Technical Report No. 65

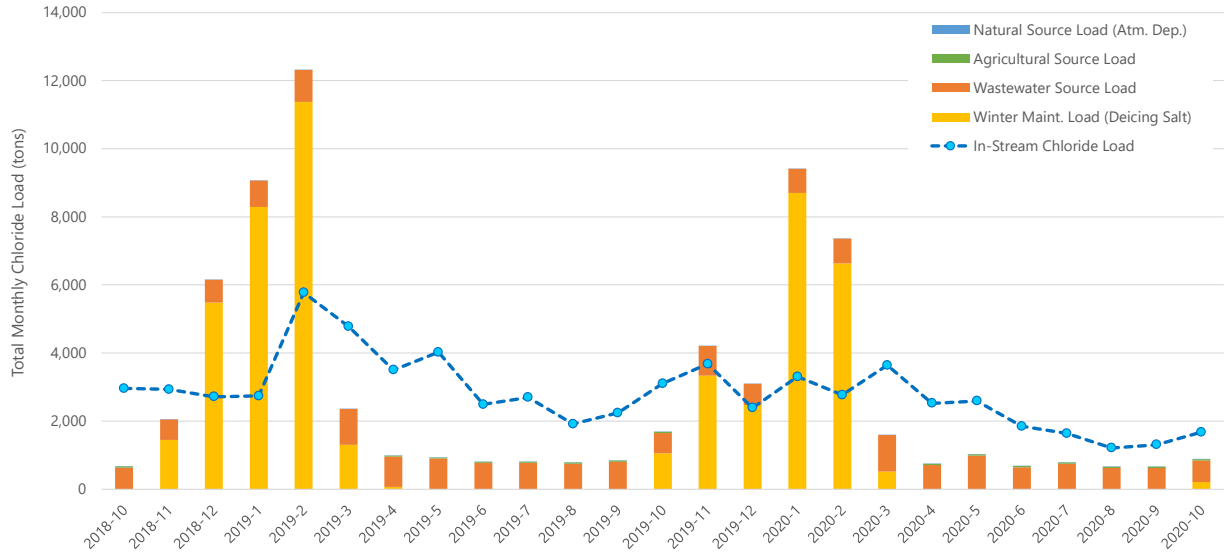
MASS BALANCE ANALYSIS FOR CHLORIDE IN SOUTHEASTERN WISCONSIN

Appendix C

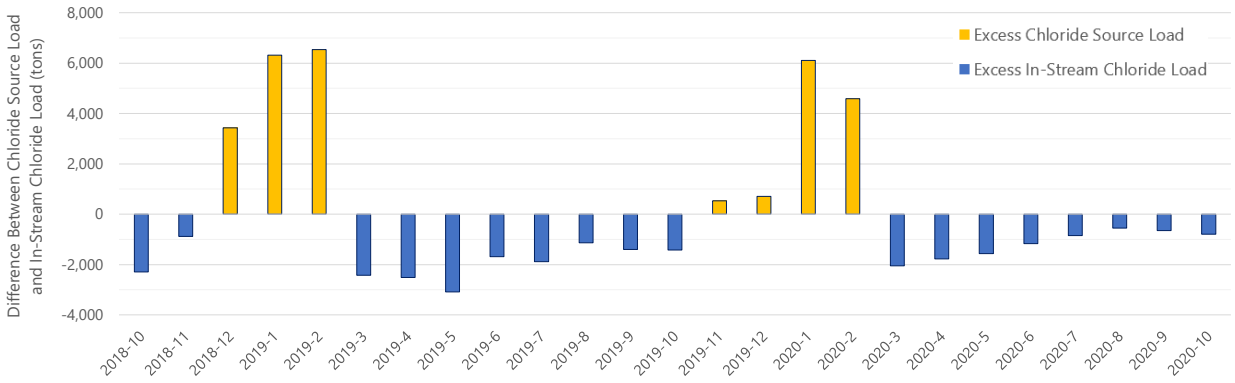
CHLORIDE MASS BALANCE ANALYSIS RESULTS FOR STREAM MONITORING SITES

Figure C.1
Chloride Loads and Mass Balance Analysis Results at Site 1 Fox River at Waukesha

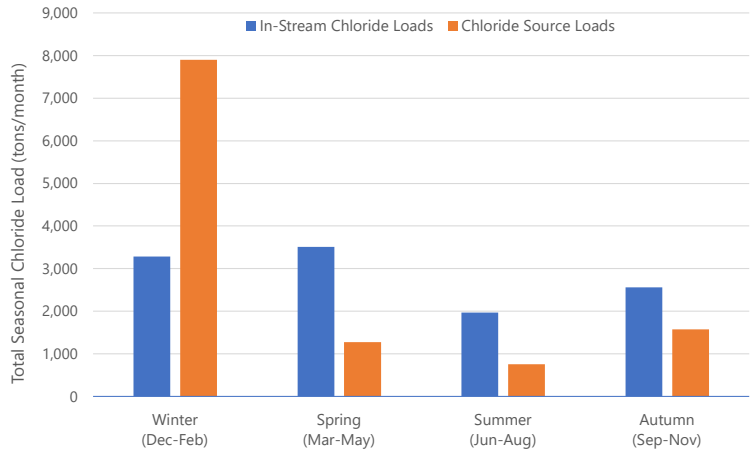
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Site 1 Results Summary

Chloride mass balance over the study period

- **0.21%** (sources > in-stream)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

- Winter 2018-2019 = **95.3%**
- Winter 2019-2020 = **78.6%**

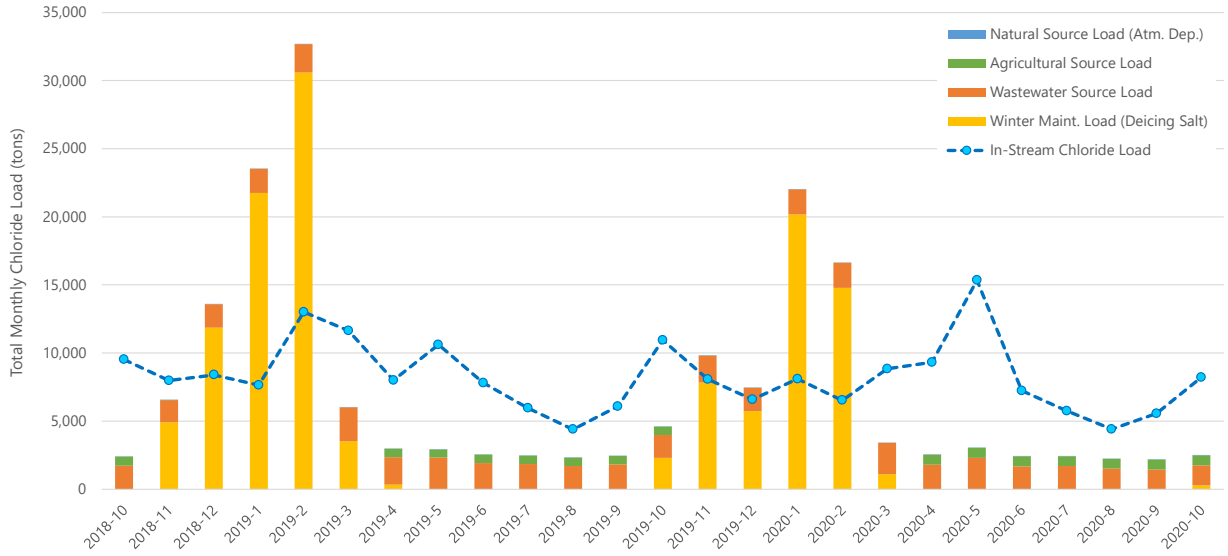
Flow-Weighted Mean Chloride Concentrations

- Study Period = **180.1 mg/l**
- Monthly Maximum = 403.8 mg/l
- Monthly Minimum = 90.1 mg/l

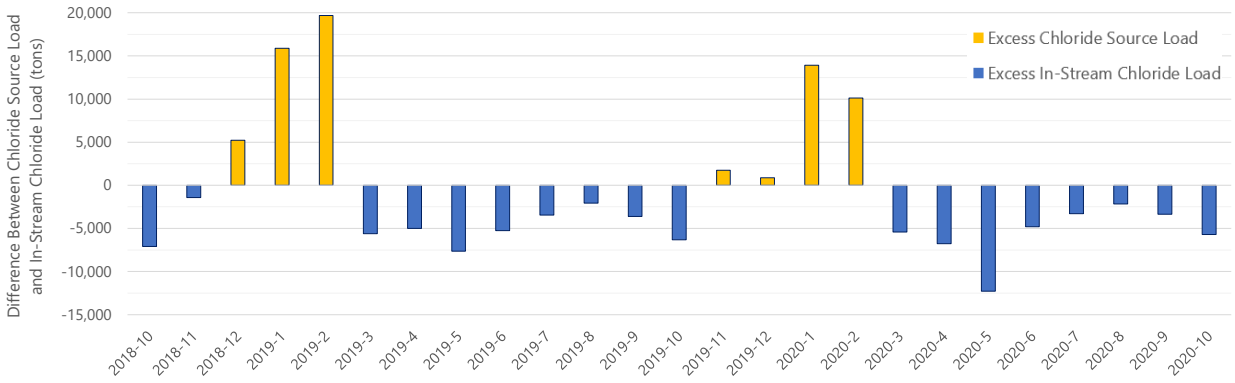
Source: SEWRPC

Figure C.2
Chloride Loads and Mass Balance Analysis Results at Site 2 Fox River at New Munster

