Metadata template[[1]](#footnote-1) for datasets of *L&O-Letters* articles

**Table 1.** Description of the fields needed to describe the creation of your dataset.

|  |  |
| --- | --- |
| **Title of dataset** | *Chloride concentrations in 235 Lake Michigan tributaries, 2018* |
| **URL of dataset** | *forthcoming upon decision at the first review stage* |
| **Abstract** | *Chloride concentrations in 235 Lake Michigan tributaries collected between July 10-15, 2018.* |
| **Keywords** | *Lake Michigan; salinization; chloride; tributary; road salt* |
| **Lead author for the dataset** | *Hilary A. Dugan* |
| **Title and position of lead author** | *Principal Investigator* |
| **Organization and address of lead author** | *Center for Limnology*  *University of Wisconsin-Madison*  *680 N. Park St. Madison, WI 53706* |
| **Email address of lead author** | [*hdugan@wisc.edu*](mailto:hdugan@wisc.edu) |
| **Additional authors or contributors to the dataset** | *Linnea Rock*  *Robert Mooney* |
| **Organization associated with the data** | *Center for Limnology*  *University of Wisconsin-Madison* |
| **Funding** | *Funding for this work was provided by a Department of Interior Northeast Climate Adaptation Science Center graduate fellowship to RJM. The project described in this publication was supported by Grant or Cooperative Agreement No. G12AC00001 from the United States Geological Survey. Its contents are solely the responsibility of the authors and do not necessarily represent the views of the Northeast Climate Adaptation Science Center or the USGS. This manuscript is submitted for publication with the understanding that the United States Government is authorized to reproduce and distribute reprints for Governmental purposes.* |
| **License** | [***CCBY***](https://creativecommons.org/licenses/by/4.0/) *– requires attribution* |
| **Geographic location – verbal description** | *Lake Michigan watershed* |
| **Geographic coverage bounding coordinates** | *xmin ymin xmax ymax*  *-89.71335 41.26538 -83.93787 46.73383* |
| **Time frame - Begin date** | *2018-07-10* |
| **Time frame - End date** | *2018-07-15* |
| **General study design** | *A spatial assessment of salt loading from tributaries into Lake Michigan to assess historic changes and future trends and to identify hot-spots of salt loading to inform reduction efforts.* |
| **Methods description** | *Our assessment of chloride loading into Lake Michigan combines observations from a 5-day circumnavigation of Lake Michigan tributaries in 2018 with publicly available historical data. In 2018, we sampled 235 of Lake Michigan's ~300 tributaries between July 10-15. All sampling took place under low- to moderate-flow conditions when streams were near or below their 30th percentile of discharge for 2018. Surface water from each tributary was collected at the road crossing nearest to the mouth via bridge sampling methods (EPA 2013). Collected water samples were immediately filtered through a 0.45 um glass fiber filter and stored on ice until they were frozen within 10 hours of collection. Water samples remained frozen until chloride analyses were performed.*  *Water samples were analyzed via ion chromatography using a Thermo Scientific Dionex ICS-2100 equipped with an IonPac AS11 analytical column and an AG11-HC column guard. The ion chromatograph was calibrated with six NaCl standards ranging from 1 to 500 mg/L and run with a 30 mM NaOH eluent solution. One sample (LM 152) resulted in a value greater than the 500 mg/L calibrated margin and was diluted and run again to verify the result. One sample (LM 95) resulted in a value too low for detection and was reported as < 1 mg/L. Twenty-five randomly selected sites were run in duplicate. The sample from Susan Creek, MI, appeared anomalous, with chloride concentrations of 611 and 645 mg/L (run in duplicate). This sample was removed from all analyses.*  *Watershed area (km2) and road densities for individual tributary watersheds (km road/km2 was calculated using the Great Lakes Aquatic Habitat Framework (GLAHF) database. Mean watershed imperviousness was determined using the 2011 National Land Cover Database (NLCD). Discharge was estimated for each sampling point location by the discharge-area ratio method and represents the estimated 5-day mean around the actual sampling date for each tributary, and as an annual median flow (Supplemental Information, Mooney et al. 2020). Chloride loads were calculated as the product of concentrations and discharge estimates. Yields were calculated by dividing the nutrient load by the area of the corresponding watershed.*  *Mooney, R. J., Stanley, E. H., Rosenthal, W. C., Esselman, P. C., Kendall, A. D. and McIntyre, P. B. (2020) Outsized nutrient contributions from small tributaries to a Great Lake. Proceedings of the National Academy of Sciences,117, 28175–28182. doi:10.1073/pnas.2001376117.* |
| **Laboratory, field, or other analytical methods** | *See above* |
| **Taxonomic species or groups** | *NA* |
| **Quality control** | *No data have been removed from this dataset. The sample from Susan Creek, MI, appeared anomalous, with chloride concentrations of 611 and 645 mg/L (run in duplicate). This sample was removed from all analyses.* |
| **Additional information** |  |
|  |  |

