EXTERNAL ORGANISATION: NIWA National Institute of Water and Atmospheric Research
SUPERVISOR/S: Drew Lohrer (NIWA) and Conrad Pilditch (UoW)
PROJECT TITLE: Productive seafloor habitats
FIELD: Marine Ecology / Earth Science
PROJECT LOCATION: NIWA Hamilton

PROJECT AIM: Improved measures of seafloor primary production and contributions of seafloor habitats to coastal marine food webs

PROJECT ABSTRACT: This is one of several projects offered under the umbrella of Te Kūwaha, NIWA’s Māori Environmental Research Group in collaboration with the University of Waikato. Te Kūwaha assists Māori communities throughout Aotearoa-New Zealand by providing support through both mātauranga Māori and science-based knowledge, tools and resources to assist in the management of natural resources. This project provides an excellent opportunity for students wishing to bridge western science and mātauranga Māori research in marine and freshwater ecosystems. Primary productivity is a national marine environmental indicator and a key ecosystem process that supports cultural, recreational, and commercial activities in the marine realm. Primary production (the conversion of sunlight energy into biomass by plants) is the base of marine food webs that support upper trophic level species including shellfish and finfish kaimoana, seabirds, and marine mammals. Oxygen is produced during photosynthesis, thus analyses of oxygen dynamics in seawater enable us to accurately quantify marine primary production. We will apply a technique known as Aquatic Eddy Covariance (AEC) to evaluate rates of seabed oxygen production across a range of habitats in a standardised way. This project will provide a quantitative basis for managing and conserving the coastal seafloor biodiversity that collectively contributes to the functioning of the wider marine ecosystem and the valued goods and services derived from it. Specifically, we will: (i) Quantify seafloor primary production, a marine ecosystem function that supports biodiversity and fuels important commercial and recreational fisheries; (ii) Determine how seafloor primary production responds to sediment eroded from coastal catchments. Terrigenous sediment is arguably New Zealand’s most damaging and prevalent nearshore contaminant. (iii) Generate maps of marine seafloor productivity in the target study area so that spatial layers of a marine ecosystem function can be incorporated into existing mandated spatial conservation planning processes. We have trialled the AEC method in Whangarei and Tauranga Harbours, and are planning additional deployments in Tamaki Strait and Ōhiwa Harbour in projects that have been co-developed with iwi and hapū. The project will provide a good introduction to cutting edge science and will provide ample opportunities for the intern to gain experience with field and laboratory work as part of a professional marine ecology team.

STUDENT SKILLS:
- Must have understandings of tikanga Māori and be comfortable in Māori settings
- Must be highly motivated and hard working
- Must have initiative and enjoy working as part of a team
- Should have some level of knowledge/understanding of marine ecology/Māori perspectives/ research
- Pay attention to detail and have an ability to work to a high standard
- Be competent using Microsoft Excel and Word
- A full drivers licence would be useful but not essential

PROJECT TASKS:
- Become familiar with laboratory and field equipment and environment
- Work within a team to deploy and retrieve Aquatic Eddy Covariance instruments
- Collect and analyse data from experiments, and prepare a written summary of results
- Present findings at team meetings and coastal wānanga
- Participate in other workstreams associated with the overarching project aim, i.e., contributing to wānanga, and coastal marine field and lab work to gain experience.
EXPECTED OUTCOMES:

- Student’s Research Poster (as per clause 6 of the Scholarship regulations)
- The project will likely involve fieldwork in Tamaki Strait and Whangarei and Ohiwa Harbours
- The project will involve high-tech measurements of seafloor primary production in seagrass meadows and other seafloor habitats (sand, mud, shellfish-dominated) that are important to finfish and other kaimoana
- The project will generate a better understanding of how catchment sediment loading affects coastal primary production, with an eventual aim of truly integrated mountains-to-sea management, or ki uta ki tāi.