

Marine fisheries and illegal fishing in Antarctica



Fisheries for fin fish and krill began to increase in the late 1960s and 1970s

By 1982, the krill catch rose to a peak of 520,201 tons

Concerns developed among scientists and Treaty countries that fish and krill stocks would be depleted beyond recovery unless some steps were taken to manage them

These concerns were the impetus for creating CCAMLR in 1980

<https://www.ccamlr.org/en/organisation/camlr-convention-text>

CCAMLR Article II

- 1. The objective of this Convention is the conservation of Antarctic marine living resources.**

- 2. For the purposes of this Convention, the term "conservation" includes rational use.**

- 3. Any harvesting and associated activities in the area to which this Convention applies shall be conducted in accordance with the provisions of this Convention and with the following principles of conservation:**
 - (a) prevention of decrease in the size of any harvested population to levels below those which ensure its stable recruitment. For this purpose its size should not be allowed to fall below a level close to that which ensures the greatest net annual increment;**

The charge for CCAMLR was partly just applying standard fisheries management techniques to Antarctica, but also to manage at an ecosystem level

Managing and monitoring entire ecosystems at that scale was new and CCAMLR had to develop their own novel methods for this

Established the CCAMLR Ecosystem Monitoring Program (CEMP) and used top predators (penguins, seals) as indicator species for the status of krill and fish stocks:

Patagonian toothfish - *Dissostichus eleginoides*

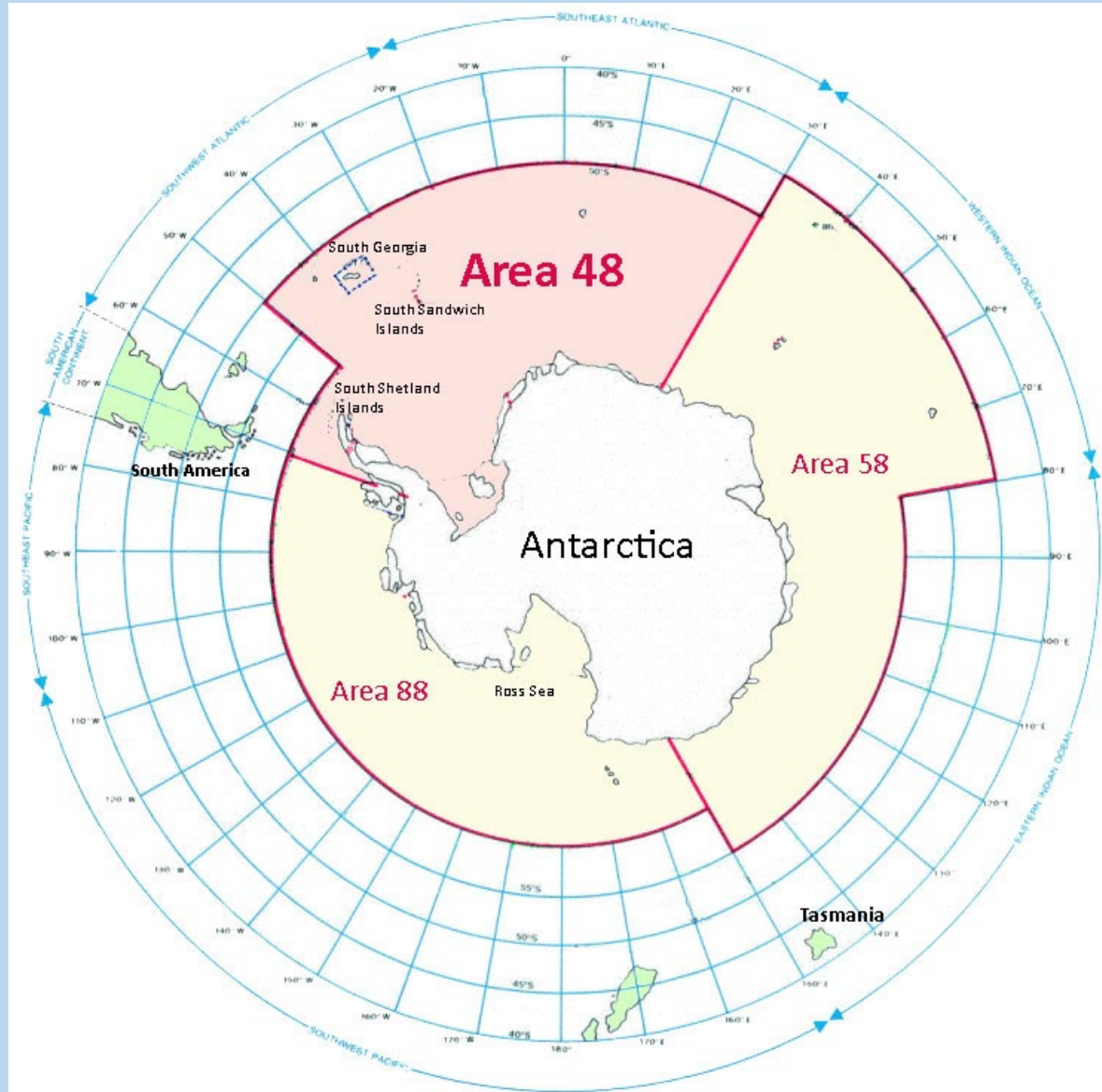
Antarctic toothfish - *Dissostichus mawsoni*-

