Brad Barnhart/Paul Mayer: Modeling the hydrologic effects of large-scale green roof implementations in four urban watersheds in Seattle, Washington using a spatially explicit ecohydrological watershed model

We utilize a spatially explicit (i.e., gridded) ecohydrological watershed model called Visualizing Ecosystem Land Management Assessments (VELMA) to simulate the resulting watershed-scale hydrologic discharge for four urban watersheds in Seattle, Washington for four scenarios of green roof implementations where 25%, 50%, 75%, and 100% of existing buildings hypothetically adopt green roofs. Intensive and extensive green roof types were tested separately and resulted in approximately 30% and 15% mean annual flow volume reductions, respectively, over a 28-year simulation. We also show that stormwater runoff reductions are smaller at higher precipitation and flow regimes, likely due to the limited storage capacity of saturated green roofs. In general, the results suggest that wide-scale implementation of green roofs can be effective at reducing stormwater runoff, and grid-based watershed models can facilitate the prioritization of urban water infrastructure to improve water quality in urban streams leading to Puget Sound.

Impact Statement:

This work will be presented at “Technical Session” of the 5th Annual Puget Sound Green Infrastructure Summit, which will be held in Tacoma, Washington, on March 20, 2020, and is coordinated by the Stewardship Partners. The conference will bring together businesses, academics, and industry groups to discuss current and future work centered around green infrastructure that ultimately impacts Puget Sound. Our modeling work will showcase the impacts of large-scale adoption of green roofs in the Seattle metropolitan area and can be used by stakeholders to estimate upper bounds of possible runoff reduction strategies using green roof technologies.

This work directly supports RAP Project XXXX and is covered in QAPP XXXX.