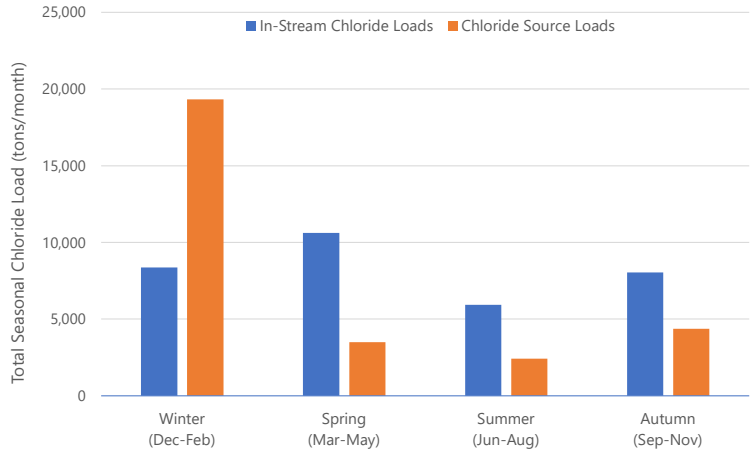
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Site 2 Results Summary

Chloride mass balance over the study period

- **-11.6%** (in-stream > sources)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

- Winter 2018-2019 = **95.5%**
- Winter 2019-2020 = **164.2%**

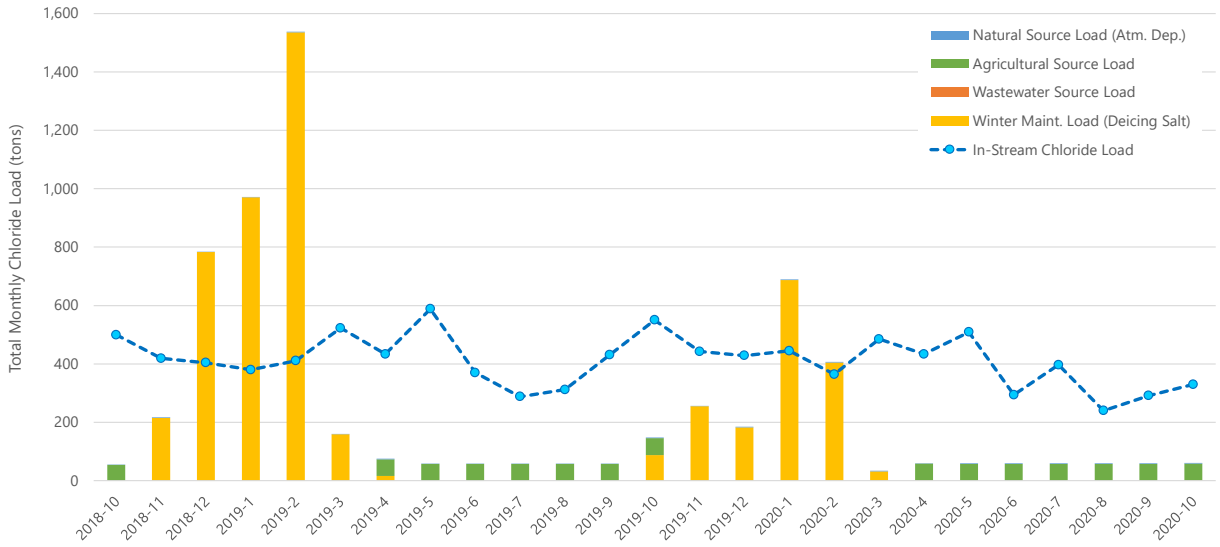
Flow-Weighted Mean Chloride Concentrations

- Study Period = **80.3 mg/l**
- Monthly Maximum = 166.2 mg/l
- Monthly Minimum = 50.0 mg/l

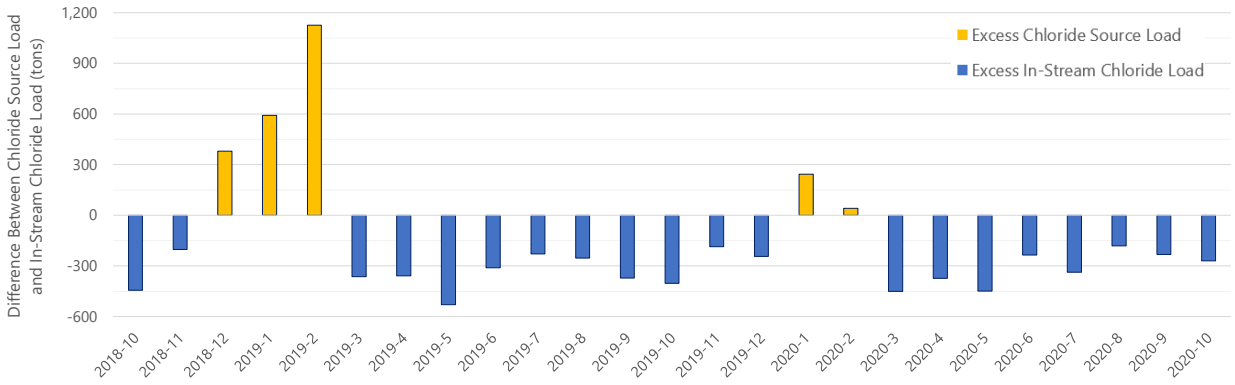
Source: SEWRPC

Figure C.3
Chloride Loads and Mass Balance Analysis Results at Site 3 Mukwonago River at Mukwonago

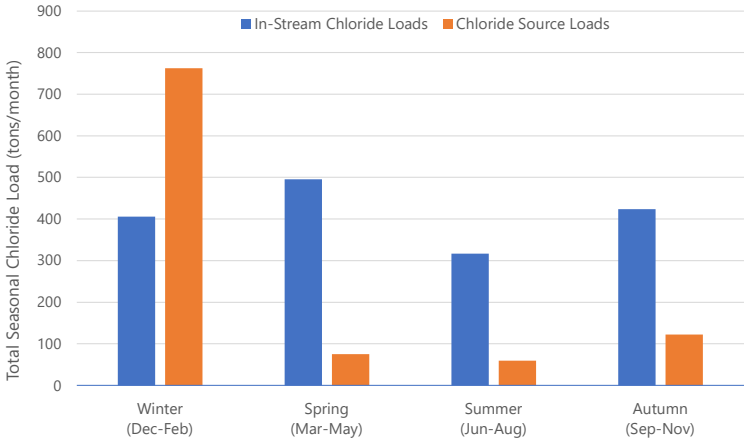
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Site 3 Results Summary

Chloride mass balance over the study period

- **-39.3%** (in-stream > sources)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

- Winter 2018-2019 = **154.5%**
- Winter 2019-2020 = **882.1%**

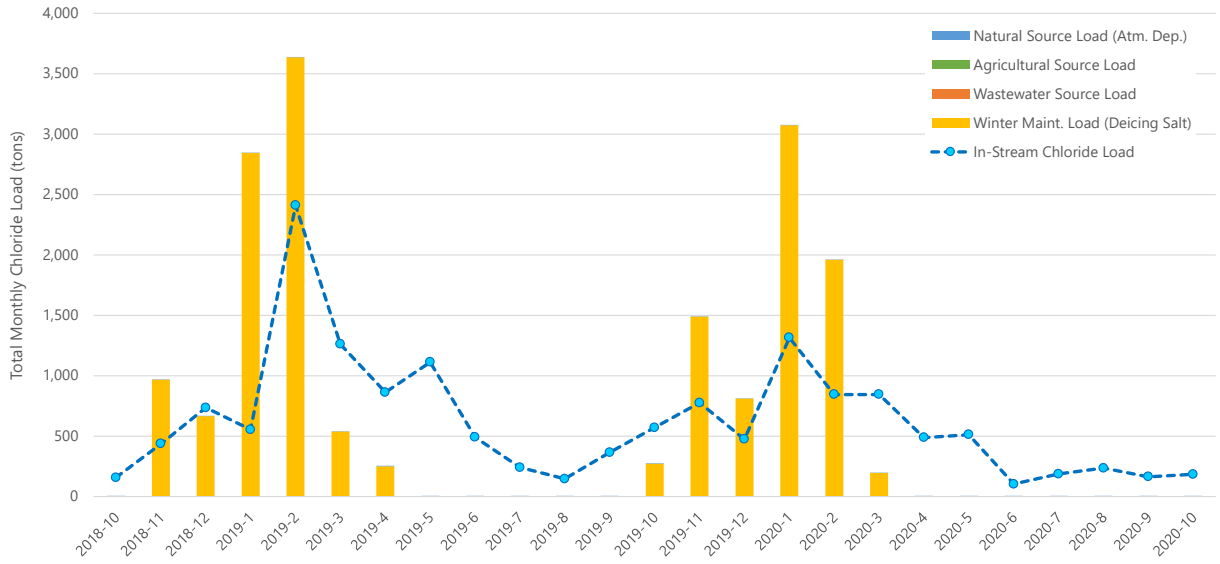
Flow-Weighted Mean Chloride Concentrations

- Study Period = **50.5 mg/l**
- Monthly Maximum = 57.8 mg/l
- Monthly Minimum = 42.3 mg/l

