

Utilizing an Unmanned Aerial System and a High Resolution Multi-Spectral Sensor to Evaluate Ecosystem Health and Predict Surface Water Quality¹

B.K. Holzbauer-Schweitzer* and R.W. Nairn²

Abstract: This study is focused in the Grand Lake O' the Cherokees watershed in northeastern Oklahoma, upstream of the Grand Lake reservoir formed by Pensacola Dam, a hydroelectric power installation. The lake receives metals-contaminated waters from the abandoned Tri-State Lead-Zinc Mining District of Oklahoma, Kansas and Missouri and is also heavily impacted by nutrient runoff due to agricultural and urban development contributing to eutrophication and significant algal blooms. Addressing these problems higher in the watershed will help to minimize water and sediment quality problems. An ATI AgBot Unmanned Aerial System (UAS) will be used in conjunction with a MicaSense RedEdge sensor to collect multispectral reflectance data in shallow, slow moving, surface drainages, allowing for estimation of chlorophyll concentrations and other water quality parameters. The spatial data paired with *in-situ* field verification will allow for data validation and strengthening of water quality and land use models. This research will attempt to find areas of most concern and suggest remediation and/or restoration efforts (e.g., land reclamation, passive treatment, contour cropping, riparian buffer restoration, and other low impact development best management practices). Even further, the data generated by the UAS may be able to be used to evaluate habitat quality (through Normalized Difference Vegetation Indices, Species Richness/Diversity, Stream Power Indices, etc.).

Additional Key Words: Chlorophyll, Habitat Assessment, Best Management Practices

¹ Poster presented at the 2017 National Meeting of the American Society of Mining and Reclamation, Morgantown, WV: *What's Next for Reclamation?* April 9 – 13, 2017. Published by ASMR, 1305 Weathervane Dr. Champaign, IL 61821.

² Brandon K. Holzbauer-Schweitzer, Graduate Research Assistant (student) and Robert W. Nairn, Viersen Family Foundation Presidential Professor, Center for Restoration of Ecosystems and Watersheds, School of Civil Engineering and Environmental Science, University of Oklahoma, Norman, OK 73019.