# Matthew Richard Voss Ross

*Assistant Professor ESS; Faculty Director, Geospatial Centroid*

## Education

2006-2010 **BA Ecology, French Minor**, *University of Colorado*, Boulder, CO.

2011-2017 **PhD Ecology**, *Duke University*, Durham, NC.

2017-2018 **Post-Doc Remote Sensing**, *University of North Carolina*, Chapel Hill, NC.

## Teaching

## Teaching

**WR 418 (3 credits, 2018-2022)- Land-use and Water Quality -** Course covers basic aqueous geochemistry, with an emphasis on analyzing data using R and open access datasets. Constructing open access book here

**WR 419 (3 credits, 2018-2020) - Water Quality Analyses -** Course covers analytical tools for analyzing water quality data with an emphasis on maintaining and curating a sensor network.

**ESS 523a (3 credits, 2019-present) - Environmental Data Science Introduction -** Course covers environmental analysis in R, with an emphasis on geospatial analysis and visualization.

**ESS 523c (2 credits, 2022-present) - Environmental Data Science Applications - Water Resources -** course covers detailed water resource analyses pipelines using R.

**WR 204 (3 credits, 2023-present) - Sustainable Watersheds** - Course covers introductory watershed and sustainability topics. Mostly delivering old material in 2023, but hopeful to redesign in Fall 2023.

**WR 440 (3 credits, 2022-present) - Watershed Problem Analysis** - Capstone course for Watershed students.

**Stat 158 A&B (1 credit, 2020) -** Open access course for learning R Module 1, Module 2

**Open access hydrology course modules** Link

**Shiny R Workshop** Course teaches students how to make shinyapps with all students successfully producing apps after one week course Link

**Graduate Student Advisor of the Year** Ecosystem Science and Sustainability Department, 2019

**Award for Creative, Innovative and Impactful Instruction** Warner College of Natural Resources, 2020

## Publications

2023 **User-focused evaluation of National Ecological Observatory Network streamflow estimates**, *S Rhea, N Gubbins, AG DelVecchia, *MRV Ross*, ES Bernhardt*, Scientific Data.
- 4

2023 **MacroSheds: A synthesis of long-term biogeochemical, hydroclimatic, and geospatial data from small watershed ecosystem studies**, *MJ Vlah, S Rhea, ES Bernhardt, W Slaughter, N Gubbins, AG DelVecchia, ...*, Limnology and Oceanography Letters.
- 3

2023 **Leveraging gauge networks and strategic discharge measurements to aid development of continuous streamflow records**, *MJ Vlah, *MRV Ross*, S Rhea, ES Bernhardt*, EGUsphere.
- 0

2023 **Human activities change suspended sediment concentration along rivers**, *J Gardner, T Pavelsky, S Topp, X Yang, *MRV Ross*, S Cohen*, Environmental Research Letters.
- 0

2023 **National-scale, remotely sensed lake trophic state, 1984-2020**, *MF Meyer, S Topp, TV King, R Ladwig, RM Pilla, H Dugan, JR Eggleston, ...*, EarthArXiv.
- 0

2023 **At the interfaces of the hydrologic sciences: Connecting water, elements, ecosystems, and people through the major contributions of Dr. Emily Bernhardt**, *AM Helton, JL Morse, EB Sudduth, M Ardón, R Bier, KA Voss, *MRV Ross*, ...*, Journal of Hydrology.
- 0

2022 **Mapping flow-obstructing structures on global rivers**, *X Yang, TM Pavelsky, *MRV Ross*, SR Januchowski-Hartley, W Dolan, ...*, Water Resources Research.
- 13

2022 **Mines to forests? Analyzing long-term recovery trends for surface coal mines in Central Appalachia**, *CJ Thomas, RK Shriver, F Nippgen, M Hepler, *MRV Ross**, Restoration Ecology, e.
- 4

2022 **Heterogenous controls on lake color and trends across the high-elevation US Rocky Mountain region**, *IA Oleksy, SM Collins, SJ Sillen, SN Topp, M Austin, EK Hall, CM O'Reilly, ...*, Environmental Research Letters.
- 2

2022 **A simple metric for predicting the timing of river phytoplankton blooms**, *NE Bruns, JB Heffernan, *MRV Ross*, M Doyle*, Ecosphere.
- 1

2021 **The color of rivers**, *JR Gardner, X Yang, SN Topp, *MRV Ross*, EH Altenau, TM Pavelsky*, Geophysical Research Letters.
- 41

2021 **Multi-decadal improvement in US lake water clarity**, *SN Topp, TM Pavelsky, EH Stanley, X Yang, CG Griffin, *MRV Ross**, Environmental Research Letters.
- 25

2021 **Shifting patterns of summer lake color phenology in over 26,000 US lakes**, *SN Topp, TM Pavelsky, HA Dugan, X Yang, J Gardner, *MRV Ross**, Water Resources Research.
- 16

2021 **Consistent declines in aquatic biodiversity across diverse domains of life in rivers impacted by surface coal mining**, *M Simonin, JD Rocca, JR Gerson, E Moore, AC Brooks, L Czaplicki, ...*, Ecological Applications.
- 12

