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Project Number
J1209

Project Title
Secret of the Rings: Does 15N in Spruce Cores Tell of Salmon-Borne Nutrients Brought from Sea to Tree?

Abstract

Objectives/Goals
We wanted to find out if levels of the nitrogen isotope 15N in Sitka spruce cores correlate with populations of past salmon runs in Freshwater Creek.

Methods/Materials
Corer, HSU Mettler Toledo balance, dryer, coffee grinder, tincapsules, U.C. Davis Stable Isotope Facility (SIF) mass spectrometer, Freshwater Creek weir counts. Obtained core samples from a Sitka spruce within 25 meters of Freshwater Creek salmon spawning area and used tree ring marks to identify wood from each of the last four decades. Prepared wood samples for each decade and sent them to SIF to be analyzed for 15N. Obtained salmon run population data from the Freshwater Creek weir for each decade and received delta 15N measures from the SIF. Calculated a correlation coefficient to see if 15N levels correlated with density of salmon runs. As a control, performed the same analysis with a Sitka spruce 200 meters from Freshwater Creek.

Results
There is a strong correlation, with correlation coefficient of 0.69, between 15N levels by decade in the spruce close to the creek and the salmon run data for each decade. There was almost no correlation between 15N levels in the spruce far away from the creek and the past salmon runs. (0.006 was the result of the correlation coefficient)

Conclusions/Discussion
Our results supported but did not prove our hypothesis. If we had repeated this experiment with multiple trees and at different salmon spawning creeks, our hypothesis would have been better supported. Nevertheless, the data we gathered supports the idea that, if careful to avoid confounding factors, 15N levels in spruce cores could assist ecologists to discover trends in the numbers of salmon in a creek or river. This information could help ecologists restore or maintain a waterway and its surrounding ecosystem to its healthiest (optimal) state.

Summary Statement
We measured levels of nitrogen isotope 15N in cores from a creekside Sitka spruce and showed that these levels had strong correlation with measured changes in populations of salmon runs in the creek over the past 40 years.

Help Received
Used lab equipment at Humboldt State University under the supervision of Dr. Ward.