

PLAZA 1 ROOM

MONDAY AFTERNOON

ROOM: Plaza1

TIME: Monday 1:00 PM

TITLE: Using long-term data to determine the effects of zebra mussels on reservoir sport fishes

AUTHOR(S):

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ABSTRACT: Little is known about zebra mussel effects on fishes in Great Plains reservoirs. We analyzed mean catch per unit effort, CPUE, which was the number of fish per gill or trap net night, and relative weight, W_r , for several common reservoir fishes from 1993 to 2007 using standardized fish sampling by the Kansas Department of Wildlife and Parks. A before after control impact design was used to compare stock-to-quality length bluegill, walleye, white bass, and white crappie CPUE and W_r for El Dorado Reservoir, Kansas, where zebra mussels became established in 2003, and Milford Reservoir, Kansas, which was the control system, in the pre-invasion, 1993-2002, and post invasion, 2004-2007, periods. White bass CPUE and W_r declined in El Dorado Reservoir post-invasion, but remained constant in Milford Reservoir, even after accounting hybrid striped bass, a potential predators and competitor, abundance. White crappie W_r also declined in El Dorado Reservoir following establishment of zebra mussels. Trends in walleye abundance and condition were similar between reservoirs, but any differences may be masked by stocking. These results suggest the presence of zebra mussel may be associated with changes in abundance and condition of some sport fishes. However, continued long term monitoring and more focused sampling linked to hypothesized zebra mussel effects such as zooplankton abundance may provide a more complete understanding of the effects of zebra mussels in warmwater reservoirs.

KEYWORDS: zebra, mussel, reservoir

ROOM: Plaza1

TIME: Monday 1:20 PM

TITLE: Diet overlap of age-0 common carp and native fishes

AUTHOR(S):

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ABSTRACT: Common carp is a pervasive species that may impose negative effects on water quality of aquatic ecosystems. However, research evaluating the effects of common carp on native fishes is limited. Common carp are highly fecund, protracted spawners, which often translates into high abundances of age-0 common carp in shallow lakes. If abundant age-0 common carp overlap spatially and temporally with other age-0 fishes, they may compete for prey resources. Hence, we compared the diets of age-0 common carp, bluegill, black crappie, yellow perch, and adult orangespotted sunfish collected in July and August to determine diet composition and overlap among these species. Zooplankton composed the majority of the diets of all species in both months. In July, orangespotted sunfish, black crappie, and yellow perch fed mainly on *Daphnia*, *Cyclops*, and *Diaptomus*, while common carp consumed primarily *Daphnia* and *Cyclops*. In August, there was a slight shift in zooplankton taxa consumed, likely due to prey availability. All species except yellow perch fed on *Cyclops*. Additionally, bluegills and black crappie consumed *Diaptomus*, yellow perch and black crappie ate *Daphnia*, carp consumed *Chydorus*, and yellow perch fed on *Ceriodaphnia*. Our results suggest that age-0 common carp consume similar prey items as native fishes, which may affect prey availability for native species and ultimately reduce growth and survival.

KEYWORDS: diet, carp, competition

ROOM: Plaza1

TIME: Monday 1:40 PM

TITLE: Variability in age-0 common carp morphology and its effects on predation risk

AUTHOR(S):

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ABSTRACT: Survival during early life stages of fishes is commonly regulated by predation. Common carp may be unique in that predation on age-0 carp appears minimal, possibly the result of morphological defenses. To evaluate whether predation risk affects age-0 carp body morphology, individuals were collected over four months from 11 shallow lakes having variable predator relative abundance. Carp exhibited longer dorsal and pectoral spines and had deeper body depths in lakes with higher predator abundance compared to lakes with lower predator abundance. To determine if morphological variability affected predation risk, varying densities of deep and shallow bodied carp were placed in open and vegetated observation tanks with largemouth bass. Largemouth bass selected deep bodied over shallow bodied carp in the open environment in two of the three prey densities. In vegetated habitats, largemouth bass always neutrally selected both body types, suggesting differential habitat use or maneuverability of the two body types. Although deep bodied carp required additional handling time, shallow bodied carp required extended time until first capture and were captured inefficiently. Our results suggest age-0 common carp may develop deeper bodies and larger spines when predators are abundant. However, these morphological defenses may result in higher vulnerability to predation in some instances. Our results provide insight into predator evasiveness of age-0 carp during early life stages that may translate into highly abundant carp populations in shallow eutrophic ecosystems.

