	-
1991-2000	0.288	0.121	0.049	0.103	-	-
1992-2001	0.268	0.106	0.046	0.098	-	-
1993-2002	0.268	0.104	0.049	0.093	1.236	1.246
1994-2003	0.268	0.095	0.056	0.088	1.260	1.233
1995-2004	0.253	0.094	0.046	0.084	1.209	1.334
1996-2005	0.264	0.090	0.045	0.078	1.210	1.330
1997-2006	0.297	0.080	0.039	0.062	1.210	1.196
1998-2007	0.297	0.073	0.031	0.058	1.169	1.175
1999-2008	0.335	0.063	0.026	0.048	1.189	1.175
MIN	**0.253**	**0.063**	**0.026**	**0.048**	**1.169**	**1.175**

Table 8-e5: Red Deer River (AB-SK) 90th Percentiles

Red Deer River (AB-SK) - 90th Percentiles						
Date	Total Phosphorus (mg/L)		Total Dissolved Phosphorus (mg/L)		Total Nitrogen (mg/L)	
	Summer	Winter	Summer	Winter	Summer	Winter
1974-1983	0.680	0.060	-	-	-	-
1975-1984	0.656	0.074	0.031	0.040	-	-
1976-1985	0.648	0.096	0.031	0.035	-	-
1977-1986	0.614	0.122	0.030	0.044	-	-
1978-1987	0.670	0.122	0.031	0.036	-	-
1979-1988	0.565	0.122	0.028	0.036	-	-
1980-1989	0.565	0.093	0.032	0.278	-	-
1981-1990	0.458	0.119	0.036	0.032	-	-
1982-1991	0.421	0.093	0.036	0.032	-	-
1983-1992	0.397	0.101	0.04	0.028	-	-
1984-1993	0.377	0.074	0.043	0.024	-	-
1985-1994	0.364	0.101	0.048	0.028	-	-
1986-1995	0.336	0.082	0.057	0.025	-	-
1987-1996	0.323	0.082	0.063	0.020	-	-
1988-1997	0.315	0.082	0.063	0.022	-	-
1989-1998	0.315	0.082	0.063	0.026	-	-
1990-1999	0.341	0.082	0.045	0.026	-	-
1991-2000	0.325	0.069	0.040	0.022	-	-
1992-2001	0.325	0.069	0.040	0.021	-	-
1993-2002	0.341	0.060	0.031	0.021	1.934	0.838
1994-2003	0.495	0.069	0.036	0.018	2.112	0.835
1995-2004	0.491	0.038	0.023	0.010	2.098	0.823
1996-2005	0.551	0.446	0.024	0.009	2.596	0.846
1997-2006	0.551	0.035	0.265	0.009	2.596	0.848
1998-2007	0.615	0.035	0.027	0.009	2.463	0.832
1999-2008	0.725	0.036	0.027	0.008	2.642	0.852
MIN	**0.315**	**0.035**	**0.023**	**0.0075**	**1.934**	**0.823**

Table 8-e6: South Saskatchewan River 90th Percentiles

South Saskatchewan River - 90th Percentiles						
Date	Total Phosphorus (mg/L)		Total Dissolved Phosphorus (mg/L)		Total Nitrogen (mg/L)	
	Summer	Winter	Summer	Winter	Summer	Winter
1974-1983	0.284	0.190	-	-	-	-
1975-1984	0.277	0.190	0.032	0.115	-	-
1976-1985	0.268	0.190	0.031	0.107	-	-
1977-1986	0.256	0.190	0.027	0.105	-	-
1978-1987	0.284	0.208	0.026	0.102	-	-
1979-1988	0.210	0.190	0.025	0.102	-	-
1980-1989	0.210	0.160	0.025	0.086	-	-
1981-1990	0.204	0.138	0.019	0.076	-	-
1982-1991	0.244	0.114	0.020	0.051	-	-
1983-1992	0.220	0.075	0.020	0.036	-	-
1984-1993	0.246	0.067	0.020	0.035	-	-
1985-1994	0.249	0.077	0.020	0.036	-	-
1986-1995	0.235	0.067	0.017	0.035	-	-
1987-1996	0.233	0.053	0.020	0.035	-	-
1988-1997	0.249	0.082	0.020	0.050	-	-
1989-1998	0.260	0.082	0.020	0.050	-	-
1990-1999	0.263	0.080	0.017	0.050	-	-
1991-2000	0.262	0.184	0.017	0.047	-	-
1992-2001	0.255	0.184	0.018	0.045	-	-
1993-2002	0.267	0.184	0.018	0.045	1.098	1.668
1994-2003	0.213	0.097	0.016	0.029	1.104	1.695
1995-2004	0.206	0.093	0.017	0.027	1.093	1.695
1996-2005	0.233	0.082	0.018	0.029	1.105	1.695
1997-2006	0.186	0.058	0.014	0.022	1.082	1.638
1998-2007	0.179	0.054	0.015	0.010	1.073	1.719
1999-2008	0.159	0.054	0.014	0.010	1.147	1.770
MIN	**0.159**	**0.053**	**0.014**	**0.010**	**1.073**	**1.638**

Table 8-e7: Assiniboine River 90th Percentiles

Assiniboine River - 90th Percentiles						
Date	Total Phosphorus (mg/L)		Total Dissolved Phosphorus (mg/L)		Total Nitrogen (mg/L)	
	Summer	Winter	Summer	Winter	Summer	Winter
1974-1983	0.322	0.200	0.150	0.168	~	~
1975-1984	0.342	0.200	0.153	0.159	~	~
1976-1985	0.342	0.205	0.156	0.172	~	~
1977-1986	0.356	0.180	0.238	0.120	~	~
1978-1987	0.372	0.135	0.314	0.064	~	~
1979-1988	0.372	0.150	0.314	0.075	~	~
1980-1989	0.378	0.135	0.378	0.064	~	~
1981-1990	0.334	0.135	0.310	0.073	~	~
1982-1991	0.328	0.102	0.306	0.064	~	~
1983-1992	0.341	0.102	0.241	0.071	~	~
1984-1993	0.354	0.125	0.227	0.080	~	~
1985-1994	0.346	0.134	0.236	0.080	~	~
1986-1995	0.330	0.134	0.233	0.080	~	~
1987-1996	0.316	0.134	0.213	0.080	~	~
1988-1997	0.313	0.134	0.197	0.080	~	~
1989-1998	0.318	0.129	0.218	0.079	~	~
1990-1999	0.313	0.143	0.197	0.096	~	~
1991-2000	0.313	0.175	0.218	0.118	~	~
1992-2001	0.312	0.175	0.220	0.118	~	~
1993-2002	0.297	0.175	0.185	0.118	1.648	2.252
1994-2003	0.291	0.157	0.164	0.103	1.658	2.278
1995-2004	0.261	0.157	0.157	0.103	1.600	2.278
1996-2005	0.282	0.136	0.161	0.079	1.568	2.192
1997-2006	0.282	0.136	0.161	0.079	1.603	2.196
1998-2007	0.278	0.155	0.160	0.093	1.730	2.073
1999-2008	0.278	0.155	0.179	0.093	1.815	2.343
MIN	**0.261**	**0.102**	**0.150**	**0.064**	**1.568**	**2.073**

Table 8-e8: Carrot River 90th Percentiles

Carrot River - 90th Percentiles						
Date	Total Phosphorus (mg/L)		Total Dissolved Phosphorus (mg/L)		Total Nitrogen (mg/L)	
	Summer	Winter	Summer	Winter	Summer	Winter
1974-1983	0.100	0.284	0.036	0.038	~	~
1975-1984	0.110	0.279	0.040	0.038	~	~
1976-1985	0.108	0.269	0.039	0.038	~	~
1977-1986	0.108	0.259	0.036	0.038	~	~
1978-1987	0.108	0.249	0.036	0.033	~	~
1979-1988	0.108	0.237	0.035	0.031	~	~
1980-1989	0.099	0.228	0.032	0.038	~	~
1981-1990	0.101	0.231	0.029	0.037	~	~
1982-1991	0.104	0.239	0.031	0.037	~	~
1983-1992	0.103	0.235	0.027	0.035	~	~
1984-1993	0.114	0.234	0.031	0.038	~	~
1985-1994	0.112	0.239	0.028	0.038	~	~
1986-1995	0.130	0.234	0.031	0.040	~	~
1987-1996	0.135	0.234	0.043	0.040	~	~
1988-1987	0.136	0.234	0.044	0.041	~	~
1989-1998	0.136	0.234	0.044	0.041	~	~
1990-1999	0.144	0.236	0.044	0.034	~	~
1991-2000	0.141	0.230	0.045	0.034	~	~
1992-2001	0.146	0.170	0.044	0.031	~	~
1993-2002	0.146	0.170	0.044	0.039	1.223	1.814
1994-2003	0.133	0.182	0.038	0.042	1.176	2.016
1995-2004	0.128	0.180	0.038	0.040	1.087	2.008
1996-2005	0.140	0.231	0.047	0.055	1.151	2.045
1997-2006	0.171	0.242	0.074	0.064	1.320	2.048
1998-2007	0.197	0.294	0.102	0.074	1.429	2.050
1999-2008	0.197	0.314	0.106	0.074	1.429	2.088
MIN	**0.099**	**0.170**	**0.027**	**0.031**	**1.087**	**1.814**

Table 8-e9: Churchill River 90th Percentiles

Churchill River - 90th Percentiles						
Date	Total Phosphorus (mg/L)		Total Dissolved Phosphorus (mg/L)		Total Nitrogen (mg/L)	
	Summer	Winter	Summer	Winter	Summer	Winter
1974-1983	0.025	0.032	0.010	0.013	~	~
1975-1984	0.025	0.031	0.012	0.013	~	~
1976-1985	0.025	0.031	0.011	0.011	~	~
1977-1986	0.026	0.031	0.010	0.011	~	~
1978-1987	0.026	0.031	0.010	0.011	~	~
1979-1988	0.026	0.032	0.010	0.011	~	~
1980-1989	0.026	0.030	0.010	0.011	~	~
1981-1990	0.025	0.031	0.010	0.011	~	~
1982-1991	0.024	0.031	0.010	0.011	~	~
1983-1992	0.024	0.017	0.010	0.010	~	~
1984-1993	0.025	0.015	0.010	0.009	~	~
1985-1994	0.024	0.015	0.010	0.008	~	~
1986-1995	0.023	0.015	0.012	0.008	~	~
1987-1996	0.023	0.016	0.012	0.008	~	~
1988-1997	0.024	0.016	0.013	0.008	~	~
1989-1998	0.023	0.016	0.012	0.007	~	~
1990-1999	0.024	0.015	0.013	0.007	~	~
1991-2000	0.024	0.015	0.013	0.007	~	~
1992-2001	0.024	0.014	0.013	0.007	~	~
1993-2002	0.029	0.014	0.020	0.008	0.508	0.415
1994-2003	0.026	0.015	0.021	0.008	0.506	0.413
1995-2004	0.024	0.014	0.016	0.008	0.510	0.414
1996-2005	0.024	0.014	0.011	0.008	0.500	0.421
1997-2006	0.024	0.014	0.011	0.008	0.480	0.422
1998-2007	0.026	0.016	0.010	0.008	0.479	0.351
1999-2008	0.025	0.015	0.010	0.008	0.478	0.350
MIN	**0.023**	**0.014**	**0.010**	**0.007**	**0.478**	**0.350**

Table 8-e10: Qu'Appelle River 90th Percentiles

Qu'Appelle River - 90th Percentiles						
Date	Total Phosphorus (mg/L)		Total Dissolved Phosphorus (mg/L)		Total Nitrogen (mg/L)	
	Summer	Winter	Summer	Winter	Summer	Winter
1975-1984	0.342	0.317	0.208	0.260	~	~
1976-1985	0.336	0.315	0.196	0.260	~	~
1977-1986	0.300	0.315	0.190	0.255	~	~
1978-1987	0.300	0.315	0.190	0.250	~	~
1979-1988	0.306	0.320	0.190	0.250	~	~
1980-1989	0.300	0.290	0.190	0.250	~	~
1981-1990	0.298	0.289	0.190	0.250	~	~
1982-1991	0.298	0.280	0.190	0.250	~	~
1983-1992	0.298	0.270	0.190	0.242	~	~
1984-1993	0.278	0.270	0.179	0.224	~	~
1985-1994	0.290	0.259	0.179	0.191	~	~
1986-1995	0.290	0.249	0.156	0.191	~	~
1987-1996	0.298	0.249	0.170	0.191	~	~
1988-1987	0.302	0.240	0.187	0.189	~	~
1989-1998	0.295	0.236	0.187	0.186	~	~
1990-1999	0.301	0.256	0.188	0.187	~	~
1991-2000	0.302	0.249	0.187	0.142	~	~
1992-2001	0.289	0.261	0.167	0.168	~	~
1993-2002	0.315	0.236	0.167	0.129	1.970	1.685
1994-2003	0.315	0.258	0.167	0.129	1.904	1.734
1995-2004	0.314	0.237	0.169	0.172	1.904	1.639
1996-2005	0.314	0.221	0.171	0.172	1.843	1.490
1997-2006	0.322	0.276	0.182	0.172	1.706	1.669
1998-2007	0.296	0.304	0.170	0.171	1.681	1.719
1999-2008	0.294	0.300	0.173	0.169	1.735	1.841
MIN	**0.278**	**0.221**	**0.156**	**0.129**	**1.681**	**1.490**

Table 8-e11: Red Deer River (SK-MB) 90th Percentiles

Red Deer River (SK-MB) - 90th Percentiles						
Date	Total Phosphorus (mg/L)		Total Dissolved Phosphorus (mg/L)		Total Nitrogen (mg/L)	
	Summer	Winter	Summer	Winter	Summer	Winter
1974-1983	0.058	0.264	0.027	0.068	~	~
1975-1984	0.060	0.220	0.029	0.065	~	~
1976-1985	0.060	0.205	0.030	0.064	~	~
1977-1986	0.058	0.170	0.023	0.064	~	~
1978-1987	0.058	0.170	0.021	0.064	~	~
1979-1988	0.058	0.130	0.022	0.046	~	~
1980-1989	0.052	0.100	0.022	0.046	~	~
1981-1990	0.057	0.098	0.022	0.043	~	~
1982-1991	0.059	0.100	0.022	0.039	~	~
1983-1992	0.061	0.095	0.022	0.036	~	~
1984-1993	0.058	0.087	0.025	0.025	~	~
1985-1994	0.060	0.087	0.026	0.032	~	~
1986-1995	0.064	0.074	0.027	0.027	~	~
1987-1996	0.066	0.079	0.030	0.029	~	~
1988-1987	0.069	0.085	0.030	0.033	~	~
1989-1998	0.070	0.081	0.029	0.038	~	~
1990-1999	0.070	0.079	0.030	0.029	~	~
1991-2000	0.070	0.077	0.030	0.027	~	~
1992-2001	0.070	0.077	0.030	0.027	~	~
1993-2002	0.071	0.077	0.030	0.027	1.159	1.738
1994-2003	0.069	0.095	0.027	0.034	1.152	1.738
1995-2004	0.067	0.079	0.028	0.038	1.180	1.585
1996-2005	0.052	0.133	0.025	0.059	1.071	1.600
1997-2006	0.068	0.136	0.027	0.048	1.199	1.422
1998-2007	0.068	0.168	0.051	0.059	1.197	1.439
1999-2008	0.068	0.204	0.051	0.070	1.197	1.644
MIN	**0.052**	**0.074**	**0.021**	**0.025**	**1.071**	**1.422**

