Paul M. **Hobson, P.E.**

Environmental Analytics · Open Source Development · Data Management and Engineering · Civil Engineering (Licensed in OR)

Portland, Oregon, USA

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Skills

Programming	Scientific Python (Expert), R (Proficient), C# & .NET (Proficient), C/C++ (Limited), git (Expert), Continuous Integration (Advanced)
Computing	Spatial Analysis (Expert), Machine Learning (Familiar), Microsoft Azure (Proficient), Google Earth Engine (Familiar)
Web	Relational Databases (Advanced), REST API Development with C# (Proficient), Python (Proficient), HTML5 (Familiar)
Numeric Models	SWMM (Familiar), HEC-RAS (Familiar), EFDC (Familiar+), WASP (Limited)

Work History

2022–Present	**Open Source Developer,** Coiled Computing	*Portland, OR*
2021–2022	**Machine Learning Engineer,** Confluency	*Portland, OR*
2017–2021	**Project Engineer (VI),** Geosyntec Consultants	*Portland, OR*
2012–2017	**Water Resources Engineer (III),** Geosyntec Consultants	*Portland, OR*
2008–2012	**Senior Staff Engineer (II),** Geosyntec Consultants	*Portland, OR*
2006–2008	**Research and Teaching Assistant,** Georgia Institute of Technology	*Atlanta, GA*

Representative Projects & Responsibilities

Daily Responsibilities | Open Source Developer

Coiled Computing

Open Source Maintenance, Customer Engagement, User Research — *2022 - Present*

As an open source developer at Coiled Computing, I took on a wide variety of roles that led the company forward. One critical role was maintaining the Dask ecosystem, a component of the larger scientific python ecosystem that allows scientists and engineers to scale up numeric computing, data analysis, and machine learning workflows onto distributed clusters. Specifically, my role included OSS community management, triaging bug reports, fixing bugs, and enhancing the libraries with new features. To support Coiled's Marketing and Outreach team, I created large, production-scale machine learning pipelines. These included integrating an ML-training & hyperparameter tuning pipeline with the Coiled platform, Dask, XGBoost, and Optuna with Snowflake and Parquet data sources to predict New York City trip times in for-hire vehicles. Additionally, I managed approximately 10 customers and provided short-term computational consulting to them on an as-needed basis.

Daily Responsibilities | Machine Learning Engineer

Confluency

Technical Leadership, Client Relations, Machine Learning — *2021 - 2022*

As a machine learning engineer at Confluency, I split my time evenly between delivering water resources projects and contributing to a Small Business Innovation Research (SBIR) grant that investigated the uses and applicability of machine learning models to solve urban stormwater and water distribution problems. For my clients, my work focused on developing computational tools in support of efforts to automate numeric model scenario creation, execution, and validation. A large part of that work included spatial and temporal analysis of hydrologic and meteorologic datasets, including synoptic analysis of rainfall records Under the SBIR grant, I developed various machine learning models to predict the occurrence and magnitude of combined sewer overflows (CSOs) based on storm characteristics and antecedent watershed conditions.

Daily Responsibilities | Project Engineer

Geosyntec Consultants

Technical Leadership, Project Management, Staff Mentorship — *2018 - 2021*

My daily duties as project engineer were varied. Annually, I managed approximately $250,000/year of environmental consulting work for industrial, municipal, and federal clients. The technical side of my job broadly related to helping clients restore, protect, and preserve the natural environment through robust data analysis, and statistical and numerical modeling. In doing so, I implemented domain-specific statistical algorithms (e.g., regression-on-order statistics for censored data), collaborate with other consultants and academia by maintaining open source libraries and web APIs built in Python or .NET. For the past five years I have served on the steering committee for the company's global information management and data analysis practice group. I also contributed to proposals and marketing efforts targeting potential clients' requests for proposals and statements of qualifications. Lastly, I happily provided daily, weekly, and *ad hoc* technical and career-focused mentorship to junior staff.