KEYWORDS: morphology, predation,

ROOM: Plaza1

TIME: Monday 2:00 PM

TITLE: Understanding the behavior of Great Lakes sea lampreys around traps in an effort to improve management

AUTHOR(S):

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ABSTRACT: Controlling Great Lakes sea lampreys (*Petromyzon marinus*) is an integral part of managing for healthy fish communities in the Great Lakes Basin. One of the methods for assessment and control of sea lampreys involves the trapping of adults in tributaries as they migrate upstream to spawn. Trapping upstream migrants reduces the spawning stock in streams with a goal of reducing the number of subsequent recruits produced. Additionally, adult males captured in traps are sterilized and released in the St. Marys River, a large river where chemical control is not a viable option, to reduce the number of effective females with a goal of reducing the number of subsequent recruits produced. In an effort to learn more about the behavior of sea lampreys around traps and potentially gain insight in how to increase the effectiveness of trapping adults, we videotaped sea lamprey behavior at the entrance of traps placed in a large river during their spawning migration. We recorded 2,715 sea lamprey encounters at the entrance of traps, with only 13% of those encounters resulting in a sea lamprey entering the trap. Sea lampreys exhibited a lot of search behavior in the funnel leading into the trap, but ultimately most did not enter the trap. During the recorded time period trap retention, however, was found to be very good with escapes making up only 1% of the total behaviors recorded. Research should focus on improving trap design and/or using attractants in order to increase the likelihood of sea lampreys entering traps.

KEYWORDS: trapping, invasive species, management

ROOM: Plaza1

TIME: Monday 2:20 PM

TITLE: Population structure of the invasive round goby in Lake Michigan

AUTHOR(S):

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ABSTRACT: The recent establishment of the round goby (*Neogobius melanostomus*), an invasive fish to the Great Lakes, provides a model system to examine fine-scale evolutionary processes that can create genetic structure within a population. We genotyped seven nuclear polymorphic microsatellite markers (11-17 individuals per site) from round gobies from 12 pierhead locations around the entire shoreline of Lake Michigan to characterize their population structure. Our primary objective was to determine whether there are significant patterns of genetic differentiation among sites along the shore of Lake Michigan. By the use of pairwise F_{ST} values, our results indicate that round goby pierhead sites exhibit population structure in Lake Michigan. Having established that significant pairwise genetic differentiation exists among many pierhead locations, we set out to determine evolutionary processes responsible for population structure. A migration-drift equilibrium model for population structure was supported by a positive correlation between genetic diversity and geographic distance along the eastern and western shores of Lake Michigan. A correlation between genetic diversity and geographic distance breaks down around the entire lakeshore. Round goby gene flow by shipping route transport and genetic drift from population isolation also explains some of the population structure in Lake Michigan.

KEYWORDS: round goby, invasive, population

ROOM: Plaza1

TIME: Monday 2:40 PM

TITLE: Evaluating the relative impacts of common carp and black bullhead on water quality characteristics

AUTHOR(S):

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ABSTRACT: Understanding the interaction and interrelationships between biological community structure and water quality is critical for the management and restoration of aquatic systems. The effects of common carp (*Cyprinus carpio*) and black bullhead (*Ameiurus melas*) on turbidity and macrophyte biomass were evaluated in experimental mesocosms. Treatments included stockings of no fish (control), common carp, black bullhead, and the combination of common carp and black bullhead. Approximately 1000g of biomass were stocked for each of the fish treatments. After 35 days, mean macrophyte biomass of the common carp treatments differed from the control and black bullhead ($P < 0.05$) treatments, but was similar to the both species ($P > 0.05$) treatment. Additionally, mean macrophyte biomass of the control and black bullhead treatments were similar ($P > 0.05$). Mean turbidity for control treatment differed from treatments of black bullhead ($P > 0.05$), common carp ($P < 0.01$), and both species ($P < 0.01$). Mean turbidity of mesocosms with black bullhead alone, was not similar to the treatment of common carp ($P < 0.01$) or the treatment of both species ($P < 0.01$). However, treatments of common carp and both species had similar mean turbidities ($P > 0.05$). Results indicated that common carp significantly impacted macrophyte biomass, while no effect of black bullhead was observed. Although, black bullhead increased turbidity the effect of common carp was greater than twice that of treatments of black bullhead at similar biomasses. Additionally, common carp appear to have an overriding effect on turbidity and macrophyte biomass in the presence of black bullhead.

KEYWORDS: carp, bullhead, mesocosms

ROOM: Plaza1

TIME: Monday 3:40 PM

TITLE: Effects of simulated cold-fronts on yellow perch early life stages

AUTHOR(S):

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ABSTRACT: Many factors have been related to yellow perch (*Perca flavescens*) recruitment, and current research aims at understanding potential mechanisms underlying these relations. For example, gradually warming temperatures during egg and larval stages have been associated with stronger year classes, whereas abrupt drops in temperature (i.e., cold-front) during this period can result in weaker or missing year classes, presumably due to egg or larvae mortality. Our objective was to evaluate the effects of temperature drops on hatching success and survival of yellow perch eggs and yolk-sac fry. During 2007 and 2008 experiments decreased water temperatures by 6 degrees C in 24 h and 8 degrees C in 45 min, respectively. However, no significant difference in hatching success was observed between treatment and control tanks in either experiment. During 2009, treatment-tank temperatures were dropped by 3 degrees C and 8 degrees C in two different sets of tanks to evaluate effects on yolk-sac fry. Again, no significant differences in survival were observed between treatment and control tanks. However, yolk-sac fry in tanks that experienced the 8 degree C drop exhibited behavioral differences in which fry became inactive and sank to the bottom of the tanks, which could potentially affect survival in lakes. Abrupt temperature drops did not reduce hatching success or cause significant mortality of yolk-sac fry in yellow perch during laboratory experiments and thus do not appear to be a mechanism affecting perch recruitment. Future research should focus on the effects of temperature declines on yellow perch larvae during the switch to exogenous feeding.

