New Zealand is leading the charge to fish unspoilt Antarctic waters. But a group of scientists is taking a stand to protect the Ross Sea.
By **Ange Davidson**. Photos by **John Weller**.

Last chance for an ocean

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The Ross Sea is the last ocean for Antarctic ecologist Dr David Ainley and his colleagues. It's Earth's only intact open-ocean ecosystem and the last natural laboratory to study fundamental ocean processes.

And commercial fishing threatens its near-pristine waters.

For the past 14 years, an international fleet has broken through the Ross Sea ice to fish Antarctic toothfish, a key predator in the ecosystem. New Zealand commercial interests, with the Government's blessing, led the charge into these pristine waters in 1996. Since then, the floodgates have opened, with up to 20 ships from a dozen nations taking up to 3500 tonnes of Antarctic toothfish every year.

Scientists have been alarmed to see 40-year-old fish being caught. "If fishing continues in the Ross Sea, the last chance to understand the complexity of a healthy ocean ecosystem will disappear forever," Ainley says.

The Antarctic toothfish fishery follows the near collapse of the Patagonian toothfish, its warmer-water relative. The Patagonian toothfish's oily, moist flesh features on the menus of fashionable, pricey eateries overseas. Renamed Chilean Sea Bass for greater market appeal, it is the most expensive white fish on the market and at NZ$50 a kilogram not a fish you will find on New Zealand dinner plates.

Raising awareness of the Ross Sea's dynamic ecosystem and the threat from fishing is The Last Ocean Charitable Trust's mission. With several projects under way, including a documentary, a book, touring photographic exhibition and building a political campaign, it aims to have the Ross Sea safeguarded as a marine reserve. It would be administered by the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR), which is part of the Antarctic Treaty System.

Driving the project with Ainley is Christchurch documentary maker Peter Young and Colorado photographer/writer John Weller. Trust chairman is New Zealand ecologist Dr Peter Wilson who, like Ainley, has spent more than 20 seasons working in the Ross Sea.

Young and Weller have filmed and photographed in the Ross Sea for the Last Ocean campaign. "The documentary [The Last Ocean] quickly moved from wildlife and nature to business and politics as I tried to understand why fishing was allowed in this most pristine place," Young says.

"I've spoken to politicians, fishermen, campaigners and, of course, I've been to the place where it all began, the Ross Sea. It's been a fascinating ride and the fact that it is our country that created the fishery in the first place makes this an issue of special interest for New Zealanders," he says.

When the Antarctic Treaty was drawn up, the waters around Antarctica were left out, becoming the high seas and part of the global commons. About 20 years after the treaty was signed, CCAMLR was drawn up and charged with protecting the Southern Ocean. It allows for rational use of marine resources, and this clause allows commercial fishing in the Ross Sea.

Ainley wryly notes that the larger fish being caught were probably born before most of the fishermen since these giant cold-water fish take as long as humans to mature and can reach up to 2.5 metres long and weigh 140kg.

"CCAMLR says in its charter that fishing cannot alter marine ecosystems beyond their ability to recover in 20 to 30 years," Ainley says. "The current CCAMLR managers

1 A Weddell seal heads towards a crack in Ross Sea ice.

2 The Ross Sea is home to 26% of the world's emperor penguins.

haven't read their charter as their stated goal is to reduce the Ross Sea toothfish spawning biomass to 50 per cent of pre-fished levels.

"How can a fish that doesn't mature until 16 years old, with the very oldest individuals contributing disproportionately to production, possibly recover its role in an ecosystem, once depleted, in two to three decades? In the ocean, size means everything in ecosystem function, and this fishery is taking all the large fish."

Young, who has travelled to every continent as a freelance cameraman, describes the Ross Sea as one of the world's greatest natural treasures. "The Ross Sea stands out, not only for its stunning landscapes and abundant wildlife but for the sum of both those parts: the ecosystem. Nowhere else on Earth can you find a marine ecosystem of this size with a natural order that has evolved without major human impact … these places need protecting not exploiting."

In the Ross Sea, the top predators put pressure down through the food web rather than relying on the amount of production at its bottom. This creates a food web shaped more like a column rather than the pyramids characteristic of marine ecosystems elsewhere.

All ocean ecosystems were once shaped like the Ross Sea's – before they were over-exploited, Ainley says. "When large predatory fish, like the Antarctic toothfish, have been removed, all kinds of things change on all levels of the ecosystem. An example is along the east coast of North America, where the removal of sharks led to the disappearance of scallops. While sharks don't eat scallops, they do eat fish that eat scallops. With the shark numbers in severe decline, the fish that predate on scallops have proliferated and the scallops are now gone."

The largest concentration of Antarctic toothfish live at the northern edge of the Ross Sea, along the dropping slope of the continental shelf where upwelling creates a very productive habitat. Since the fishery began, it is estimated that well over a million fish have been taken.

Scientists working at the southern edge of the species range at McMurdo Sound believe this is why it is almost impossible to catch toothfish for their research. In the previous 30 years, scientists easily caught, tagged and released 200-500 fish a season. For the past few years they haven't caught any.

In 2005 more than 50 Ross Sea scientists from seven nations including New Zealand set up Friends of the Ross Sea Ecosystem (FORSE). Last year FORSE, with the Antarctic and Southern Ocean Coalition (ASOC), worked on a proposal for the entire Ross Sea to become a marine reserve. It was presented to the Antarctic Treaty Powers in April and to CCAMLR in September last year.