Table 8-e12: Saskatchewan River 90th Percentiles

Saskatchewan River - 90th Percentiles						
Date	Total Phosphorus (mg/L)		Total Dissolved Phosphorus (mg/L)		Total Nitrogen (mg/L)	
	Summer	Winter	Summer	Winter	Summer	Winter
1974-1983	0.130	0.035	0.022	0.017	~	~
1975-1984	0.130	0.036	0.028	0.018	~	~
1976-1985	0.130	0.036	0.024	0.018	~	~
1977-1986	0.130	0.039	0.022	0.018	~	~
1978-1987	0.130	0.040	0.017	0.019	~	~
1979-1988	0.130	0.040	0.020	0.020	~	~
1980-1989	0.130	0.040	0.017	0.020	~	~
1981-1990	0.130	0.041	0.017	0.020	~	~
1982-1991	0.130	0.041	0.019	0.020	~	~
1983-1992	0.130	0.039	0.018	0.020	~	~
1984-1993	0.129	0.037	0.020	0.020	~	~
1985-1994	0.129	0.035	0.014	0.019	~	~
1986-1995	0.127	0.035	0.014	0.019	~	~
1987-1996	0.118	0.032	0.018	0.018	~	~
1988-1987	0.121	0.030	0.018	0.014	~	~
1989-1998	0.124	0.030	0.015	0.012	~	~
1990-1999	0.124	0.030	0.015	0.012	~	~
1991-2000	0.103	0.028	0.015	0.011	~	~
1992-2001	0.092	0.029	0.015	0.011	~	~
1993-2002	0.092	0.029	0.016	0.011	0.774	0.768
1994-2003	0.088	0.028	0.015	0.011	0.766	0.774
1995-2004	0.088	0.028	0.016	0.011	0.794	0.770
1996-2005	0.095	0.028	0.017	0.012	0.804	0.772
1997-2006	0.105	0.028	0.015	0.011	0.852	0.760
1998-2007	0.095	0.039	0.017	0.014	0.788	0.681
1999-2008	0.095	0.032	0.017	0.014	0.856	0.681
MIN	**0.088**	**0.028**	**0.014**	**0.011**	**0.766**	**0.681**

Table 8-e13: 90th Percentiles for Full Data Range on all Rivers

90th Percentiles of Full Data Range				
Alberta - Saskatchewan Rivers				
		Total Phosphorus (mg/L)	**Total Dissolved Phosphorus (mg/L)**	**Total Nitrogen (mg/L)**
Battle River	**Summer**	0.335	0.051	2.260
	Winter	0.100	0.045	1.550
Beaver River	**Summer**	0.171	0.060	1.140
	Winter	0.127	0.060	1.862
Cold River	**Summer**	0.023	0.010	0.460
	Winter	0.024	0.017	0.467
North Saskatchewan River	**Summer**	0.278	0.046	1.230
	Winter	0.115	0.101	1.225
Red Deer River near Bindloss	**Summer**	0.563	0.035	2.320
	Winter	0.069	0.024	0.860
South Saskatchewan River	**Summer**	0.246	0.018	1.114
	Winter	0.110	0.067	1.771
Saskatchewan - Manitoba Rivers				
		Total Phosphorus (mg/L)	**Total Dissolved Phosphorus (mg/L)**	**Total Nitrogen (mg/L)**
Assiniboine River	**Summer**	0.311	0.186	1.801
	Winter	0.180	0.115	2.252
Carrot River	**Summer**	0.140	0.057	1.417
	Winter	0.266	0.059	2.052
Churchill River	**Summer**	0.025	0.010	0.484
	Winter	0.021	0.010	0.411
Qu'Appelle River	**Summer**	0.304	0.190	1.822
	Winter	0.290	0.249	1.767
Red Deer River near Erwood	**Summer**	0.066	0.029	1.195
	Winter	0.161	0.055	1.998
Saskatchewan River	**Summer**	0.124	0.018	0.838
	Winter	0.034	0.017	0.761

