Prey Use of Three Wetland Sunfishes: Effects of Ontogeny, Gape Size and Seasonal Prey Variation

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INTRODUCTION

The diets of different sized fishes provide information about variation in potential competitive and predatory interactions in freshwater food webs. Freshwater sunfishes (Centrarchidae) typically undergo ontogenetic niche shifts throughout life affecting their survival and growth.1,2,3,4,5 The bluespotted sunfish (Enneacanthus gloriosus), the dollar sunfish (Lepomis marmoratus), and the warmouth (Lepomis gulosus) (pictured below) are three wetland sunfish species that commonly co-occur in the Florida Everglades. These species vary morphologically (warmouth grow the largest and have the largest gape at a given size), however all three occupy the same habitat (spikerush sloughs) and are primarily benthivorous. Prey use in these species has been poorly studied in wetlands, particularly in relation to intraspecific and interspecific variation.

Objective: Quantify intraspecific and interspecific variation in prey use among bluespotted sunfish, dollar sunfish, and warmouth in Everglades wetlands by comparing individuals within species (i.e. different sizes) and between species (i.e. matched for standard length [SL] or gape).

METHODS

We collected bluespotted sunfish, dollar sunfish, and warmouth from experimental wetland macrocosms at the Loxahatchee Impounded Landscape Assessment (LILA). LILA is a unique Everglades physical model designed for Everglades restoration research. Fish were collected using fyke nets, hoop nets, and minnow traps in March 2011 (dry season) and September 2011 (wet season). Gut contents were acquired via gastric lavage or dissection and were from 30 mm SL to 150 mm SL. We collected bluespotted sunfish, dollar sunfish, and warmouth from Experiments 1 and 2 of the wet season (Fig 1) and 30 mm SL to 150 mm SL. We used a unique Everglades physical model designed for Everglades restoration research. Fish were collected using fyke nets, hoop nets, and minnow traps in March 2011 (dry season) and September 2011 (wet season). Gut contents were acquired via gastric lavage or dissection and were from 30 mm SL to 150 mm SL. We collected bluespotted sunfish, dollar sunfish, and warmouth from Experiments 1 and 2 of the wet season (Fig 1) and 30 mm SL to 150 mm SL. We used ANOSIM to test for differences in intraspecific and interspecific variation.

RESULTS

General prey use

Warmouth, dollar sunfish, and blue- spotted sunfish were strongly inverte- vorous. We found a diverse array of prey items in fish stomachs (Fig 1), ranging from microarthropods (daphnia, hydra, carina, etc.) to decapods (crayfish, shrimp) and vertebrates (fish, tadpoles).

Ontogenetic shifts in prey use

Bluespotted and dollar sunfish (30-60 mm SL) did not exhibit ontogenetic shifts in prey use in either season and generally consumed small insects and crustaceans (Table 1, Fig 2).

Warmouth (30-152 mm SL) displayed ontogenetic shifts in prey use both seasons (Table 1). Dry season warmouth underwent a strong shift from amphipods and odonates to shrimp, crayfish, and vertebrates as size increased (Figs 2, 3). Wet season shifts were less pronounced (Figs 2, 3) and were possibly influenced by reduced prey densities.

CONCLUSIONS

At similar gapes, these sunfish consume similar prey items and the degree of diet overlap suggests strong competition. Seasonal variation in prey availability and differences in hunting strategy/competitive ability may drive differences in prey use. Small warmouth may actively hunt odonates, whereas bluespotted and dollar sunfish may only consume odonates when abundant and frequently encountered during primary foraging (gleaning dipterans form vegetation). As warmouth grow, prey use shifts to larger, more mobile prey items (when available) and they outgrow interspecific competition and become predators of the other sunfish.

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