

Spatial and temporal variations in the total mercury concentration of bivalves from Rhode Island estuarine and marine waters

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Shellfish, including bivalves, support substantial commercial and recreational fisheries in Rhode Island (RI), and, therefore, may be an important dietary source of contaminants for human consumers. Mercury (Hg), for example, is a pervasive contaminant in estuarine and marine environments, which often bioaccumulates in the tissues of resident biota. In this study, total Hg concentrations were measured in five bivalve species sampled from RI inshore and coastal waters (Mar-Aug, Nov-Dec, 2006-2022), and results were examined relative to the geographic location and time of year individuals were collected. Mean Hg concentrations varied significantly across bivalve species, with the highest concentrations measured in the hard shell clam *Mercenaria mercenaria* (mean \pm SD Hg = 0.21 ± 0.14 ppm dry wt; n = 212), followed by the soft shell clam *Mya arenaria* (0.15 ± 0.10 ppm; n = 86), horse mussel *Modiolus modiolus* (0.14 ± 0.04 ppm; n = 30), and ribbed mussel *Geukensia demissa* (0.14 ± 0.10 ppm; n = 165), and lowest in the blue mussel *Mytilus edulis* (0.10 ± 0.05 ppm; n = 217). The Hg concentrations of bivalves were significantly higher in the upper Narragansett Bay relative to the lower bay (0.17 ± 0.14 ppm and 0.11 ± 0.04 ppm, respectively), with spatial differences in contamination likely reflecting species-specific distribution patterns and a north-south gradient in anthropogenic pollution sources. Bivalve Hg concentrations were also generally higher during the late fall and early spring (Nov-Dec, Apr: 0.21 ± 0.13 ppm) compared to summer months (Jul-Aug: 0.10 ± 0.07 ppm), which may be caused by seasonal patterns in environmental conditions (e.g., temperature and/or dissolved oxygen) and prey availability. Finally, for commercially utilized bivalves of regulation size (blue mussel, hard and soft shell clam), all individuals had Hg concentrations below the U.S EPA threshold level of 2.1 ppm dry weight (converted from 0.3 ppm wet weight using 86% moisture content of bivalve tissue). These results suggest the consuming bivalves from the Narragansett Bay pose minimal Hg-related risks to human health.