Appendix 9: Major Ion Background Analysis for Selected Rivers

Appendix 9-a: Time Series Graphs

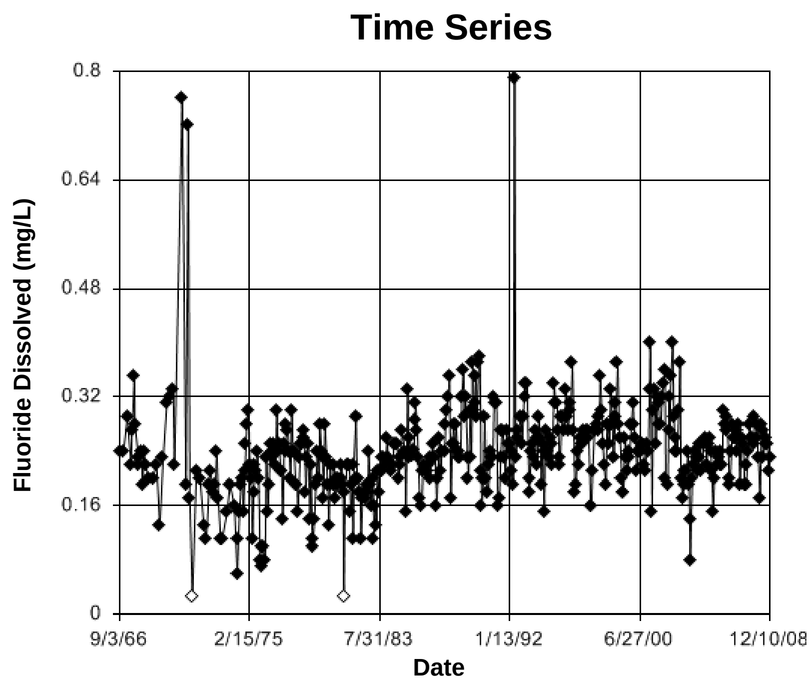

Figure 9-a1 Battle River: Fluoride Dissolved

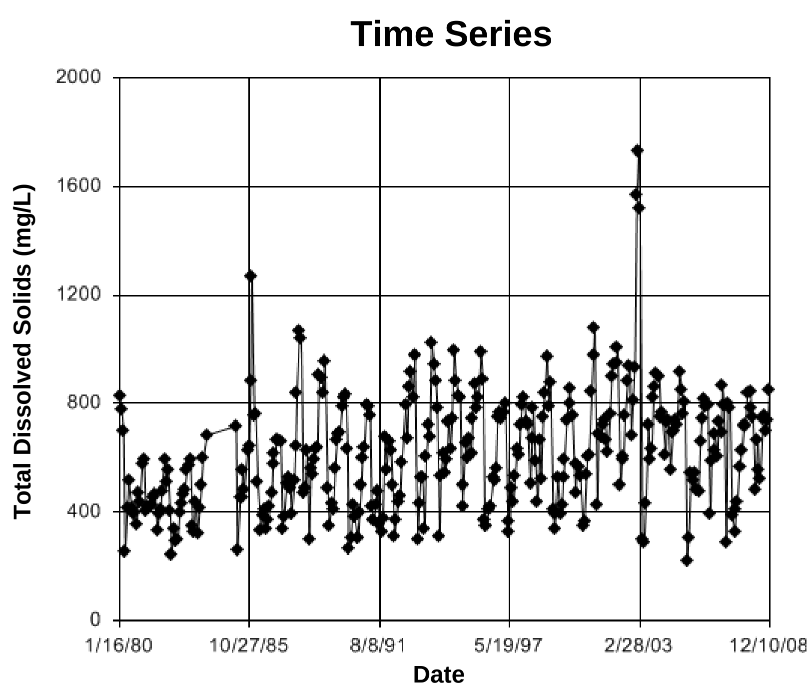

Figure 9-a2: Battle River Total Dissolved Solids

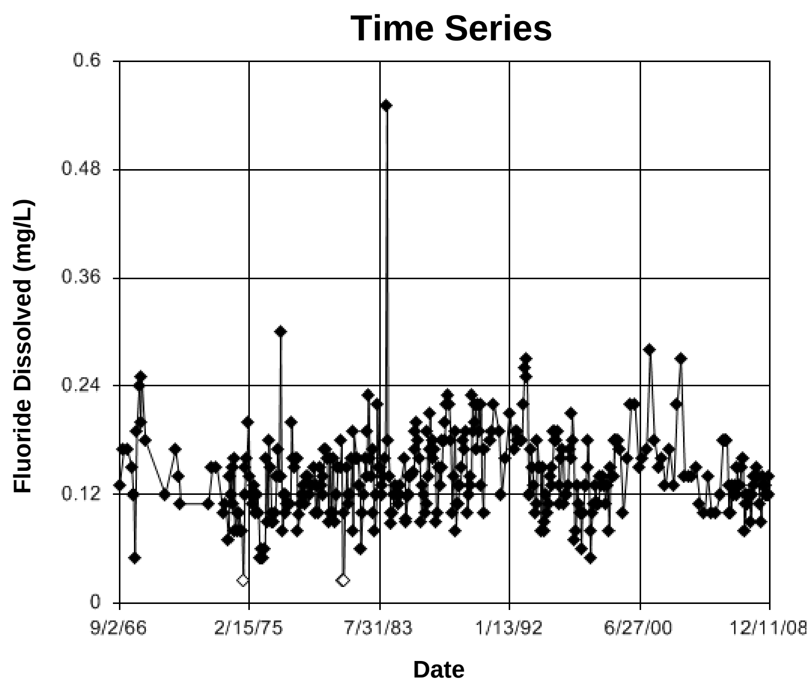

Figure 9-a3: Beaver River Fluoride Dissolved

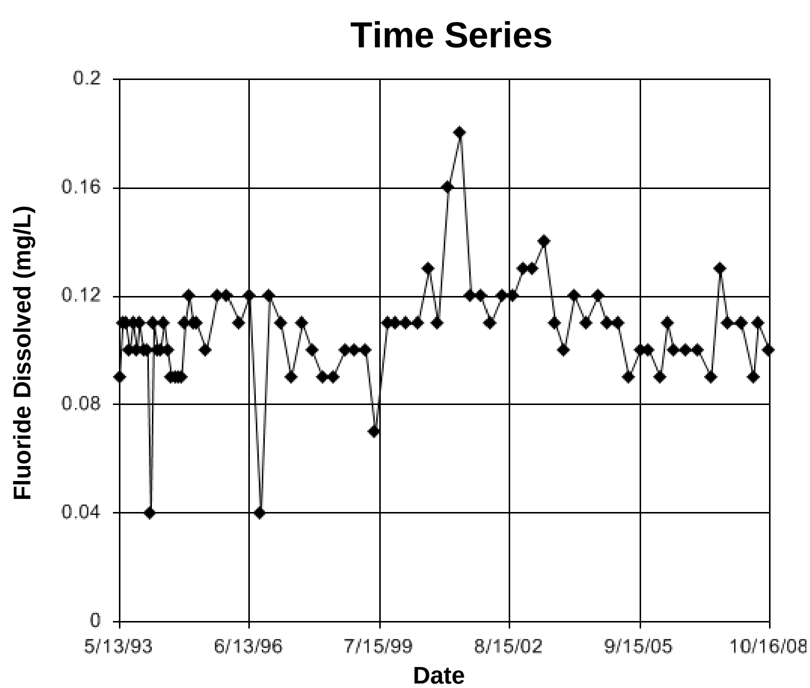

Figure 9-a4: Cold River Fluoride Dissolved

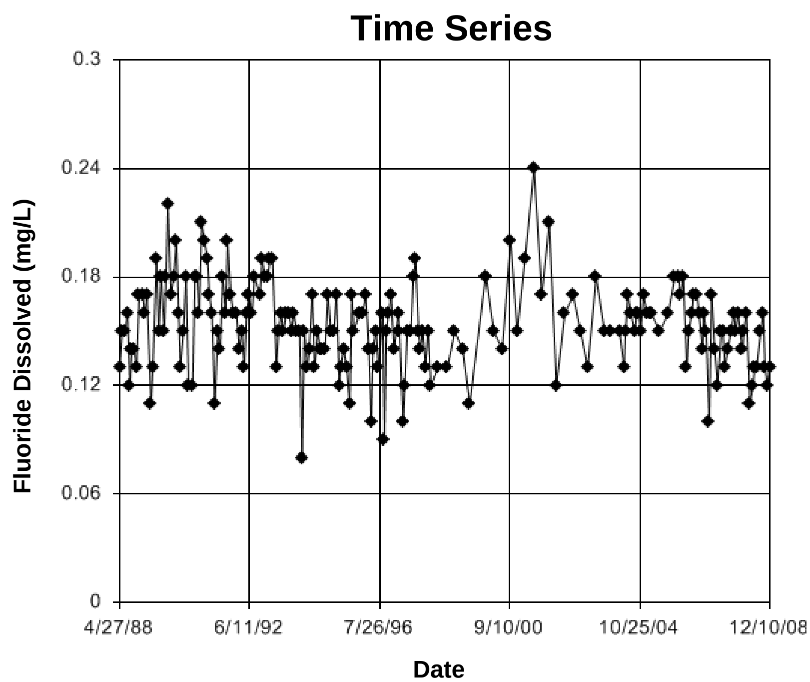

Figure 9-a5: North Saskatchewan River Fluoride Dissolved

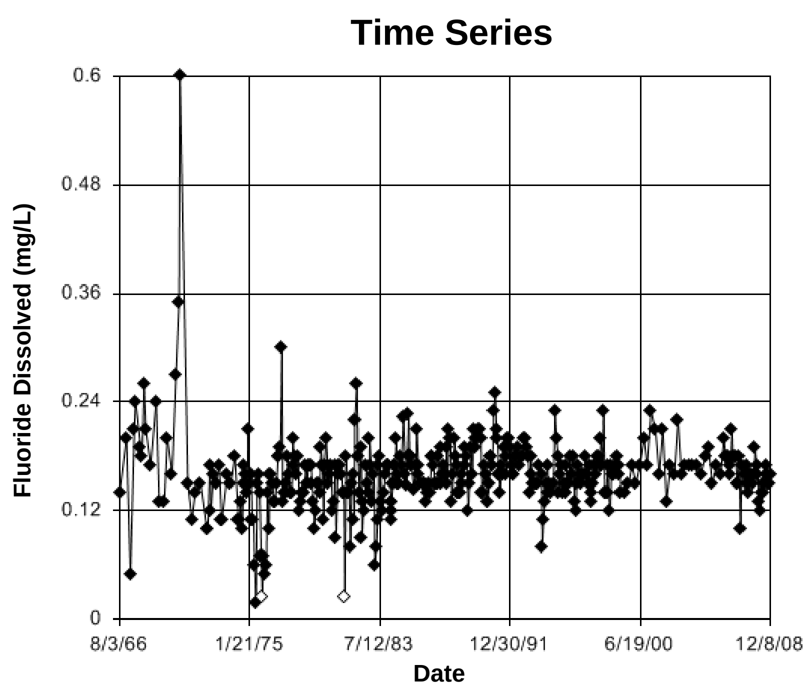

Figure 9-a6: Red Deer River (AB-SK) Fluoride Dissolved

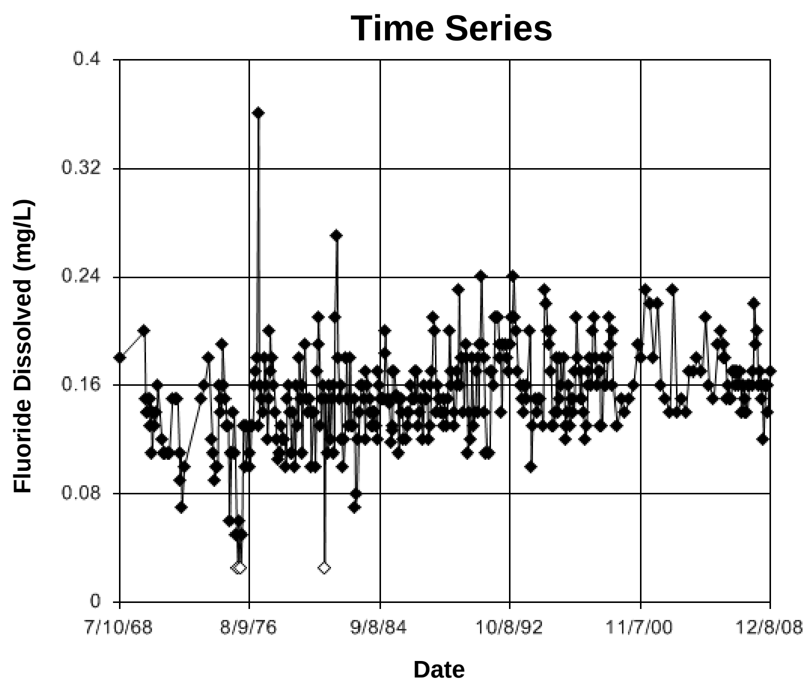

Figure 9-a7: South Saskatchewan River Fluoride Dissolved

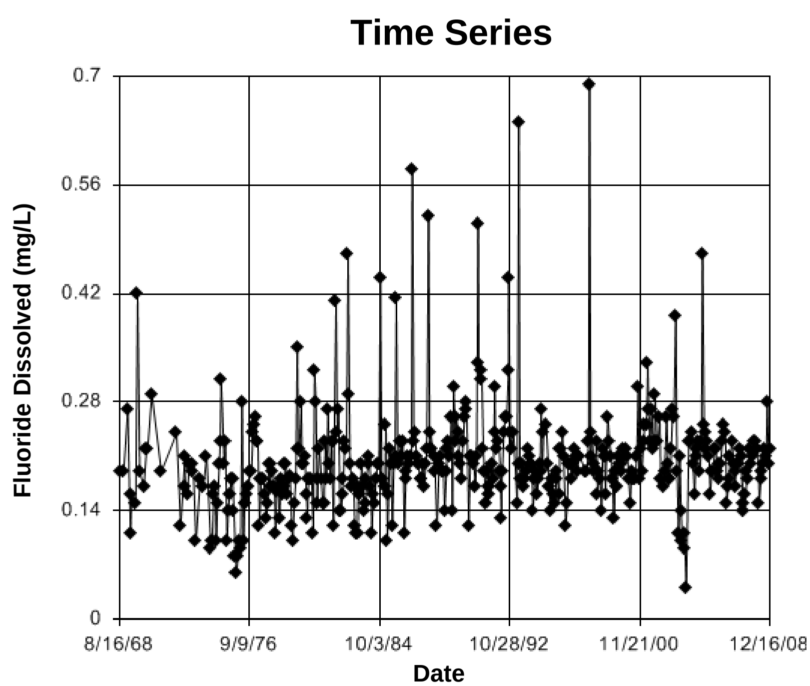

Figure 9-a8: Assiniboine River Fluoride Dissolved

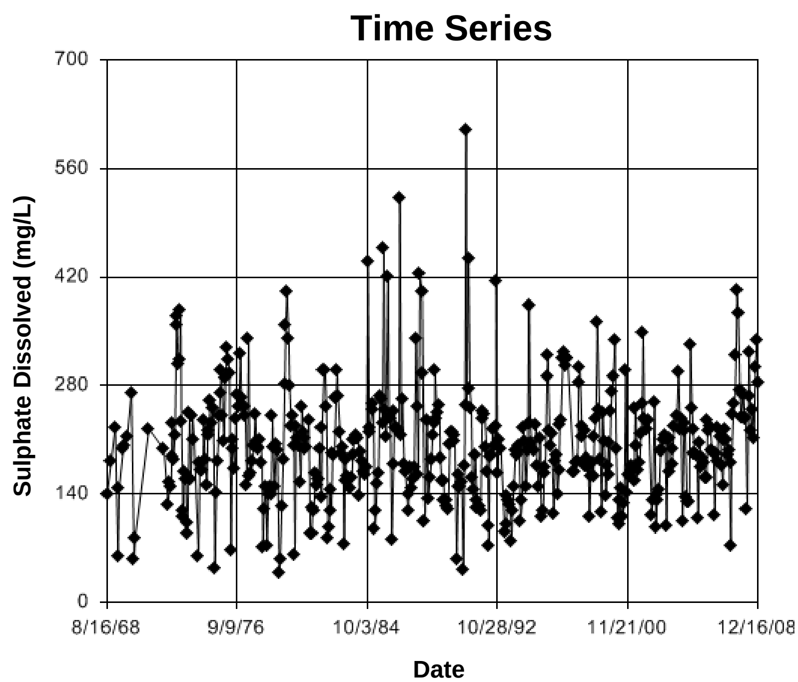

Figure 9-a9: Assiniboine River Sulphate Dissolved

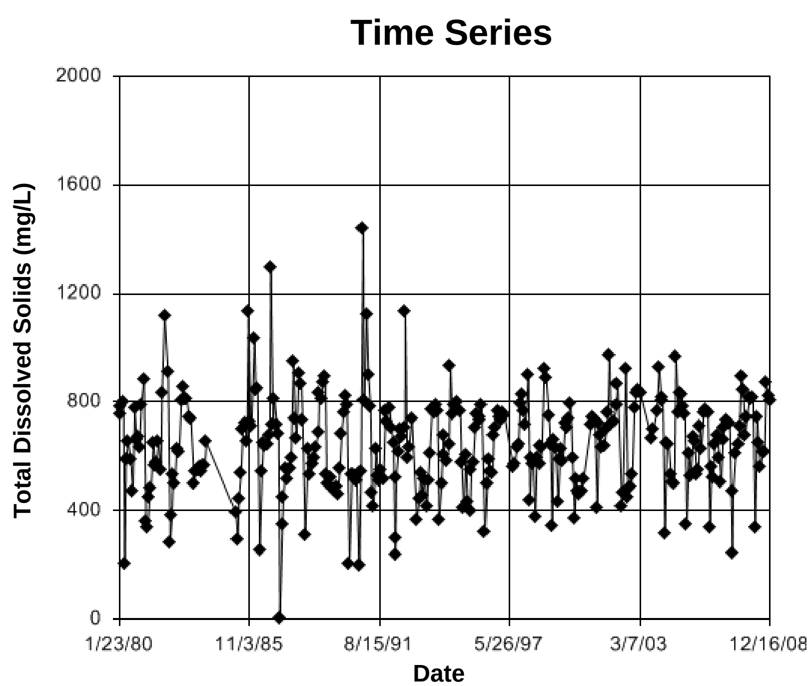

Figure 9-a10: Assiniboine River Total Dissolved Solids

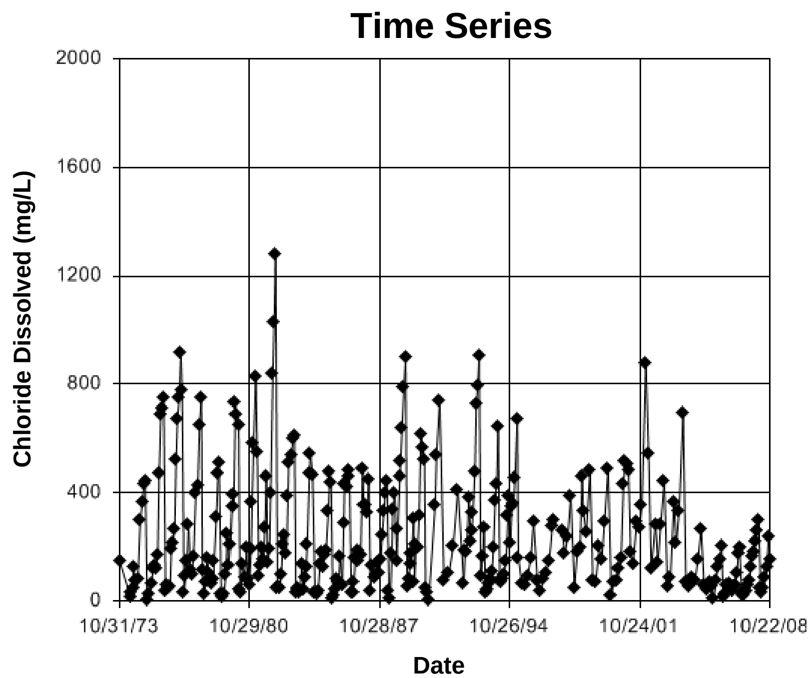

Figure 9-a11: Carrot River Chloride Dissolved

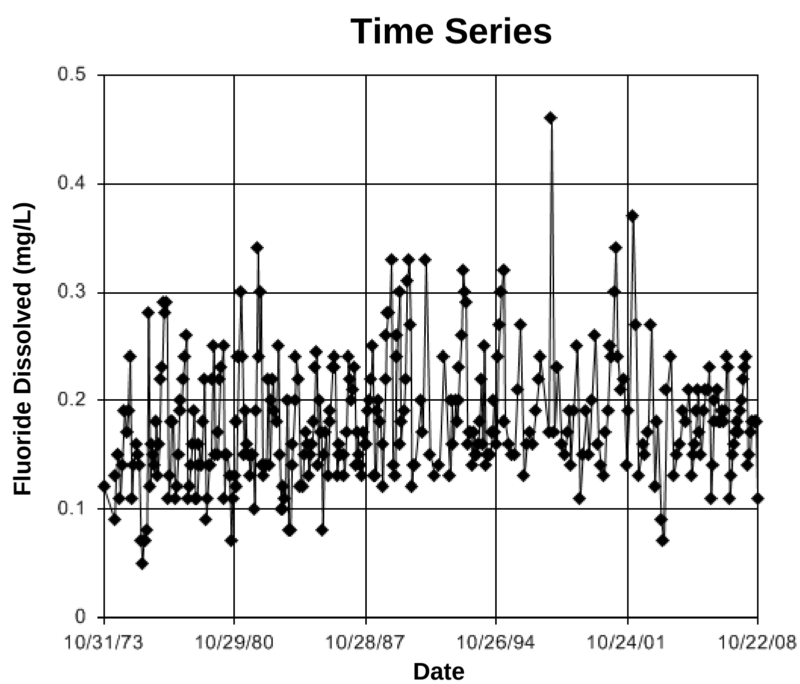

Figure 9-a12: Carrot River Fluoride Dissolved

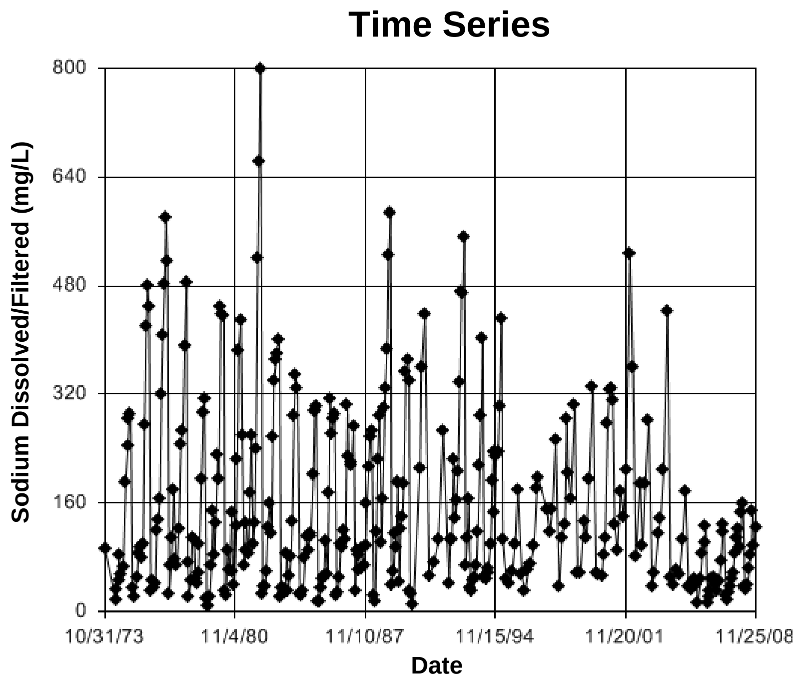

Figure 9-a13: Carrot River Sodium Dissolved/Filtered

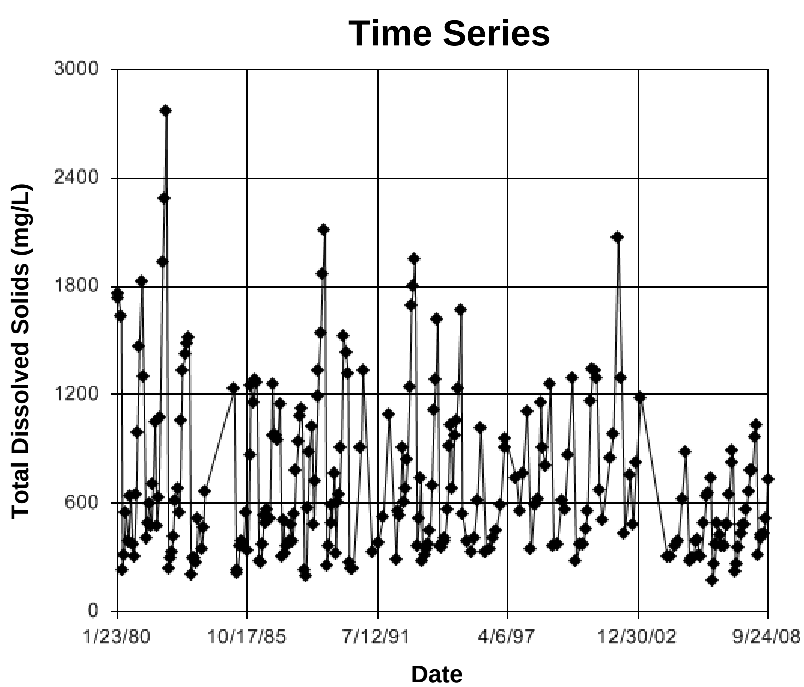

Figure 9-a14: Carrot River Total Dissolved Solids

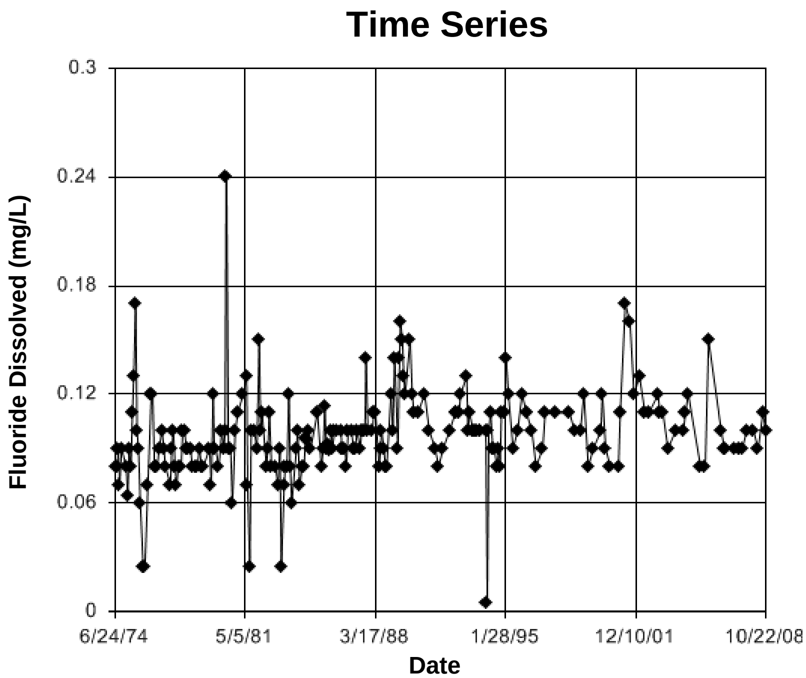

Figure 9-a15: Churchill River Fluoride Dissolved

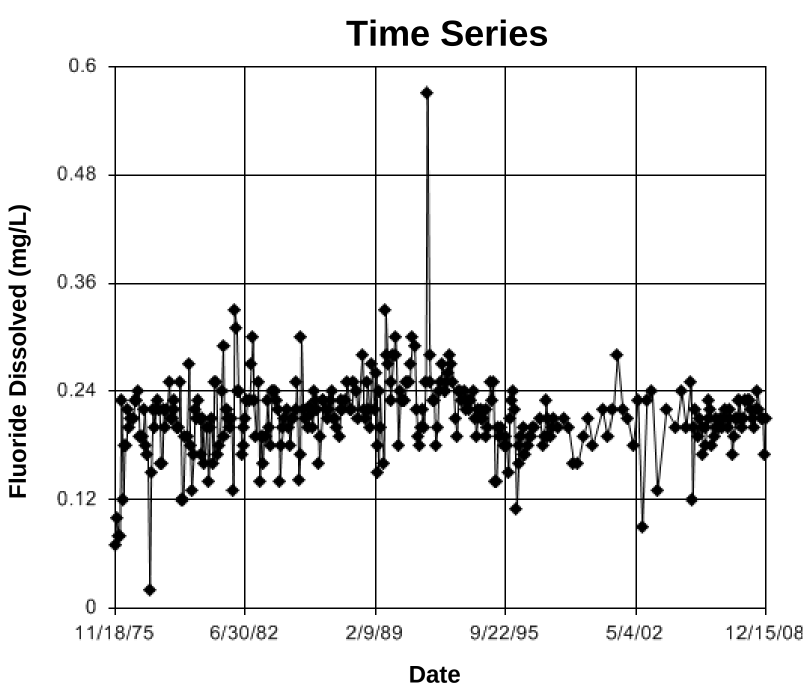

Figure 9-a16: Qu'Appelle River Fluoride Dissolved

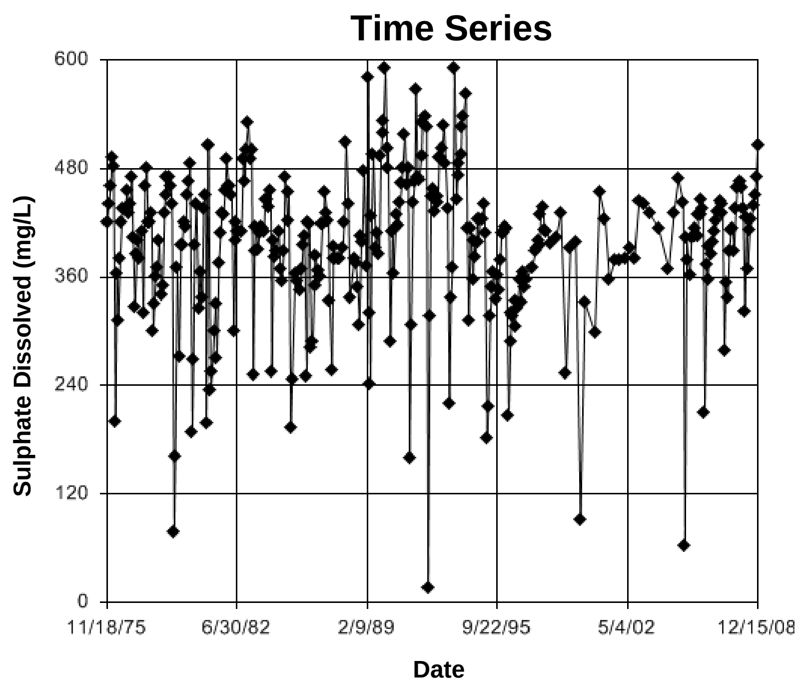

Figure 9-a17: Qu'Appelle River Sulphate Dissolved

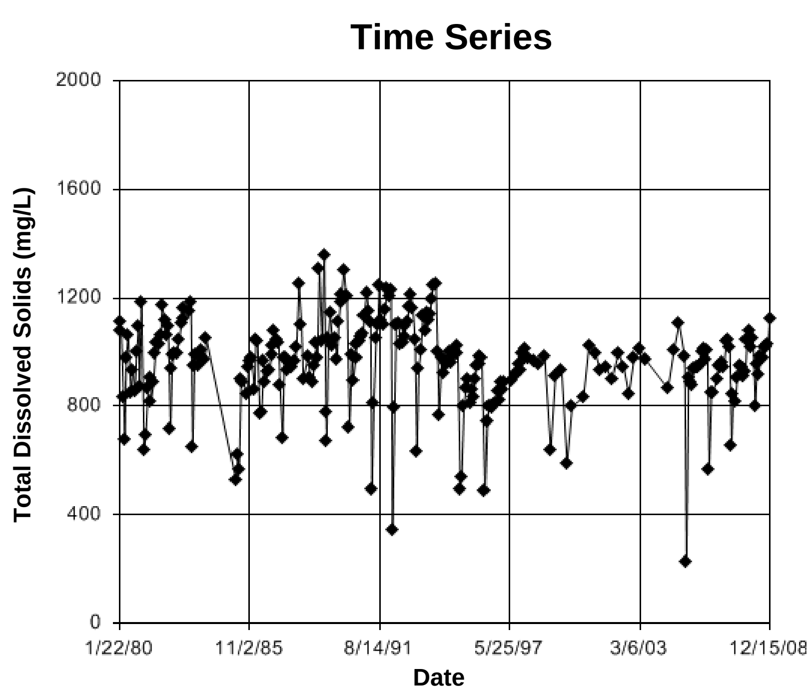

Figure 9-a18: Qu'Appelle River Total Dissolved Solids

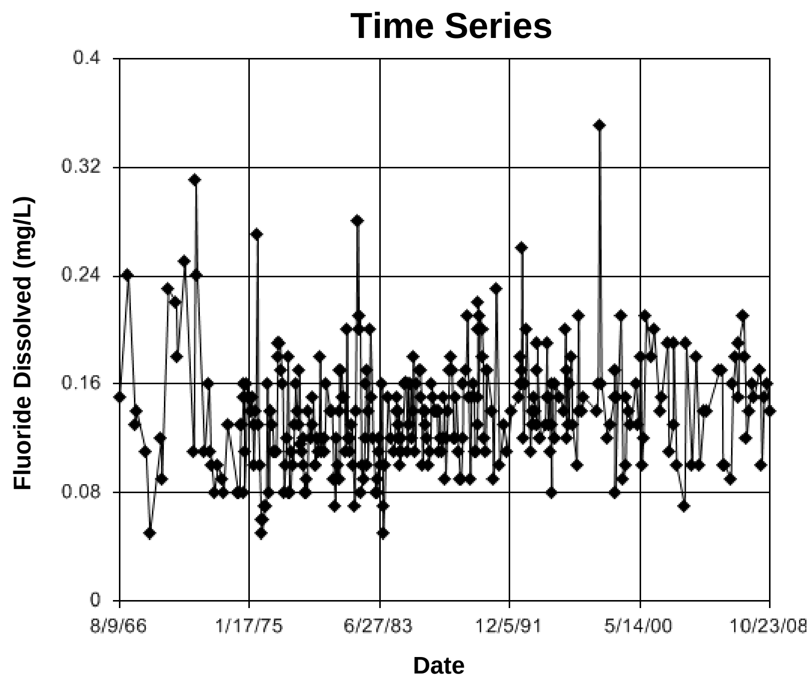

Figure 9-a19: Red Deer River (SK-MB) Fluoride Dissolved