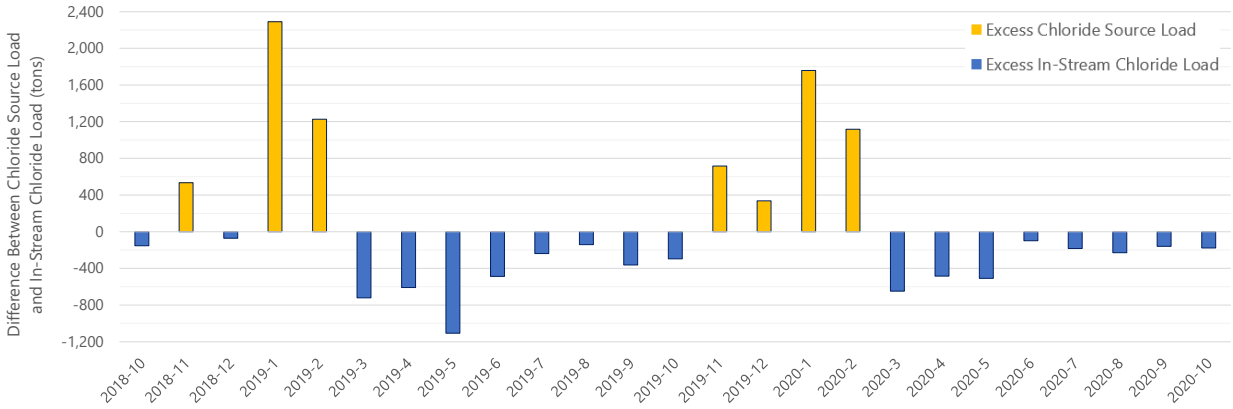
Source: SEWRPC

Figure C.4
Chloride Loads and Mass Balance Analysis Results at Site 9 Oak Creek

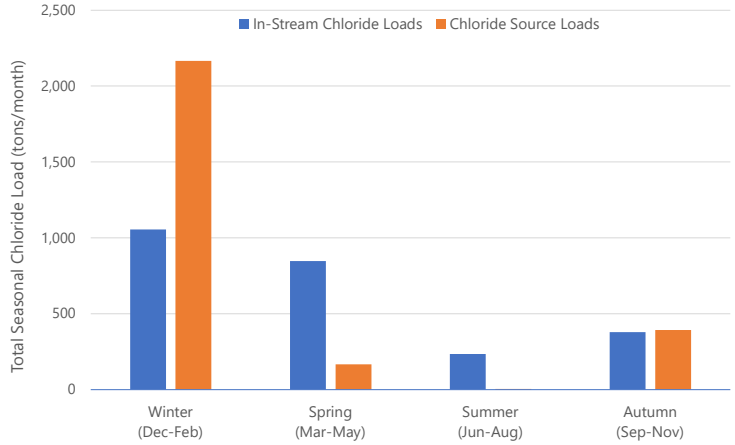
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Source: SEWRPC

Site 9 Results Summary

Chloride mass balance over the study period

- **8.3%** (sources > in-stream)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

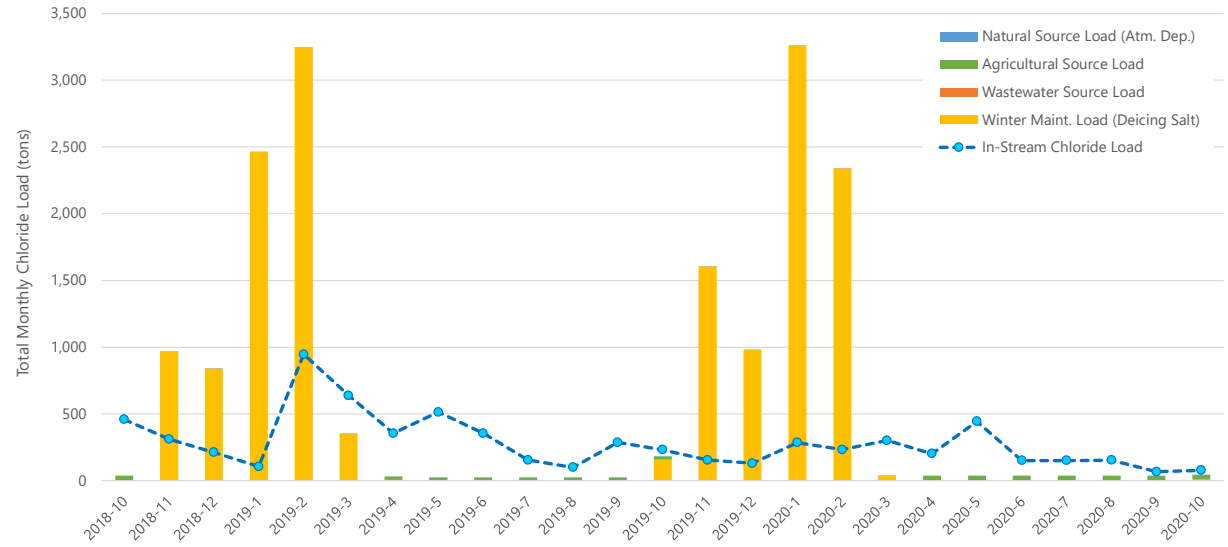
- Winter 2018-2019 = **99.8%**
- Winter 2019-2020 = **63.5%**

Flow-Weighted Mean Chloride Concentrations

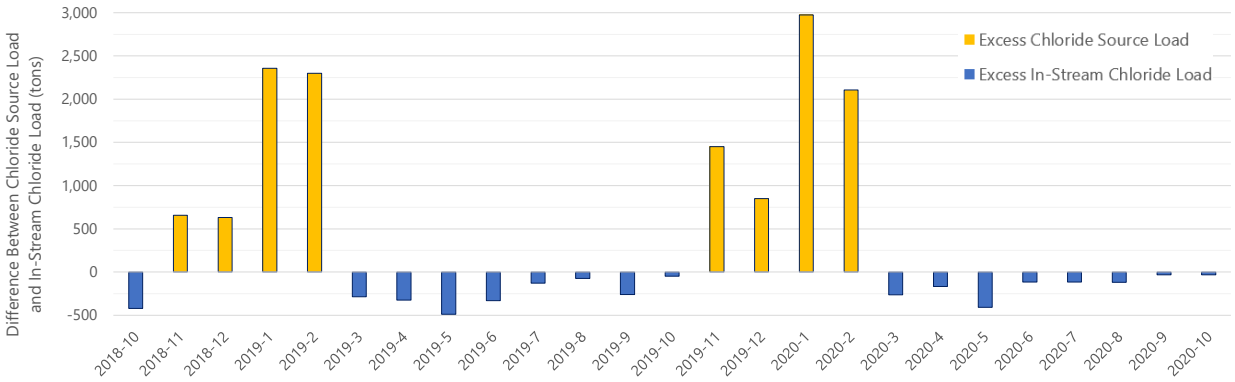
- Study Period = **158.3 mg/l**
- Monthly Maximum = 548.0 mg/l
- Monthly Minimum = 23.7 mg/l

Figure C.5
Chloride Loads and Mass Balance Analysis Results at Site 10 Pike River

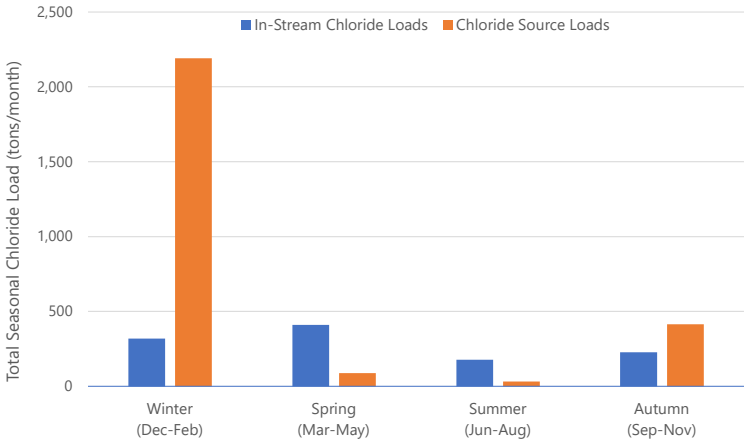
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Site 10 Results Summary

Chloride mass balance over the study period

- **138.3%** (sources > in-stream)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

- Winter 2018-2019 = **32.6%**
- Winter 2019-2020 = **16.9%**

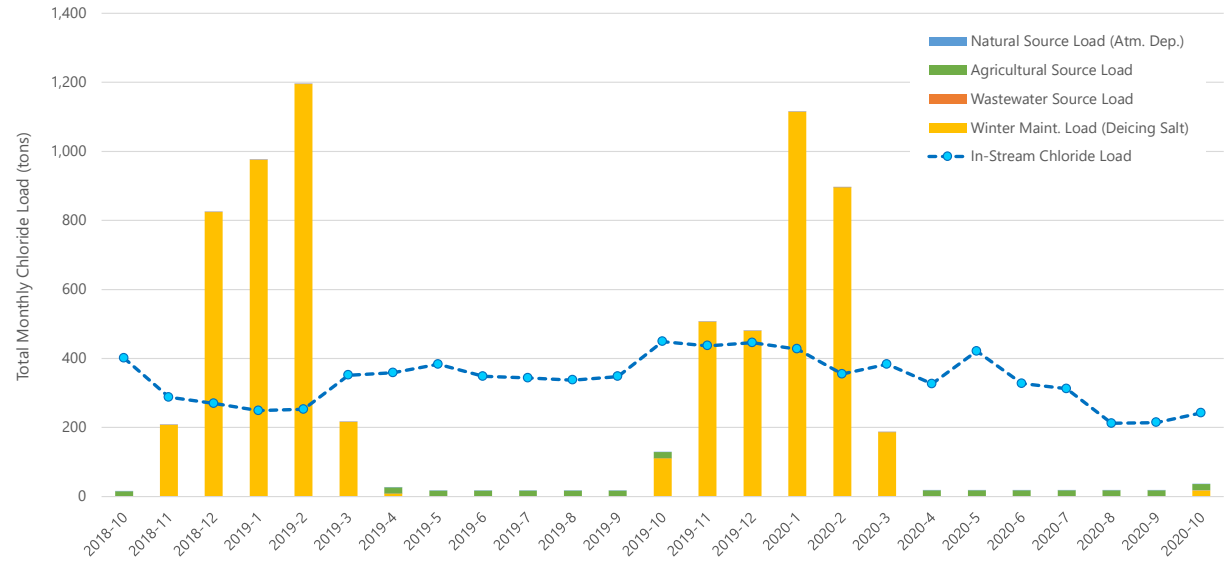
Flow-Weighted Mean Chloride Concentrations

