Title

Data and scripts associated with "Thresholds of Area Burned and Burn Severity for Downstream Riverine Systems to 'Feel the Burn'"

Summary

This data package is associated with the publication "Thresholds of Area Burned and Burn Severity for Downstream Riverine Systems to 'Feel the Burn'" submitted to Water Resources Research (Wampler et al. 2025).

This study used the Soil and Water Assessment Tool (SWAT), a processed based model to explore the impacts of area burned and burn severity on streamflow, nitrate, and dissolved organic carbon (DOC) in two test basins: a semi-arid, mixed land use basin and a humid, primarily forested basin. We developed 1800 wildfire scenarios that we ran in each basin: 20 different burn extents (5 to 100% by 5%), 3 different burn severities (low, moderate, and high), and 30 different post-fire precipitation scenarios. We also ran an additional 30 scenarios associated with no wildfire for the 30 post-fire precipitation scenarios. For each scenario we were interested in the change in runoff ratio (streamflow) and average concentration and annual loads (nitrate and DOC) across the wildfire scenarios.

This data package contains the data and scripts required to build SWAT models for the two test basins, create and run the wildfire scenarios, and generate the data summaries and figures used in the associated manuscript.

Brief Overview of Methods

This data package includes R scripts ("scripts") which are numbered in ascending order of use to reproduce the model and results from the associated manuscript. While most of the data is pulled via R from publicly available data sources, a few additional files are needed to create the models which are located in the "inputs" folder. This folder also contains two different versions of the SWAT wildfire module. For specific details on workflow steps see "thresholds_workflow.pdf". Model outputs can be found in the "outputs/data" folder, while figures and summary tables used in the manuscript are in "outputs/figures" and "outputs/summary-outputs" respectively.

Critical Details

- While not required to generate the results from this paper, as calibrated parameters have been provided, a third-party software SWAT-CUP (2W2E GmbH, 2019) was used to determine the calibration parameters found in "inputs/calibration-parameters.csv".

Data Package Structure

This dataset contains (1) file-level metadata; (2) data dictionary; (3) data package readme; (4) workflow documentation; (5) a folder with model input data ("inputs"); (6) a folder with model output data ("outputs"); and (7) a folder with scripts needed to create and run the models and analyze the outputs ("scripts"). The input data folder contains the following items: (1) a DOC/wildfire module where the DOC outputs are in kilograms per time step (Wampler et al. 2023); (2) a DOC/wildfire module where the DOC outputs are in milligrams per liter; (3) a modified SWAT-CUP (https://www.2w2e.com/home/SwatCup)

file with absolute parameter values; (4) a .csv file with calibrated parameter values for both models; (5) a .txt file called "model.in" with updated parameters for the DOC module; and (6) a .pdf with directions for using the wildfire module. The folder with model output data contains three subfolders: (1) "data", which contains the processed model outputs; (2) "figures", which contains the figures from the manuscript; and (3) "summary-outputs", which contains summarized data used to create tables and results for the manuscript. This package contains the following file types: csv, exe, in, txt, pdf, R, png.

Citations and Acknowledgements

Cite this data package with the appropriate DOI. Cite the associated manuscript in any work that that uses analyses or conclusions presented in the manuscript. To cite the paper:

Wampler, K. A., Myers-Pigg, A. N., Kang, H., Regier, P., Scheibe, T. D., and Bladon, K. D. (2025). Thresholds of Area Burned and Burn Severity for Downstream Riverine Systems to 'Feel the Burn'. ESS Open Archive [preprint].

Citations:

- Wampler, K. A., Bladon, K. D., & Faramarzi, M. (2023). Modeling wildfire effects on streamflow in the Cascade Mountains, Oregon, USA. *Journal of Hydrology*, *621*, 129585. https://doi.org/10.1016/j.jhydrol.2023.129585
- 2W2E GmbH. (2019). SWAT-CUP. Zürich, Switzerland: Water Weather Energy Ecosystem. Available from https://www.2w2e.com/home/SwatCup

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Change History

Data Package Version	Changes
Version 1 *April 2025*	Original data package publication