USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2002NJ1B

Title: Effects of the Biopollutant, Phragmites australis, On the Nutritional Status (Biochemical Condition) of Juvenile Weakfish, New Directions Incorporating Otolith Chemical Signature Analysis

Project Type: Research

Focus Categories: Wetlands, Nutrients, Ecology

Keywords: weakfish, Phragmites, biopollutant,trophic relay, nekton, macrophyte, sagittal otolithes, Spartina, lipid, free fatty acid, triacylglycerols, isotope, finfish

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Abstract

As the tertiary link in many food chains, fishes are often reliable indicators of the condition of complex ecosystems. Thus, data on the intensity and direction of fat deposition, and the level of body fat reserves can not only be used to assess the "degree of well being", but also serve to integrate the overall value of habitats to their production.

Abundant food at individual locations does not preclude young weakfish from establishing temporary residency in specific areas, at least long enough to take on the "signatures" of locally produced sources of organic matter.

We previously identified seven sub-regions, including tidal marshes, of Delaware Bay where juvenile weakfish were seasonally abundant, and where different suites of primary producers contributed nutrients to secondary production in this species during the period June through October of each year (Figure 1).

Previous research, demonstrated that C, N and S derived from Phragmites australis dominated marshes of the Mid and Upper Delaware Bay support significant secondary production of juvenile weakfish, especially when fish are between about 20 mm and 60mm SL.

Given the site fidelity (temporary residency) observed, could you infer that some of the seven sub-regions of Delaware Bay that have been defined (Figure 1) are more important than others in supporting weakfish production? If the biochemical condition and growth of juvenile weakfish from these sub-regions differs, as

others suspect it does (Lankford and Targett 1994; Grecay and Targett 1996; Paperno et al. 2000), then recruitment to adult populations may be partially a function of habitat (sub-region) quality. The proposed work addresses this question through the following hypothesis:

Ho There are no differences in biochemical condition of young-of-year weakfish emigrating from Delaware Bay in late fall relative to their previous habitats of residency (determined from the stable isotope biomarkers and otolith microchemistry

The first group of juvenile weakfish, up to 15 individuals < 60 mm SL from each sub-region, will be used to build a "baseline" of isotope values (otolith and homogenate) that will be used to elucidate the habitat utilization history of the second group of juvenile weakfish, up to 60 larger juveniles collected at the mouth of Delaware Bay just prior to emigration in 2001, via the same stable isotope parameters (Thorrold 1998, Litvin et. al. in prep). The neutral lipid content data will then be used to investigate the effect of differential habitat residency on the biochemical condition of the emigrating young-of the-year weakfish.