UNIVERSITY GRADUATE SCHOOL BULLETIN ANNOUNCEMENT

Florida International University
University Graduate School

Doctoral Dissertation Proposal Defense

Abstract

Impacts of Non-Native Fishes on Energy Flow in an Aquatic Food Web

By: **Peter Flood**

Invasive species are a driver of global change causing extinctions and altered ecosystem states. However, study of invasion impacts on ecosystem function, particularly in aquatic systems, is an emerging topic in ecology. Non-native fishes are 1/3rd of fish species richness in Everglades National Park (ENP). Two invasive species, the African Jewelfish (*Hemicrhomis letourneuxi*) and the Asian Swamp Eel (*Monopterus albus*), have recently reached high abundances in ENP. Yet, their impacts on energy flow in the aquatic food web are unknown. My dissertation will quantify these impacts. I will start by quantifying the pre-Jewelfish food web. This study uses a late 1990s data set of stomach contents (n = 3,435) and carbon and nitrogen stable isotopes (n = 152). Quantitative metrics include trophic position, diet, and trophic niche. Bayesian analyses (such as stable isotope mixing models, SIMMs) will be used to quantify diet and trophic niche. Next, I will use laboratory feeding experiments to determine the trophic enrichment factor (TEF) for five ENP consumers, including Jewelfish. The TEF – the difference in isotopic content between a consumer and its food – is key to generating accurate SIMMs. Then, I will describe the contemporary food web after invasions of Jewelfish and Swamp Eels. This study will include fatty acids and bomb calorimetry in addition to stomach contents and stable isotopes. Additionally, I will use a field enclosure study to assess the relative strength of non-consumptive effects (NCEs) across trophic levels using Jewelfish, a native competitor, and a native piscivore. Enclosures will have mesh that permits small fish and invertebrates to move freely, while enclosing focal species and permitting their chemical visual cues to be perceived by potential competitors and prey from outside. Finally, I will use these data to generate a spatial model coupling long-term monitoring data of fish community structure with calorimetry data to create a landscape description of energy density across ENP. The energy layer will be implemented in the Everglades Landscape Model to simulate changes in energy density of aquatic consumers before and after invasions. The information gathered in this dissertation will advance invasion ecology by quantifying impacts on energy flow – ecosystem function – before and after invasion. I will also provide information for managers and a spatial model to aid management decisions for ENP aquatic communities.

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Time: 11:00 AM
Place: Virtual Zoom meeting

Department: Biological Sciences
Major Professor: Dr. Joel Trexler