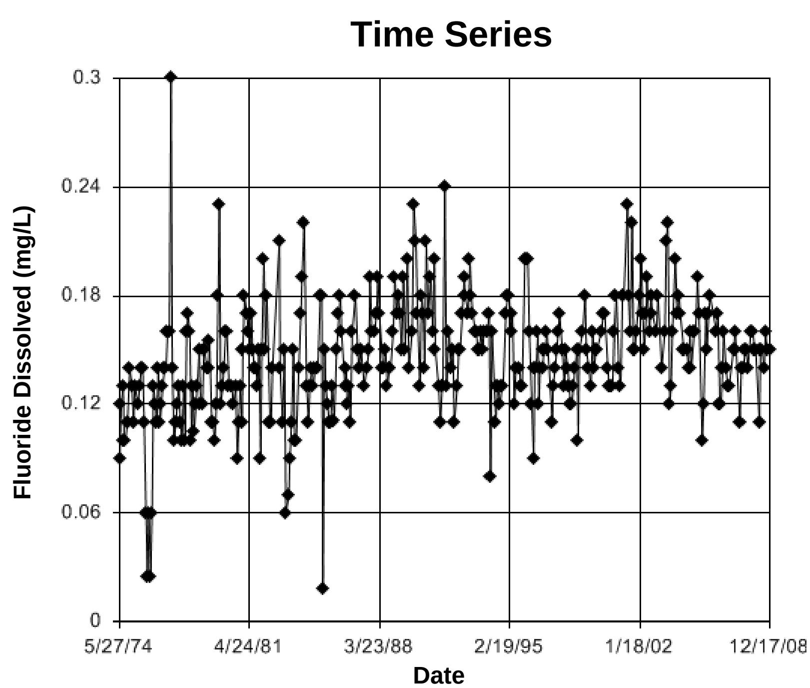

Figure 9-a20: Saskatchewan River Fluoride Dissolved

Appendix 9-b: Seasonality Graphs

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 6.923
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 61 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 6.923
Adjusted Kruskal-Wallis statistic (H') = 6.923

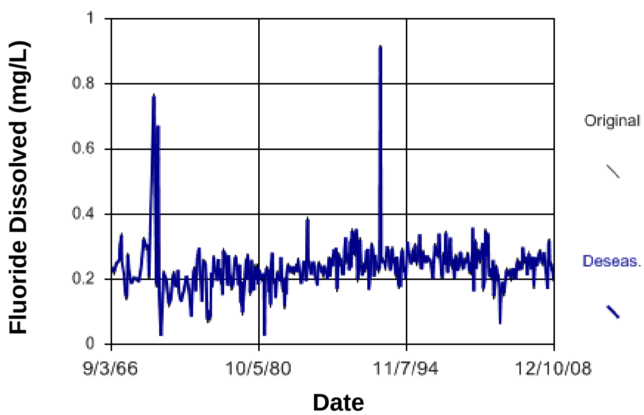

Figure 9-b1: Battle River Fluoride Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 19.66
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 17 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 19.66
Adjusted Kruskal-Wallis statistic (H') = 19.66

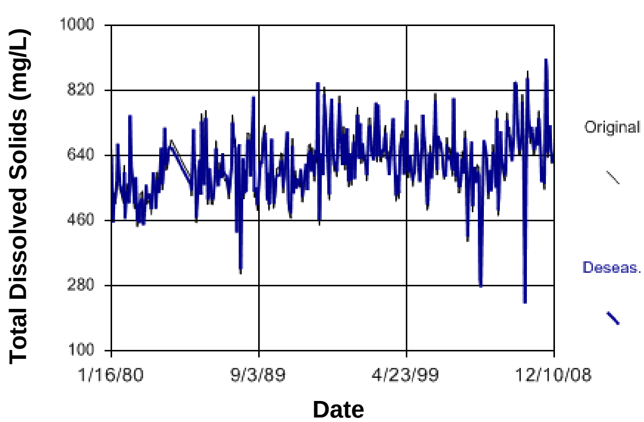

Figure 9-b2: Battle River Total Dissolved Solids

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 1.149
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 54 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 1.149
Adjusted Kruskal-Wallis statistic (H') = 1.149

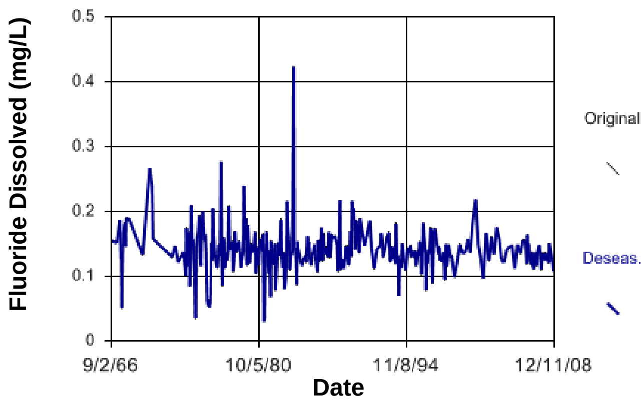

Figure 9-b3: Beaver River Fluoride Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 1.005
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 8 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.9652
Adjusted Kruskal-Wallis statistic (H') = 1.005

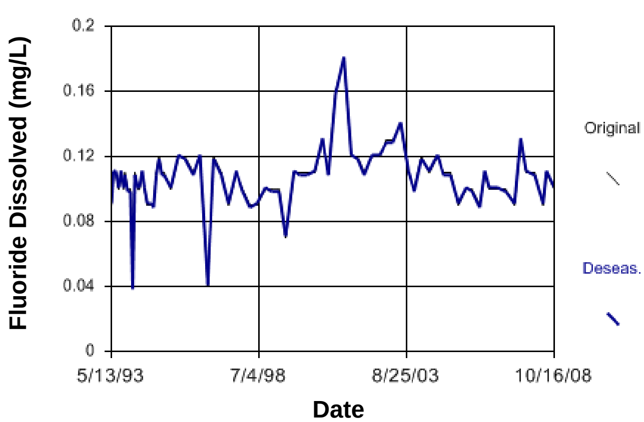

Figure 9-b4: Cold River Fluoride Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 0.1147
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 20 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.1147
Adjusted Kruskal-Wallis statistic (H') = 0.1147

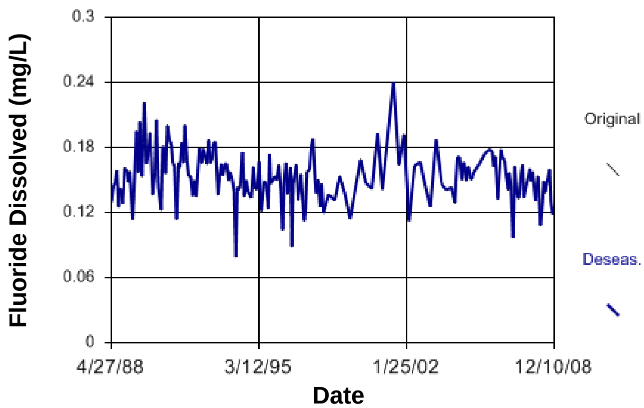

Figure 9-b5: North Saskatchewan River Fluoride Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 1.03
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 58 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 1.03
Adjusted Kruskal-Wallis statistic (H') = 1.03