- Study Period = **51.5 mg/l**
- Monthly Maximum = 113.9 mg/l
- Monthly Minimum = 20.9 mg/l

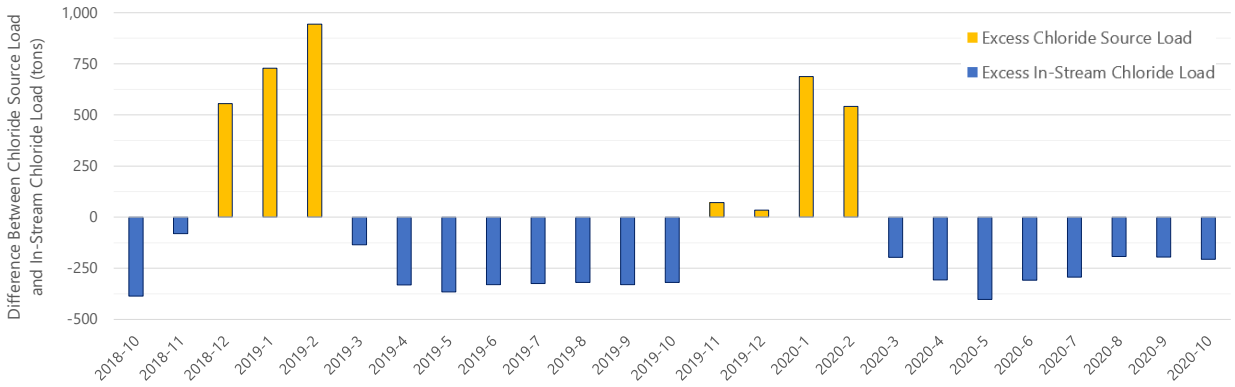
Source: SEWRPC

Figure C.6
Chloride Loads and Mass Balance Analysis Results at Site 11 Bark River Downstream

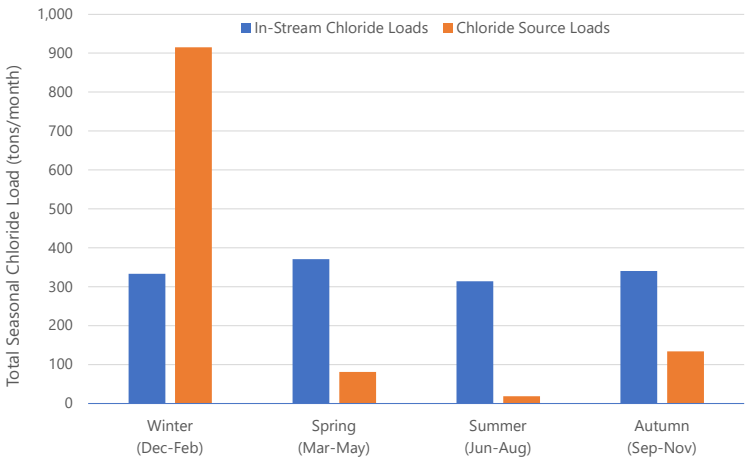
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Source: SEWRPC

Site 11 Results Summary

Chloride mass balance over the study period

- **-17.2%** (in-stream > sources)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

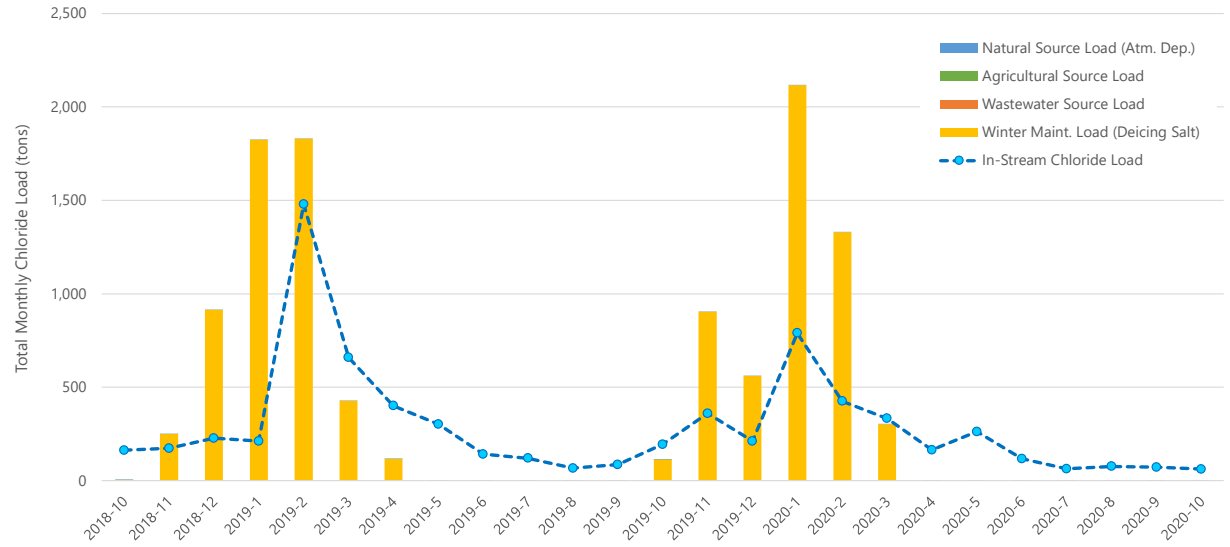
- Winter 2018-2019 = **110.3%**
- Winter 2019-2020 = **157.1%**

Flow-Weighted Mean Chloride Concentrations

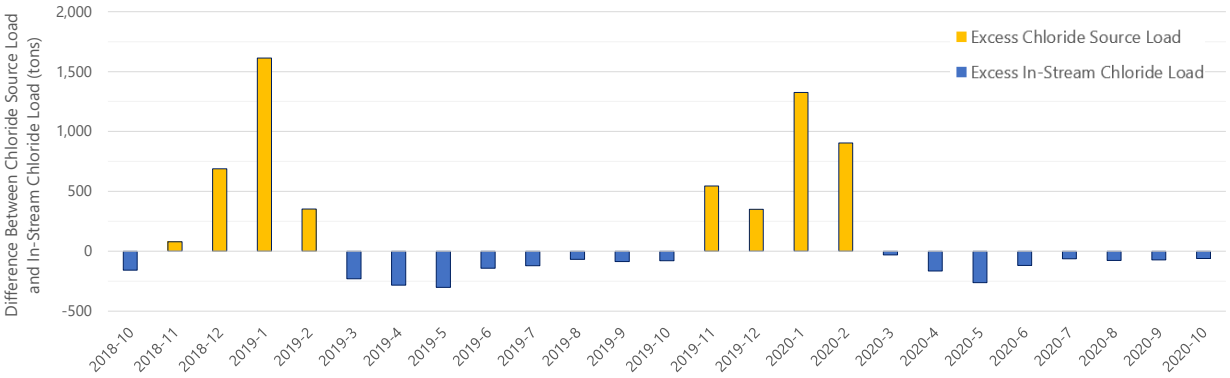
- Study Period = **90.9 mg/l**
- Monthly Maximum = 125.2 mg/l
- Monthly Minimum = 62.8 mg/l

Figure C.7
Chloride Loads and Mass Balance Analysis Results at Site 12 Lincoln Creek

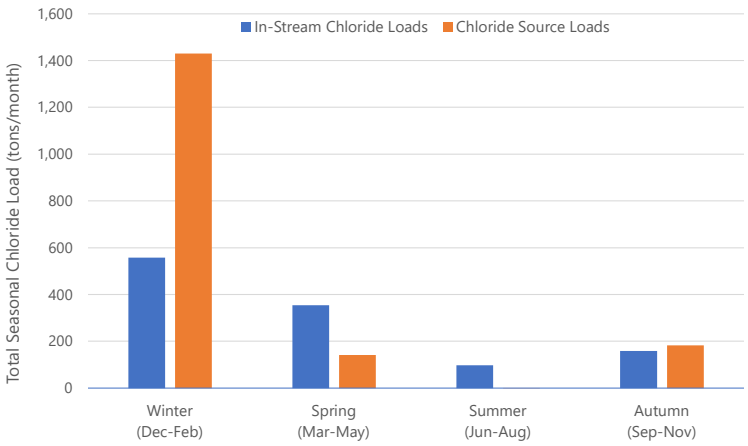
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Site 12 Results Summary

Chloride mass balance over the study period

- **49.5%** (sources > in-stream)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