2021 **Mountaintop mining legacies constrain ecological, hydrological and biogeochemical recovery trajectories**, *MRV Ross*, F Nippgen, BL McGlynn, CJ Thomas, AC Brooks, RK Shriver, ...*, Environmental Research Letters.
- 5

2021 **Predicting mean annual and mean monthly streamflow in Colorado ungauged basins**, *A Eurich, SK Kampf, JC Hammond, M Ross, K Willi, AG Vorster, B Pulver*, River Research and Applications.
- 4

2021 **Identifying geomorphic process domains in the synthetic landscapes of West Virginia, USA**, *KL Jaeger, *MRV Ross**, Journal of Geophysical Research: Earth Surface.
- 3

2020 **Research trends in the use of remote sensing for inland water quality science: Moving towards multidisciplinary applications**, *SN Topp, TM Pavelsky, D Jensen, M Simard, *MRV Ross**, Water.
- 173

2020 **Timing of Landsat overpasses effectively captures flow conditions of large rivers**, *GH Allen, X Yang, J Gardner, J Holliman, CH David, M Ross*, Remote Sensing.
- 25

2020 **A participatory science approach to expanding instream infrastructure inventories**, *A Whittemore, *MRV Ross*, W Dolan, T Langhorst, X Yang, S Pawar, ...*, Earth's Future.
- 18

2020 **Mercury and selenium loading in mountaintop mining impacted alkaline streams and riparian food webs**, *JR Gerson, LC Naslund, YT Liu, H Hsu-Kim, CT Driscoll, *MRV Ross*, ...*, Biogeochemistry.
- 8

2019 **AquaSat: a dataset to enable remote sensing of water quality for inland waters**, **MRV Ross*, SN Topp, AP Appling, X Yang, C Kuhn, D Butman, M Simard, ...*, Water Resources Research.
- 84

2019 **Excess nitrate export in mountaintop removal coal mining watersheds**, *AC Brooks, *MRV Ross*, F Nippgen, BL McGlynn, ES Bernhardt*, Journal of Geophysical Research: Biogeosciences.
- 12

2018 **Mapping the yearly extent of surface coal mining in Central Appalachia using Landsat and Google Earth Engine**, *AA Pericak, CJ Thomas, DA Kroodsma, MF Wasson, *MRV Ross*, ...*, PloS one.
- 114

2018 **Pyrite Oxidation Drives Exceptionally High Weathering Rates and Geologic CO2 Release in Mountaintop-Mined Landscapes**, **MRV Ross*, F Nippgen, BA Hassett, BL McGlynn, ES Bernhardt*, Global Biogeochemical Cycles.
- 42

2018 **Direct and indirect drivers of land degradation and restoration**, *. Barger, N. N., Gardner, T. A., Sankaran, M., Belnap, J., Broadhurst, L ...*, In IPBES.
- 0

2017 **Creating a more perennial problem? Mountaintop removal coal mining enhances and sustains saline baseflows of Appalachian watersheds**, *F Nippgen, *MRV Ross*, ES Bernhardt, BL McGlynn*, Environmental science & technology.
- 45

2016 **Deep impact: Effects of mountaintop mining on surface topography, bedrock structure, and downstream waters**, **MRV Ross*, BL McGlynn, ES Bernhardt*, Environmental science & technology.
- 106

2015 **Designer ecosystems: incorporating design approaches into applied ecology**, **MRV Ross*, ES Bernhardt, MW Doyle, JB Heffernan*, Annual review of environment and resources.
- 56

2015 **Microchemical analysis of selenium in otoliths of two West Virginia fishes captured near mountaintop removal coal mining operations**, *MC Arnold, LA Friedrich, TT Lindberg, M Ross, NM Halden, E Bernhardt, ...*, Environmental toxicology and chemistry.
- 8

2012 **Effects of fuels reductions on plant communities and soils in a piñon-juniper woodland**, *MR Ross, SC Castle, NN Barger*, Journal of arid environments.
- 47

## Awards

## Grants

### Totals 2018 - 2023

- **Total Grants 2018 - 2023 - $5,628,362**
- **Lab Portion 2018 - 2023 = $4,600,226**

### Individual Grants

2023 **National Park Service**, *PI.*
- Climate Change Vulnerability Assessments for Water Supply to National Parks

2023 **USGS Remote Sensing Branch**, *PI.*
- AquaSat 2.0 democratizing and improving remote sensing of water quality for inland waters

2023 **City of Fort Collins**, *PI.*
- Poudre River Monitoring Network and Decision System (long-term funding)

2023 **BHP Internet of Water**, *PI.*
- Visualizing and interpreting municipal water quality data

2022 **NASA Water Resources**, *PI.*
- Real-time satellite and sensor fusion for predicting and understanding water quality threats to water supply networks of Northern Colorado

2022 **Northern Colorado Water Supply Coalition**, *PI.*
- Cameron Peak Fire Water Quality impacts to Rivers and Reservoirs, towards a Decision Support System