KEYWORDS: perch, cold front, juvenile

ROOM: Plaza1

TIME: Monday 4:00 PM

TITLE: Quantitative analysis of yellow perch recruitment based on long-term trend data collected from southern Lake Michigan

AUTHOR(S):

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ABSTRACT: Lake Michigan yellow perch have sustained long-term periods of recruitment failure in the past several decades. Although attempts to explain poor recruitment have been successful, many plausible factors remain untested and their relative importance has not been quantified. To resolve a portion of this issue, monitoring data collected from three sites in southern Lake Michigan were used to test for the relative influence of 7 abiotic and biotic variables suspected to influence yellow perch survival and recruitment. Recruitment, defined as the number of age-2 individuals, was first described as a function of individual exogenous variables in the context of a Ricker stock-recruitment relationship. Variables listed in order of explanatory power (R^2) included alewife biomass (39%), spottail shiner biomass (28%), and the abundance of reproductively mature yellow perch (23%). Other variables tested and those found to be unrelated to recruitment included round goby biomass, yearly average and variation in water temperature and water clarity. Multivariate models were then constructed using different permutations of significant factors. A model with all three covariates explained the greatest proportion (77%) of recruitment variability and was the best retrospective predictor of year class strength. Results of this study indicate that yellow perch recruitment in southern Lake Michigan is predominantly driven by negative biotic interactions with dominant members of the near-shore community namely exogenous alewife and native spottail shiners. Further, even though density-dependent mechanisms are likely important, our model downplays the role of mature stock abundance and suggests more relaxed harvest policies.

KEYWORDS: perch, recruitment,

ROOM: Plaza1

TIME: Monday 4:20 PM

TITLE: Assessing the reproductive contribution of stocked largemouth bass

AUTHOR(S):

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ABSTRACT: Much work has been conducted to increase the initial success of stocked fish. However, little has been done to determine the reproductive contribution of those stocked fish that do survive. Introduced fish may not compete successfully with resident largemouth bass for optimal spawning sites or may simply make poor choices in selecting nesting sites. To evaluate the survival and reproductive success of stocked largemouth bass to resident populations, fingerlings were produced with the MDH B2B2 allele as a genetic tag and were introduced into five study lakes. Once these fish reached sexual maturity, their reproductive success and recruitment to the population was assessed by comparing changes in the MDH B2 allele frequencies of young-of-year fish through time. The overall frequency of the MDH B2 allele increased most in small lakes, but was relatively low in larger lakes. Reproductive contribution of stocked largemouth bass as adults was similar to the contribution of naturally produced fish. These results indicate that if stocked largemouth bass survive to adulthood they contribute to reproduction similar to natural fish. Approaches that increase the proportion of stocked fish in the adult population can therefore increase the reproductive contribution of largemouth bass stocking programs to lake populations.

KEYWORDS: largemouth, reproduction, stocking

ROOM: Plaza1

TIME: Monday 4:40 PM

TITLE: Factors limiting walleye recruitment in a lake michigan tributary

AUTHOR(S):

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ABSTRACT: The Muskegon River historically supported one of the largest runs of adfluvial walleye (*Sander vitreus*) in Lake Michigan. Their number has steadily declined since the mid 1950s and today is supported by agency stocking efforts. Identifying limiting factors to recruitment during the early life history is imperative to understanding why this population remains degraded while other have rebounded around the Great Lakes. We placed egg mats (i.e., furnace filter attached to a 60 cm x 38 cm steel frame) at six sites prior to spawning, which were sampled weekly, to estimate egg deposition in the river. We inoculated egg incubators with fertilized eggs (1 egg/well) and deployed them at six sites in the river. Incubators were retrieved after 21 days and 28 days. Our estimates of egg densities ranged from 84,590 to 103 eggs/m² at the six sites and averaged 6,894 eggs/m², which is consistent with or greater than many systems that have a naturally sustained spawning population. Egg survival in incubators was highly variable, ranging from 21.3% to 70.3% during among sites in the river, whereas control incubators held at a hatchery experienced higher survival (%). Based on comparisons with other systems with naturally sustained spawning populations of walleye, our preliminary results suggest that egg densities and viability are not likely to be limiting walleye recruitment in the Muskegon River.

KEYWORDS: walleye, reproduction, Muskegon