- Winter 2018-2019 = **47.9%**
- Winter 2019-2020 = **27.1%**

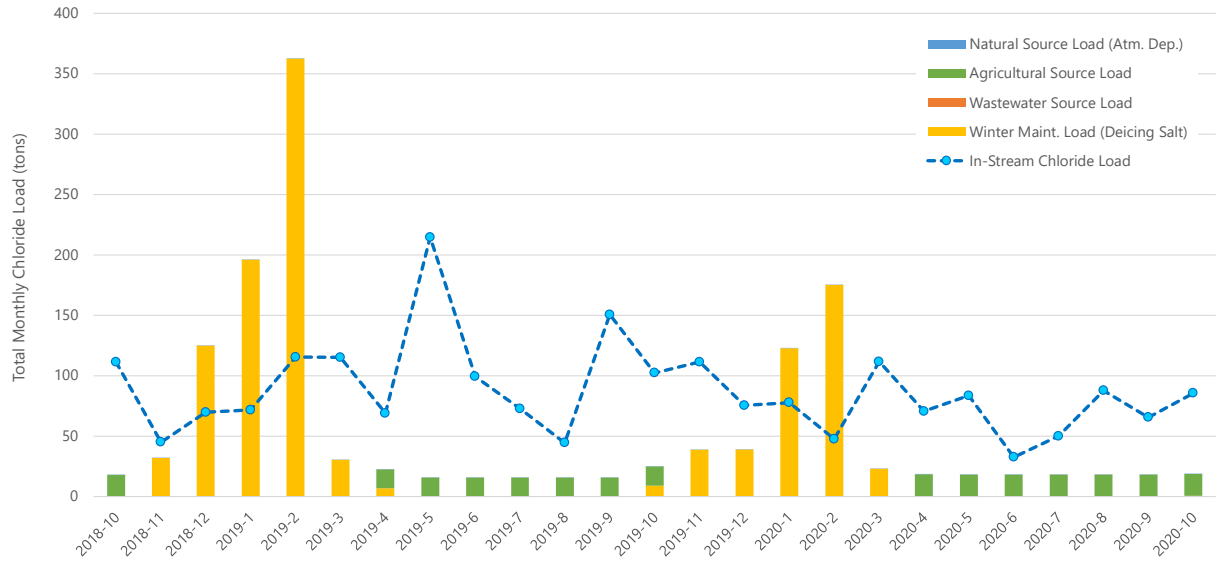
Flow-Weighted Mean Chloride Concentrations

- Study Period = **196.3 mg/l**
- Monthly Maximum = 1035.5 mg/l
- Monthly Minimum =25.0 mg/l

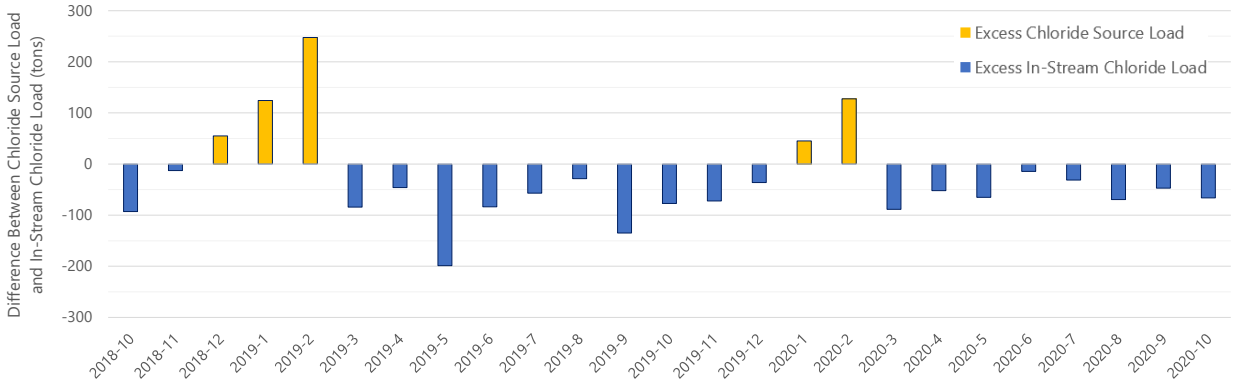
Source: SEWRPC

Figure C.8
Chloride Loads and Mass Balance Analysis Results at Site 16 Jackson Creek

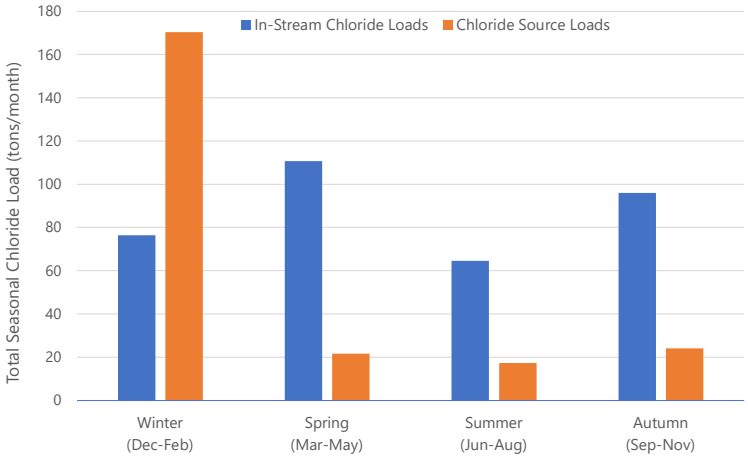
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Source: SEWRPC

Site 16 Results Summary

Chloride mass balance over the study period

- **-34.7%** (in-stream > sources)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

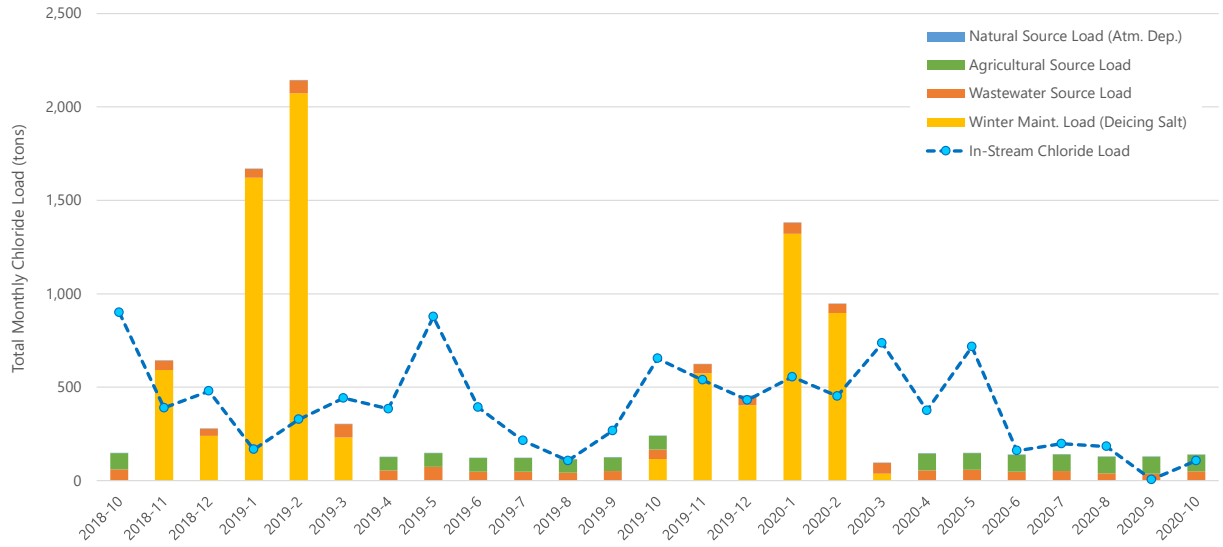
- Winter 2018-2019 = **191.6%**
- Winter 2019-2020 = **250.5%**

Flow-Weighted Mean Chloride Concentrations

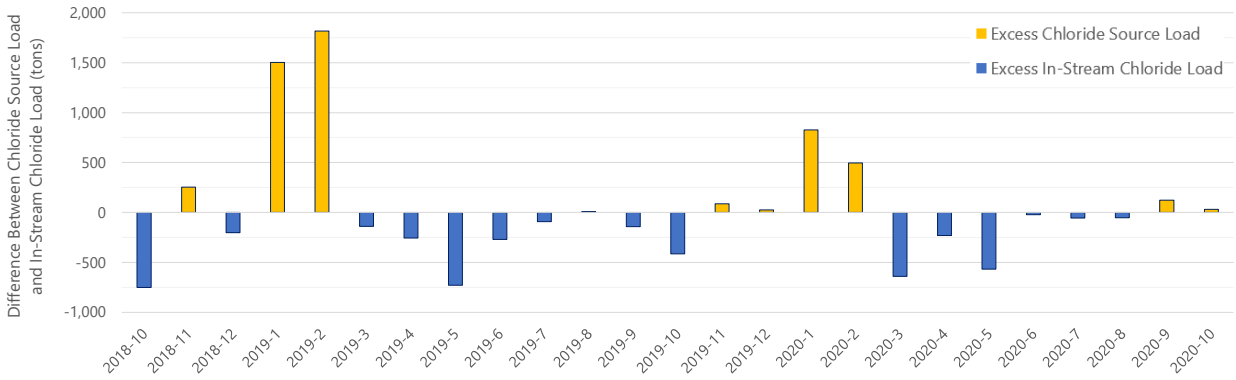
- Study Period = **49.5 mg/l**
- Monthly Maximum = 125.3 mg/l
- Monthly Minimum = 24.3 mg/l

Figure C.9
Chloride Loads and Mass Balance Analysis Results at Site 25 Root River Canal