Smart Media Basin Real-Time Monitoring and Control

The Boeing Company

Project Management, Instrumentation, Dashboarding *2020 - 2021*

- Coordinated final construction and instrumentation of a full scale stormwater treatment basin with four other on-site contractors and electricians
- Using Campbell Scientfic hardware, implemented an automated sampling program to collect time-weighted influent and effluent stormwater samples to verify the basin's efficacy in removing PCBs and heavy metals
- Created a PowerBI dashboard to display real-time hydrologic performance data of the basin

Iowa Agricultural BMP Assessment

Iowa Nutrient Research & Education Council

Data Management, Workflow Automation, Spatial Analysis *2020 - 2021*

- Incorporated high-resolution DEM and land cover rasters with vector datasets of BMPs within select HUC12 watersheds
- Assessed agricultural phosphorus loss reduction due to implementation of agricultural BMPs in the 1980s, 2006 - 2008, and 2016 - 2018 by HUC12, major land resource area, and state boundaries
- Automated the workflow into a python library with a command line interface

Wood River Flow Monitoring

Water For Life Foundation

Project Management, Instrumentation, Streamflow Monitoring *2020 - 2021*

- Performed site visits and met with client to select locations for two streamflow monitoring stations on the Wood River in Klamath Falls Oregon
- Evaluated flow monitoring technologies considering the client's budget, accuracy requirements, and highly mobile bed conditions
- Supervised subcontractors installing the monitoring equipment and verification measurements via ACDP
- Identified gaining and losing reaches with the monitoring data

Sullivan Creek Stream Restoration

Lehigh Hanson

Hydraulic Modeling, Stream Restoration, Construction Oversight *2015*

- Part of a team developed a 3D hydraulic and sediment transport model for a braided stream in Metaline Falls, WA
- Supervised subcontractors constructing a stream restoration to improve bull trout habitat and restore a barrier wall protecting a groundwater treatment system
- Restoration of the reach include installing logs and root balls to provide refugia for trout and to redirecting flow back to the main channel following previous in-stream work that diverted flow to a braid, leading to bank erosion threatening property.

The International Stormwater BMP Database | https://dot.bmpdatabase.org

NCHRP & WRF

Project Management, Web API Development, Statistical Analysis *2015 - 2020*

- Secured granted funding from the National Cooperative Highway Research Program (NCHRP) and the Water Research Foundation (WRF).
- Lead the migration from Microsoft Access database file to an Azure SQL database with a RESTful API written in C#.
- Authored statistical report summarizing the efficacy of the pollutant removal strategies found in the database. Analysis relied on scientific python and supported further development of `wqio`, which implements regression-on-order-statistics, a technique for imputing left-censored observations.

Tahoe Regional Stormwater Management Program | Tahoe Data Management System

Tahoe Resource Conservation District

Database Design, Web API Development, Statistical Analysis *2010 - 2021*

- Designed and developed a SQL Server database and desktop frontend to manage stormwater quality, hydrologic, and meteorologic data from the Lake Tahoe Basin in support of their lake clarify initiative.
- Responsible for periodic update, curation, and management of high-frequency environmental monitoring data and database/API performance.
- Developed SQL and C#-based ETL scheme to provide site-specific and basin-wide reports for annual summaries and long-term environmental trends.

Natural Gas Pipeline Hazard Analysis

State of Arizona

Project Management, Geospatial Analysis, Machine Learning *2016*

- Compiled a comprehensive dataset of natural gas pipeline stream crossings throughout Arizona from disparate data sources including old database and hard-copy maps.
- Automated the collection and assessment of hydrological and geomorphological conditions at pipeline crossings.
- Oversaw supervised machine learning analyses to classify the risk of pipeline exposure based on watershed characteristics and other data.

