

2020 Impairment Assessment for Stream C (WBIC 4000013)

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Surface water quality data for 2016 – 2018 was received from the Flambeau Mining Company of copper, zinc, and hardness (mg/L CaCO₃) in Stream C (Site SW-C1) and an upstream connected waterway (Site SW-C9). This 2020 assessment is based on samples taken from October 2016 to November 2018 and totals 15 samples. Stream C is listed for Acute Aquatic Toxicity from zinc and copper.

To determine if Stream C was still impaired for zinc and copper the formula for Acute Aquatic Toxicity Criteria (ATC) in Wisconsin's [NR 105](#) Table 2 was used.

$$ATC = e^{(V*(\ln(\text{Hardness}))+\ln(ACI))}$$

Values for V and ln ACI are provided in NR 105 Table 2. Hardness values were provided in the sample data. In order to use the ATC formula hardness values for zinc need to be greater than or equal to 12 mg/l CaCO₃ and for copper greater than or equal to 13 mg/L CaCO₃. All 15 samples at site SW-C1 had sufficiently high water hardness, but at site SW-C9 several samples had water hardness lower than required. A site is considered impaired if it exceeds the criteria more than once every 3 years (WisCALM 2020).

This assessment shows levels of zinc below criteria (Figure 1) and high levels copper, consistently exceeding criteria (Figure 2) in Stream C (SW-C1). A 2018 assessment based on samples taken from April 2013 to October 2015 showed continued impairment with 5 of 11 samples exceeding. The 2020 assessment showed no impairment for zinc at the Stream C site (Table 1). Based on this new data the zinc listing for Stream C is recommended for removal from the 2020 impaired waters list. The stream will remain listed for copper.

Table 1. Number of water quality criteria exceedances for Copper and Zinc at a Stream C site and an upstream site. Site SW-C9 had fewer than 15 samples that met water hardness requirements for criteria comparison.

Site	Copper Exceedances	Zinc Exceedances	Impairment Status
Stream C (SW-C1)	14/15	0/15	Delete Zinc listing. Retain Copper listing.
Upstream Site (SW-C9)	6/6	2/8	Potential impairment – water not on hydrolayer; intermittent or ephemeral.