At the other end of the spectrum, the New Zealand and UK fishing industries have applied to have the Antarctic toothfish fishery certified as sustainable by the industry body, the Marine Stewardship Council. ASOC, supported by FORSE, has objected.

The New Zealand fleet is also hoping to persuade CCAMLR to move towards a full quota system, with New Zealand having a lion share of the quota because it pioneered the fishery and because of its historical association with the Ross Dependency. Already New Zealand takes 55 per cent of the catch.

"As the last intact ocean ecosystem on Earth, the value of the Ross Sea ecosystem to humanity is huge," Wilson says. "This wonderful natural asset has taken all preceding history to evolve yet we treat it like a larder, and it's not like we are feeding thousands; we are destroying this incredible asset to feed a wealthy few."

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Hotspot in a cold climate

Ross Sea is a biodiversity hotspot. It accounts for a mere 3.2 per cent of the Southern Ocean, yet is the ocean's most productive stretch of water.

Of the world's populations, in the Ross Sea are found:

- **38 per cent of Adélie penguins**
- **26 per cent of emperor penguins**
- **6 per cent of Antarctic minke whales**
- **50 per cent of Ross Sea killer whales**

There are impressive numbers of snow and Antarctic petrels, South Polar skua, Weddell and crabeater seals, the rare Arnoux's beaked whale, leopard and Ross seals.

The Antarctic toothfish – the most voracious piscine predator of the Southern Ocean – holds the ecological niche of sharks in warmer waters.

The toothfish and its favourite meal, the Antarctic silverfish, are both primitive members of the Nototheniidae family and are neutrally buoyant. This allows them to feed at all depths. The toothfish has a heartbeat once every six seconds and produces anti-freeze called glycoprotein that allows it to survive in Antarctica's ice-laden waters.

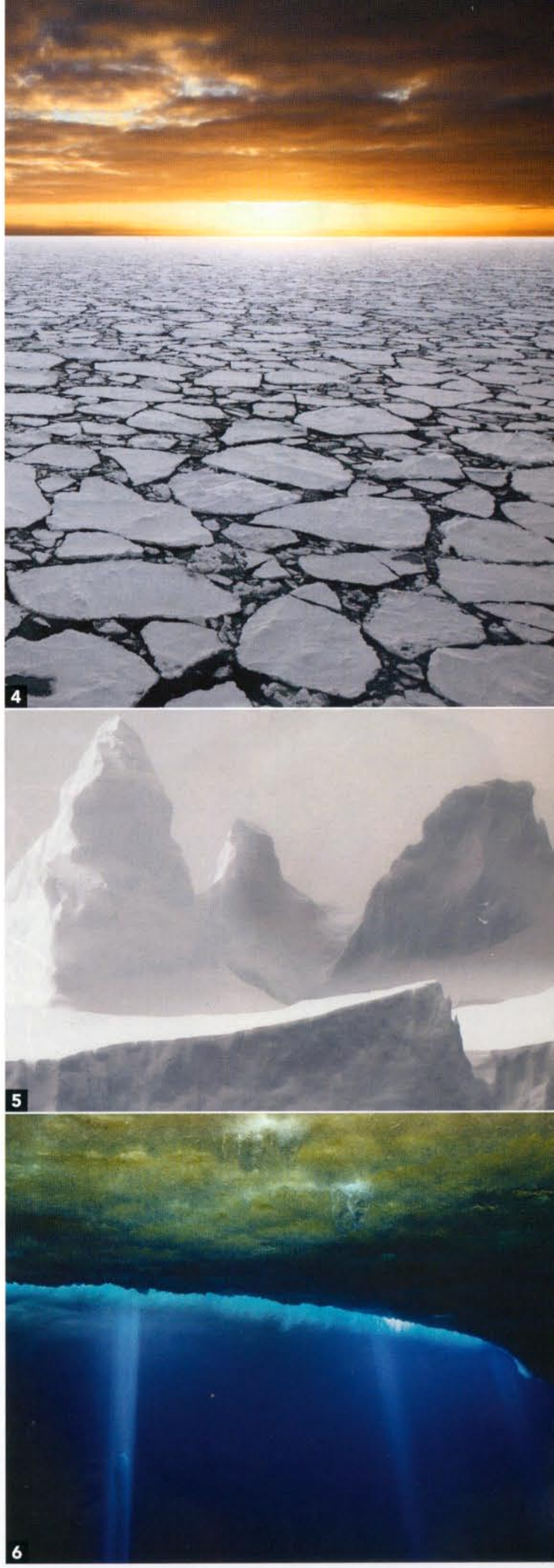
Almost all other Antarctic fish are benthic, or bottom dwelling, and feed on zooplankton and molluscs.

The Ross Sea is also rich with invertebrates. More than 400 Antarctic invertebrate species were first described from Ross Sea specimens, and at least 40 are endemic to its waters. F&B

How you can help

Write to the Minister of Fisheries and Minister of Conservation and ask them to stop the Antarctic toothfish fishery and to press for the Ross Sea to be protected as a marine reserve.

Visit **www.lastocean.co.nz** and join FORSE.



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3 An Adelie penguin leaps from the bracing waters of the Ross Sea.

4 Sunset over the Ross Sea ice pack.

5 Snow petrels fly alongside an iceberg.

6 A light shaft through the ice spotlights a Weddell seal.