also known as the Chilean Sea Bass

Mackerel icefish - *Champsocephalus gunnari*

Antarctic krill - *Euphausia superba*

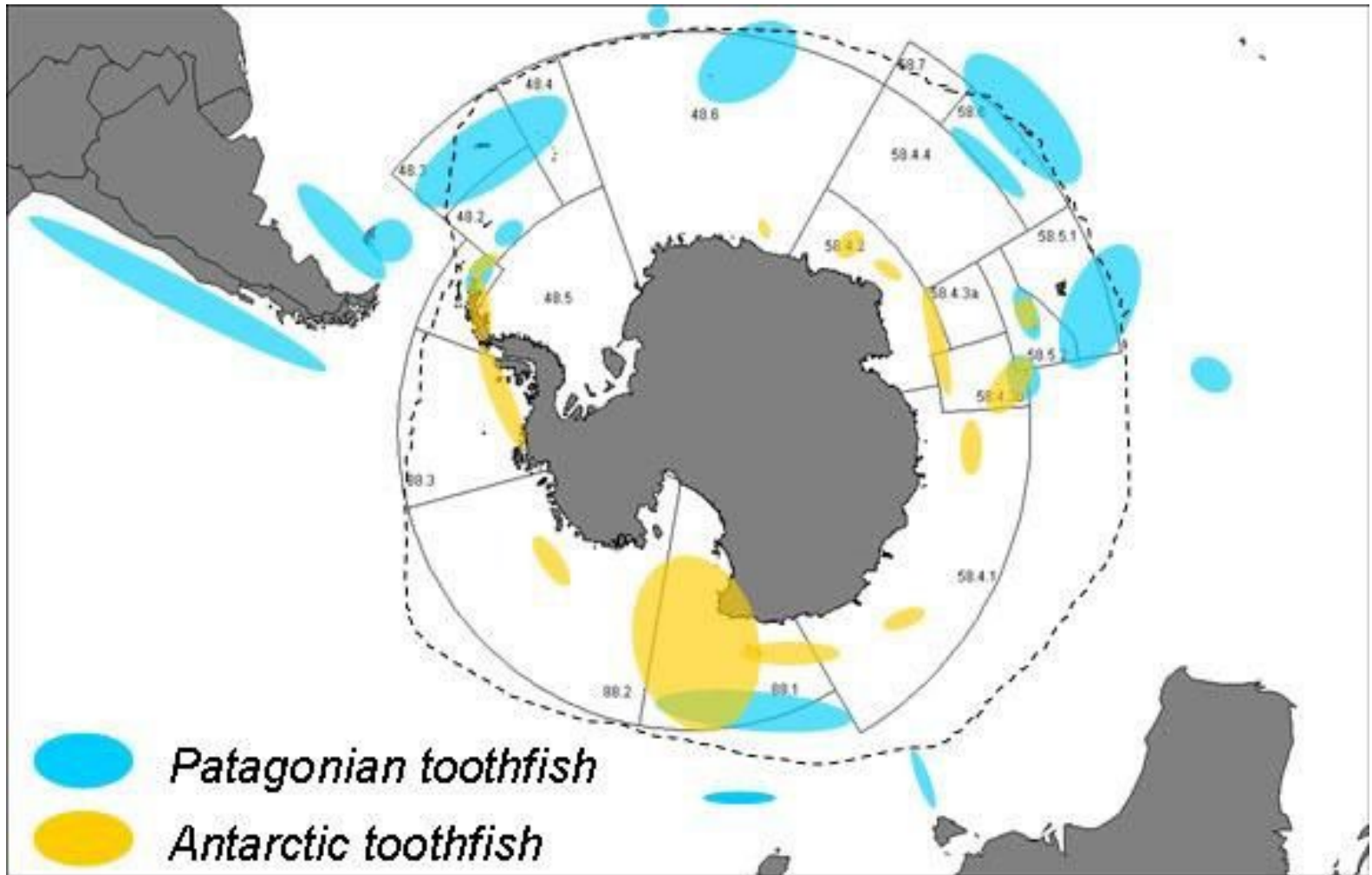
To monitor fisheries, CCAMLR established numbered sectors in the Southern Ocean: 48, 58, and 88



