Alabama Water Resources Research Institute
Auburn University

Annual Technical Report
2018

General Information

Products

2018AL189B:
1.Oral Presentation: Stormwater management: Innovations and challenges for the City of Campo Grande in the Future – Presented in the City Council of the Campo Grande, MS, Brazil, June 2019.
2.Oral Presentation: An Innovative Lining Strategy to Prevent Channel Erosion. Jose Vasconcelos, Auburn University - To be presented in the Alabama Water Resources Conference and Symposium, Orange Beach, September 2019.
3.Abstract Submission: 2020 ASCE EWRI World Environmental and Water Resources Congress in Las Vegas, NV entitled, “A field assessment of empty CCS to prevent post-construction stormwater channel erosion.”

2018AL190B:
1.Thesis Proposal Defense: Connor Cain, Geosciences M.S. Student, “Natural and Anthropogenic Contaminants in Groundwater and Cancer Cases in Fruithurst, Alabama.” August 6, 2019.
2.Paper Presentation: Ashwood, L. 2019. “The Justice and Institutional Interplay: Bringing the Local into the Theoretical Fold of Communicative Action.” Section on Environmental Sociology, Roundtables. American Sociological Association. Paper. August 11. New York, NY.
3.Paper Presentation: Cain, C, J., Lee, M.-K., Ashwood, L., Dimova, N.T., Cuffey, J., Billor, M.Z., Hayworth, J., Montiel, D., Stonecypher, K., Hiett, C., and Sutton, C.R. 2019 (forthcoming). Connecting geology and groundwater contamination to cancer cluster in Fruithurst, Alabama.” Geological Society of America.
4.Paper Presentation: Cain, C, J., Lee, M.-K., Ashwood, L., Montiel, D., Dimova, N.T., Stonecypher*, K., Hiett, C., Furr, A., and Sutton, C.R. 2019 (forthcoming). “Environmental risk analyses for Leukemia cluster in Cleburne County, Alabama.” Southeastern Geological Society of America Annual Meeting.
5.Paper Presentation: Stonecypher, K., M. Lee, L. Ashwood, A. Furr, C. Hiett, N. Dimonva, P. Majokweni, D. Montiel, C. Sutton. 2018. “Assessing Socio-Environmental Factors for a Childhood Leukemia Cluster in Cleburne County,

2018AL191B:
1.Coffman, KO. (In preparation). Influence of habitat disturbance by river regulation on long-term occupancy of fish and macroinvertebrates in the Tallapoosa River, Alabama. Doctoral Dissertation, Auburn University, Alabama.
2.Community Report: Ashwood, L. Cleburne Cancer Concerns, K. Defler, C. Hiett, and M.K. Lee. “Questions and Answers: Fruithurst and Muscadine Cancer Concerns.” Forty-three page public document distributed January 20, 2018. (*Note: authorship joint, listed alphabetically).

Information Transfer Program

2018AL190B: Research activities involved community citizens in keeping with program’s goal of training the next generation of water and environmental scientists. The research breaks down traditional barriers between scientific disciplines (environmental sociology, hydrology, geochemistry, environmental health), further helping to educate students and community members involved in the research. Volunteers from Fruithurst area have been trained and participated in conducting survey and environmental sampling. Through the process, the community provide inputs, participated in data collection, and planed mitigation to reduce environmental exposure.

2018AL191B: Results from this project will be used to inform stakeholders on the impact of dam release patterns on aquatic habitat around shoals in Alabama.

Student Support

2018AL189B: 2 undergraduate students, 2 graduate students
2018AL190B: 3 undergraduate students, 2 M.S. students, 1 REU student
2018AL191B:1 undergraduate student, 1 Ph.D. student, 1 postdoctoral researcher

Notable Achievements and Awards

2018AL189B:
1.Supported Proposal: “Life-cycle cost analysis of alternative channel stabilization technologies” by Jorge A. Rueda, Jose G. Vasconcelos, Wesley Zech, and Wesley Donald funded by Auburn University Highway Research Center.
2.Supported Proposal: “Development of Cost-Effective Erosion Control Systems for Drainage Ditches and Water Channels using Reclaimed Asphalt Pavement, submitted to C.W. Matthews Contracting Company, Atlanta, GA.

2018AL190B:
1.Grant Received: “Achieving Action in Community Based Research: Clean Water for Cleburne Cancer Concerns.” AU Competitive Outreach Scholarship Grant. Office of Faculty Engagement. $25,000. PI Ashwood, with Co-PIs A. Furr, C. Hiett, and M. K. Lee
2.Submitted an application for an CNH2 NSF grant for the first time, but did not receive funding: Ashwood, L. (PI), with J. Cuffey (Co-PI), N. Damova (Co-PI), J. S. Hayworth (Co-PI), M.K. Lee (Co-PI). “CNH2-L: Dirty Wells, Dynamic Communities: Altering the Negative Feedback Between Groundwater Contamination, Human Exposure, and Agency Distrust.” National Science Foundation. $1,599,925.

