

## POPULATION BIOLOGY / ECOLOGY I

### *Abstracts*

#### EFFECT OF ADULT SIZE AND LITTORAL HABITAT ON LARVAL SUNFISH PRODUCTION IN UNEXPLOITED LAKES

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Adult size structure and lake morphometry may influence larval production and timing of spawning in sunfish. We quantified how these factors affected larval sunfish in seven unexploited, small (2.47-8.67ha) coal mine lakes during the summer of 2003. Lakes were stratified across categories of adult size structure and littoral habitat availability. Larval tows were conducted weekly in each of the lakes to estimate densities throughout the spawning season. Littoral habitat was quantified by conducting bathymetric surveys with an echosounder and calculating percent availability. Peak and total larval sunfish densities increased with adult size. The earliest peak spawning occurred in lakes with large adults. Although lakes range from 2% to 32% littoral volume, this measure did not affect larval sunfish production among lakes. Management that increases adult size in lakes will likely improve reproduction and recruitment success.

Keywords: *sunfish, larvae, production, spawning*

#### COMPARING THE DEMOGRAPHICS OF CHANNEL CATFISH POPULATIONS FROM FISHED AND UN-FISHED REGIONS OF THE WABASH RIVER

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Commercial fishing alters the density, size structure, and growth rates of fish populations. During fall 2001, 2002 and 2003, we sampled channel catfish *Ictalurus punctatus* in four 106.2 km commercially fished river reaches and one non-commercially fished reach of the Wabash River. Fish were sampled using three-phase AC electrofishing, and baited 2.54 cm and 3.18 cm bar mesh hoop nets. Because mean length of capture differed between gear types mortality was independently estimated for each. Growth was modeled for both fished and un-fished river reaches using a von Bertalanffy model. Mean electrofishing catch per unit effort (CPUE) was significantly higher in the un-fished reach (15.13 fish/hr) compared to the commercially fished reaches (6.44 fish/hr) ( $P = 0.0022$ ). However, mean CPUE for both 2.54 cm and 3.18 cm mesh hoopnets did not differ significantly between the un-fished and fished reaches ( $P = 0.3132$  for 2.54 cm and  $P = 0.6552$  for 3.18 cm hoopnets). Fish sampled in the commercially fished river reaches had a lower mean length with greater relative weight and growth, and had higher annual mortality compared to the un-fished river reach. Commercial exploitation may have led to faster growth rates and better condition by lowering densities of large fish and increasing annual mortality, thereby reducing intraspecific competition.

Key words: *Commercial fisheries, channel catfish, demographics*

## HABITAT USE AND MOVEMENT PATTERNS OF ASIAN CARP IN THE LOWER ILLINOIS RIVER

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Asian carp have become an increasing nuisance in recent years in the Illinois River, presenting potential problems of resource competition for native species in this system. Understanding when and where these fish spawn and what habitat they are using is essential for the management of these species. Habitat use and movement patterns of bighead carp (*Hypophthalmichthys nobilis*) and silver carp (*H. molitrix*) were quantified in the lower Illinois River (River Mile 80.2 to River Mile 0) and Swan Lake, an adjacent backwater with ultrasonic telemetry. We implanted forty silver carp and forty bighead carp with ultrasonic transmitters during 2004. Long-range movement was continuously monitored with stationary receivers (N=3). Intensive, weekly mobile tracking during the spawning season and intermittent tracking during fall through winter quantified habitat use. To date, both species were frequently found in slower water velocity habitats perhaps to forage, and were numerous in areas with high physical complexity (tree snags, sandbars). The lower Illinois River, particularly near Swan Lake, provides this habitat, with greater than 81% of the tagged fish using this area. Bighead and silver carp also inhabited Swan Lake (44%). Side channels (sloughs) of islands also were used by both species, with about 20% of tagged fish occurring in these areas. Flooding of the Illinois River during summer 2004 increased movement of fishes of both species upstream, and more activity in general in the lower reaches was observed. Effective management of these species requires knowledge of behavior and life history characteristics such as habitat use, spawning activity and seasonal movement patterns.

