**HRES LONG TERM MONITORING METHOD HISTORY**

FIELD & LAB

Temperature & Oxygen

YSI model 57 temperature and oxygen meter: (YEARS?)

YSI ProODO temperature and oxygen meter

Light

Li-Cor spherical quantum sensor: 1987-2019

Secchi

Standard black and white secchi disk: 1987-2019

Current

Wooden current cross from L&O methods: 1989-2019

Conductivity

Analytical Lab conductivity meter

Orion Research model SA250 conductivity meter

YSI field conductivity meter

pH

Fisher Accumet pH meter measured in the field, Cardinals

YSI sonde, Transects

Fisher Accumet pH meter, 30 ml BOD bottles, measured in lab

Seston

934-AH glass fiber filters: 1987-2019

Chlorophyll-a (**grind method**)

Gelman AE glass fiber filters 1987-1991

Chlorophyll-a (**no grind method**, Cole & Caraco determine slight underestimate)

Transects begin 1991

Switch to Whatman GF/F glass fiber filter

Basic methanol 24 hour extraction at room temperature

Acidification method (phaeopigment correction): 1987-2019

Fluorometers: Turner Designs model 10-000R: 1987-2000

Turner Designs model TD-700: 2000-2014

Turner Designs Trilogy Fluorometer: 2014-2019

Total Organic Carbon: DOC; (total dissolved carbon, dissolved inorganic carbon)

Astro TOC analyzer, persulfate digestion method: 1987-1993

Shimadzu Gas Chromatograph; DIC: 1988-2008 (most samples); 2008-2014 (standards and samples approximately 4 times per field season)

Shimadzu 5050 TOC analyzer; TC, IC: 1994-2007

Shimadzu TOC-V Carbon analyzer; TC, IC: 2007-2019

Non-Purgeable Organic Carbon: NPOC; (acidify and sparge)

Shimadzu 5050 TOC analyzer; NPOC (DOC): 1997-2007

Shimadzu TOC-V Carbon analyzer; NPOC (DOC): 2007-2019

Water Chemistry Sample

Filtered sample, sulfuric acid preserved, 1N acid 1 milliliter per 120 ml (analyzed for Ammonia, Nitrate, Phospate) UV-VIS spectrophotometer, ALPKEM analyzer, LACHAT analyzer

Unfiltered sample, sulfuric acid preserved, 1N acid 1 milliliter per 120 ml (analyzed for Total Nitrogen, Total Phosphorous) UV-VIS spectrophotometer, ALPKEM analyzer, LACHAT analyzer

Run standards, blanks, digestion checks, QAQC standards

Alpkem Method

Lachat Method

Turbidity

Bench top nephelometer: 2008-2015

Turner Designs Trilogy Fluorometer: 2015-2019

Micro Zooplankton abundance

Sucrose buffered formaldehyde preservation

Add Sodium Bicarbonate as additional buffer once Zebra Mussel arrived

Samples counted on Olympus inverted microscope: 1989-2019

Macro Zooplankton abundance

Sucrose buffered formaldehyde preservation

Add Sodium Bicarbonate as additional buffer once Zebra Mussel arrived

Samples counted on Olympus dissecting microscope: 1989-2019

Phytoplankton samples

Lugols preserved 1 Liter sample (10 milliliters lugols per Liter sample)

Some samples counted by Howard Marshall (Old Dominion College, VA ???) some counted by Smith ??? most counted by Sarah Fernald

Bacterial Abundance

19 ml sample preserved in 1 milliliter of 20% buffered formaldehyde (Borax) Acridine Orange stained samples filtered through Nuclepore 0.2 micron polycarbonate filters, mounted on microscope slides, counted using Olympus compound (BH2) microscope, mercury lamp fluorescence, 100X objective: 1989-2019

Bacterial Production: Thymidine & Leucine

Tritiated thymidine incubations and DNA extraction method for all Kingston bacterial production data

Tritiated Leucine microcentrifuge method used for some experiments

Analyze samples using liquid scintillation counter: 1987-2012

Bacterial Cell Volume

35 mm photos taken using Olympus compound microscope 100X objective

Analyzed using image analysis software: 1988-1994?

Flagellate Abundance

Live samples stained with Proflavine and mounted on microscope slides

Counted using Olympus compound microscope, mercury lamp fluorescence, 60X objective: 1990-2006

Ciliate Abundance

Tintinnid Ciliates counted in Micro Zooplankton samples:1987-2019

Microplate Enzyme Assay

Methyl Umbelliferyl enzyme substrates; used primarily for experiments

Denitrification Enzyme Assay

GC (run by Groffman lab), N2O gas Standards

Used primarily for experiments and some marsh sediment assays

**REFERENCES FOR MORE DETAILED METHOD INFORMATION:**

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