NZ IPY-CAML Voyage 2008

13 - 16 MAR Heading Home — John Mitchell

Midday Friday, and all the sampling on Admiralty Seamount was completed. Our survey time has run out and we're heading home. It's a 1550 nautical mile steam from the Admiralty Seamount to Wellington, which will take just under 6 days if the weather is kind to us. If not, it could be much longer.

Fig. 1. NZ IPY-CAML Voyage participants (Photo: Peter Marriott).

A summary of what we've achieved:

- 39 sampling sites from the shelf, slope, abyss or seamounts
- total of 312 gear deployments using one of our 12 different gear types
- 88 fish, 8 squid and 18 octopus species recovered and identified
- 51 different invertebrate groups sampled consisting of nearly 4000 species lots
- 30 000 specimens retained for further analysis
- 55 hours video and 12,500 still images of the seabed taken
- In excess of 2000 litres of water filtered
- 7140 nautical miles travelled by the time we return to Wellington

Fig. 2. NIWA's research ship *Tangaroa* working in heavy pack ice (Photo: Peter Marriott).

SCIENCE REPORT

Seamount fish Stu Hanchet (NIWA)

The diversity of 'demersal' fish (fish that live on or just above the seafloor) sampled on the seamounts over the past week has been low, even when taking account of sampling difficulties. Sampling these fish has proved difficult because of the very rugged terrain and widespread areas of sensitive benthic communities, so only two bottom trawls were possible. Specimens from the trawls were supplemented by those collected from the seamount sleds, and DTIS images (Fig. 3).

Only six species have been recorded among the samples so far. These include the grey notothen (*Lepidonotothen kempi*) (Fig. 4), several specimens of Whitson's grenadier, De Witt's icefish, violet cod, Johnston's cod, a large Antarctic toothfish weighing 57 kg, and a single eelpout. The grey notothen – the most common of the species – has been surprisingly abundant at some sites, showing up frequently in both seamount sled hauls and DTIS transects. In general, we've been getting good corroboration in fish species between the DTIS and the sled.

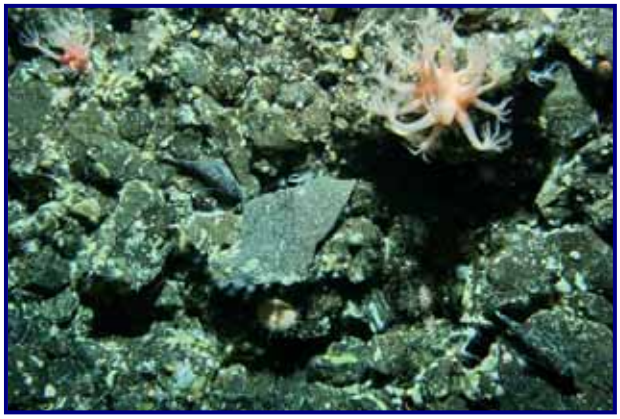

Fig. 3. Spot the fish! The well-camouflaged grey notothen (*Lepidonotothen kempi*) was very abundant at this site – with three individuals just visible (to the trained eye) in this DTIS image. (Photo: DTIS)

Fig. 4. The grey notothen (*Lepidonotothen kempi*) is the most common demersal fish species on the seamounts. (Photo: Peter Marriott)

When is an eel not an eel?
Andrew Stewart (Museum of New Zealand, Te Papa Tongarewa) & Stu Hanchet (NIWA)

At first glance, eelpouts (family Zoarcidae) look like eels (Fig. 5). They have the same elongate slender bodies, no spines in the fins and a sinuous swimming style. But they don't have the eel's larval stage ('leptocephalus') and their skeletal structure is quite different. In fact, they're more closely related to blue cod.