2022 **NASA Remote Sensing of Water Quality**, *PI.*
- Understanding and predicting algae blooms in networks of rivers and reservoirs

2021 **USGS Integrated Information Dissmenination Division**, *PI.*
- Process-Guided Deep Learning for Informing Selection of Monitoring Locations in Priority Watersheds

2021 **Colorado Water Center**, *PI.*
- High elevation fire controls on reservoir and river algae blooms

2021 **Northern Colorado Water Supplier Coalition**, *PI.*
- Cameron Peak Fire Water Quality impacts to Rivers and Reservoirs

2020 **NSF Hydrological Sciences RAPID Award**, *Institutional PI.*
- Collaborative Research: Increased access to infrastructure for distance education in hydrologic science

2020 **Colorado State University Provost Office**, *PI.*
- University-wide training in foundational data-analysis software

2020 **Colorado Water Institute**, *PI.*
- Linking the topology of forest disturbance to water quality to enhance forest and water resource management in Colorado

2020 **City of Fort Collins**, *PI.*
- Poudre River Monitoring Network and Decision System

2019 **NSF DEB Macrosystems and NEON-Enabled Science**, *Institutional PI.*
- Collaborative Research: MACRO-Sheds: Comparative Ecosystem Biogeochemistry at Continental Scales

2019 **USDA National Need Fellowship program**, *CO-PI.*
- Re-visioning graduate training for the era of agricultural big data

2019 **NSF EAR Hydrological Sciences Post-DOC awarded directly to Anna Bergstrom**, *Faculty Adviser to Anna Bergstrom.*
- Controls on weathering, solute fluxes, and geologic carbon cycling in glacierized catchments

2019 **Wyoming Water Research Program**, *CO-PI.*
- Identifying, predicting and managing the occurrence of harmful cyanobacterial blooms in Wyoming reservoirs

2018 **City of Fort Collins, In-Situ Sensor Manufacturing**, *PI.*
- Real-time water quality monitoring and decision network in the Poudre River

2018 **Colorado Water Institute**, *PI.*
- Tools for improving knowledge of reservoir water quality in the Front Range of Colorado

## Selected Presentations (2018-2023)

### 2023

**MRV Ross** *Data science for water resource decision making* Invited Speaker at Boise State University

**MRV Ross** *The future of hydrology education* Invited Speaker at CUAHSI Biennial

### 2022

**MRV Ross** *From Dissonance to Harmony in big environmental datasets* Invited Speaker at University of Nevada, Reno

**MRV Ross** *Remote sensing of water quality for management and science* Invited Speaker at University of Florida, Gaineseville

### 2021

**MRV Ross** *Using Environmental Big Data to Understand, Manage, and Better Design Freshwater Ecosystems* Invited speaker to University of California Santa Barbara Bren School

### 2020

**MRV Ross** *Matched-up, the importance of open-access training data for global-scale remote sensing of water quality* Invited speaker to the Workshop on Knowledge Guided Machine Learning at University of Minnesota. 2020

**MRV Ross** *From printing press to pdfs, the limits of papers in scholarly communication and open science* Invited speaker to Virtual Summit on Incorporating Data Science and Open Science Techniques in Aquatic Research. 2020

SN Topp^, TM Pavelsky, EH Stanley, X Yang, CG Griffin, **MRV Ross.** *Multi-Decadal Increases in U.S. Lake Water Clarity* Invited Talk at Ecological Society of America Virtual Conference. 2020.

### 2019

J Gardner, **MRV Ross**, SN Topp, X Yang, TM Pavelsky. AGU Fall Meeting. *Trends and patterns in riverine suspended sediment concentrations across the continental USA revealed by satellite remote sensing.*

X Yang, M Belanger, DK Byron, W Dolana, H Galit, S Januchowski-Hartley, M Jorrisen, T Langhorst, E Lawton, KA McQuillan, T Pavelsky, S Pawar, **MRV** Ross, A Whittemore. AGU Fall Meeting. *Our fragmented rivers—-mapping human-made river obstructions around the globe.*

SN Topp^, TM Pavelsky, **MRV Ross.**, EH Stanley, X Yang. AGU Fall Meeting. *Lakes as integrators: Multi-decadal fluctuations in regional lake water clarity and seasonality across the U.S.*

T Langhorst, TM Pavelsky, SN Topp, **MRV Ross**, C Dai, MT Durand, RPM Frasson, I Howat. *Remotely sensed discharge and sediment flux of the Sagavanirktok River.*

### 2018

**MRV Ross**, SN Topp, AP Appling, X Yang, J Gardner, T Pavelsky. *What can 34 years of imagery tell us about suspended sediment dynamics and controls in large rivers?* Fall Meeting of the American Geophysical Union, Washington DC, December 2018.

**MRV Ross**. *The ecology of a designed ecosystem: legacies in the man-made mountains of Appalachia.* Invited speaker to CU-Boulder Ecology Symposium, 2018.

**MRV Ross**. *Novel approaches to understanding spatial and temporal variation in water quality.* Invited speaker to CU-Boulder Civil and Environmental Engineering Symposium. 2018