

KAPLAN Project: Analyzing Biodiversity, Species Ranges and Gene Flow in Nodule Areas of the Seabed

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The Kaplan Project is the first and most successful attempt to analyze species composition and rates of gene flow of living organisms across the abyssal plains of the Clarion-Clipperton Zone in the Central Pacific Ocean. It is also an excellent example of how collaborative marine scientific research is being used by the International Seabed Authority to minimize the risks of mining activities to deep-sea biodiversity in this Zone.



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Abyssal sediments in the Clarion-Clipperton Zone are home to abundant nickel- and copper-rich nodules of increasing commercial interest. Sediments in the deep sea may also be major reservoirs of biodiversity, but before the Kaplan Project, there was very limited knowledge of the number of species residing within the nodule-rich areas and the typical geographic ranges of these species. This made it extremely difficult to predict the threat of nodule mining to biodiversity and, in particular, the likelihood of species extinctions within areas that would potentially be perturbed by single mining operations.

During the Kaplan Project, scientists set out to evaluate the biodiversity of three key faunal groups by determining levels of species overlap in sample areas and estimating numbers of species at 'stations' spaced out over areas across the Clarion-Clipperton Zone. The sample groups represented a broad range of ecological and life-history faunal types and, combined, they constituted a high percentage of species abundance and richness in abyssal sediments.

Samples were collected by scientists using special "DNA-friendly techniques" during three major research cruises in the nodule province of the deep sea in the Clarion-Clipperton Zone. Collected samples were then transported to laboratories in the United States, United Kingdom, Japan and France for sorting, and detailed morphological and molecular analyses.

Overall results indicated high, unanticipated and still poorly sampled levels of species diversity for all three sample faunal groups. For example, of the more than 250 morphospecies of foraminifera recognised from one of the sampling sites, only 17 were shared by the other two sites.

Based on data collection and analysis, the researchers recommended that the International Seabed Authority establish marine protected areas at multiple locations across the zone to safeguard biodiversity that could be affected by mining activities.

Next Steps

Based on the results of the Kaplan project, the International Seabed Authority is in discussion with the Global Census of Marine Life on Seamounts (CenSeam) to conduct a similar study of the genetic make-up of plant and animal life found on seamounts.

The Authority is also engaging with scientists, contractors and its Legal and Technical Commission in the development of a comprehensive proposal to establish preservation reference zones (marine protected areas) in the Clarion-Clipperton Zone. To that end, in October 2007 a group of scientists, funded with the support of Pew Foundation, developed a set of recommendations for determining the size and location of a network of representative preservation zones. The draft recommendations will be presented to members of the Authority at their 2008 annual meeting.

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