Map showing Area 48 and the CCAMLR areas

Based on CCAMLR map: Boundaries of the Statistical Reporting Areas in the Southern Ocean

Distribution of toothfish in the Southern Ocean CCAMLR monitors 13 legal fisheries in these sectors



The toothfish fishery actually began off the coast of Chile in the 1970s so a market had already been established

Fishable populations were discovered near several subantarctic islands in the mid 1980s and the fishery spread rapidly to all sectors of the Southern Ocean by the 1990s.



Toothfish is the most valuable fishery in Antarctica

Market prices can exceed \$30 per kilogram and one fish can grow to over 2 m in length and 100 kg in weight



In the Ross Sea, toothfish are important prey for Weddell Seals



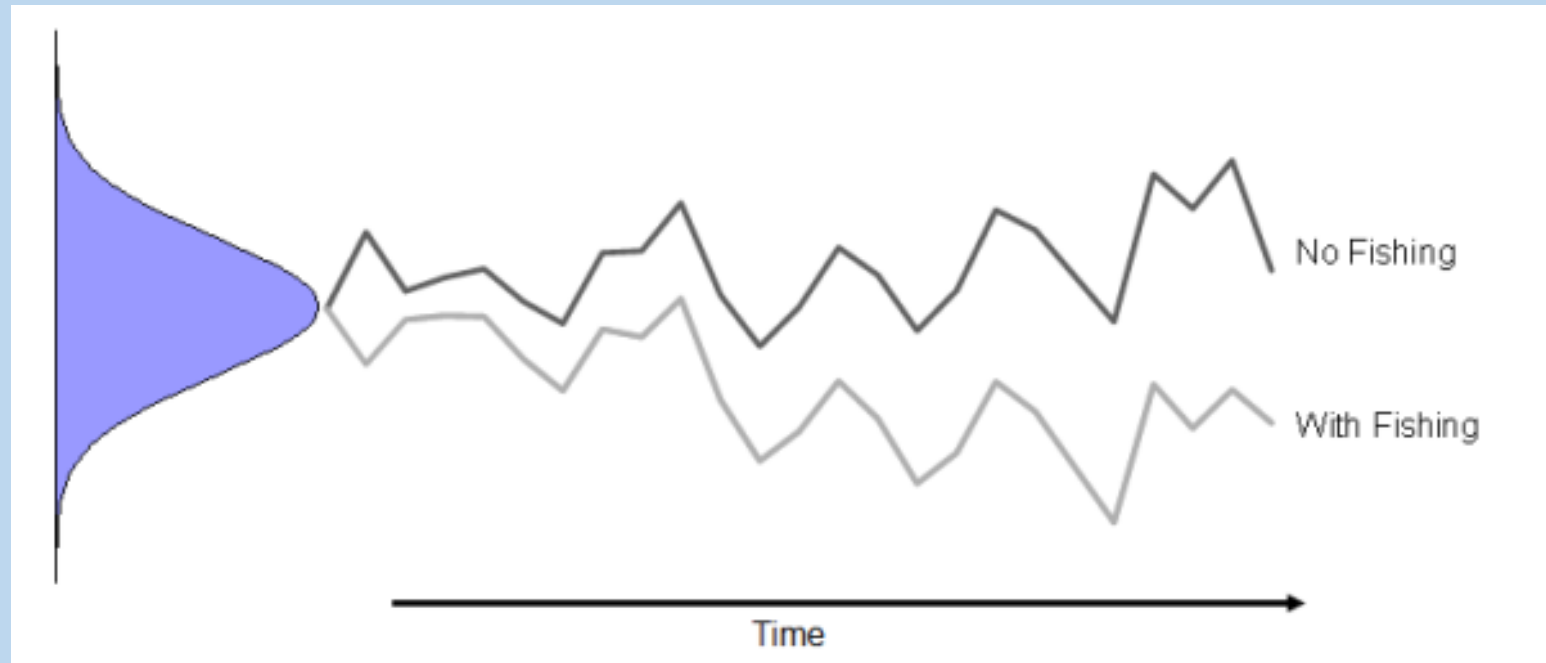
Ainley and Siniff 2009

Also by the late 1990s, illegal fishing became more pronounced and steps were taken to reduce their impact

In one year, the illegal take was estimated to equal the legal limit

CCAMLR began setting stock quotas, total allowable catch (TAC), based on estimated losses from illegal as well as legal fisheries

CCAMLR uses standard fishery population models to project population sizes into the future, thus setting TACs that allows 'conservation' and 'rational use' as set forth in the convention