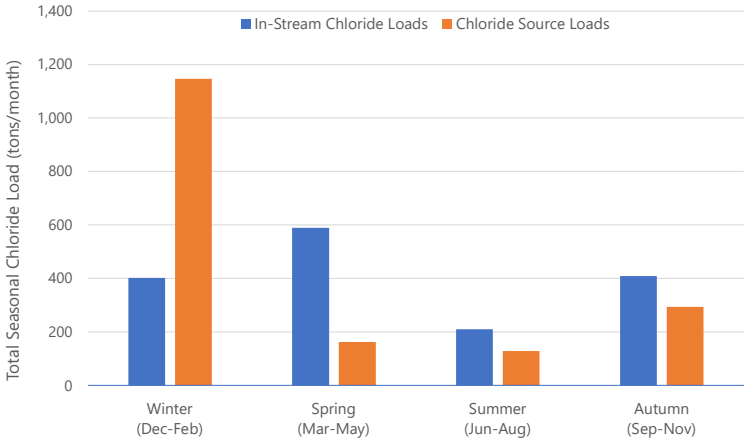
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Site 25 Results Summary

Chloride mass balance over the study period

- **6.1%** (sources > in-stream)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

- Winter 2018-2019 = **60.2%**
- Winter 2019-2020 = **109.3%**

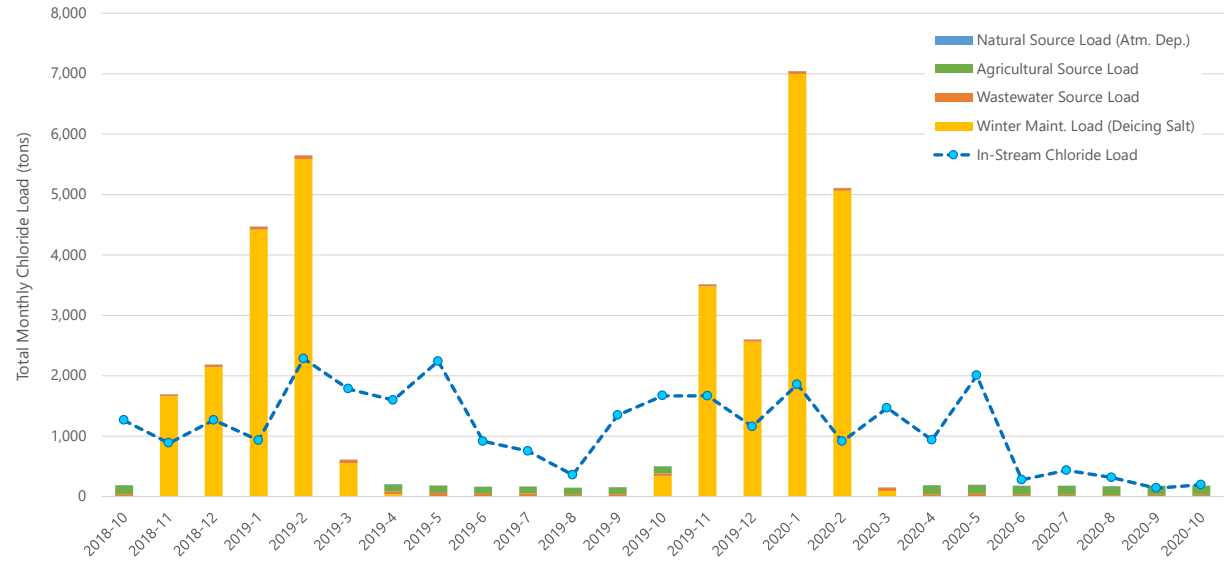
Flow-Weighted Mean Chloride Concentrations

- Study Period = **50.1 mg/l**
- Monthly Maximum = 121.4 mg/l
- Monthly Minimum =10.6 mg/l

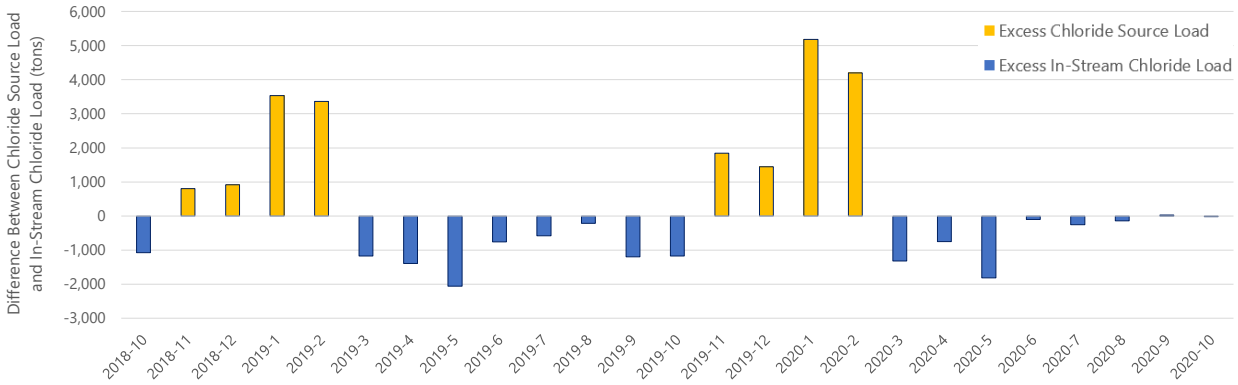
Source: SEWRPC

Figure C.10
Chloride Loads and Mass Balance Analysis Results at Site 30 Des Plaines River

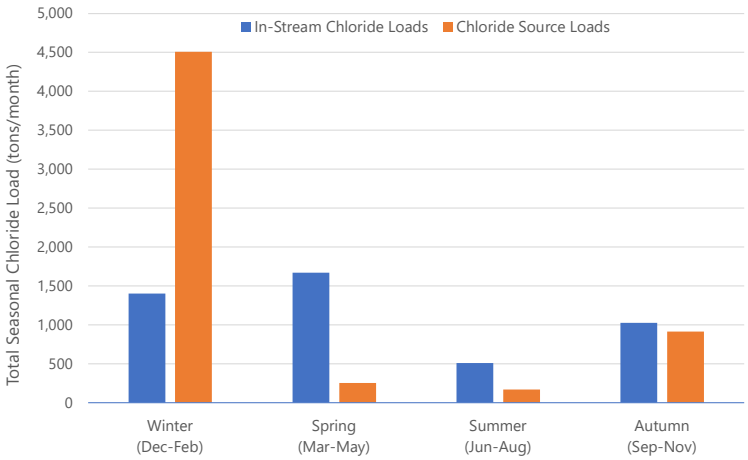
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Source: SEWRPC

Site 30 Results Summary

Chloride mass balance over the study period

- **25.7%** (sources > in-stream)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

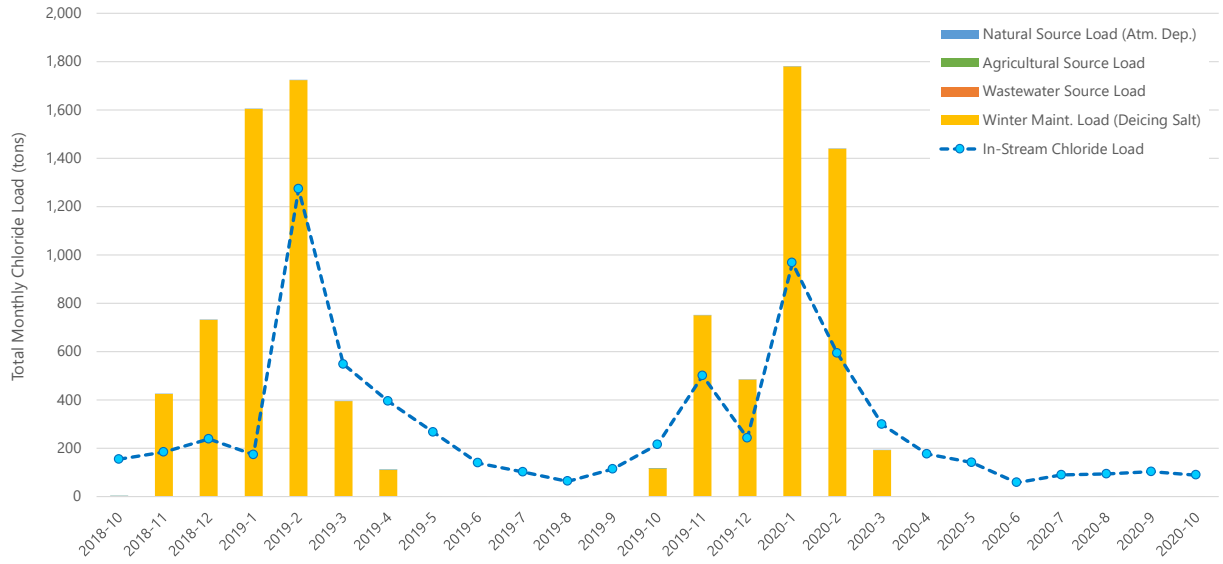
- Winter 2018-2019 = **98.8%**
- Winter 2019-2020 = **34.3%**

