



# USGS NSF GRIP, GSP Opportunity

- Point of Contact Name:** Jud Harvey
- Point of Contact Email:** [jwharvey@usgs.gov](mailto:jwharvey@usgs.gov)
- USGS Center:** National Research Program
- Project Title:** A National-scale River Corridor Model
- Summary:**

The need for better models and more effective use of data to characterize river corridor transport processes is keenly felt, from evaluating the effectiveness of river and watershed management practices all the way to clarifying regulatory authority under the Clean Water Act. The intern's work will address these needs by contributing to the development of a parsimonious but physically-based model of hydrologic transport, storage, and reaction for the six million reaches of the nation's streams and rivers. The Networks with EXchange and Subsurface Storage (NEXSS) model will be used to interpret broad patterns of hydrogeomorphic and land-use controls on water quality and ecological health, and to forecast how water quality will respond in the future to land use and climate change.
- Project Hypothesis or Objectives:**

Rivers are a small fraction of the landscape, yet they transform substantial amounts of solutes and energy-rich materials at rates that are disproportionately high relative to their aerial extent. Biogeochemical reaction of organic carbon and nutrients not only regulate nutrient budgets and stream ecology, but also strongly influence the fate of mining contaminants, organic contaminants from industrial and military sources, and emerging contaminants from unconventional oil and gas development. However, a large-scale analysis of river corridor storage and processing of materials is lacking. To address the issue we propose to build a national-scale river corridor model that synthesizes newly available hydrogeomorphic variables from across the nation and couples that data with new parsimonious but physically-based transport and reaction models that are connected through the estimated six million channel reaches of the National Hydrography Dataset (NHDPlus).
- Duration:** Up to 12 months

|  |   |
|--|---|
| ● <b>Internship Location:</b>              | Reston, VA  |
| ● <b>Field(s) of Study:</b>                | Chemistry, Engineering, Geoscience, Life Science, High Performance Computing  |
| ● <b>Applicable NSF Division:</b>          | EAR Earth Sciences, DEB Environmental Biology, HPC High Performance Computing   |
| ● <b>Intern Type Preference:</b>           | Either Type of Intern   |
| ● <b>Keywords:</b>                         | River Corridor, water quality, hyporheic zone, groundwater-surface water interactions, high performance computing   |
| ● <b>Expected Outcome:</b>                 | The intern will help: (1) assemble critical new hydrogeomorphic data for the nation's streams and rivers, (2) process the data for use with the National Hydrography Dataset (NHDPlus), and (3) apply the datasets with our evolving models of river corridor transport to answer important questions about controlling processes and effectiveness of management alternatives.   |
| ● <b>Special skills/training Required:</b> | The intern would be well served by prior experience and interest using large databases and models. Newly compiled datasets from EPA and USGS include extensive field observations on channel wetted widths and depths and solute tracer time of travel (4,900 tracer datasets) which will aid in estimating hydraulic geometry for mean monthly flow conditions. Floodplain connectivity [Scott et al., 2007, 2014; Jones, 2014; Jones et al., 2014] will be quantified based on Lidar data from the National Elevation Dataset and land use classifications from the National Land Cover Database (NLCD; [Fry et al., 2011]). Modeling of hydrologic transport and reactive processing of solutes follows recent publications by Gomez-Velez and Harvey (2014) and Gomez-Velez et al. (2015) |
| ● <b>Duties/Responsibilities:</b>          | Aid other team members compiling and using datasets from EPA and USGS including extensive field observations on channel wetted widths and depths and solute tracer time of travel (4,900 tracer datasets) which will aid in estimating hydraulic geometry for mean monthly flow conditions. Floodplain connectivity [Scott et al., 2007, 2014; Jones, 2014; Jones et al., 2014] will be quantified based on Lidar data from the National Elevation Dataset and land use classifications from the National Land Cover Database (NLCD; [Fry et al., 2011]). Modeling of hydrologic transport and reactive processing of solutes follows recent publications by Gomez-Velez and Harvey (2014) and Gomez-Velez et al. (2015)  |

---