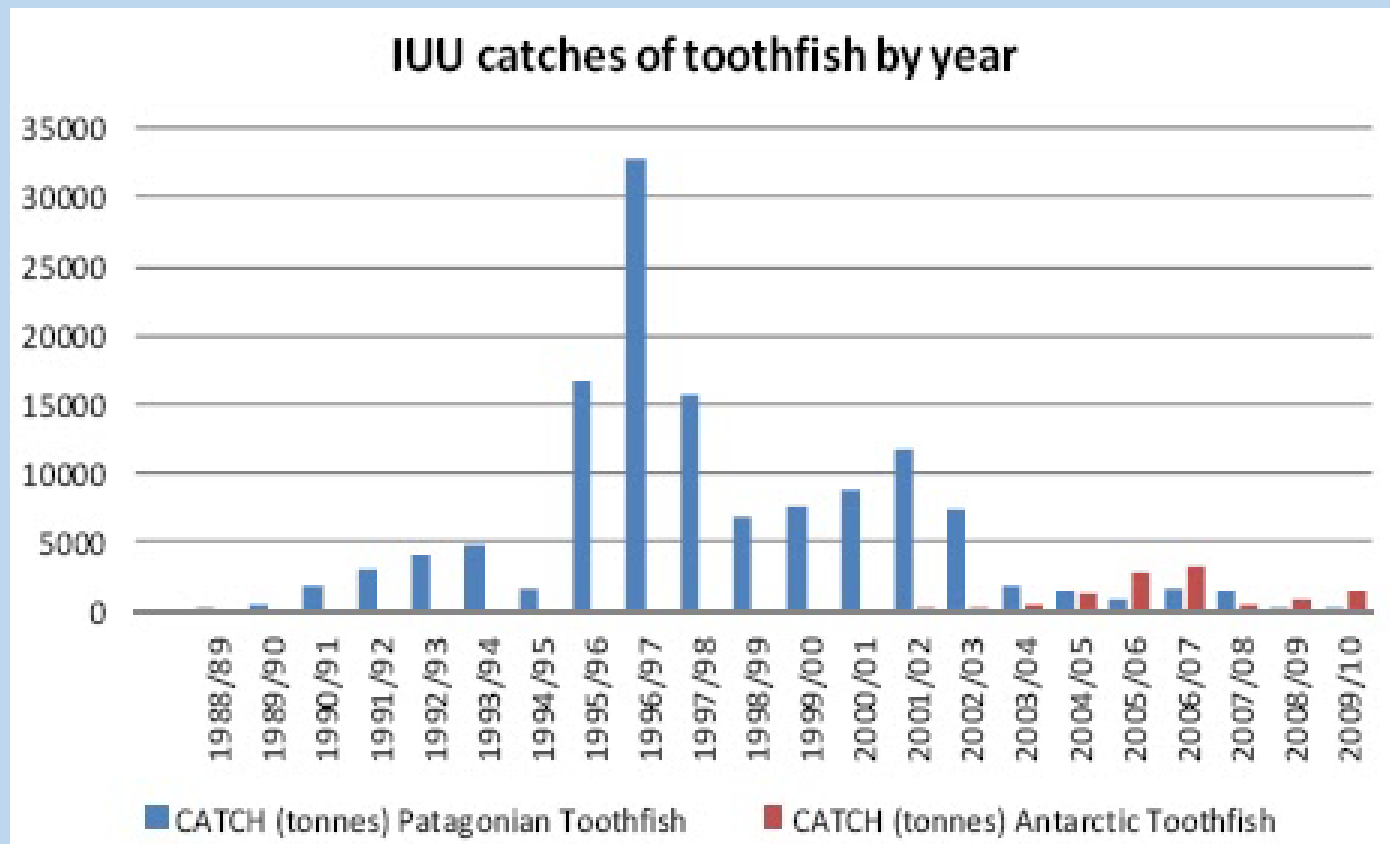


Illegal, unregulated, and unreported catches of toothfish

To address this problem, CCAMLR adopted a Catch Documentation Scheme (CDS) for toothfish species in 2000

<https://www.ccamlr.org/en/compliance/conformit%C3%A9>

All catches must be reported, tracked from point of landing through the trade cycle to verify legal status of the fish



Numerous conservation organizations, member nations also joined in and enforcement against illegal fishing vessels (seizures, fines, etc.) began to make a difference

By 2010, most illegal activities have stopped, though the more southern Antarctic toothfish is now being fished in the Ross Sea (aka, The Last Ocean) since the late 1990s



[New Zealand Actions](#)

[Interpol Purple Notice](#)

A strong effort by scientists and conservation organizations to have the Ross Sea recognized as an MPA failed until 2016

Introduction to film *The Last Ocean*, an effort to show the public the importance in protecting the Ross Sea



The new MPA, approved in October 2016, has been described as a 'pyrrhic' victory with no substantial protections in place:

[Audubon magazine article](#)

Australian responses to illegal fishing vessels:

<http://envlaw.com.au/the-volga-cases/>

<https://www.maritime-executive.com/article/australian-border-force-burns-illegal-fishing-vessels>

Currently only ~5% of the Southern Ocean is protected by MPAs

In 2011, CCAMLR agreed to establish nine MPAs in Antarctica

As of 2023, only two have been implemented (South Orkneys and Ross Sea).