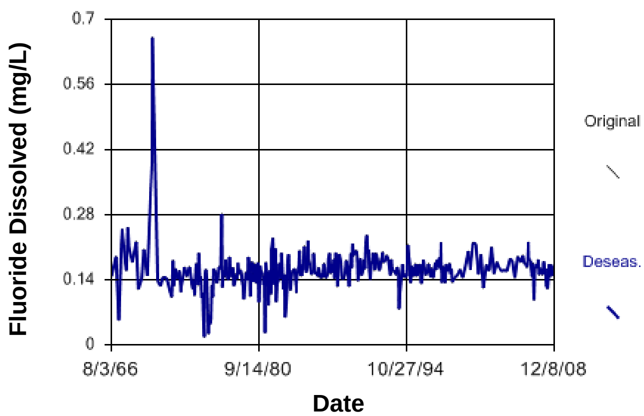

Figure 9-b6: Red Deer River (AB-SK) Fluoride Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 25.03
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 63 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 25.03
Adjusted Kruskal-Wallis statistic (H') = 25.03

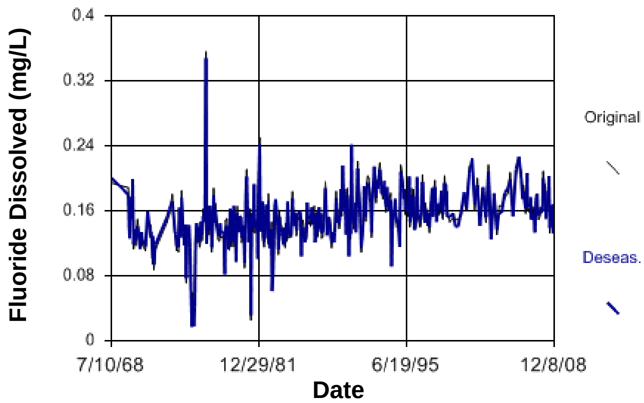

Figure 9-b7: South Saskatchewan River Fluoride Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 23.59
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 41 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 23.59
Adjusted Kruskal-Wallis statistic (H') = 23.59

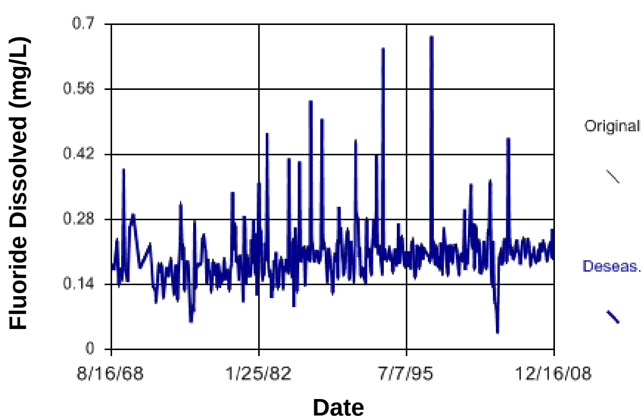

Figure 9-b8: Assiniboine River Fluoride Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 62.78
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 43 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 62.78
Adjusted Kruskal-Wallis statistic (H') = 62.78

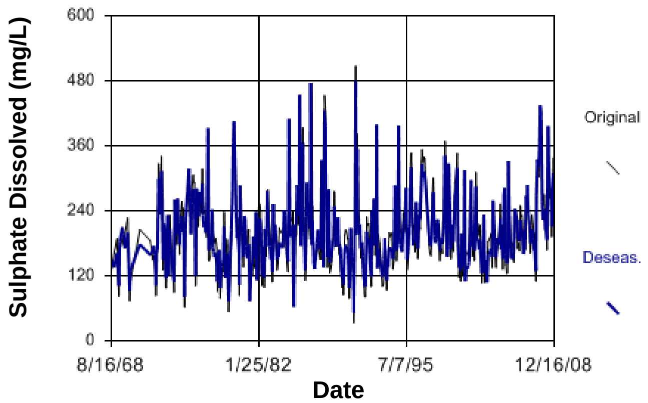

Figure 9-b9: Assiniboine River Sulphate Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 95
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 8 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 95
Adjusted Kruskal-Wallis statistic (H') = 95

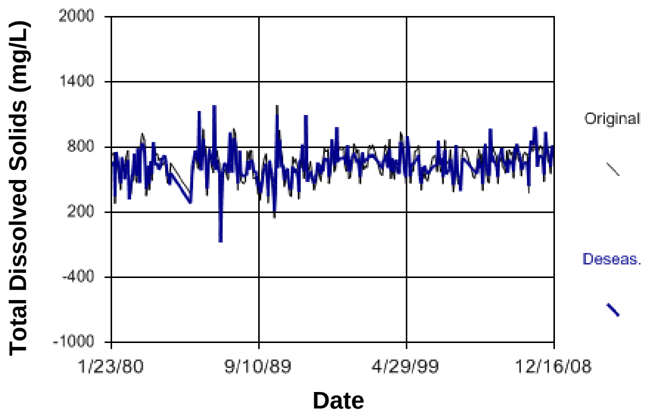

Figure 9-b10: Assiniboine River Total Dissolved Solids

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 63.08
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 23 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 63.08
Adjusted Kruskal-Wallis statistic (H') = 63.08

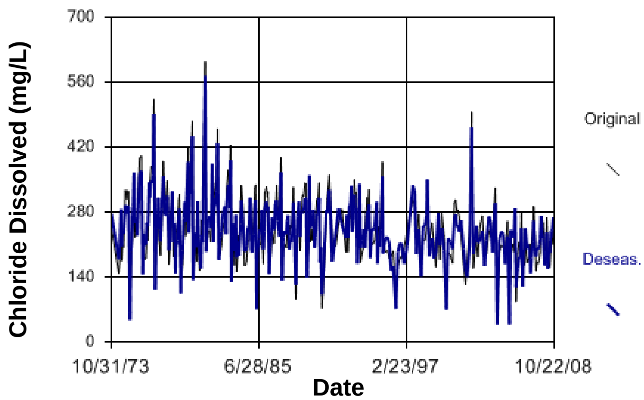

Figure 9-b11: Carrot River Chloride Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 30.3
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 27 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 30.3
Adjusted Kruskal-Wallis statistic (H') = 30.3

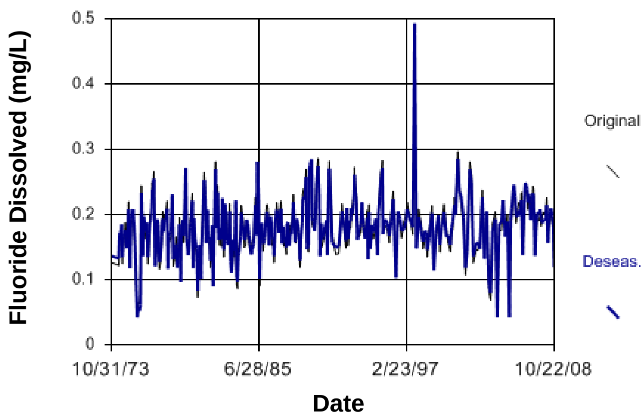

Figure 9-b12: Carrot River Fluoride Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 64.67
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 42 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 64.67
Adjusted Kruskal-Wallis statistic (H') = 64.67

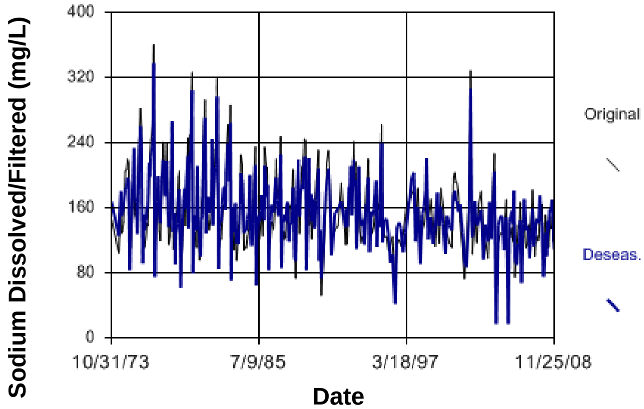

Figure 9-b13: Carrot River Sodium Dissolved/Filtered

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 63.64
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 63.64
Adjusted Kruskal-Wallis statistic (H') = 63.64

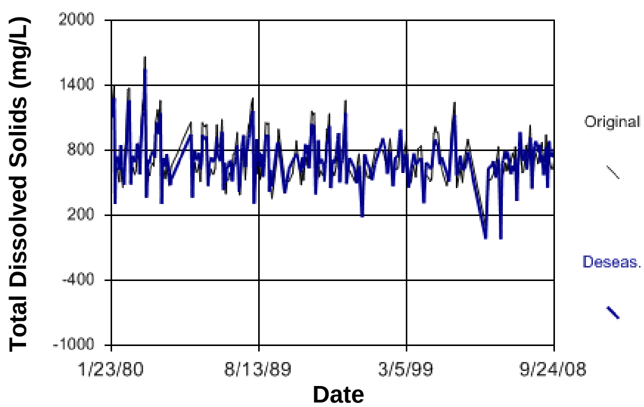

Figure 9-b14: Carrot River Total Dissolved Solids

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 5.083
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 10 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 5.083
Adjusted Kruskal-Wallis statistic (H') = 5.083

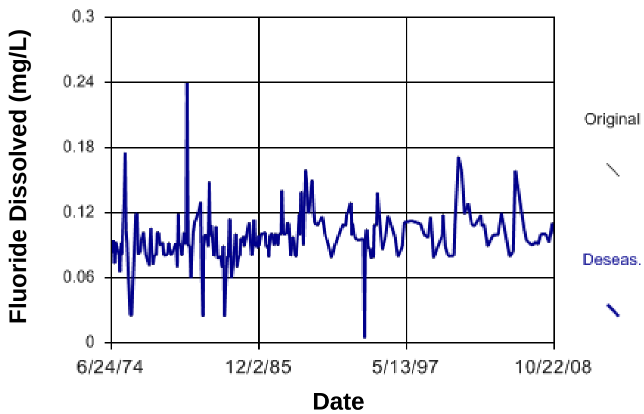

Figure 9-b15: Churchill River Fluoride Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 1.019
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 44 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 1.019
Adjusted Kruskal-Wallis statistic (H') = 1.019

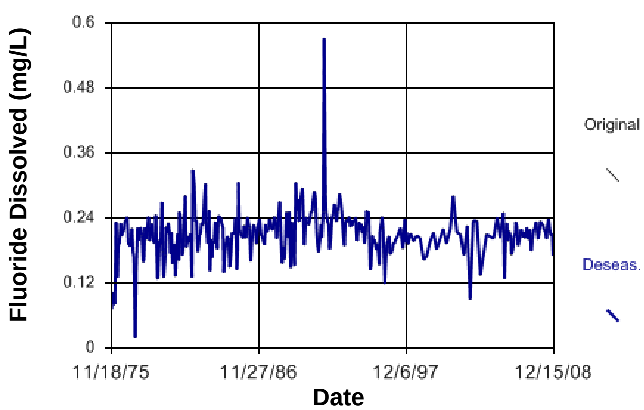

Figure 9-b16: Qu'Appelle River Fluoride Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 18.52
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 19 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 18.52
Adjusted Kruskal-Wallis statistic (H') = 18.52

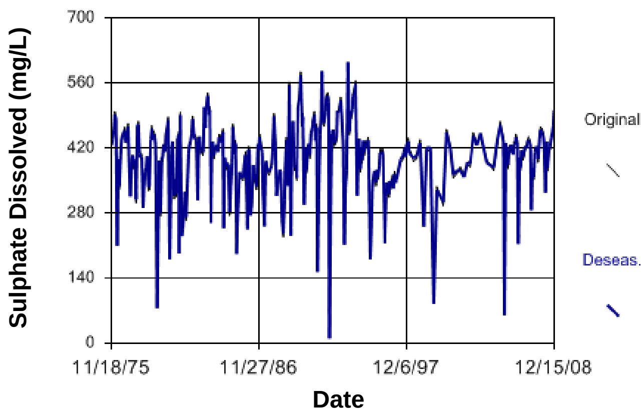

Figure 9-b17: Qu'Appelle River Sulphate Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 9.113
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 22 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 9.113
Adjusted Kruskal-Wallis statistic (H') = 9.113

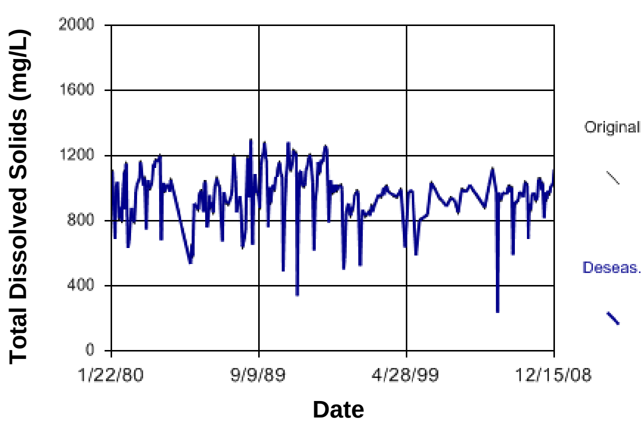

Figure 9-b18: Qu'Appelle River Total Dissolved Solids

Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 1.552
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 37 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 1.552
Adjusted Kruskal-Wallis statistic (H') = 1.552

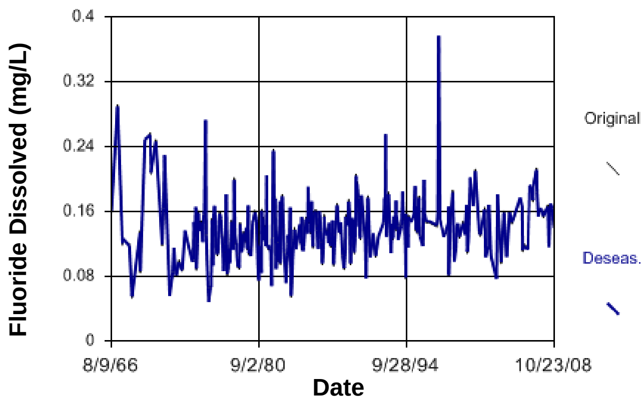

Figure 9-b19: Red Deer River (SK-MB) Fluoride Dissolved

Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITYat the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 36.5
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
There were 65 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 36.5
Adjusted Kruskal-Wallis statistic (H') = 36.5