Flow-Weighted Mean Chloride Concentrations

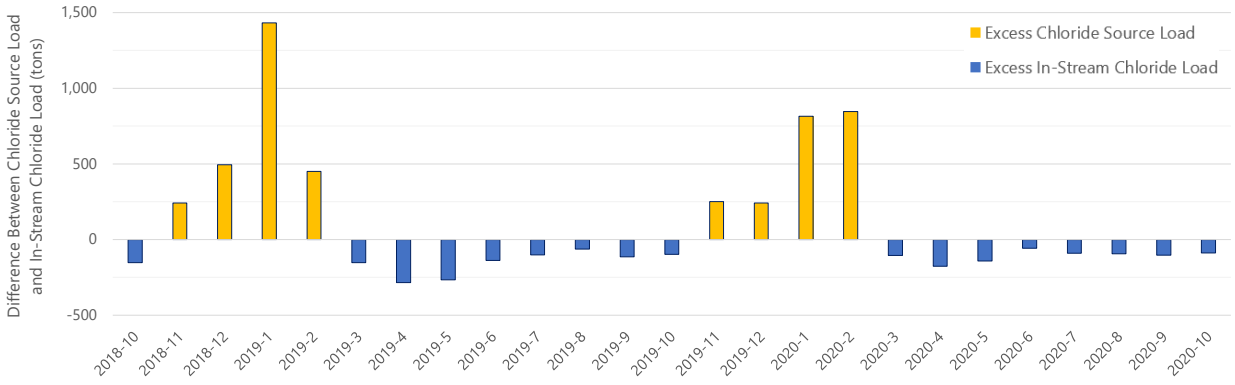
- Study Period = **63.4 mg/l**
- Monthly Maximum = 139.0 mg/l
- Monthly Minimum = 32.3 mg/l

Figure C.11
Chloride Loads and Mass Balance Analysis Results at Site 53 Honey Creek at Wauwatosa

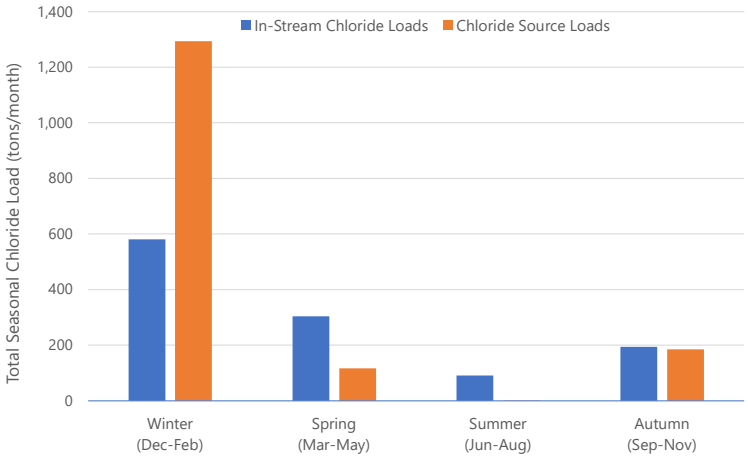
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Source: SEWRPC

Site 53 Results Summary

Chloride mass balance over the study period

- **35.3%** (sources > in-stream)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

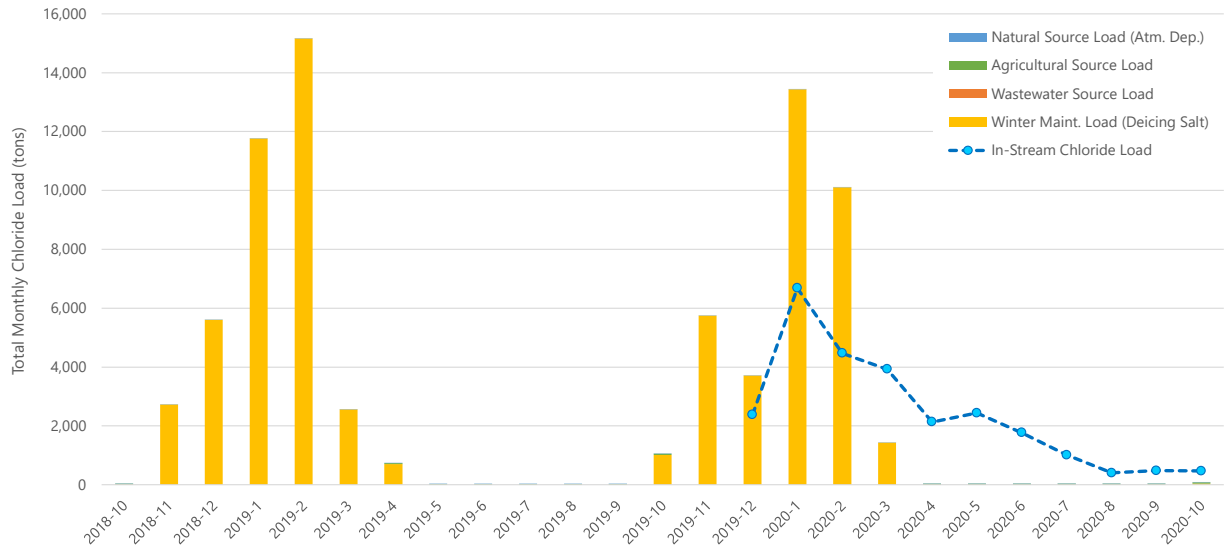
- Winter 2018-2019 = **46.4%**
- Winter 2019-2020 = **39.6%**

Flow-Weighted Mean Chloride Concentrations

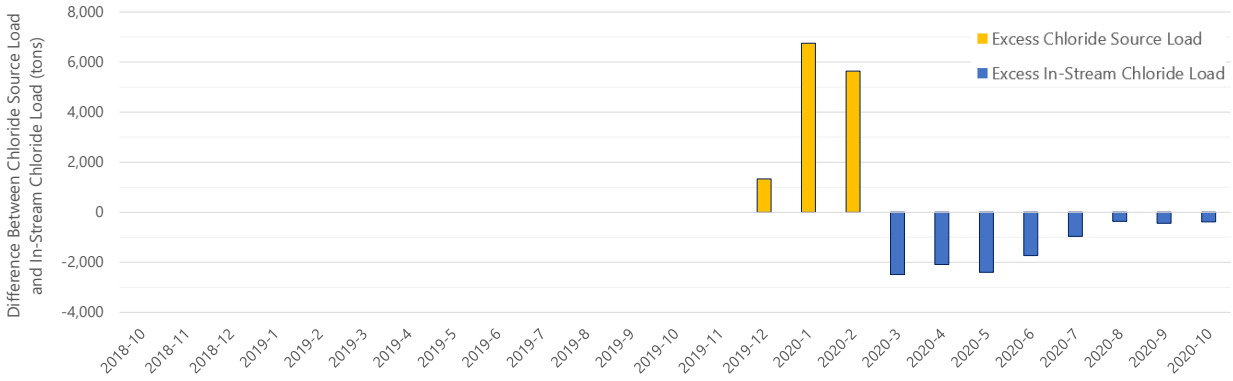
- Study Period = **221.6 mg/l**
- Monthly Maximum = 1232.5 mg/l
- Monthly Minimum = 52.9 mg/l

Figure C.12
Chloride Loads and Mass Balance Analysis Results at Site 57 Menomonee River at Wauwatosa

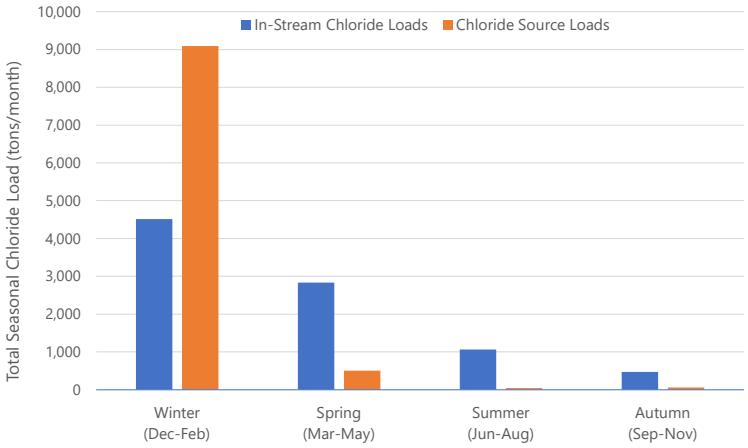
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Site 57 Results Summary

Chloride mass balance over the study period

- **10.9%** (sources > in-stream)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

- Winter 2018-2019 = n/a
- Winter 2019-2020 = **79.2%**

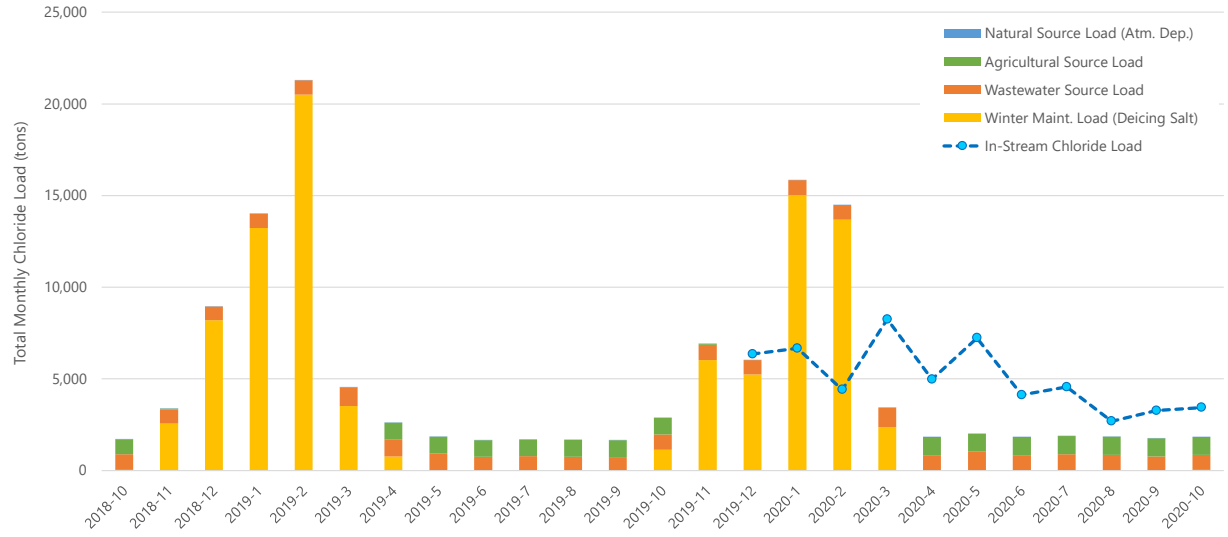
Flow-Weighted Mean Chloride Concentrations