**Table 2.** Data dictionary: description of the variables (i.e., columns) in EACH dataset. You must provide sufficient detail for another user to understand and use the data. If there are 10 variables (i.e., columns) in the dataset, then there should be 10 rows in this table that describe each column. Be sure to include all relevant information for your dataset, including the unique identifiers for your dataset or system, dates, replicate numbers, latitude and longitude of sampling locations, etc.

Dataset filename: *LM\_Tributary\_Chloride.csv*

Dataset description: *Chloride concentrations from Lake Michigan tributaries*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Column name | Description | Units | Code explanation | Data format | Missing data code |
| *hydroID\_GLAHF* | *Unique identifier for individual tributary watersheds. HydroID numbers are directly from the Great Lakes Aquatic Habitat Framework database (glahf.org)* | *NA* |  | *Double* |  |
| bottle\_vial\_ID | Identifying vial labels for field samples. Bottle ID coincides with the order that the sample was collected. | NA |  | Double |  |
| streamName | The name of the tributary. 'No name' indicates that were unable to find an official tributary name. | NA |  | Character |  |
| Flowlitersday | Estimated discharge on day of sampling. | L day-1 |  | Double |  |
| urban | The percentage of the watershed considered urban | % |  | Double |  |
| barren | The percentage of the watershed considered barren | % |  | Double |  |
| forest | The percentage of the watershed considered forested | % |  | Double |  |
| shrubland | The percentage of the watershed considered shrubland | % |  | Double |  |
| herbaceous | The percentage of the watershed considered herbaceous | % |  | Double |  |
| agriculture | The percentage of the watershed considered agriculture | % |  | Double |  |
| wetland | The percentage of the watershed considered wetland | % |  | Double |  |
| Strahler order | The strahler order of the tributary | Integer |  | Double |  |
| Areakm2 | The area of the watershed | km2 |  | Double |  |
| damspresent | ‘Yes' indicates that there are dams within the watershed, 'No' indicates the absence of dams within the watershed | Binary |  | Character |  |
| chloride | Chloride concentration | mg L-1 |  | Double |  |
| GLHDID | Unique ID created by the GLHD team that numbers all of the  watersheds and interfluves sequentially counterclockwise across the  Basin, beginning with the mainland Boundary Waters area. | NA |  | Double |  |
| Duplicate | Duplicate sample. Yes or no. | NA |  | Double |  |
| Flow\_m3s | Estimated discharge on day of sampling | m3 s-1 |  | Double |  |
| Flow\_median\_m3s | Estimated annual median discharge | m3 s-1 |  | Double |  |
| Population\_Density\_n\_km2 | Watershed population density | Number km-2 |  | Double |  |
| Road\_Density\_kmroad\_km2 | Watershed road density | km km2 |  | Double |  |
| MaxImperviousness | Max imperviousness in the watershed | % |  | Double |  |
| MeanImperviousness | Mean imperviousness in the watershed | % |  | Double |  |

**Table 3. Data provenance**

If you used data derived from other sources, provide the information here so future users know where the data came from.

|  |  |  |  |
| --- | --- | --- | --- |
| **Dataset title** | **Dataset DOI or URL** | **Creator (name & email)** | **Contact (name & email)** |
| NLCD landcover | https://www.mrlc.gov/ | Multi-Resolution Land Characteristics (MRLC) consortium | See URL |
| Great Lakes Aquatic Habitat Framework | https://www.glahf.org/ | Consortium of Great Lakes researchers and managers | See URL |

**Scripts/code (software) –** *OPTIONAL*

It is recommended that you also provide your scripts along with your data, although it is not required at this time in our journal.

|  |  |  |
| --- | --- | --- |
| **File name** | **Description** | **Scripting language** |
|  |  |  |
|  |  |  |

**Notes and Comments:**

1. *This document liberally borrows from a similar document provided by the Environmental Data Initiative* [↑](#footnote-ref-1)