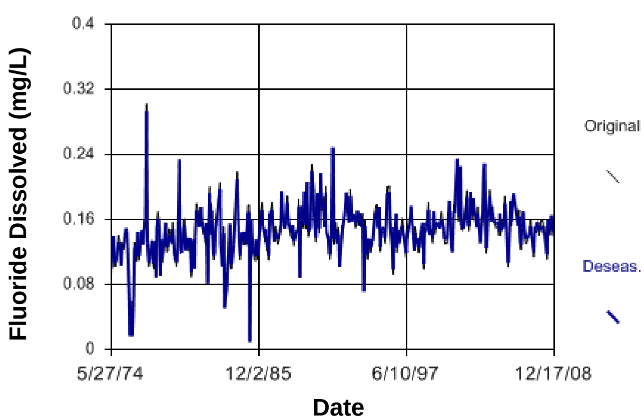

Figure 9-b20: Saskatchewan River Fluoride Dissolved

Appendix 9-c: Seasonal Kendall/Sen's Slope Graphs

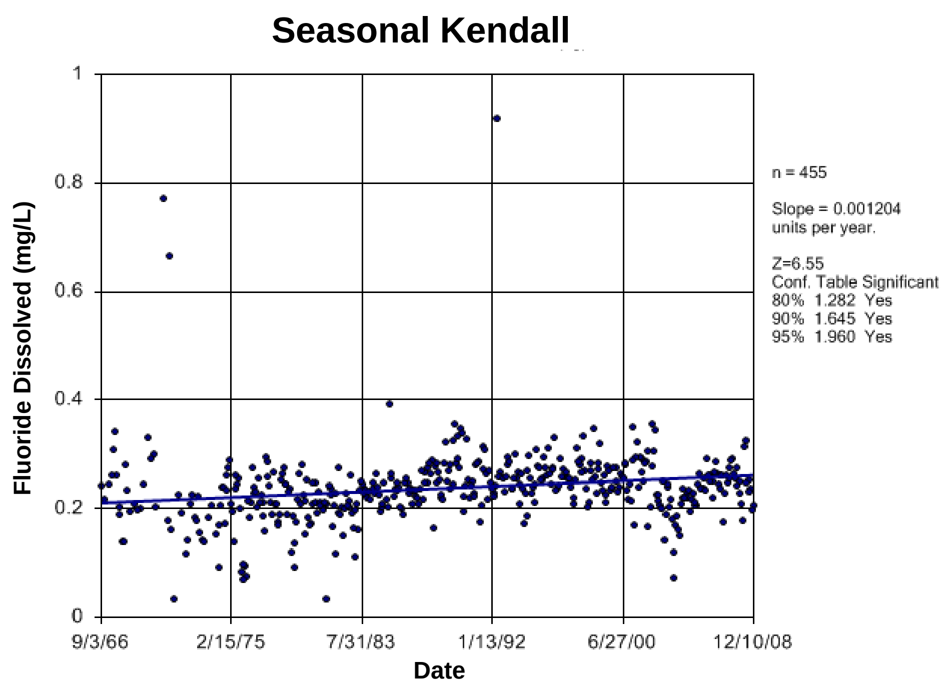

Figure 9-c1: Battle River Fluoride Dissolved

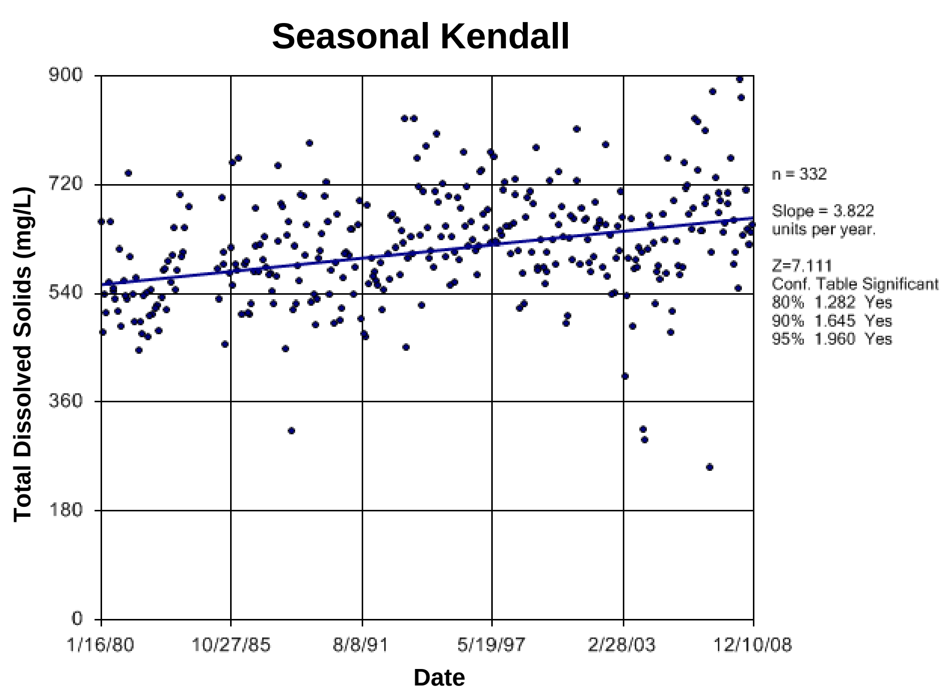

Figure 9-c2: Battle River Total Dissolved Solids

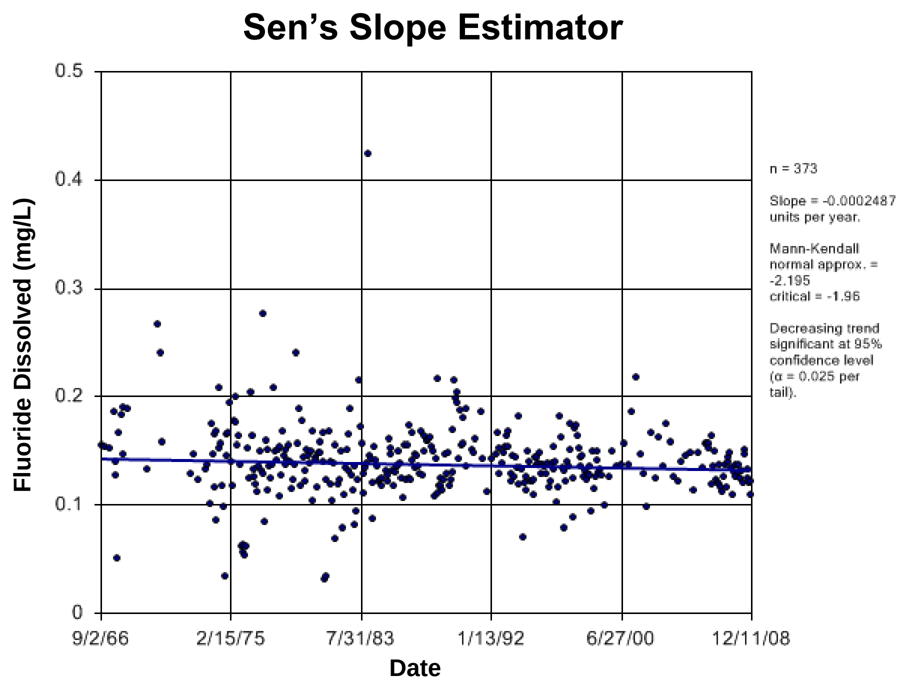

Figure 9-c3: Beaver River Fluoride Dissolved

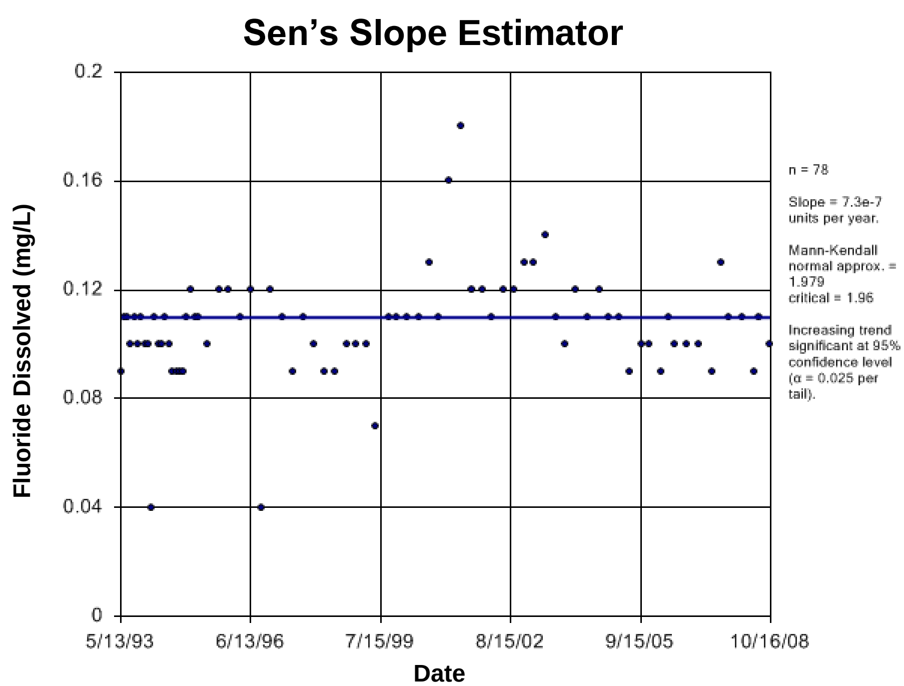

Figure 9-c4: Cold River Fluoride Dissolved

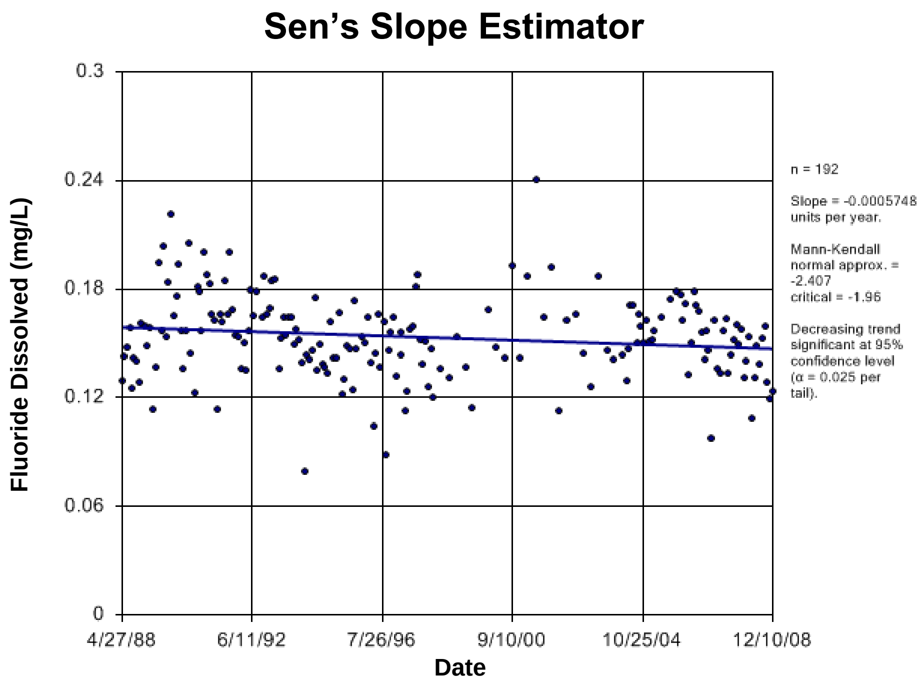

Figure 9-c5: North Saskatchewan River Fluoride Dissolved

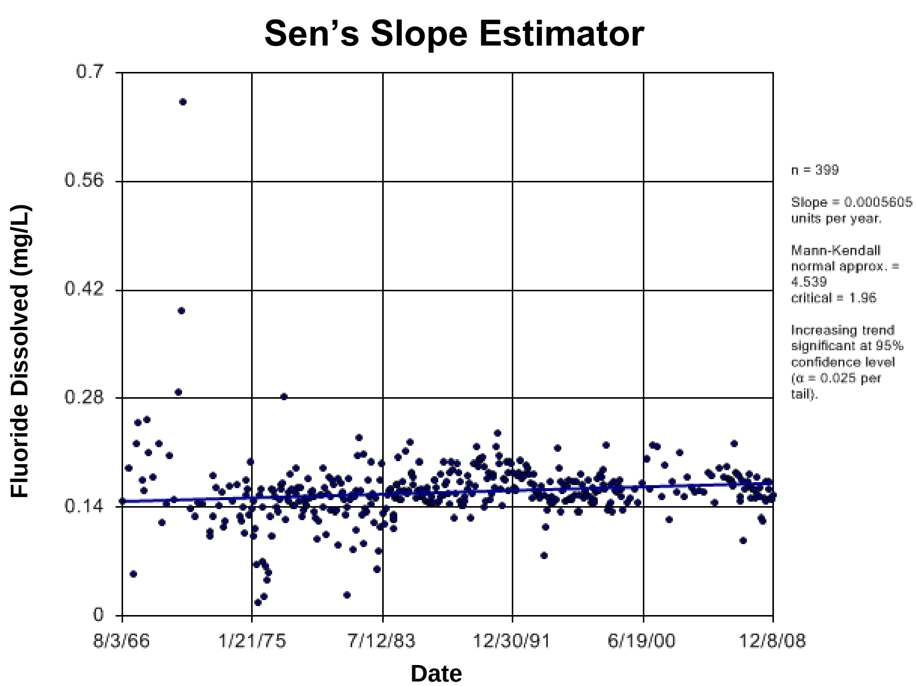

Figure 9-c6: Red Deer River (AB-SK) Fluoride Dissolved

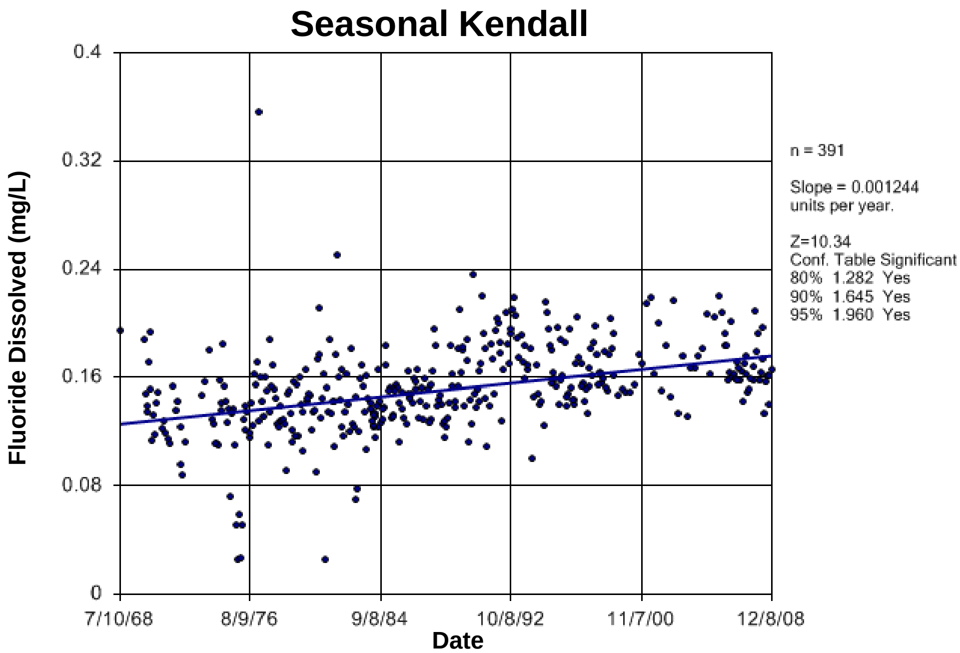

Figure 9-c7: South Saskatchewan River Fluoride Dissolved

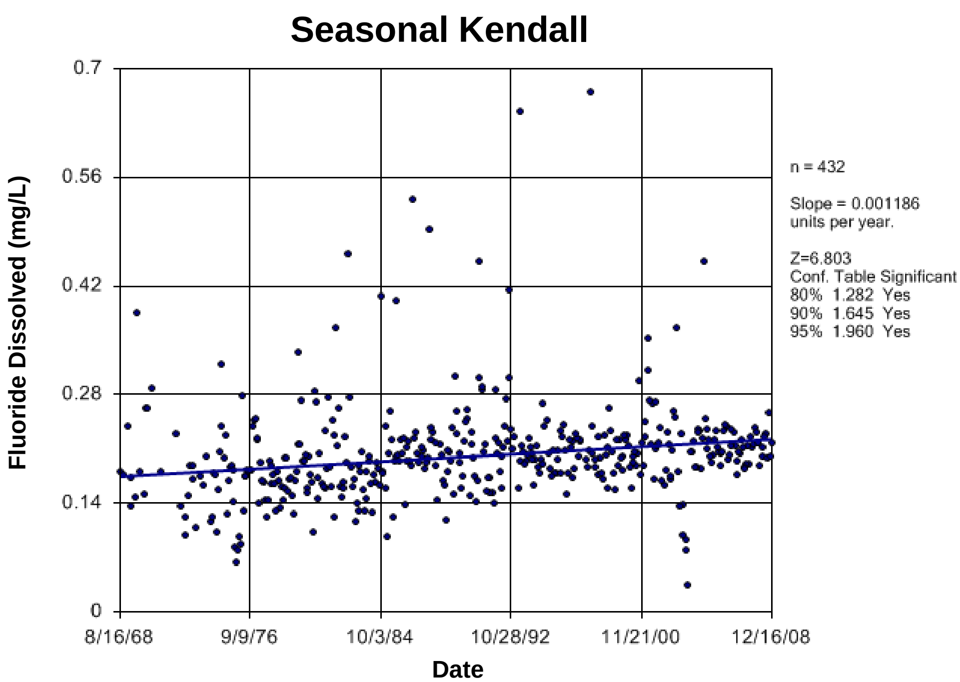

Figure 9-c8: Assiniboine River Fluoride Dissolved

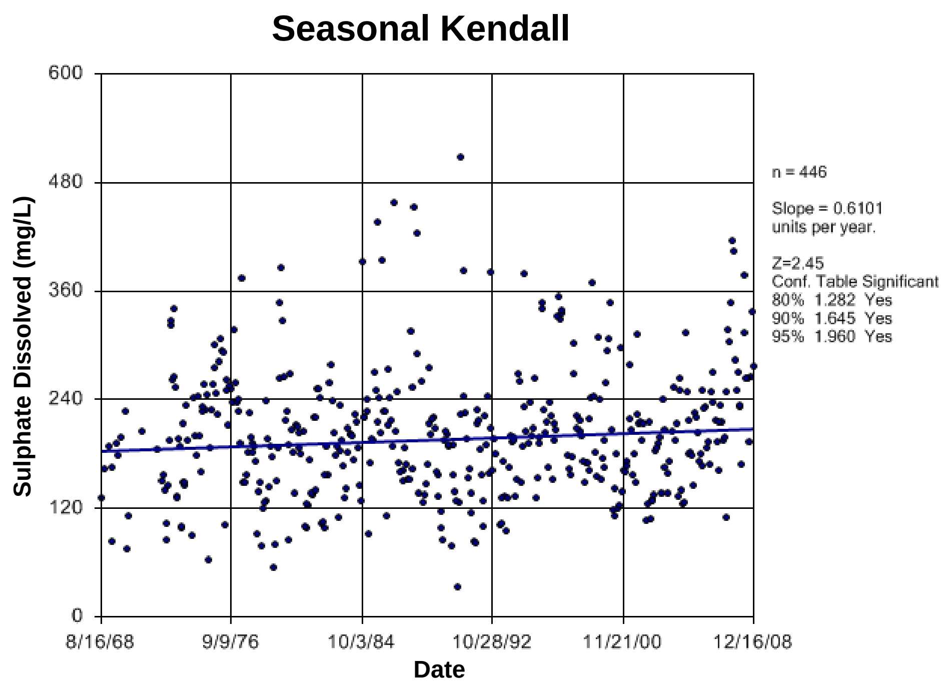

Figure 9-c9: Assiniboine River Sulphate Dissolved

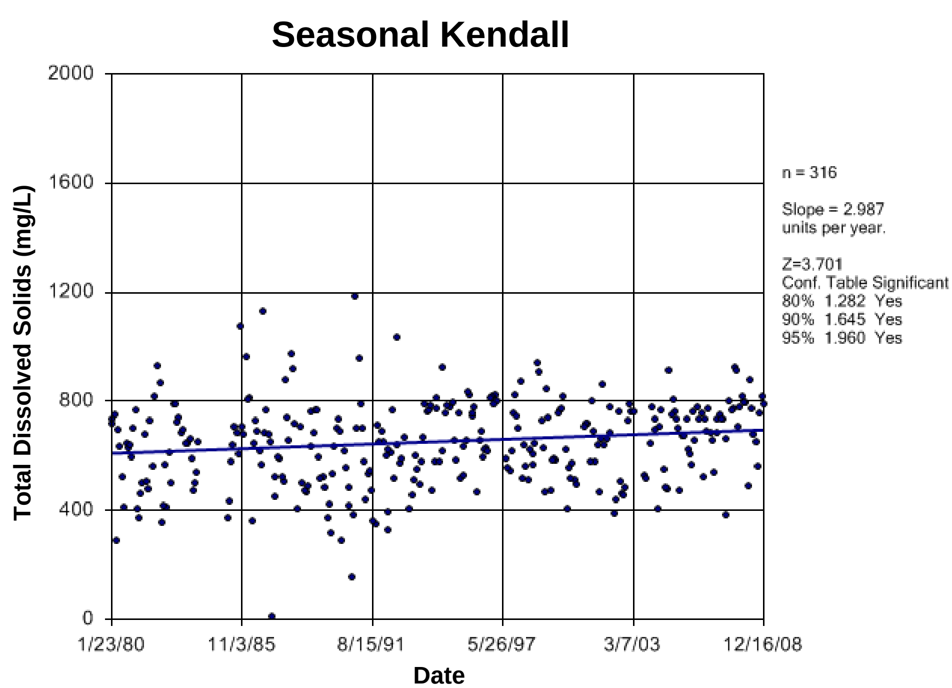

Figure 9-c10: Assiniboine River Total Dissolved Solids

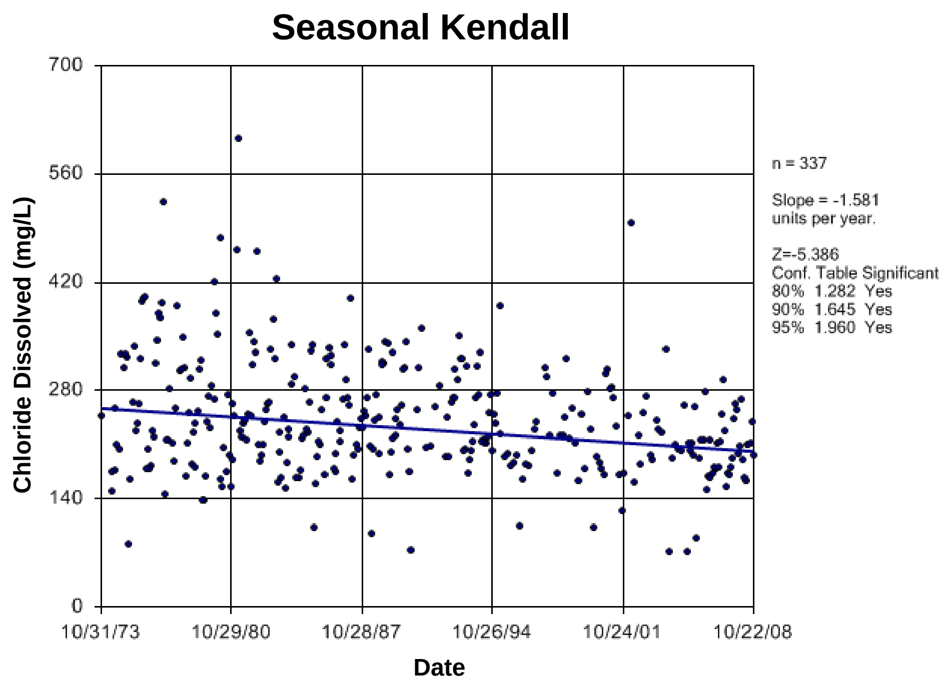

Figure 9-c11: Carrot River Chloride Dissolved

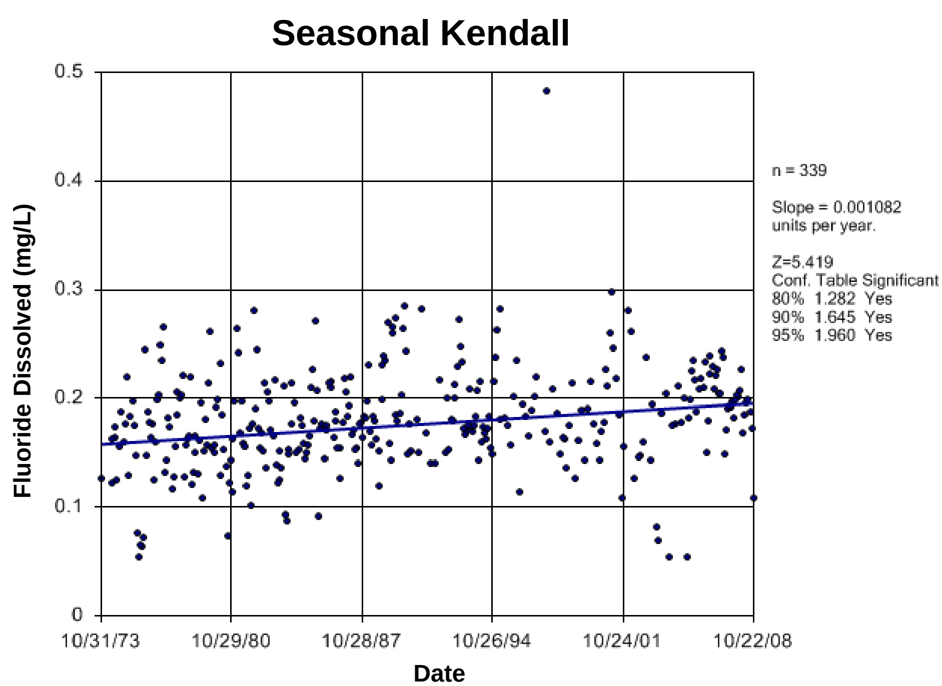

Figure 9-c12: Carrot River Fluoride Dissolved

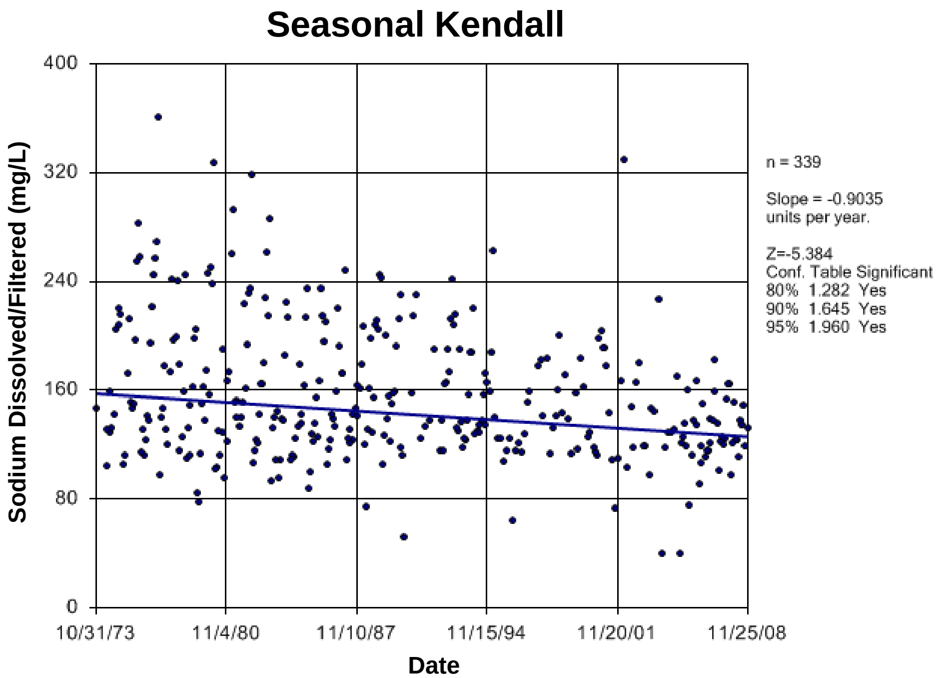

Figure 9-c13: Carrot River Sodium Dissolved/Filtered

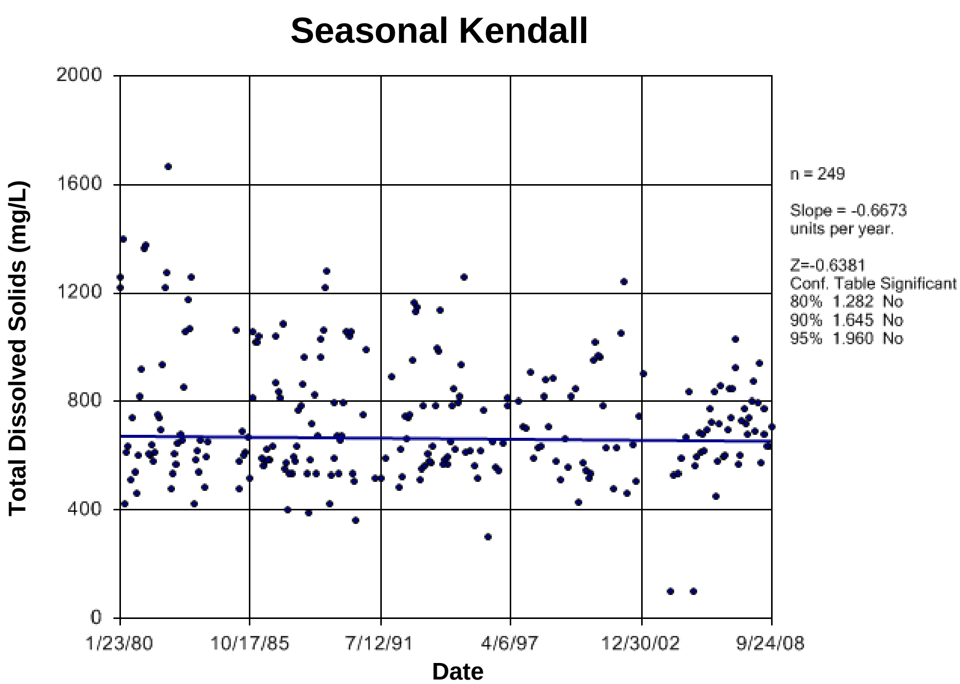

Figure 9-c14: Carrot River Total Dissolved Solids

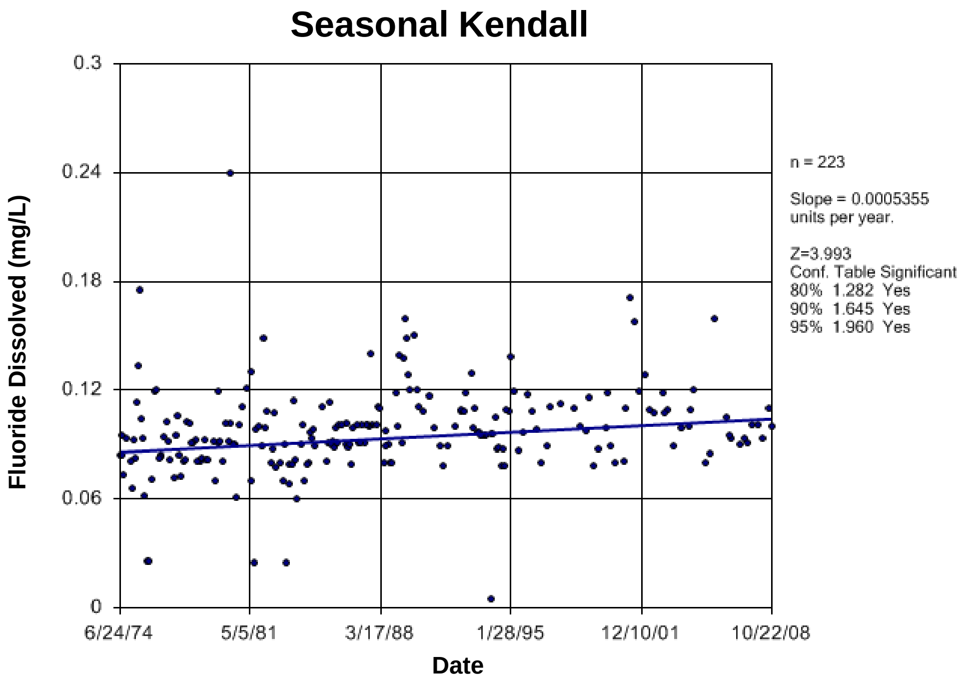

Figure 9-c15: Churchill River Fluoride Dissolved

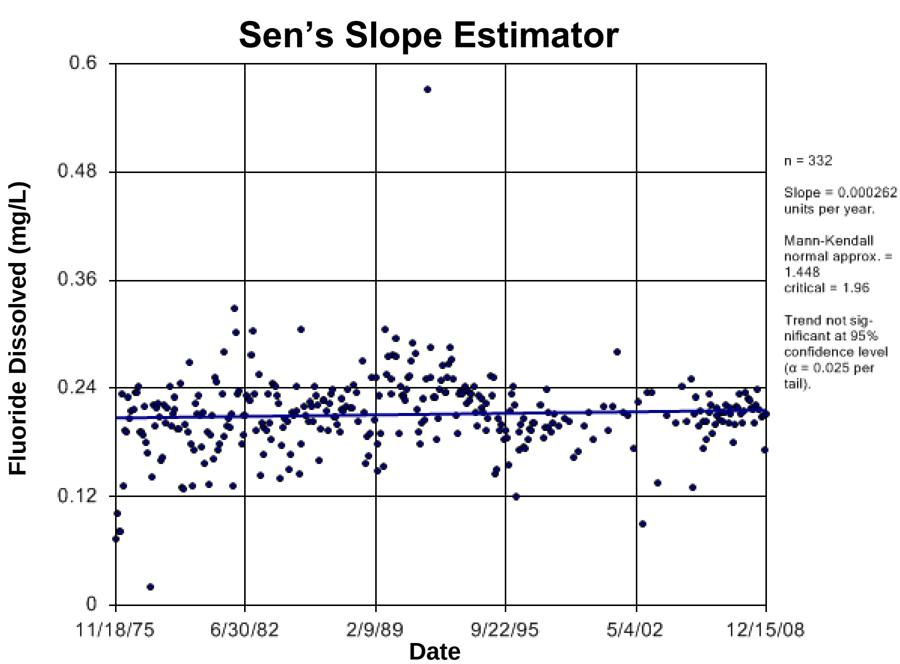

Figure 9-c16: Qu'Appelle River Fluoride Dissolved

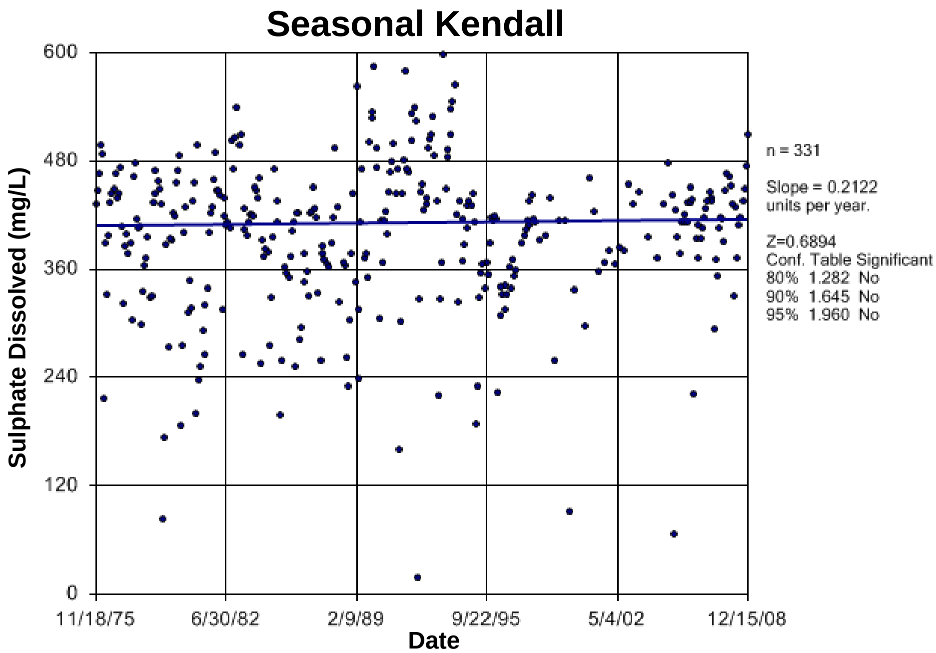

Figure 9-c17: Qu'Appelle River Sulphate Dissolved

