MRes Project: Assessing metal concentrations in deep-sea organisms to help establish guidelines for deep-sea mining management.

Supervisors: Dr William Reid, Dr Ben Wigham and Dr Shannon Flynn

Framework: the first semester October-December inclusive is largely taken up with taught modules, however Covid-19 contingency planning means the first three weeks of October in 2020/21 academic year will provide opportunities to begin planning the main project (MST8025). This preparation will be completed by early March (including formal proposal for summative assessment), data gathering and analysis will be in the period March-June, with July to mid-September devoted to writing up. The main outputs are a research paper, a literature review and oral presentation due by mid-September. The research paper is assessed by External and Internal Examiners who are not involved in project supervision.

Duration of Research Project: preparation during October-February, intensive work during January-September 2021.

The Project: Deep-sea mining refers to the removal of natural mineral resources in waters beyond the continental shelf at depths greater 200 m. Large, concentrated deposits of minerals are found as seafloor massive sulphide deposits, polymetallic nodules or rich-cobalt crusts which contain commercially important metals including copper, cobalt, nickel, aluminium, manganese and zinc. Extraction of these metals will result in large-scale disturbance of the seafloor through physical removal of the seabed or dispersing metal rich sediments in plumes. This has the potential to remobilise minerals from the sediment which may become bioavailable to deep-sea organisms. This project will examine the metal concentrations in a range of different deep-sea organisms from a variety of different trophic guilds that were sampled from the Mid-Atlantic Ridge. Mid-ocean ridges are areas where large concentrated accumulations of metal rich seafloor massive sulphide deposits are found and will potentially be mined in the future. At present we do not understand the normal range of metal concentrations in deep-sea organisms inhabiting mid-ocean ridge environments and how this varies spatially and temporally. This baseline information will be important to assess potential environmental impacts of deep-sea mining.

Fig. 1: Deposit feeding holothurian found in association with manganese nodules.

Eligibility: You need at least an upper 2:1 BSc degree in a relevant subject, experience of working within a laboratory environment, a good understanding of statistical analysis and an independent worker with good organisational skills.

To Apply: Admission to the MRes in Marine Ecosystems & Governance is via https://www.ncl.ac.uk/postgraduate/courses/degrees/marine-ecosystems-governance-mres/#profile with a personal statement of your career aspirations and skills you would bring to the work, CV and a proposal (including scientific rationale, objectives, methodology, outline budget, any health, safety or ethical [e.g. animal or human subject analyses] issues

and timetable). The proposal needs to be discussed with the supervisors before the application (email: william.reid@ncl.ac.uk; ben.wigham@ncl.ac.uk; shannon.flynn@ncl.ac.uk).