Puget Sound Stormwater Heatmap | https://stormwaterheatmap.org

The Nature Conservancy

Distributed Data Management, Hydrologic Modeling, Geostatistical Analysis *2018 - Present*

- Interactive stormwater pollutant heatmap helps city planners in the Puget Sound area prioritize green infrastructure.
- Project required automating >10,000 hydrologic model runs along with results post-processing and uploading to Google Big Query.
- Model results were then combined with high-resolution terrain and landuse raster data and aggregated into a Google Earth Engine layer.
- Full workflow requires handling of tens of terabytes of data.

Sediment and Pollutant Fate & Transport Modeling Projects

Various Confidential Clients

Hydraulic Modeling, Software Engineering, Data Management, and Geospatial Analysis — *2012 - Present*

- Utilized three-dimensional hydrodynamic and sediment fate and transport modeling for litigation support projects requiring strict confidentiality.
- My role focused on building tools to support the creation of 3D hydrodynamic models and post-processing model results.
- Projects typically support further development of open source libraries such as `pygridgen` and `pygridtools`.

Select Presentations and Publications

NCHRP 25-25 Task 120 Final Report: Use of the State Department of Transportation Portal to the International Stormwater BMP Database | Full text

Contributing Author

Transportation Research Board - National Cooperative Highway Research Program — *March 2020*

- This report details the grant-funded work to create a web portal to the stormwater management data most relevant to state departments of transportation.
- The portal allows engineers and scientists to query the database for stormwater quality data, generate statistical summaries, and access reports.
- An interactive web map provides an alter direct access to data and result summaries.

A New Statistical Methodology: Using subcatchment monitoring data to prioritize placement of stormwater treatment controls

Coauthor

Otto, M., Hobson, P., Kampalath, R. *et al* — *August 2013*

- Outlines the statistical methodology used to prioritize stormwater treatment measures at the Santa Susana Field Laboratory in southern California.
- The overall project received an award from the California Stormwater Quality Association for innovation in stormwater quality management.

Erodibility of Sediment at Bridge Foundations in Georgia | Full text

Primary Author

Hobson, P., Navarro, R., Sturm, T.W. — *July 2010*

- This paper provided a high-level summary to my master's research in which the erodibility of sediments was related to geotechnical and rheological properties.
- Presented at the Joint Federal Interagency Conference on Sedimentation and Hydrologic Modeling.

Estimating Critical Shear Stress of Bed Sediment for Improved Prediction of Bridge Contraction Scour in Georgia

Contributing Author

Sturm T.W., Hong, Seung H., Hobson, P. — *2008*

- This report summarized nearly a decade of research into Georgia sediment erodibility under Dr. Terry Sturm.
- Submitted to the Georgia Department of Transportation

`pygridgen` & `pygridools`: A Successful Collaboration with the Private Sector, Academia, and the Open Source Community | Slides

Austin, TX

Scipy Conference — *July 2017*

- Covered the challenges and successes of making niche, domain-specific tools more accessible to practicing scientists and engineers.
- Discussed my experience as a consulting engineer and maintainer of a python interface to a C-library designed to create curvilinear-orthogonal grids for hydrodynamic and oceanographic modeling.
- Highlighted the contributions of academia, the open-source scientific community, the US federal government, and in most notably the effort and infrastructure provided by conda-forge.

Python in Civil and Environmental Engineering | Slides

Portland, OR

PDX Python — *March 2016*

- Presented to a general audience of python enthusiasts to provide general context of the challenges of environmental consulting and the ways in which the rapidly expanding scientific python ecosystem was addressing them.
- I also introduced some of the open source libraries I had authored.

Education

Georgia Institute of Technology

Aug. 2006 – Dec. 2008

M.S. Civil Engineering — *Atlanta, GA*

Thesis: *Rheologic and Flume Erosion Characteristics of Georgia Sediments from Bridge Foundations*

Georgia Institute of Technology

Aug. 2001 – May 2006

B.S. Civil and Environmental Engineering — *Atlanta, GA*

Cooperative education degree, graduated with Highest Honors