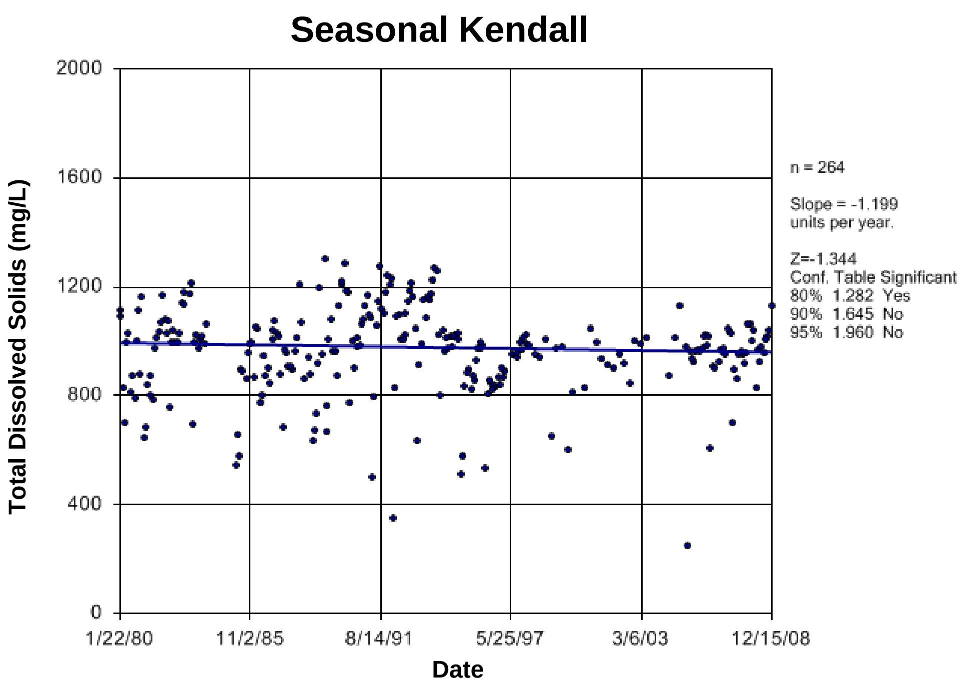

Figure 9-c18: Qu'Appelle River Total Dissolved Solids

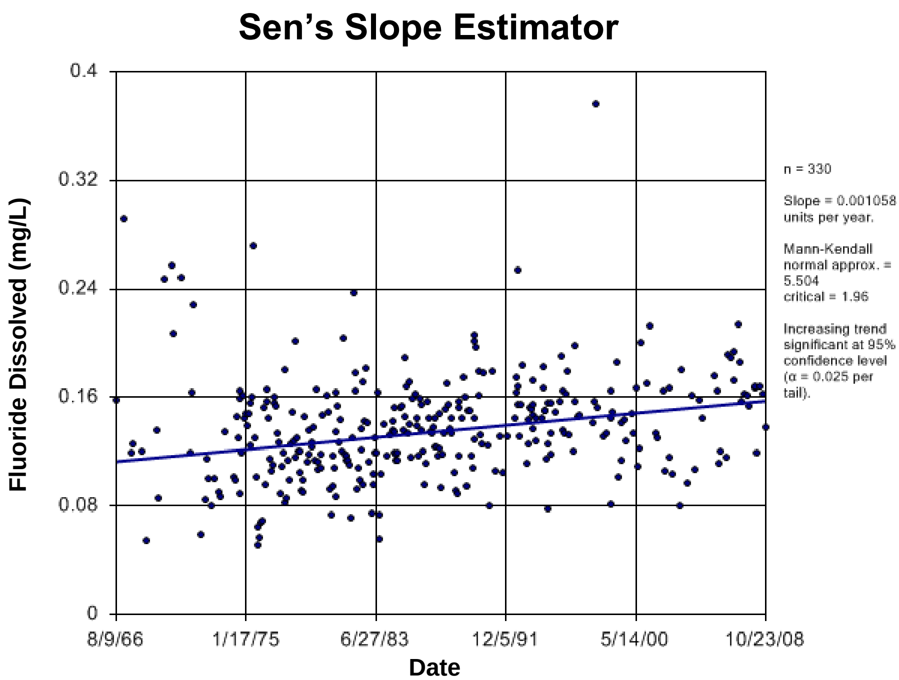

Figure 9-c19: Red Deer River (SK-MB) Fluoride Dissolved

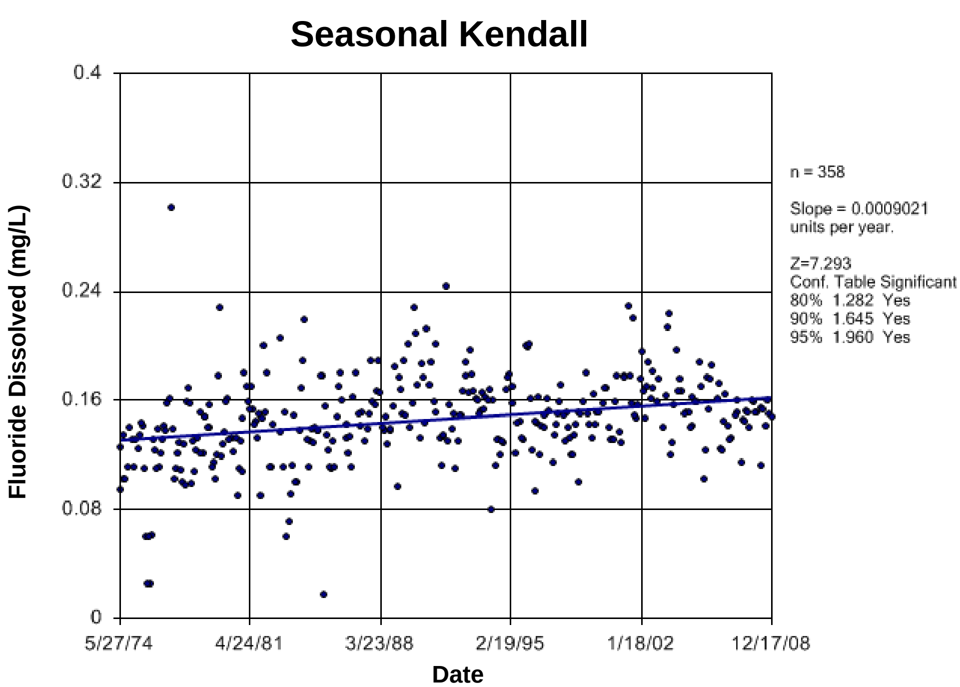

Figure 9-c20: Saskatchewan River Fluoride Dissolved

Appendix 9-d: Trend Analysis Summary

Trend Analysis Summary - Flow Weighted Concentration Trend				
	Z Critical = 1.960			
Parameter	n	Z Calc	p<0.05	Slope units/yr
Battle				
Fluoride Dissolved	455	6.55	Sig	0.001204
Total Dissolved Solids	332	7.111	Sig	3.822
Beaver				
Fluoride Dissolved	373	-2.195	Sig	-0.0002487
Cold				
Fluoride Dissolved	78	1.979	Sig	0.00000073
North Saskatchewan				
Fluoride Dissolved	192	-2.407	Sig	-0.0005748
Red Deer (AB-SK)				
Fluoride Dissolved	399	4.539	Sig	0.0005605
South Saskatchewan				
Fluoride Dissolved	391	10.34	Sig	0.001244
Assiniboine				
Fluoride Dissolved	432	6.803	Sig	0.001186
Sulphate Dissolved	446	2.45	Sig	0.6101
Total Dissolved Solids	316	3.701	Sig	2.987
Carrot				
Chloride Dissolved	337	-5.386	Sig	-1.581
Fluoride Dissolved	339	5.419	Sig	0.001082
Sodium Dissolved/Filtered	339	-5.384	Sig	-0.9035
Total Dissolved Solids	249	-0.6381	Not Sig	-0.6673
Churchill				
Fluoride Dissolved	223	3.993	Sig	0.0005355
Qu'Appelle				
Fluoride Dissolved	332	1.448	Not Sig	0.000262
Sulphate Dissolved	331	0.6894	Not Sig	0.2122
Total Dissolved Solids	264	-1.344	Not Sig	-1.199
Red Deer (SK-MB)				
Fluoride Dissolved	330	5.504	Sig	0.001058
Saskatchewan				
Fluoride Dissolved	358	7.293	Sig	0.0009021

Value: no seasonality

Appendix 9-e: 90th Percentile Proposed Objectives

Proposed Objectives for Fluoride Dissolved (90th Percentile) (mg/L)				
River	**Season**	**Fluoride**		**Whole Database**
Battle River	Open	0.250	0.28	0.310
	Closed	0.272	0.32	
