

## **Seamounts as oases in an oceanic desert?**

I write this in the Department of Fisheries and Oceanography, University of the Azores in the town of Horta on the island of Faial on the mid-Atlantic ridge. My purpose here is to help run a workshop on the ecology, fisheries and conservation of seamounts. Taking place between 16<sup>th</sup> and 22<sup>nd</sup> May 2005, the workshop is being attended by 33 scientists from the Azores (Portugal), France, Germany, the UK, Ireland, the USA, Canada, Australia and New Zealand.

The Azores is not easy to reach for the delegates from Australia, New Zealand or Hawaii, but is an ideal place to consider the ecology of seamounts. Several of these amazing structures exist in the vicinity of the Azores and are the sites of important fisheries that support communities on the islands.

The workshop has as its goal the production of a book, which will be published by Blackwell Publishers in the *Fish and Aquatic Resources Series*. The book will contain a series of 19 chapters each authored by a group of specialists who have been informed by the intensive group discussions that have taken place during the last four days. The book will be edited by Tony Pitcher (Fisheries Centre, University of British Columbia, Vancouver, Canada and FSBI member, Figure 1), myself from the Department of Biology, University of Leicester UK, Malcolm Clark (NIWA, New Zealand), and Telmo Morato and Ricardo Santos, both of the University of the Azores here in Horta.

The workshop has seen the presentation of a large amount of data on seamounts. These are essentially the marine ocean equivalent of mountains although the conditions for life get tougher as the mountain is descended rather than ascended, as is true for terrestrial mountains. Exactly what defines a seamount is not always agreed in that the geological structures that form seamounts can vary in height from 50 metres above the abyssal plain to over 3000m. From the point of view of a fish, the critical thing is how close to the surface the top of the seamount comes. We decided that there are three categories of seamount that can be identified from an ecological point of view; those where the tip projects into the photic zone, those that reach the depth of the deep scattering layer, which is normally made up of mesopelagic fishes and zooplankton, and seamounts where the peak is more than 1000m below the surface.

The fauna associated with seamounts can broadly be divided into those that live all the time on or around the structure and those that visit for a specific purpose such as finding food or to reproduce. There is evidence that unexploited fish biomass at seamounts is higher than expected, some of it supported by zooplankton that gets swept over the peak of the mount and then trapped there either by the physical presence of the top, or by a swirling current formed as water flows by the seamount and forms a cap of entrapped water that can retain organisms for up to 17 or so days. Discussions during the workshop emphasised that this cap, often called a Taylor cap, is not a permanent feature of all

seamounts and its existence depends on the depth at which the peak is located and the oceanographic conditions around it.

Seamounts are also important stopping off points for a range of large oceanic animals including whales, turtles, seabirds and of course fish. The Azores is now somewhere to visit if you want to watch whales (see later), but up until 1987 the locals caught the whales for their oil and meat. The workshop took place in the old whale-processing factory, which has now been converted into a centre for marine biodiversity and is illustrated in Figure 2. Seamounts also attract large fish such as sailfish, barracuda and tuna, which are sought after by both sport and commercial fishers.

Off New Zealand and Australia, seamount fish have been exploited for some years so that fisheries scientists in the antipodes have considerable experience of the effects fishing has had on seamount communities. Many seamounts have large cold-water coral assemblages, which form a densely structured sub-habitat on the peaks and around the edges of the mounts. These are very vulnerable to trawling where the heavy gear smashes the coral and destroys the communities dependent on it. There is an urgent need to understand better the damage caused and to devise management measures to conserve these important habitats.

The most evident result that emerged from the workshop was that the ecology of seamounts is unique and poorly known. Paul Wessel of the University of Hawaii, estimates that there could be up to 100,000 seamounts scattered through the world's oceans. Only a handful of these have been sampled effectively such as the Cobb Seamount off the west coast of North America and the Great Meteor Seamount at 30°N 28.5°W in the eastern north Atlantic. Evidence from fisheries shows that considerable diversity exists with some species, such as the orange roughy (*Hoplostethus atlanticus*), forming the basis of important commercial fisheries. What is clear though is that many of the fish species of commercial value have slow production rates and cannot withstand heavy exploitation.

Some workshop participants were fortunate to spend Saturday visiting the island of Pico, just a short twenty-minute ferry trip from Faial. We visited a museum in Lajes do Pico devoted to whaling, which was still carried out from small open boats until the 1980's. In the same place fishermen were observed bringing an assortment of fish caught a short way off-shore, including the parrot fish shown in Figure 3. It was also a delight to visit the museum created by Dr Malcolm Clarke (Figure 4) to explain the biology of sperm whales and squid to the general public. Malcolm worked for many years with the Marine Biological Association of the UK and now lives part of each year on the south coast of Pico in a delightful site overlooking the Atlantic. Later the group travelled in boats along the south coast of Pico to observe sperm whales and dolphins. A truly remarkable sight.

Horta, Portugal, 21<sup>st</sup> May 2005.



Figure 1. Former Beverton Medal winner and FSBI member Tony Pitcher speaking to the world.



Figure 2. The old whale processing factory at Horta where the workshop on seamount ecology and fisheries was held.



Figure 3. Parrotfishes (*Sparisoma cretense*) caught by local fishers from Lajes do Pico, on the island of Pico, part of the Azores, Portugal.



Figure 4. Dr Malcolm Clarke, squid and whale biologist in his museum devoted to the two animal groups he has Spent his life studying.