Tracking Domoic Acid Levels in Phytoplankton and Mussels in Narragansett Bay, Rhode Island

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Narragansett Bay (NB) is home to various species of the diatom *Pseudo-nitzschia*. During *Pseudo-nitzschia* blooms, certain species produce a neurotoxin called domoic acid (DA). In other marine regions, such as the North American west coast, DA is detected in high amounts because of *Pseudo-nitzschia* blooms, bioaccumulating in shellfish such as mussels and subjecting humans to potential intoxication through ingestion. The first *Pseudo-nitzschia* bloom in NB that resulted in high levels of DA in shellfish meat resulting in a fisheries closure was in October of 2016, despite *Pseudo-nitzschia* presence in NB for over 50 years. Following the 2016 bloom, it has become necessary to understand levels of DA and seasonal fluxes of the toxin in NB. We filtered water collected at sampling stations in NB, extracted samples of phytoplankton for DA analysis and enumerated *Pseudo-nitzschia*. Additionally we tested mussels collected at various locations in NB at the height of the June 2019 *Pseudo-nitzschia* bloom and at the decline. We developed a methodology to extract DA from mussel tissue. This consisted of a 4 hour extraction with 70% Isopropanol and 30% acetic acid and running the sample through an SPE column. Using LC-MS/MS with MRM monitoring based on the protonated DA molecule, we analyzed the samples to detect the presence of DA in phytoplankton cells and mussels tissue. We detected a spike in DA levels in phytoplankton samples during the June 2019 bloom and did find DA in certain mussel samples, although the levels are below those that would trigger a shellfish closure. Understanding the seasonal patterns of DA concentrations in NB is important to management agencies and the public's consumption of shellfish, as consuming shellfish with DA can cause memory loss and even irreparable damage to neurons. It will be interesting to determine if the DA spikes we have recorded in June 2018 and June 2019 will reoccur in future years.

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