Beaver River	Open	0.154	0.17	0.190
	Closed	0.186	0.22	
Cold River	Open	0.120	0.121	0.120
	Closed	0.120	0.121	
North Saskatchewan River	Open	0.170	0.18	0.180
	Closed	0.172	0.19	
Red Deer River (AB-SK)	Open	0.170	0.18	0.200
	Closed	0.200	0.21	
South Saskatchewan River	Open	0.160	0.17	0.190
	Closed	0.190	0.21	
Assiniboine River	Open	0.230	0.26	0.260
	Closed	0.240	0.26	
Carrot River	Open	0.190	0.2	0.250
	Closed	0.248	0.29	
Churchill River	Open	0.110	0.12	0.120
	Closed	0.110	0.12	
Qu'Appelle River	Open	0.250		0.250
	Closed	0.250		
Red Deer River (SK-MB)	Open	0.150	0.16	0.180
	Closed	0.170	0.193	
Saskatchewan River	Open	0.150	0.17	0.180
	Closed	0.180	0.19	

Proposed Objectives for Carrot River Chloride Dissolved and Sodium Dissolved/Filtered (90th Percentile) (mg/L)				
River	**Season**	**Seasonal**		**Whole Database**
Chloride Dissolved	Open	266.6		544.9
	Closed	728.2		
Sodium Dissolved/Filtered	Open	130.5	163.4	357.5
	Closed	330.0	442.0	

Legend

- Increasing Trend (green)
- Decreasing Trend (cyan)
- No Trend (yellow)

Proposed Objectives for Sulphate Dissolved (90th Percentile) (mg/L)				
River	**Season**	**Sulphate**		**Whole Database**
Assiniboine River	Open	224.4	259.5	298.6
	Closed	284.4	313.4	
Qu'Appelle River	Open	446.6		486.0
	Closed	501.8		

Proposed Objectives for Total Dissolved Solids (TDS) (90th Percentile) (mg/L)				
River	**Season**	**TDS**		**Whole Database**
Battle River	Open	597.0	698.8	872.5
	Closed	901.8	968.0	
Assiniboine River	Open	668.7	702.8	834.4
	Closed	829.0	885.9	
Carrot River	Open	597.4	742.3	1331.3
	Closed	1294.9	1672.0	
Qu'Appelle River	Open	1083.0		1144.0
	Closed	1205.6		

Legend

- Increasing Trend
- Decreasing Trend
- No Trend

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