Most eelpouts are benthic (bottom dwellers) although a few small species live in the water column. They are generalist in what they eat – taking polychaetes (bristle worms), molluscs and krill. During the current voyage, we've caught eelpouts at a big range of depths – from shallow waters to the abyssal plains. Individuals have occasionally been seen on DTIS transects, often nestled in amongst the available cover, such as large sponges or rocks. They're easy to distinguish from other fish species on DTIS because they're usually seen curled up resting on the seabed (Fig. 6).

The Southern Ocean is home to 26 species of eelpouts, of which nine have been recorded from the Ross Sea region. On this voyage, we've caught fifteen specimens, some of which appear to be range extensions into the Ross Sea, and at least one does not appear to match any published descriptions, so may be an undescribed species. However, taxonomic identification of the family is difficult, so it will require further work before the actual number of species caught is known.

Fig. 5. The most common eelpout taken during the survey, *Lycodichthys dearborni* (Photo: Peter Marriott)

Fig. 6. An unidentified eelpout nestled amongst the benthos on the Ross Sea shelf (Photo: DTIS).

Famine and feast on seamounts David Bowden (NIWA)

We've now sampled four seamount features on a transect north from the Ross Sea shelf and have seen intriguing differences in benthic fauna. The over-riding impression of the most southerly feature, South Scott seamount, was one of coarse rubble substrata and sparse fauna dominated by small ophiuroids (brittle stars) and little else (Fig. 7). Moving north to 'Scott B' and 'Scott A' seamounts the picture was little different, with occasional black corals (antipatherians) at deeper stations (Fig. 8) and isolated patches of more diverse assemblages seen in shallower depths. Our first DTIS deployments at Scott Island seamount, however, revealed a remarkable abundance of benthic life.

Fig. 7. Benthic community at South Scott seamount, 400 m (Photo DTIS, Dave Bowden).

Fig. 8. Black coral at 1000 m on Scott A seamount (Photo DTIS, Dave Bowden).

On the shallowest peaks, volcanic sand and gravel substrata were covered by dense populations of brittle stars, sea pens, sea stars, and urchins (Fig. 9). Most of these taxa we

have seen before but never in such numbers. Particularly striking was the large predatory sea star belonging to the genus *Labediaster* (Fig. 10). This has previously only occurred as isolated individuals, but here more than 100 were recorded in a single video transect, which covers and area of approximately 1000 square metres.

An even more remarkable observation during a deeper DTIS deployment on this seamount was the presence of large numbers of Antarctic krill (*Euphausia superba*) close to the seabed at a depth of 500 m. Krill are thought to be found only in the surface waters and have only once before been reported close to the seabed at depth (A. Clarke, BAS, personal communication). The combination of high abundance of benthic fauna and zooplankton in the water column also suggests there's something very different going on around Scott Island compared with the other seamounts in this chain.

Fig. 9. Abundant sea pens and ophiuroids at 150 m on Scott Island seamount (Photo: DTIS, Dave Bowden).

Fig. 10. *Labediaster* sp. sea star at 150 m on Scott Island seamount (Photo: DTIS, Dave Bowden).

The abundant sea pens are likely to be feeding on small zooplankton in the water column such as copepods and other small crustaceans. Brittle stars can feed either on suspended particles in the water column or on organic detritus on the seabed. The unidentified *Labediaster* sea star, like other sea stars, preys on other benthic organisms, but by lifting some of its many arms into the water it is also an effective predator of zooplankton and small fish. So it's likely that the high biomass of benthic fauna is likely to be supported by correspondingly high input of planktonic food.

One possible explanation for the increased abundance of benthic fauna on the shallower seamounts is that they intercept migrating zooplankton as they drift horizontally during their daily vertical migrations between the lightless depths and the surface waters. For benthic predators which feed on zooplankton this would create a bonanza of food.

There are likely to be many other factors involved. One of the great benefits of the multi-disciplinary IPY programme we are running, with simultaneous water column and benthic measurements, is that we should be able to get a much clearer picture of what is actually happening here. Stable isotope diet analyses will be especially useful in this respect, to tell us who is eating whom in the seamount ecosystem.