

Metadata

Dataset Title:

Cary_Stream_Chemistry_Data.csv

Cary Environmental Monitoring Program Stream Chemistry Data: 1985-2024

Abstract

The Cary Institute of Ecosystem Studies Environmental Monitoring Program is a long-term data collection program designed to understand how the environment changes over time. The program includes monitoring of climate including temperature and precipitation, as well as variables related to air pollution, such as acid deposition and ozone, water pollution and streamwater hydrology.

The Cary Institute of Ecosystem Studies, Environmental Monitoring Program furnishes data under the following conditions: The data have received quality assurance scrutiny by our program, and, although we are confident of the accuracy of these data, the Cary Institute will not be held liable for errors in these data. Data are subject to change resulting from updates in data screening or models used.

Data citation: Please click on the Cite button on the Figshare repository.

Those wishing to publish data from the Cary Institute of Ecosystem Studies, Environmental Monitoring Program are encouraged to contact Data Manager Vicky Kelly, kellyv@caryinstitute.org.

Investigators

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Keywords

Cary Institute, Cary Institute of Ecosystem Studies, data, climate, stream, streamwater, chemistry, conductivity, conductance, pH, calcium, magnesium, potassium, sodium, chloride, sulfate, nitrate, ammonium, phosphate, silica, dissolved organic carbon

Timeframe

The data in this file start 17 January 1985 and end 26 December 2023. Data collection is ongoing. Sample collection began in November 1985 (Site 2) and January 1985 (Site 4).

Geographic location

Stream samples are collected at the end of every month at two sites on the East Branch of Wappinger Creek at the Cary Institute of Ecosystem Studies. Before 1996, samples were collected at four sites. Redundancy in the data and cost of analysis prompted us to discontinue collecting samples at two of the sites. The two remaining sites are Site 2 (Fern Glen, GPS coordinates N41.78707, W73.73317) and Site 4 (Lowlands, GPS coordinates N41.79235, W73.74937).

Methods

The stream is a tributary to the main branch of Wappinger Creek, which flows into the Hudson River at Wappingers Falls. Approximately 1.6 km upstream from the gauging station is the Village of Millbrook sewage treatment plant. In addition to the sewage treatment plant, Dietrich Pond and its associated dam can influence the stream. Stream samples are collected at the end of every month. Samples are collected

when the stream is as near base flow as possible, however, base flow varies seasonally and is generally higher in winter than summer. The samples are analyzed at the Cary Institute Analytical Laboratory for pH, conductivity, nitrate, sulfate, ammonium, phosphate, chloride, sodium, calcium, magnesium, potassium and silica and DOC (see Table below for analytical methods). Samples collected between 1985 and 1998 were not preserved in any way and were stored in the light at room temperature before analyses were completed. Samples from January 1999 onward are preserved as follows. Samples are divided into three aliquots, one aliquot is filtered and preserved with Optima grade concentrated sulfuric acid (0.5 ml per 125 ml of sample) for analysis of nitrate, ammonium, phosphate, and DOC. Another aliquot is filtered and analyzed for sulfate, chloride, sodium, calcium, magnesium, potassium and silica. Silica analyses are completed within 4 days of sample collection. The third aliquot is untreated and analyzed for conductivity and pH.

STREAM CHEMISTRY DATA QUALITY ASSURANCE & QUALITY CONTROL PARAMETERS & METHODS

All sample bottles and glassware are cleaned with deionized and air dried. Once each year a sample bottle is filled with deionized water, filtered, acidified and analyzed as a regular sample. This is to ensure that the sample handling procedures introduce no contamination.

When analytical results are received from the Cary Institute analytical lab, data are checked by examining time series graphs of sample concentrations for each analyte. Any data that are potential outliers are reanalyzed. If reanalysis returns the same results, no changes are made to the dataset. If reanalysis returns different results, ion balances are examined and the sample is examined for potential contamination. The concentration value that returns the best ion balance is submitted to the dataset unless there is obvious contamination, in which case the data value is replaced with a missing value code.

Data Table

Column name	Description	Unit or code explanation or date format	Empty value code
DATE	Date in MM/DD/YYYY format where MM is month number, DD is date number and YYYY is year		blank
SITE	Site number on Wappinger Creek	Unitless	blank
COND	Conductivity (umho)	Umho	blank
CA	Concentration of Ca+2 (mg/L) (DL 0.01 mg/L)	mg/L	blank
MG	Concentration of Mg+2 (mg/L) (DL 0.01 mg/L)	mg/L	blank
K	Concentration of K+ (mg/L) (DL 0.01 mg/L)	mg/L	blank
NA.	Concentration of Na+ (mg/L) (DL 0.01 mg/L)	mg/L	blank
NH4_N	Concentration of NH4+_N (mg/L) (DL 0.02 mg/L)	mg/L	blank
PH	pH	pH units	blank
SO4	Concentration of SO4-2 (mg/L) (DL 0.02 mg/L)	mg/L	blank
NO3_N	Concentration of NO3-_N (mg/L) (DL 0.02 mg/L)	mg/L	blank

