

how both shading and mixed nutrient quality leaf litter can influence the decomposition rates by shredder invertebrate populations. Three treatments of leaves in 10 mm mesh bags were placed in both lighted and shaded reaches of Salt Creek in Muskingum County, Ohio, including: a high nutrient species, American elm (*Ulmus americana*); a low nutrient species, white oak (*Quercus alba*); and a mixed nutrient quality pack of both. Each leaf packet treatment (n=4) was retrieved after 2 and 6 week periods to record mass loss and invertebrate abundance. Initial results indicate decomposition occurred faster in both packs of mixed and high nutrient quality leaves over low quality, while overall lighted treatments decomposed faster than shaded ones. Shredder abundance also appeared to be low throughout all treatments. A two-way analysis of variance will be conducted to determine if significant relationships exist involving shading and nutrient quality treatments on both decomposition rates and shredder abundance.

**Poster Board No. 60 - THERMAL REFUGE OF JUVENILE STEELHEAD TROUT IN THE CUYAHOGA VALLEY.** Dillon Weik, [dweik@bgsu.edu](mailto:dweik@bgsu.edu), Christopher Kemp, [ckemp@bgsu.edu](mailto:ckemp@bgsu.edu), (Jeffrey Miner, [jminer@bgsu.edu](mailto:jminer@bgsu.edu)), Bowling Green State University, Aquatic Ecology & Fisheries Lab, Department of Biological Sciences, Bowling Green OH 43403.

Steelhead Trout (*Oncorhynchus mykiss*) is a popular sport fish that has been introduced and stocked in the Great Lakes, creating a productive recreational fishery. However, the impact of non-native Steelhead Trout on the native fish community of cold-water tributaries in the region is unresolved. This study was conducted in 2 large mainstem tributaries of Lake Erie during summer 2017. It was hypothesized that juvenile Steelhead Trout would use the mainstem during early summer, but then move into cool-water refugia as mainstem temperature increased. Fish communities were characterized in these habitats during 6 sampling trips through summer. Continued studies will be comparing the communities in association with temperature variables (e.g., temperature differences, and temperature relative to critical thermal maxima). Preliminary results suggest that in mid-summer, juvenile Steelhead Trout were relegated to the cool-water streams and thus had the potential to compete with native species in this habitat. To access this potential, diets will be compared of the 3 species: Steelhead Trout, Redside Dace (*Clinostomus elongatus*), and Creek Chub (*Semotilus atromaculatus*). It is hypothesized that Steelhead Trout and Redside Dace feed primarily on terrestrial invertebrates, and thus will exhibit the greatest potential for food resource competition. From our study, we will compare the spatial and temporal overlap of juvenile non-native Steelhead Trout with native fish species in cool-water refugia of Lake Erie tributaries throughout the summer and highlight the potential for competition between the 2 groups.

**Poster Board No. 61 - AN EVALUATION OF CHANGE IN THE UNIONIDAE IN THE LOWER ROCKY RIVER FROM 2011.** Jamil H. Wilson, [j.h.wilson@vikes.csuohio.edu](mailto:j.h.wilson@vikes.csuohio.edu), Robert A. Krebs, [r.krebs@csuohio.edu](mailto:r.krebs@csuohio.edu), Cleveland State University, Dept. of Biological, Geological, and Environmental Sciences, 2121 Euclid Ave., Cleveland OH 44115.

The Rocky River is one of many moderately sized Ohio tributaries of Lake Erie sufficiently large to possess a diverse assemblage of freshwater mussels in the family Unionidae. The regional development of natural conservation efforts to improve water quality was hypothesized to improve the mussel assemblage. The present study sought to determine changes in freshwater bivalve populations since original surveys in the northern region of the river conducted in 2001. Visual and physical touch survey methods were incorporated to locate mussels, all conducted when water levels were low and clear. Water quality was assessed from the records of the Ohio Environmental Protection Agency. Time spent at each survey site ranged from approximately

an hour and a half to almost 3 hours, and depended on the extent of its geographic structure, variation in habitat, and presence of live mussels. Live mussels (n=69) were collected along with empty shells (n=58), most of which were found in 2 distinct but separate locations. The total assemblage consisted of 8 species in comparison to the 9 that were seen in the same area in 2001, but large shifts in relative abundance occurred. *Leptodea fragilis* populations decreased precipitously. Populations of *Lasimigona costata* and *L. complanata* may be increasing, and the presence of young individuals suggested recruitment, but only of these two species. Mostly older specimens of other species were found, which suggests overall a decrease despite improvements in water quality that has been taking place throughout the Lake Erie watershed.

