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Mercury Accumulation and the Mercury-PCB-Sex Interaction in Summer Flounder

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Abstract

commercial shery extend from Massachusetts to North Carolina. e summer ounder recreational shery is most concentrated in New York and New Jersey waters of the Atlantic Ocean [9-11]. Although the spawning season for summer ounder occurs during September through March, peak spawning typically occurs during October and November. Summer ounder is one of the important predators inhabiting the western Atlantic coastal ecosystem, and the diet of adults primarily consists of sh and squid [12]. Female summer ounder grow considerably faster than male summer ounder [11]. To the best of our knowledge, the di erence in whole- sh Hg concentrations between the sexes of summer ounder has yet to be quanti ed. Adult male summer ounder exceeded adult female summer ounder in whole- sh PCB concentration by 43%, and this di erence has been attributed to a higher energy expenditure rate in males and the growth dilution e ect [13].

e overall goal of our study was to characterize Hg accumulation in mature summer ounder from the coastal waters of New Jersey. Speci c objectives included: (1) quantify the di erence in whole- sh Hg concentrations between the sexes of summer ounder caught from a spawning aggregation o the New Jersey coast, (2) quantify the di erence between somatic tissue Hg concentration and ovary Hg concentration in female summer ounder, (3) estimate the change in whole- sh Hg concentration of female summer ounder associated with release of eggs at spawning, (4) determine whether the bulk of Hg in summer ounder is MeHg, (5) determine whether the e ect of sex on Hg concentration was signi cantly di erent from the e ect of sex on PCB concentration in summer ounder, and (6) discuss the implications of our ndings with regard to the continued operation of the summer ounder shery. Of special interest was whether the ratio of Hg concentration in males to Hg concentration in females was less than the ratio of PCB concentration in males to PCB concentration in females for summer ounder.

Methods

Field methods

e same 50 adult summer ounder used by Madenjian et al. [13] in their study on the di erence in PCB concentrations between the sexes were used in our study. In brief, these sh were captured via

recovery was 110.2%, which is well within the range of acceptance (75-125%) for the USGS Mercury Research Laboratory. We estimated a detection limit for MeHg of 2 ng/g (dry weight basis), based on multiple analyses of a sh homogenate (IAEA 407) and following USEPA protocol [15]. All summer ounder MeHg concentrations were expressed on a wet weight basis.

Data analyses

e mass balance approach described by Niimi [19] was used to calculate whole- sh Hg and whole- sh MeHg in each of the ve females selected for mercury determinations of ovaries and somatic tissue. e body burden of mercury (either Hg or MeHg) in a portion of the sh is the weight of mercury contained in that portion of the sh. Body burdens in the ovaries and somatic tissue were calculated by multiplying the

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