Keywords: *Asian carp, invasive species, Illinois River, habitat use*

## ONTOGENETIC DIVERGENCE IN SECONDARY SEXUAL CHARACTERISTICS IN THE SLIDER (*Trachemys scripta*)

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Although secondary sexual characteristics (SSCs) can distinguish sexes and indicate maturity in male turtles, interpopulational variability in growth rates may result in geographic differences in their development. Because of the potential for such variability, we studied a population of slider turtles (*Trachemys scripta*) in southern Illinois to determine 1) at what size SSCs develop, 2) how young turtles could be sexed using SSCs, and 3) interpopulational variation of SSC's between Illinois and southern populations of the same species. We measured the following SSCs from 209 *T. scripta*: plastron length, foreclaw length (all five claws on the left fore-foot), and pre- and postanal tail lengths. For males, foreclaws 2, 3, and 4 grew longer and more rapid relative to plastral length compared to females, such that, sexual differences were present at age 3. Male preanal tail lengths diverged from females at approximately 100 mm PL to lengths 2 times longer than females. The combined SSCs resulted in males diverging from females at 100 mm plastron length between ages 3 and 5.

Keywords: *Trachemys scripta*, *secondary sexual characteristics*, *sexual dimorphism*, *Emydidae*

### HABITAT USE OF JUVENILE SLIDER TURTLES (*Trachemys scripta*)

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Life history studies often detail ontogenetic changes such as differences in habitat use. Several freshwater turtle species exhibit marked differences in habitat use patterns across ages and sizes. We investigated differential habitat use in a population of red-eared slider turtles (*Trachemys scripta*) from a floodplain lake located in Gallatin County, Illinois. We used 25 baited hoop traps for 26 days and all *T. scripta* captured were aged, measured, and sexed. At each trap location we measured water depth, distance from shoreline, canopy cover, presence/absence of logs, presence/absence of bushes, and bank slope for comparison among age classes. Our results suggest that juvenile turtles prefer areas with basking sites such as logs to those without.

Keywords: *Trachemys scripta*, *ontogenetic*, *habitat use*, *juvenile*

### VOCAL VERSATILITY IN LEOPARD FROGS: DOES MALE CALL COMPLEXITY ADVERTISE BEAUTY OR BRAUN?

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The study of communication is of paramount importance for understanding how animals interact and what kinds of information individuals convey to one another. In many species, competition between males and mate choice decisions by females are based on highly elaborate morphological, behavioral, or acoustical male displays. My research focuses on a highly exaggerated acoustic trait, the complex advertisement call of a common North American anuran. Northern leopard frogs (*Rana pipiens*) migrate from overwintering sites to temporary ponds in early spring after which they breed for a period of several weeks. Males neither defend territories nor appear to interact directly with each other, but instead partition their time between calling and searching for mates. In contrast to this otherwise simple mating system, northern leopard frogs have a remarkably complex advertisement call. Males use a repertoire of several distinct notes in variable numbers and combinations to generate hundreds of unique calls (perhaps equivalent to the way people put words together to form sentences). Why northern leopard frogs have developed such a complex vocalization system is far from clear. It is not known, for example, if different calls serve different functions. I conducted field and laboratory playback experiments using advertisement calls of varying complexity to test for differential responses of male and female receivers. Males changed their calling behavior in response to call playbacks; some playbacks elicited call matching (responding with the same call as the playback), others resulted in males switching to aggressive vocalizations, and others caused the males to cease calling altogether. Females exhibited a strong preference for complex calls over simple calls; however, this preference was eliminated when call duration was controlled. I will discuss the potential communicative significance of call complexity in anurans and explore the relationship between the development and production of a complex advertisement call repertoire and the proclivity for speciation events in the leopard frog species group.

Keywords: *anurans, call complexity, mating behavior, vocalizations*