

Title: Identifying Primary and Secondary Controls on Turbidity and Sediment Yield in Oregon’s Long-term Paired Watershed Studies

Investigators:

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Project duration: 24 months (December 1, 2015-November 30, 2017; see Section 6 regarding the change in start/end dates of this project)

Objectives: The Watersheds Research Cooperative (WRC), consists of three paired watershed studies (Trask [TWS], Hinkle Creek [HCWS], and Alsea [AWS]). Turbidity and suspended sediment data have been collected at all of these watershed studies; however, there has been no attempt to integrate the results across studies to provide broader insights that may not be possible otherwise. The overall objectives of the proposed research are to:

- a) synthesize the turbidity and suspended sediment data from TWS, HCWS, and AWS.
- b) model the relationship between turbidity and sediment yield and morphometric, soils, geologic, and climatic variables at the catchment scale to identify primary and secondary controls.
- c) provide a process-based framework to classify watersheds in terms of resilience and vulnerability to sedimentation, which may be used to assess contemporary forest practices.
- d) develop testable hypotheses for identifying ‘hot spots’ for turbidity and sediment production within forested watersheds.

Summary of accomplishments toward objectives over past year: Despite the significant barriers in hiring the highly qualified personnel (post-doctoral scholar) needed to complete the analyses (see section 6), we have made good progress in organizing the requisite data for this project – a critical step towards accomplishment of the project objectives. In particular, we have accomplished the following:

- Compiled all watershed GIS data, including:
 - 2006 NLCD raster layer
 - 2011 NLCD raster layer
 - 12-digit HUC watersheds layer
 - NHD streams shapefile
 - SSURGO soils shapefile - calculated hydrologic soil shapefile
 - Geology shapefile
- Alsea Watershed Study data compiled, including:
 - Meteorological data (2008-2014; air temperature, relative humidity, photosynthetically active radiation)
 - Complete GIS coverage of watersheds and site locations
 - Stream temperature data (2006-2014)
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- Trask Watershed Study data compiled, including:
 - Meteorological data (2005-2014; air temperature, precipitation, solar radiation, wind speed, direction, relative humidity)
 - Complete GIS coverage of watersheds and gage site locations
 - Stream temperature data (2006-2014)
- Hinkle Watershed
 - Connected to database and begun to access to meteorological, sediment, and turbidity data
- Acquired the necessary NetMap data layers from TerrainWorks for the Alsea, Trask, and Hinkle region, which will be used to design and build an advanced watershed modeling and analysis system.
- Hired the post-doctoral scholar who will complete the research. Start date for this individual at OSU is December 1, 2015.

Problems, barriers, proposed changes to objectives: The principal barrier to achievement of objectives of this project was posed by the difficulty in hiring the highly qualified personnel (post-doctoral scholar) needed to complete the analyses. This potential barrier was known to the PIs as the proposed project necessitates an individual with a unique skill-set. In an attempt to avoid this barrier the PIs posted the post-doctoral scholar opportunity broadly at key websites (x8) and dispersed it to ~73 colleagues in related fields. Moreover, we sent out the position posting on February 12, 2015, the same day we were notified of successful project funding. We received 14 applicants for the position, of which we interviewed 3, offering the position to the top candidate on April 2, 2015. The candidate accepted the position and was scheduled to start at the proposed project start time. Unfortunately, the candidate informed us on May 26, 2015 that he was offered (and accepted) a tenure-track faculty position at another university. As such, we had to re-post the position on May 26, 2015 – we received 18 applicants, of which we interviewed 4, offering the position to the top candidate on July 6, 2015 (5 days after the official start date of the funding). Given the candidate's current personal and academic situation this candidate was not able to officially move to Corvallis and begin working on this project until December 1, 2015. Given this barrier, we explained this situation and requested from Jeff Light (Committee Chair) and Steve Tesch a 6 month extension to the end date of this project, which was accepted (i.e., new project dates: December 1, 2015-November 30, 2017).

Planned work:

	15	2016												2017												
	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
Finalize research plan																										
Gather data layers for analyses																										
Post-doctoral scholar begins																										
Data QA/QC																										
Preliminary data analyses and model development (focus on one watershed study)																										
Model calibration																										
Statistical analysis of results																										
Incorporate data from two other watershed studies into model																										
Extension of research and results at international conferences																										
Manuscript #1																										
Manuscript #2																										
Manuscript #3																										
Manuscript #4																										

List of names and brief overview of graduate and/or undergraduate engagement in project [e.g., thesis, research experience for UG, etc.]

- Dr. Nicholas Cook (Postdoctoral Scholar), Casey Steadman (PhD candidate), Ryan Cole (undergraduate; honors thesis student), Joey Tinker (undergraduate student).
 - Cook, Steadman, Cole, and Tinker have been engaged in this project to aid in quality assurance/quality control of various data sets from the TWS, HCWS, and AWS. They have also assisted in standardization of data set presentation across studies to prepare the data for analyses by the incoming post-doctoral scholar. Additionally, Dr. Cook has been integral in preparation of the spatial (GIS) layers across studies and in organization of the NetMap layers, which he will use in his OFIC funded research project that is closely aligned to this FWHMF project. We believe this graduate and undergraduate engagement will aid us in achieving the project objectives while also providing excellent educational opportunities.