**Poster Board No. 62 - AN UPDATE OF MUSSEL POPULATIONS THROUGHOUT THE UPPER CUYAHOGA RIVER WATERSHED.** Rachel E. Andrikanich, [r.andrikanich@vike.csuohio.edu](mailto:r.andrikanich@vike.csuohio.edu), Robert Krebs, [r.krebs@csuohio.edu](mailto:r.krebs@csuohio.edu), Cleveland State University, Department of Biological, Geological, and Environmental Sciences, 2121 Euclid Ave., Cleveland OH 44115.

The Cuyahoga River is one of America's heritage rivers, the former poster-child for the Clean Water Act (1972), and in the upper reaches, part of Ohio's Scenic River program. As such, the Cuyahoga River has been one of the most protected streams in the country since the 1970s. Water quality is now within acceptable limits outlined by Ohio Environmental Protection Agency, shoreline integrity has increased throughout the watershed, and sediments mostly test free from toxins and heavy metals. With water quality recovery, freshwater mussels (family Unionidae) were expected to increase in the upper Cuyahoga River or at least sustain abundance and richness levels reported in the 1990s. To test for levels of change, timed surveys of 2 person hours were made at 25 sites chosen based on proximity of roads or foot paths along the river in 2012 and these surveys were repeated using the same approach in 2016. However, only 389 mussels of 8 species were found in 2012 and just 111 of 4 species in 2016. These results present a declining trend and significant losses at many sites based on categorical analysis of binomial probabilities. Mapping relative abundance against the physical habitat suggested that the decline of freshwater mussels is a complex problem that may involve impoundments, flow dynamics below dams, and sediment stability. Restoring natural flow regimes, in addition to protecting habitat, are critical to support successful reproduction and survival in this imperiled fauna moving forward.

**Poster Board No. 63 - AQUATIC COMMUNITY CHARACTERISTICS ASSOCIATED WITH EMERGENT MACROPHYTES OF COASTAL LAKE ERIE WETLANDS.** Jaimie L. Johnson, [jaimiej@bgsu.edu](mailto:jaimiej@bgsu.edu), Jeffrey G. Miner, [jminer@bgsu.edu](mailto:jminer@bgsu.edu), Bowling Green State University, Aquatic Ecology & Fisheries Lab, Department of Biological Sciences, Bowling Green OH 43403.

Wetlands are important features of an ecosystem, especially in the Great Lakes region because they provide habitat for many species of all taxonomical levels; add economic value to the area by means of hunting, fishing, trapping, bird-watching, and other recreational activities; and they act as a natural filter by removing excess nutrients and toxins prior to reaching main water reserves. However, invasive macrophytes, such as European frogbit (*Hydrocharis morsus-ranae*), may negatively impact wetlands and increase the difficulty to properly manage wetland ecosystems services. Thus, the central focus of this study is to determine the abiotic and biotic wetland community characteristics that differentiate these aquatic macrophyte habitats. Monotypic patches of 4 different species of macrophytes, including open water (n=27), were sampled at Ottawa National Wildlife Refuge in July and September of 2017. Data

was collected on water chemistry, sediment nutrients, macrophyte biomass, periphyton growth, zooplankton, macroinvertebrates, fish, and water birds associated with each sample site. Dissolved oxygen measurements were taken at each site and showed extreme hypoxic conditions within sites of *H. morsus-ranae*, reaching levels as low as 0.07 mg/L midday when dissolved oxygen is typically highest. Low oxygen levels, as well as low light attenuation, caused by *H. morsus-ranae* could drive organisms such as fish and macroinvertebrates out of these habitats and prevent the growth of periphyton and submerged vegetation vital for a healthy wetland. This study reinforces the need for more research on how to best eradicate and prevent *H. morsus-ranae* from further invading aquatic ecosystems.

**Poster Board No. 64 - IS LAKE WINNIPEG THE NEXT LAKE ERIE? RECENT DREISSENIID MUSSEL COLONIZATION MAY LEAD TO MORE TOXIC CYANOBACTERIAL BLOOMS.**

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Lake Winnipeg (Manitoba, Canada), the world's 12th largest lake by area, is host to yearly cyanobacterial harmful algal blooms (cHABs) dominated by *Aphanizomenon* and *Dolichospermum*. cHABs in Lake Winnipeg are primarily a result of eutrophication but may be exacerbated by the recent introduction of dreissenid mussels. Since the invasion of dreissenids into Lake Erie has been hypothesized to be one factor promoting the toxic *Microcystis* blooms currently seen in the western basin, this work aimed to analyze the current cyanobacteria population in Lake Winnipeg as an estimation of the effect of dreissenid mussel introduction in Lake Erie. Prior to the invasion, Lake Erie cHABs were a mixed community of *Microcystis*, *Aphanizomenon* and *Dolichospermum*. Surface water samples from Lake Winnipeg were collected in 2013 from 23 sites during summer and 18 sites in fall. Gene, ELISA, and MS-cyanotoxin profiles identified microcystins (MC) as the most abundant cyanotoxin across all stations, with MC concentrations highest in the North Basin. In the fall, *mcyA* genes were sequenced to determine which species had the potential to produce MCs, and 12 of the 18 sites were a mix of both *Planktothrix* and *Microcystis*. Current blooms in Lake Winnipeg produce low levels of MCs, but the capacity to produce cyanotoxins is widespread across both basins. If dreissenid mussels continue to colonize Lake Winnipeg, a shift in physicochemical properties of the lake due to faster water column clearance rates may yield more toxic blooms potentially dominated by *Microcystis*.