- Study Period = **161.4 mg/l**
- Monthly Maximum = 549.9 mg/l
- Monthly Minimum = 45.2 mg/l

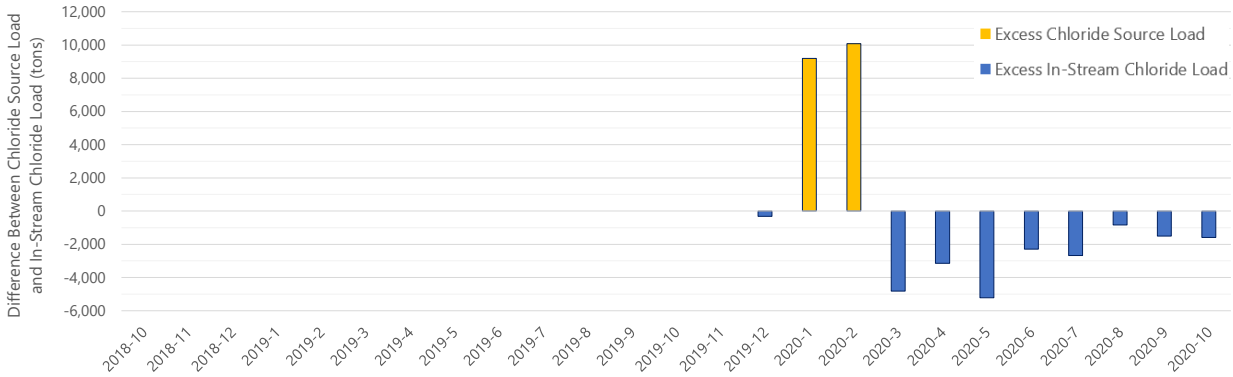
Source: SEWRPC

Figure C.13
Chloride Loads and Mass Balance Analysis Results at Site 58 Milwaukee River at Estabrook Park

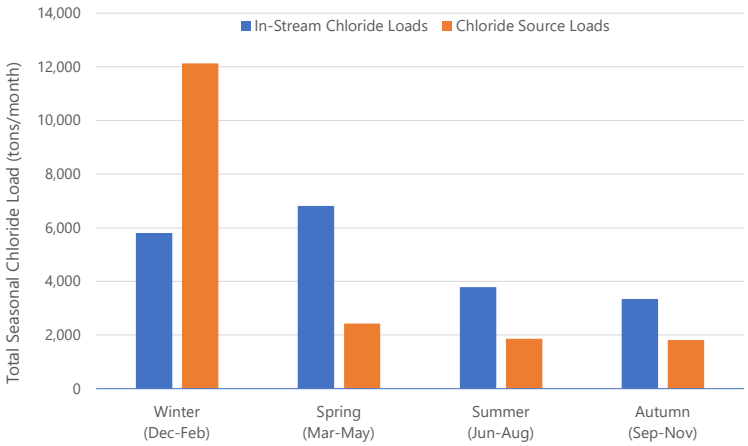
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Site 58 Results Summary

Chloride mass balance over the study period

- **-5.5%** (in-stream > sources)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

- Winter 2018-2019 = n/a
- Winter 2019-2020 = **114.3%**

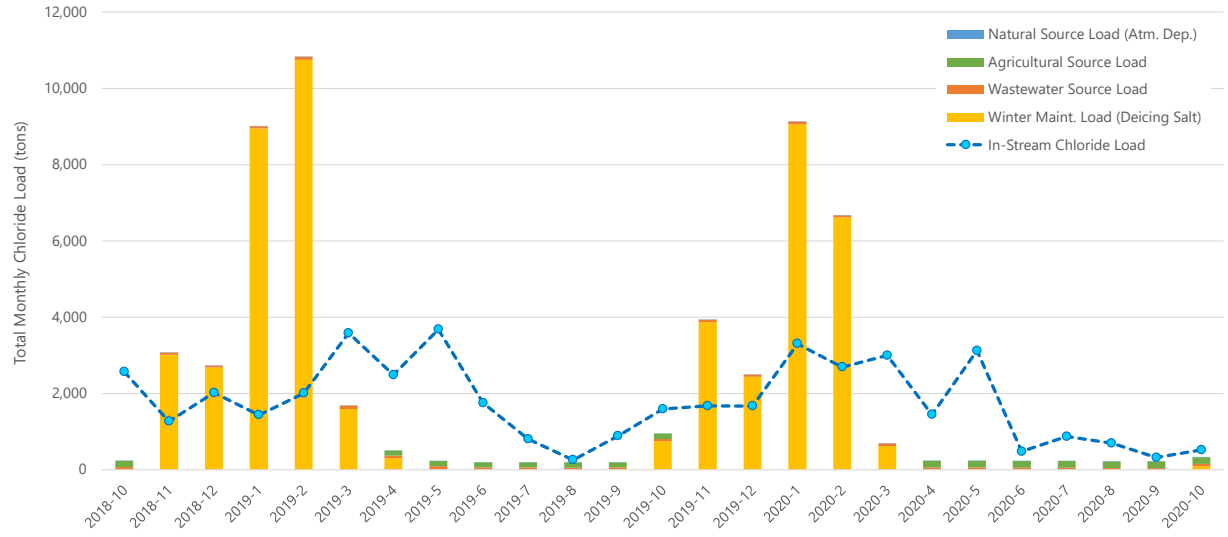
Flow-Weighted Mean Chloride Concentrations

- Study Period = **65.0 mg/l**
- Monthly Maximum = 96.3 mg/l
- Monthly Minimum = 49.5 mg/l

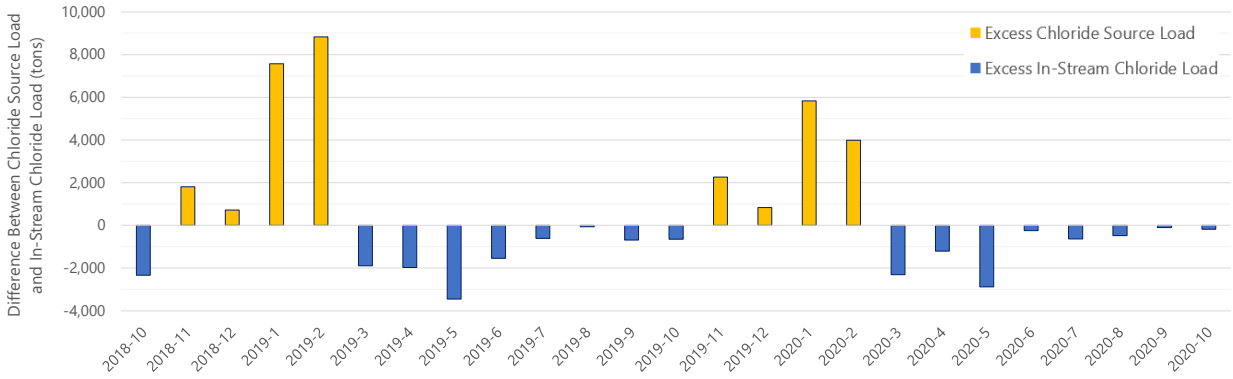
Source: SEWRPC

Figure C.14
Chloride Loads and Mass Balance Analysis Results at Site 59 Root River near Horlick Dam

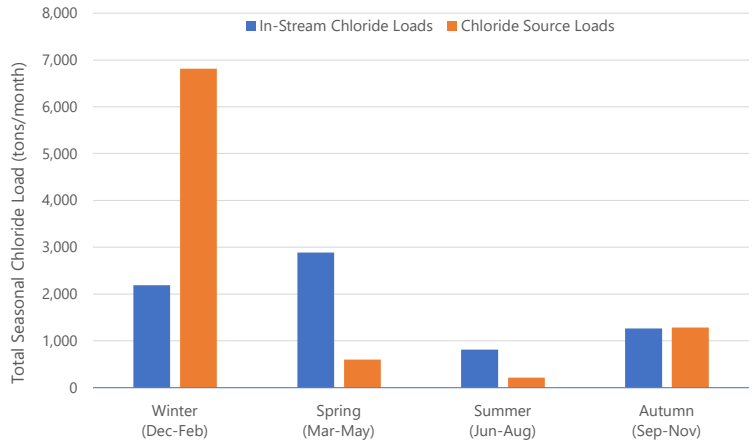
(a) Monthly Chloride Sources Loads Versus In-Stream Chloride Loads



(b) Monthly Excess Chloride Loads



(c) Seasonal Chloride Load Comparison



Site 59 Results Summary

Chloride mass balance over the study period

- **24.1%** (sources > in-stream)

Percent of the winter excess chloride load accounted for by excess in-stream chloride load over the following non-winter months

- Winter 2018-2019 = **57.4%**
- Winter 2019-2020 = **62.1%**

Flow-Weighted Mean Chloride Concentrations

- Study Period = **70.0 mg/l**
- Monthly Maximum = 193.8 mg/l
- Monthly Minimum = 27.0 mg/l

Source: SEWRPC