

Undergraduate Research Symposium May 17, 2019 Mary Gates Hall

Online Proceedings

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MCNAIR SESSION - PROBLEMS OF ACCESS, SUSTAINABILITY, AND HEALTH IN THE SOCIAL AND PHYSICAL ENVIRONMENT

Session Moderator: Clarence Spigner, Health Services

MGH 287

12:30 PM to 2:15 PM

* Note: Titles in order of presentation.

Evaluating the Societal, Economical, and Environmental Aspects of Providing Clean and Safe Drinking Water to Small Communities

Julissa Freund, Junior, Environmental Engineering, Univ New Hampshire

McNair Scholar

Mentor: Selina Taylor, McNair Scholars, University of New Hampshire

Drinking water is essential in a person's everyday life. However, not everyone has access to clean drinking water. This research explored the societal, economical, and environmental issues that are involved in helping a small system deliver clean and safe drinking water. The nearby community of Rollinsford, New Hampshire, was studied and worked with to help understand their issues and solve Rollinsford's problems. As a small community that has approximately 2,600 people, Rollinsford wrestled with many challenges. Such as a need for optimization of their existing corrosion control due to recent lead and copper rule violations. This research explored the challenges faced by Rollinsford on an everyday basis. By expanding their website to include the latest information on lead and copper as well as answering their frequently asked questions, the community better understood the challenges it faced. To develop the best possible economic and environmental options for Rollinsford's drinking water, we established a direct partnership with the town water facility operator and assisted him with laboratory research and water analyses. People in Rollinsford may not have the information they need about their water supply and might drink dirty water that could affect them for the rest of their lives. Therefore, this research helped inform a small town and provided the knowledge and experience that can then be applied to communities everywhere.

Predicting Streamflow, Snowpack, and Stream Temperature Sensitivities to Climate Change in the Pacific Northwest's Green River Basin

Jane Harrell, Senior, Atmospheric Sciences: Climate McNair Scholar

Mentor: Bart Nijssen, Civil and Environmental Engineering

Mentor: Yifan Chang

Mentor: Andrew Bennett

Climate change will have significant impacts on Pacific Northwest hydrology. Rising temperatures and shifts in precipitation will lead to changes in snowpack, runoff, and streamflow timing, impacts that will have implications for water and environmental resource management. The Pacific Northwest's Green River Basin is a valuable water supply and provides habitat to several cold-water aquatic species including the threatened Puget Sound Chinook salmon, but also has a major flood risk. Streamflow in the basin is seasonally regulated for flood prevention and ecosystem health, and changes in the annual hydrologic cycle will have consequences for flood risk and ecosystem habitat. To investigate the implications of climate change on streamflow, snowpack, and stream temperatures in the Green River Basin, climate sensitivity analysis and future climate impacts are simulated using two watershed models with varying spatial and process complexity: 1) the conceptual Snow17/Sacramento Soil Moisture Accounting model (Snow17/Sac) implemented with two elevation zones and 2) the process-oriented Structure for Unifying Multiple Modeling Alternatives (SUMMA) model implemented using twelve USGS HUC-12 subareas. Stream temperature climate sensitivities are modeled using the River Basin Model (RBM) Semi-Lagrangian Stream Temperature model. Future climate change impacts on basin hydrology and stream temperatures are assessed using an ensemble of statistically downscaled climate projections from 34 Global Climate Models (GCMs) run as part of the Intergovernmental Program on Climate Change 5th Assessment Report. The future warming scenarios show moderate changes in stream-

flow volume, shifts in streamflow timing, and reductions in snowpack, which differ depending on the watershed model. The presentation provides key results and findings from the study, and comments on potential impacts on stream temperature and fish.

Invisible Barriers: The Relationship of Sensory Sensitivities in Autism and Accessibility Issues in Public Spaces

Heidi Morgan, Senior, Child, Youth, & Family Studies, Portland State University

McNair Scholar

Mentor: Miranda Cunningham, Social Work, Portland State University

Many adults with Autism experience sensory processing sensitivities as a part of their diagnosis. Research shows that 94.4% of adults with Autism report co-occurring sensory abnormalities. These sensitivities can create accessibility challenges for the autistic community, especially for autistic individuals with hypersensitivities. This study will explore how these sensory sensitivities are experienced as barriers to accessing public spaces and the impact that limited access has on quality of life experienced by autistic adults. The author will develop a self-report survey to assess the frequency, diversity, and intensity of these barriers and create a publication which will include the photographs and narratives of the participants experiences of sensory dysregulation as a barrier. The survey and the publication will be reviewed through the process Community-Based Participatory Research (CBPR). Data will be obtained through using photovoice, narratives, and surveys highlighting the subjective experiences that hypersensitive autistic adults encounter in their everyday lives in the public sphere. We anticipate that multiple barriers to access will be reported by participants though we recognize these may differ in form, place, and intensity. The outcome of the proposed study will be used to center the voices of the self-advocating autism community about the barriers they experience daily and to promote policy change to create more sensory friendly public spaces.

