

The Use of Stable Nitrogen Isotopes
in Evaluating Landscape-Level Nitrogen Inputs
to Hood Canal, Washington, USA

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ABSTRACT

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Eutrophication can have profound negative effects on marine ecosystems. The nutrient most associated with marine eutrophication is nitrogen (N). Human activities have increased total nitrogen inputs to US marine ecosystems by an average of six times and approximately two-thirds of US coastal waters are moderately to severely degraded due to N pollution. This study evaluated stable nitrogen isotopes and nitrogen content in marine algae at 9 sites in Hood Canal, Washington, USA. The results from this nitrogen analysis were compared with land use parameters in an attempt to identify anthropogenic sources of nitrogen. This study found that nitrogen isotopes in marine algae were significantly correlated with development, sewage effluent, distance to open ocean water, cultivated land, forested land, and wetlands. This study also found a significant link between nitrogen isotope values and nitrogen content in macroalgae. Values found during this study show that enriched isotope values, typically associated with anthropogenic sources of nitrogen, are associated with lower tissue nitrogen values in algae. A shift in the slope of these relationships may be able to delineate an increase in anthropogenic nitrogen and nitrogen loading, possibly noting a shift to eutrophic conditions. The Puget Sound ecosystem has the potential to provide cultural and subsistence resources to our community, if it is managed appropriately. This research may provide a cost-effective tool to monitor and evaluate nitrogen cycling in Puget Sound so we may better know how to conserve the valuable resources it provides to us, as well as the habitat and resources it provides to the flora and fauna that call it home.

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