CL	Concentration of Cl- (mg/L) (DL 0.02 mg/L)	mg/L	blank
PO4_P	Concentration of PO4-3_P (mg/L) (DL 0.002 mg/L)	mg/L	blank
SIO2	Concentration of SiO2 (mg/L) (DL 0.1 mg/L)	mg/L	blank
DOCPPM	Concentration of DOC (ppm) (DL 0.05 ppm)	Ppm	blank
TEMP	Stream temperature at time of sampling (C) (Site 2 only)	degrees C	blank
Q	Stream flow rate at time sample collected (m ³ /s) (Site 2 only)	m ³ /s	blank

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Methods of Analysis
Cary Institute of Ecosystem Studies Analytical
Laboratory

ION	INSTRUMENT	TECHNIQUE
NH ₄ ⁺	Lachat QuikChem 8000	Phenate method ¹ #10-107-06-1-J
SO ₄ ⁼ , NO ₃ ⁻ (PPT, AQ), Cl ⁻	Dionex ICS2000 Ion Chromatograph	Ion exchange chromatography, AS18 and AG18 columns, SRS (self-regenerating) suppressor ² with CRD 200 (carbonate removal device)
K ⁺ , Na ⁺	Perkin Elmer Aanalyst 300 Atomic Absorption Spectrometer	Flame atomization, direct air ³
Ca ⁺⁺ , Mg ⁺⁺	Leeman Labs Inductively Coupled Plasma/Profile	Emission spectroscopy
NO ₃ ⁻ (WC)	Lachat QuikChem 8000	Cadmium diazotization ¹ Method #10-107-04-1-C
PO ₄	Lachat QuikChem 8000	Phosphomolybdate ¹ Method #_10-115-01-1-M
pH	Fisher-Accumet AR20 pH meter with Fisher glass electrode, Fisher calomel reference probe	Standardization with Fisher 7.00 and 3.00 buffer solutions; samples and buffers at room temperature
Specific Conductance	Fisher-Accumet AR20 pH/conductivity meter	Conductivity probe w/ 1.0 cm ⁻¹ cell constant
DOC (Dissolved Organic Carbon)	Shimadzu TOC 5050	High temperature combustion of sample; platinum catalyst C to CO ₂ , NDIR detect.

¹Standard Lachat methods, 2000, Lachat Instruments, Milwaukee, WI

²Small, H., Stevens, T.S., and Bauman, W.C. *Anal. Chem.* 1975, 47:1801-1809

³Slavin, W. *Atomic absorption spectroscopy*. Wiley-Interscience, New York. 1968. PPT=precipitation samples, AQ=air samples, WC=Wappinger Creek samples

Common Methods of Analysis
Cary Institute of Ecosystem Studies
Rachel L. Carson Analytical Facility

ION	INSTRUMENT	TECHNIQUE
NH ₄ ⁺	Lachat QuikChem 8500	Phenate method ¹ #10-107-06-1-J
NO ₃ ⁻ / NO ₂ ⁻	Lachat QuikChem 8500	Cadmium diazotization ¹ Method #10-107-04-1-C
TDN ⁵	Lachat QuikChem 8500	In-line UV/persulfate method ¹ #31-107-04-3-A
TDN ⁶ /TN ⁷	Lachat QuikChem 8500	Off-line persulfate method ¹ #31-107-04-4-A
PO ₄	Lachat QuikChem 8500	Phosphomolybdate ¹ Method #10-115-01-1-M
TDP ⁶ /TP ⁷	Lachat QuikChem 8500	Off-line persulfate method ¹ #10-115-01-4-F
SO ₄ ⁼ , NO ₃ ⁻ , Cl ⁻	Dionex ICS2000 Ion Chromatograph	Ion exchange chromatography ² , RFIC, AS18 and AG18 columns, SRS (self-regenerating) suppressor with CRD 200 (carbonate removal device)
Ca ⁺⁺ , Mg ⁺⁺ , K ⁺ , Na ⁺ and other metals	Perkin Elmer Optima 8000 Inductively Coupled Plasma	Emission spectroscopy ³
pH	Fisher-Accumet XL200 pH meter with Fisher glass electrode, Fisher calomel reference probe	Standardization with Fisher 7.00 and 3.00 buffer solutions; samples and buffers at room temperature
Specific Conductance	Fisher-Accumet XL200 pH/conductivity meter	Fisher Conductivity probe w/ 1.0 cm ⁻¹ cell constant
C/N	ThermoFinnigan Flash EA 1112	Dumas Method ⁴

¹ Standard Lachat methods, 2005, Lachat Instruments, Loveland, CO

² Thermo Fisher Scientific. Thermo Scientific Application Note 154: Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column. Sunnyvale, CA, 2014.

³ PerkinElmer. Application Note: Analysis of Trace Metals in Surface and Bottled Water with the Optima 7300 DV ICP-OES. PerkinElmer, Inc. Shelton, CT 06484 USA, 2010.

⁴ S.L. McGeehan and D.V. Naylor, *Communications in Soil Science and Plant Analysis* VOL. 19, ISS. 4, 1988

⁵ NOT RECOMMENDED FOR SAMPLES WITH HIGH PARTICULATE LOAD

⁶ FILTERED SAMPLES

⁷ UNFILTERED SAMPLES