Three others have been proposed:

East Antarctica: proposed by Australia, failed to reach consensus to approve this year, eighth time in a row

Weddell Sea: proposed by Germany

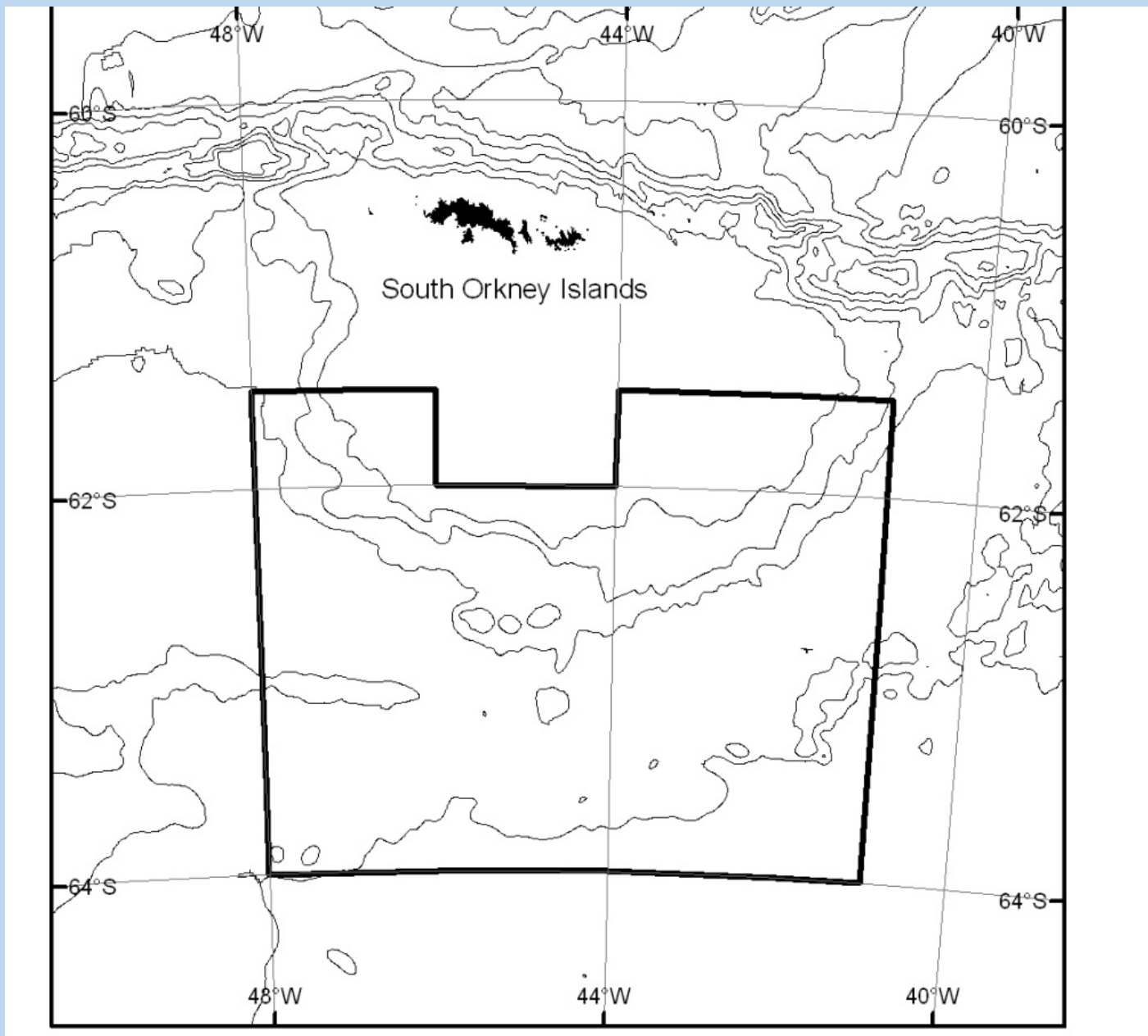
<https://www.asoc.org/campaign/weddell-sea-mpa/>

