# Artificial neural networks allow researchers to relate groundwater geochemistry to microbial community structure

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- We applied nonlinear artificial neural network and generalized linear data analysis methods to relate microbial biomarkers (phospholipids fatty acids [PLFA]) to groundwater geochemical measurements at the Shiprock New Mexico uranium mill tailings disposal site.

- The resulting neural network models greatly outperformed the generalized linear models.

- Sensitivity analysis indicated that tritium, which was indicative of riverine influences, and uranium were important in predicting the distributions of the PLFA classes.

- These results indicate that the microbial community at the Shiprock site is coupled to the geochemistry and knowledge of the geochemistry allows prediction of the community composition.
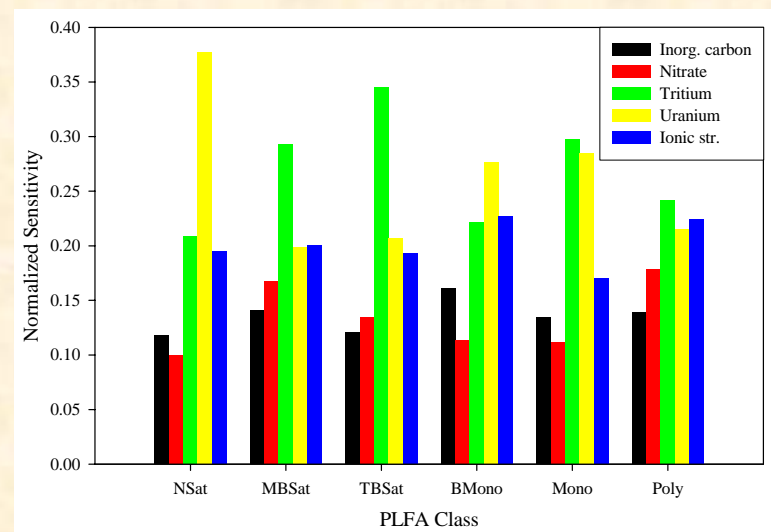
Sensitivities of geochemical variables in predicting PLFA classes with the median-performing NN model. A larger sensitivity value indicates that the PLFA abundance is more sensitive to small changes in the concentration of the corresponding geochemical variable.

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