## Methods

### Streamflow site selection

Whenever possible, streamflow (discharge) measurements were taken directly from the site of the chloride measurement. In some cases, the direct data was not available and discharge values from remote sites were corrected using the following methods. All methods required accurate drainage areas to be known. Drainage areas for all sites were determined in a Geographic Information System (GIS). Watershed boundaries were determined for each site. The majority of linework was taken from the 12-digit Hydrologic Unit boundaries (USDA, 2009); in most cases, the basin pour point did not correlate directly to the site location, and the downstream component of the basins were edited manually by comparison with USGS Digital Raster Graphics and, in the Milwaukee area, with Subwatershed and Subbasin boundaries published by the local planning commission (SEWRPC, 2005).

#### Single discharge site available

In cases where there were discharge values near the sampling site, the discharge was scaled by drainage area. For example, if the sample was taken at a point on the river with that had a drainage area , and the nearest discharge measurements () were taken at a location with drainage area . Then the corrected discharge () would be:

1

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| Sample Site | DAS | Discharge Site | DAQ |
| Kinnickinnic River @ S 27th St | 16.8624 | Kinnickinnic River @ S. 11th St | 19.94208 |
| Kinnickinnic River @ S 7th St | 19.94208 | Kinnickinnic River @ S. 11th St | 19.94208 |
| Kinnickinnic River @ 1st St | 23.21119 | Kinnickinnic River @ S. 11th St | 19.94208 |
| Kinnickinnic River @ Jones Island Ferry | 24.68081 | Kinnickinnic River @ S. 11th St | 19.94208 |
| Menomonee River @ 25th St | 133.46707 | Menomonee River @ 70th St Bridge @ Wauwatosa | 122.52972 |
| Milwaukee River @ Wells St | 699.25096 | Milwaukee River @ Port Washington Rd | 683.26228 |
| Milwaukee River @ Jones Island @ Mouth At Milwaukee | 860.58119 | Milwaukee River @ Port Washington Rd | 683.26228 |

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#### Multiple discharge sites available

In cases where the sampling site was located between two streamgages, the corrected flow was calculated using linear interpolation. For example, discharge values are known ( and ) along with the perspective drainage areas ( and ), and drainage area of the sampling site is , then the corrected discharge () would be:

2

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| --- | --- | --- | --- | --- | --- |
| Sample Site | DAS | Discharge Site 1 | DA1 | Discharge Site 2 | DA2 |
| Menomonee River At County Line Road | 30.19758 | Menomonee River @ 70th St Bridge @ Wauwatosa | 122.52972 | Menomonee River @ Pilgrim Rd At Menomonee Falls\* | 34.7 |
| Menomonee River @ 124th St | 59.25414 | Menomonee River @ 70th St Bridge @ Wauwatosa | 122.52972 | Menomonee River @ Pilgrim Rd At Menomonee Falls\* | 34.7 |
| Menomonee River @ Hampton Ave | 82.12109 | Menomonee River @ 70th St Bridge @ Wauwatosa | 122.52972 | Menomonee River @ Pilgrim Rd At Menomonee Falls\* | 34.7 |
| Milwaukee River @ Brown Deer Rd | 59.25414 | Milwaukee River @ Port Washington Rd | 82.12109 | Milwaukee River @ Pioneer Rd Near Cedarburg | 30.19758 |

* Gap in flow data for Menomonee River @ Pilgrim Rd At Menomonee Falls fitted with data from Menomonee River @ 70th St Bridge @ Wauwatosa as described in Partial discharge available or gap corrections

#### Partial Discharge Available and Discharge Gap Corrections

In some cases, an appropriate discharge measurement was available, but did not span the entire sampling record, or contained a significant measurement gap. A remote discharge measurement was available for the sampling period of record. In this scenario, a linear regression was done on the overlapping data. The resulting coefficients were used to correct the remote discharge measurements. The discharged used in the WRTDS calculations was a combination of the direct measurements at the sample site, and the corrected measurements at the remote site.

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| Sample Site | Missing data | Complete Discharge Site | Slope | Intercept |
| Menomonee River @ Pilgrim Rd At Menomonee Falls | 1977-1979 | Menomonee River @ 70th St Bridge @ Wauwatosa | 0.1963 | 0.2438 |

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## References

Southeastern Wisconsin Regional Planning Commission, Environmental Division and GIS Division, 2005, SEWRPC Digital Watershed Mapping: Southeastern Wisconsin Regional Planning Commission, GIS Division, Waukesha, Wis.

U.S. Department of Agriculture, Natural Resources Conservation Service, National Cartography and Geospatial Center, 2009, HUC12\_polygon: U.S. Department of Agriculture, Natural Resources Conservation Service, National Cartography and Geospatial Center, Fort Worth, Texas