This hard red coral with featherstars is usually found outside the fiords at depths in excess of 150m, but the peat-stained waters encourage the beautiful coral to grow just 15m below the surface. Photo: Warren Farrelly

A sea cucumber Stichopus mollis. *Little is known about this animal, but as an efficient cleaner it is believed it plays an important role in the delicate ecology of the fiords. Last year the Ministry of Agriculture and Fisheries gave permission for 73 tonnes of the cucumbers to be harvested for export to the Asian market where they are regarded as a delicacy.* Photo: Lance Shaw

Below: *Captain Helmut Just and the vessel* Mata Whao Rua, *which recently targeted sea cucumbers in the fiords. Fortunately the cooked cucumbers proved too tough for the intended customers, but once the processing process has been refined the operation could be restarted. The same boat has recently experimentally fished for the giant southern spider crab in subantarctic waters.* Photo: Southland Times

across the fiord it soaks up the sunlight.

As light cannot penetrate very deep, many species usually found at much greater depths live within the first 40m. Below 40m, light levels drop quickly and life thins out.

Dr Grange proposed that if the top 40m band contained the majority of life on the fiord rock walls, then a habitat area for the fiords could be calculated. Since the coastline of the fiords covers 948 kilometres and the gradient of these walls averages 45 degrees (it is often between 60 and 80 degrees), then, using simple maths, the habitat of the area is about 46 square kilometres. This is smaller than Wellington Harbour (87 km^2) or Manukau Harbour (145 km^2).

Many rare, unknown and protected species - about which little is known - live in this small area.

The largest black coral population in the world occurs in Fiordland (7.5 million colonies) and is accessible to scuba divers studying these fascinating organisms.

Red corals, gorgonian fans, brachiopods, feather stars and sea pens can also be seen in this 40m band.

Species-rich area

The area supports more than 60 fish species and contains representatives from warm water, cold water and deep water habitats.

However, apart from their existence and basic biology, little is known about these creatures, their ecological relationship with other animals and their role in the marine environment.

Some species have been studied elsewhere but, because the fiord environment is unique, comparisons with populations of different areas is very difficult.

One species which has been extensively studied is black coral (*Antipathes fiordensis*). Dr Grange, who has studied the animal over many years, found that limited water exchange with the open coast and weak currents caused low levels of food supply and growth rates. An average growth rate of 2.5cm a year suggests some black coral trees could be older than 200 years.

It is not unreasonable to assume that limited food supply will similarly affect other organisms of the fiord rock wall community.

Considering the habitat size, it is easy to see that fiords are extremely vulnerable to fishing pressure and why in Easter last year only two blue cod were caught in Doubtful Sound.

While the effects of single species extraction are obvious, there are also indirect effects on the environment caused by the removal of one species from the food chain and the complex web of species interactions.

Fishermen working the open coast of Fiordland are noticing changes which may have been caused by the crayfishing boom of the 1970s. Some scientists believe the depletion of crayfish stocks caused a massive increase in kina, which are predated by crayfish.

The large numbers of kina have munched their way through long-established seaweed beds, destroying the habitat for small fishes. Small fishes feed big fishes, so the effect of the extraction of one species may have had a dramatic effect on the whole coastal ecosystem.

The latest commercial venture in the fiords - the extraction of sea cucumbers - has begun in the absence of knowledge about the animals' lifestyle and role in the ecosystem. Fortunately last summer's operation ceased a quarter of the way through its permit to extract 73 tonnes of sea cucumbers.