Projects

APPLICATION OF CELLULAR CONFINEMENT SYSTEMS TO MITIGATE SEDIMENTRELATED ISSUES IN STORMWATER SYSTEMS

Project Type: Annual Base Grant **Project ID:** 2018AL189B

Project Impact: Sediment and erosion control in stormwater systems constitute one issue of great relevance within Alabama, and many research efforts have been placed in devising methods to control channel erosion. This research has performed an evaluation of the use of cellular confinement systems (CCS) as a means to protect ditches and other stormwater facilities from erosion. While CCS have been used in various contexts for erosion and sediment control, the present research used a new form of CCS deployment. Typically, CCS have been applied with some type of media, such as crushed rock or concrete, within the cells. However, the present research considered the use of CCS without any filling or media material. The research hypothesis was that empty cells would create significant amount of energy dissipation that reduce water velocity and shearing near channel beds, thus prevent erosion. If the hypothesis was confirmed, CCS could be a channel lining attractive over rip-rap or vegetated channels. Following the construction of an apparatus, and after months of deployment, the CCS-lined channel deployed near Cox Rd., in Auburn, AL successfully managed to drain excess rainfall without presenting erosion. Hydrological measurements indicated that flow velocities in over the cells reached peak values in the range of 3.5 ft/s, which is above the permissible velocity for most earthen channels. Samples collected upstream and downstream from the CCS-lined channel did not show increase in turbidity values, but instead a decrease in turbidity along the channel was often reported.

Addressing the Socio-Environmental Factors in the Cleburne County, Alabama, Childhood Leukemia Cluster

Project Type: Annual Base Grant **Project ID:** 2018AL190B

Project Impact: This grant was used to help support the strategic collection and analysis of soil and water samples from 30 sites, 24 of which were water samples; and 6 of which were soil samples, based on survey and interview results in the Fruithurst Elementary School District area. The grant helped support a Geosciences graduate student to perform data analysis and compilation of 504 surveys (response rate 64%) and analyze geologic core samples, in addition to testing of radon, heavy metals, and volatile and semi-volatile organic compounds in cancer patients' well water. We did this work utilizing community-based research methods, also known as citizen science, which included survey (sociology) and sampling (geoscience) training for community members. We found a relationship between human health outcomes and a series of contaminants in well and soil samples. We shared this information with our community research partners. We currently are working to integrate our survey findings with our sampling results through geospatial mapping. Results: 1. Geospatial analysis suggests a potential spatial correlation between leukemia-lymphoma occurrence and the metamorphic Heflin Phyllite bedrocks exposed in the region (Figure 1). 2. Results of preliminary testing show that radon levels in well water range from 1.3 – 8,449 pCi/L (Figure 2). Radon levels in several well locations are higher than the EPA recommended level of 4,000 pCi/L. 3. Measurable amounts of Bis(2-ethylhexyl) phythalate (0.011 and 0.024 mg/kg, above the EPA MCL standards of 0.006 mg/kg), were found in four well samples (Figure 2), including two locations near the Problend rubber manufacturing plant. Soil samples collected near the rubber plant also had measurable amounts of Bis(2-ethylhexyl) phythalate (2.1 mg/kg). 4. The cancer patients' well water samples show a wide range in major ion concentrations that differ from current municipal water (Figure 3). The large variation in well water chemistry reflects different well screen depths and aquifer lithology.

Integrating Sonar And Aerial Photogrammetry To Quantify Habitat Persistence For Shoal Dwelling Fishes And Invertebrates In Relation To Flow Prescriptions

Project Type: Annual Base Grant **Project ID:** 2018AL191B

Project Impact: The objectives of this project were to combine data of a digital terrain model (DTM) acquired with a UAS with bathymetry data acquired with an (ACDP) to assess habitat fish habitat conditions in relation to dam release schedules. We have successfully created DTMs from rivers derived from UAS imagery. We had proposed to

use a side-scan sonar instrument to acquire bathymetry data. However, the side-scan sonar available to us was not capable of acquiring bathymetry data based on the sonar sensor. The second proposed method was to use an ADCP in collaboration with the USGS. Increased dry periods in late 2018 reduced the discharge volumes in our study areas below the minimum required for ADCP data acquisition. In early 2019 we observed a federal government shutdown for 5 weeks during which USGS employees were not able to work. After the shutdown ended it was hard to schedule field work time because the USGS partners had to make up for the work not performed during the shutdown. We anticipate using other resources to acquire ADCP data in the fall when river conditions will be conducive to the task.