Comparison of Microhabitat Selection between Riffle Dwelling Darters, the Orangethroat (*Etheostoma spectabile*) and Orangebelly (*E. radiosum*), in Upper Blue River of Oklahoma

Kourtney Myskey, Junior, Biology, East Central Coll

McNair Scholar

Mentor: J. Bruce Moring, Biology, East Central University

The Blue River of south-central Oklahoma is a spring-fed stream that drains much of the eastern Arbuckle-Simpson Aquifer, and is one of only two free-flowing rivers in Oklahoma with little to no anthropogenic influences on the flow of this river. Not much is known about the structure and composition of fish communities in the upper reaches of the Blue

River. In collaboration with The Nature Conservancy, assessments of fish in riffle habitats of the Blue River were conducted adjacent to the Oka' Yanahli Nature Conservancy Preserve in the summer of 2018. Fish samples collected were processed, individual fish were identified to species based on morphology, and biological metrics were calculated. A total of eighteen species of fish were collected from the riffle stream habitats in the upper reaches of the Blue River. The relative abundance of each species was calculated, and the Central Stoneroller (*Campostoma anomaum*) was highest in abundance, the Orangebelly Darter ranked second in abundance, and the Orangethroat Darter ranked third. The Orangethroat and Orangebelly darter were more likely to be found in areas in the riffles where river bed particles were in the small to large cobble size range (60 to 100 millimeters). The two darter species did not show any difference in preference for current velocity in the riffle habitats. The two darter species co-occurred in riffle microhabitats as indicated by the positive correlation between the numbers of each darter species collected across all seine hauls. Looking at biota in this river could give insight into how different habitats function in a free-flowing river, and more specifically, what is could potentially happen in riffle habitats of the Blue River because these areas will be the first stream habitats affected if flows are reduced from anthropogenic withdrawals of water from the Arbuckle-Simpson Aquifer.

The Use of Reflectance Photospectroscopy to Determine Characterization of Skin Melanin Content for Predictive Validity of Self-Report Survey Comparison

Mark Sanchez, Senior, Mathematics, Portland State University

McNair Scholar

Mentor: Lisa Marriott, School of Public Health, Oregon Health & Science University

It has shown that there are higher death rates with individuals with darker skin types due to lack of diagnosis based on wording of skin sensitivity surveys. In the realm of research and dermatology, the Fitzpatrick Skin Type (FST) scale has been the gold standard of measurement to classify sun sensitivity for human's skin. More research of the subject is necessary but it is important not to underestimate the impact of UV exposure and exclude a portion of society. It is the scope of Study 3 to reword part of the survey for cultural awareness as well as introduce an objective source of measurement using photospectroscopy. It is important to include these groups that have been discounted in prior studies. Some of the language has been utilized in prior research and it was an attempt of this study to improve on the language used. Participants were asked to complete a brief self-report skin type survey prior to measurement of skin melanin using a reflectance photospectroscopy device. The areas measured were dorsal and ventral wrist area and ventral upper arm area. The results cor-

relate well with the subjective and objective components. Improvement will be paramount to future research in this project as we aim to bring this group to understanding what might be necessary in the future design of this project and how a statistically significant correlation can bring us closer to asking the pertinent questions that help people determine their skin types. We hope to design a replicable and accurate way to categorize skin type which will be able to deliver the most accurate sun exposure behaviors.

The Effects of Mixed-Severity Wildfire on Small Mammal Occupancy in Northern California and Southern Oregon

Christopher Sirakowski, Senior, Biology, Portland State University

McNair Scholar

Mentor: David Green, Institute for Natural Resources, Oregon State University

Mentor: Sean Matthews, Institute for Natural Resources, Portland State University

Wildfires play a major role in the structure and composition of landscapes and the general ecology of the Pacific Northwest. The Klamath-Siskiyou eco-region in northern California and southern Oregon has been experiencing an increase in the frequency, scale, and intensity of wildfires in recent years. Understanding the effects of wildfires on small mammal communities is an important, yet understudied, aspect of the response of wildlife to wildfires. In 2014, two wildfires burned areas on and adjacent to a long-term study area of wildlife. We will investigate the effects of these wildfires on the occupancy of small mammals such as *Neotoma fuscipes*, *Glaucomys sabrinus*, and *Tamiasciurus douglasii*, using occupancy analyses of data collected during fall field seasons using track plate stations. The longitudinal data set that we have includes years of data before the fires occurred, allowing us to disentangle any effects of the wildfires from any naturally occurring variation. This research is important in determining what lasting effects these increases in wildfire frequency are going to have on predator-prey dynamics.

Developing a Wellness Program to Increase Physical Activity and Improve Diet

Janet Solano, Junior, Psychology, Calif St University San Marcos

McNair Scholar

Mentor: Richard Armenta, College of Education, Health and Human Services, California State University, San Marcos

Diabetes and cardiovascular disease play a significant role in disease and mortality in the US, especially among underrepresented groups. Lack of physical activity and unhealthy eating can lead to cardiovascular disease (CVD), diabetes, and other adverse health outcomes. This project will utilize com-

munity based participatory research to develop a wellness program from American Indians in San Diego County. This will be done through conducting focus groups, and interviews with community members and through conducting surveys on health and wellness. Further, a wellness program will be developed from community feedback. We expect to observe an increase of physical activity, better diet, and higher knowledge about healthy behaviors with the program.