HO25 Assessing the population status of the Caribbean spiny lobster, *Panulirus argus*, on a unique coral reef ecosystem

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Over the last few decades, populations of the Caribbean spiny lobster have been in steady decline because of the combined effects of over-harvesting and reef flattening. Their occupation of a central node within Caribbean coral reef food webs means that *P. argus* population decreases have detrimental ecological effects at all trophic levels, and prevention of further losses should therefore be a conservation priority for the region. *P. argus* has a very complex life-history and its ecosystem interactions are highly dependent on the individual's stage of development, e.g. when their carapace is 5-15mm long they feed exclusively on algae and live alone, but as they grow they become increasingly social and their diet diversifies to include a range of macroinvertebrates. This means that having a clear understanding of the age structure of spiny lobster populations is essential for conservationists attempting to preserve ecosystem function and the health of Caribbean coral reefs.

Banco Capiro is a newly discovered reef system located off the north coast of Honduras in Tela Bay. With hard coral cover >62% and macroalgae cover <10%, it may well be the healthiest coral reef in the Caribbean today. Little is known about this remarkable reef, but because of the efforts of local conservation enthusiasts, legislation was passed in spring 2017 which led to the creation of the AMATELA marine reserve. There is a paucity of data pertaining to the state of *P. argus* populations on the reefs of Honduras, but recent diver observations have shown that they appear to be flourishing on Banco Capiro which is home to a high abundance of large, and presumably sexually mature, lobsters. Several studies have shown that protection of lobsters in marine reserves can have hugely beneficial consequences for adjacent non-protected areas of reef because of the spill-over effect. The establishment of the AMATELA marine reserve may therefore facilitate persistence and recovery of lobster populations on other more impacted reefs throughout the region, but before its efficacy can be evaluated detailed population assessments must be conducted.

P. argus distribution and abundance is determined by numerous biotic and abiotic factors, and the complex interactions that occur between them. Relative abundances of predators and prey, crevice availability and conspecific density will all alter behaviours and affect the population structure. When predation risk is high, lobsters will form large aggregations in relatively small crevices, but when predator numbers are low, populations will become more diffuse and inhabit a wider range of habitats. Students on this project will use SCUBA to gather size-structure data for *P. argus* populations on Banco Capiro. Standardised belt transects will be used to assess lobster abundances, and the carapace length of all encountered individuals will be recorded. Students can choose to augment these basic population monitoring data in numerous ways using a variety *in-situ* and/or *ex-situ* survey techniques. Quantification of predator and prey abundances, coupled with estimations of reef complexity, possibly using new 3D modelling technologies developed by Operation Wallacea scientists, may help to elucidate the patterns of *P. argus* distribution observed throughout the summer.

Alternatively, students may choose to conduct controlled behavioural experiments in the newly built wet-lab at Tela Marine Research Centre. Lobsters caught live on the reef can be brought back to the lab for use in habitat preference experiments. Students can investigate how crevice size, shape and even material affect lobster habitat selection, and these studies can be enhanced by enriching the experimental environment with various biotic components, such as *P. argus* predators or prey items, to assess how they affect habitat preferences.

This is a brand-new project for 2018 meaning that students have the exciting opportunity to work with their supervisor to shape the future direction of this important research project; to misuse a well-known idiom, the world really is your lobster!!

Reading List

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