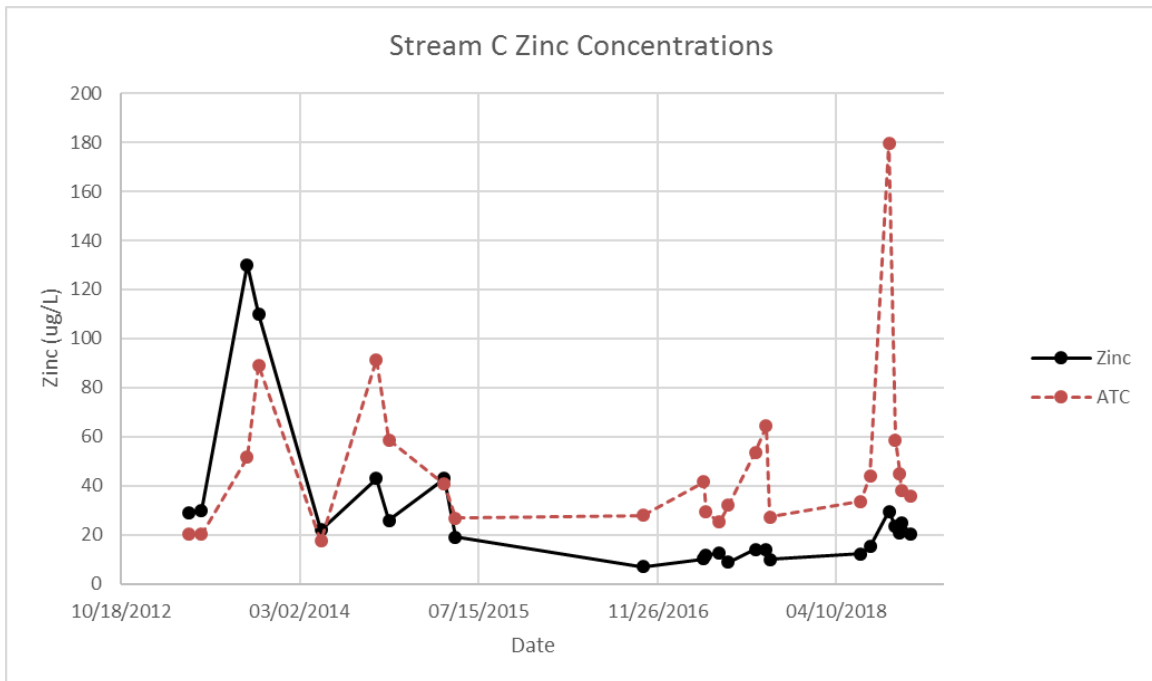


Figure 1. Concentration of zinc in surface water of Stream C from 2012 – 2018 compared against the Aquatic Toxicity Criteria (ATC) at site SW-C1. A visible exceedance of water quality for zinc can be seen when the solid black line is above the red dashed line. There were no exceedances from 2016 – 2018.

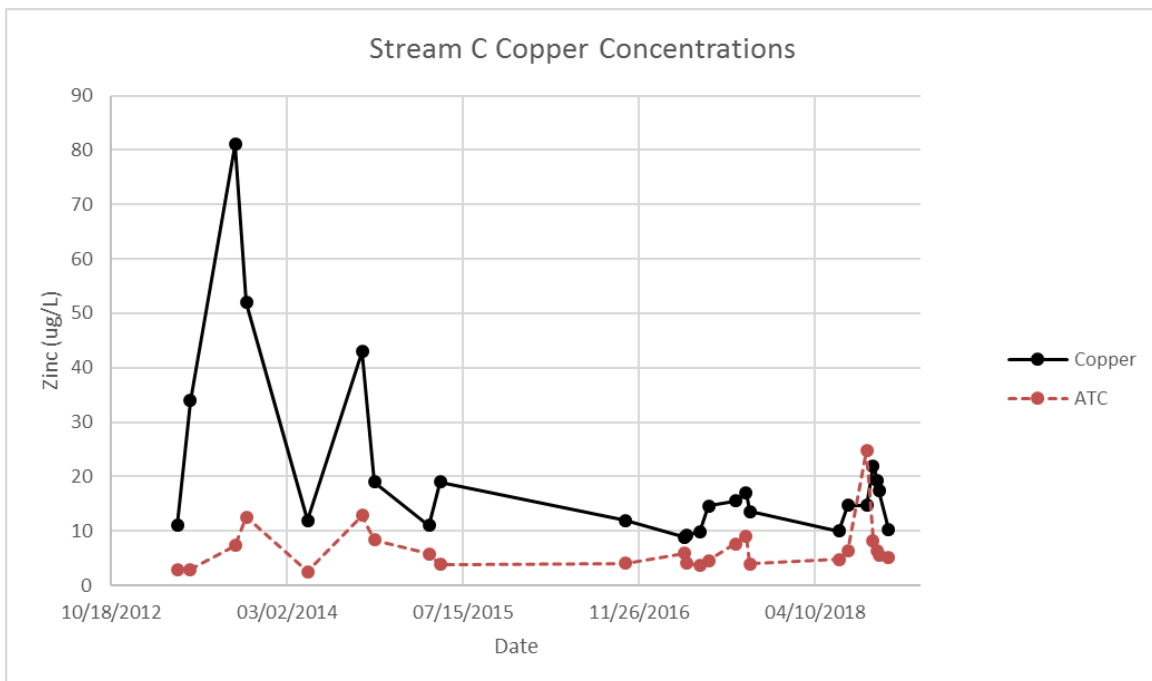


Figure 2. Concentration of copper in surface water of Stream C from 2012 – 2018 compared against the Aquatic Toxicity Criteria (ATC) at site SW-C1. A visible exceedance of water quality for zinc can be seen when the solid black line is above the red dashed line. For the majority of samples copper concentrations exceeded the ATC.