**Poster Board No. 65 - EXAMINING VOCABULARY TEACHING STRATEGIES USED IN CHILDREN'S EDUCATIONAL TELEVISION SHOWS.**

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Research to date has offered insight into vocabulary teaching strategies used in educational television shows (Linebarger et al. 2017; Linebarger & Piotrowski 2010), and effects of show viewing on vocabulary learning (Linebarger & Walker 2005; Oetting, Rice, & Swank 1995). This work has examined the use of labeling, defining/mislabeling, repetition of target words, and onscreen print to teach vocabulary, all of which have a growing evidence-base. What has not yet been established is whether vocabulary teaching strategies are consistent within episodes or over time.

Since typically developing children learn vocabulary differently than children with atypical development, some strategies may be more effective than others at positively influencing vocabulary learning. If educational programs are purposefully selected based on the use of strategies that work for children with different language profiles, vocabulary outcomes may improve. The aims of this study are to a) explore the frequency with which vocabulary teaching strategies are used in educational television shows for young children, and b) determine whether strategy use is consistent over show air time. Television show selection was determined based on a) show content, b) main focus, and c) age of intended audience. *Word Girl*<sup>TM</sup>, *Sesame Street*<sup>®</sup>, *Martha Speaks*<sup>TM</sup>, and *Reading Rainbow*<sup>®</sup> met inclusion criteria. To date, vocabulary teaching strategies in 18 episodes of *Word Girl*<sup>TM</sup> were coded using a researcher developed coding system and episodes from *Sesame Street*<sup>®</sup>, *Martha Speaks*<sup>TM</sup>, and *Reading Rainbow*<sup>®</sup> are in progress. Preliminary data analysis revealed inconsistent patterns of strategy use across episodes of *Word Girl*<sup>TM</sup> and over time.

**Poster Board No. 66 - VARIETY EFFECTS AND MOTIVATED BEHAVIOR.**

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Humans and animals respond to diversity in food items by increasing intake and appetitive behaviors; this observed variety effect reflects changes in the motivational value of such rewards. Previous work on the effects of food variety posits 2 main mechanisms by which these motivational changes may come about. Variety may slow habituation processes by decreasing exposure to any one food item, or variety effects may be due to incentive contrast, whereby comparisons between items impact their relative value. The current work uses an experimental operant paradigm with more than 1 level of variety to build on what is known about how reward variety affects motivational processes. Three flavors of sucrose rewards were used to investigate rats' responses to qualitative reward variety in 4 contexts: no, low, and high variety, and a context with no variety but high satiety. The current study also used predictive cues about impending outcomes, allowing examination of the impact of factors such as predictability, and short-term ("micro") variety. The results of this study showed only slight variety effects on incentive contrast and relative reward processes, but several confounding factors could have obscured larger variety effects. The results have implications for deepening our understanding of motivational processes in general, as well as for informing potential clinical approaches to motivation and eating disorders.

**Poster Board No. 67 - SYNTHESIS AND CHARACTERIZATION OF NITROSYLATED TRIS-(ETHYLENEDIAMINE) COBALT (III) COMPLEX.**

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Prior work in our lab demonstrated that nitric oxide release from nitrosylcobalamin is cytotoxic to a variety of cancer cell lines. The nitrosylation (addition of nitric oxide, NO) to tris-(ethylenediamine) cobalt (III) complex (TECC) and, its subsequent characterization, is being performed to study its potential as a nitric oxide delivery agent in anti-cancer treatment. NO-TECC may be either a nonoate-like compound, or possibly NO may substitute for one of the ethylenediamine ligands. Evidence collected to date suggests that NO-TECC has been successfully synthesized in our lab from TECC suspended in CH<sub>2</sub>Cl<sub>2</sub> and continuously pressurized with NO gas at room temperature. Infrared spectral analysis of the resultant solid reaction product shows stretching frequencies (1400 to 1900 cm<sup>-1</sup>) consistent with possible NO attachment to nitrogen similar to a nonoate. Thin layer chromatography on silica gel resolves 2 compounds, TECC (Rf 0.45) and a potential NO-TECC (Rf

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