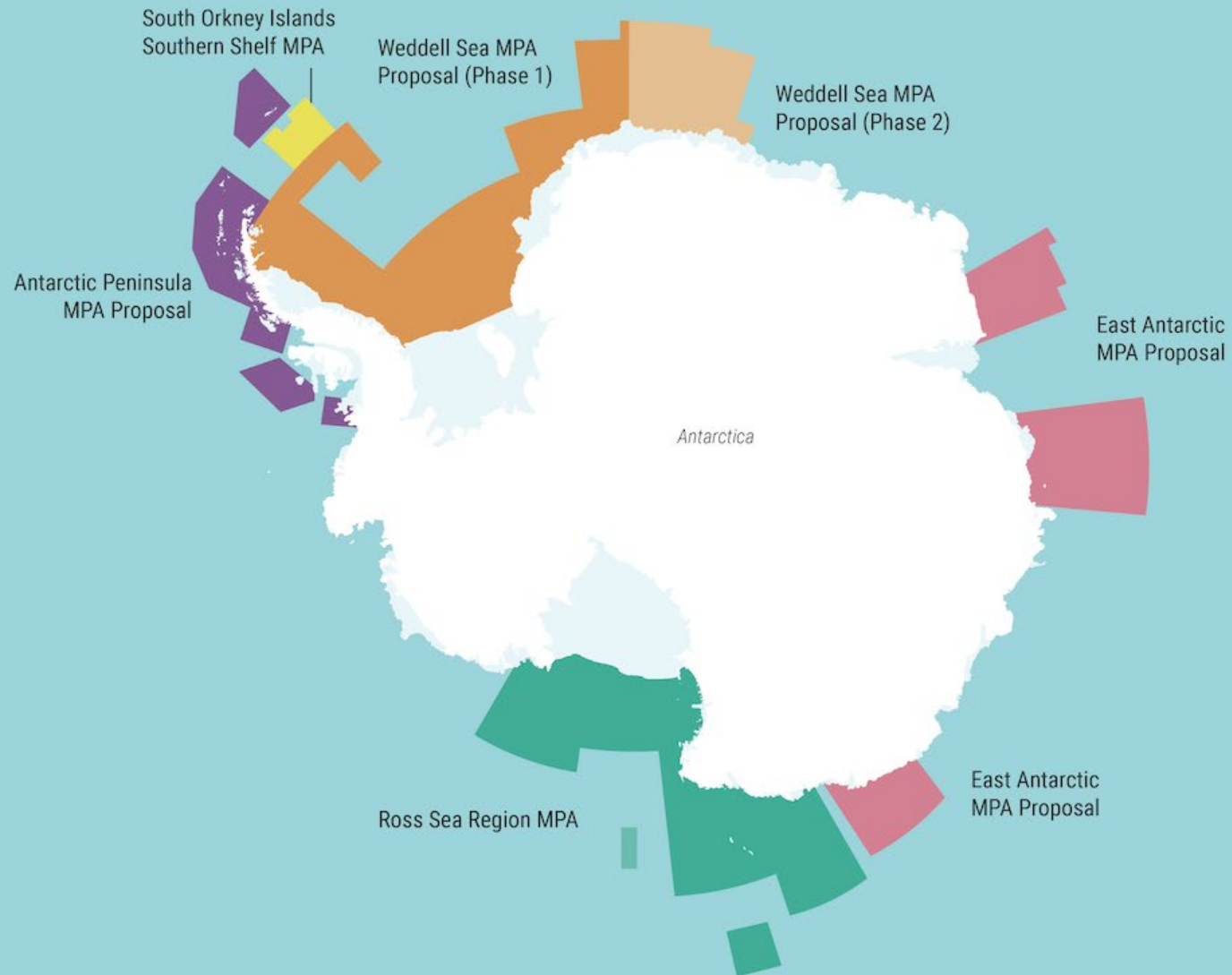
Antarctic Peninsula: proposed by Argentina

<https://www.asoc.org/campaign/antarctic-peninsula-mpa/>

Most member countries (25 plus the EU) support these MPAs, but China and Russia continue to block them, including at the latest CCAMLR meeting in October 2023

South Orkneys MPA proposed by the U.K. and approved by CCAMLR in 2009





The Krill Fishery in Antarctica

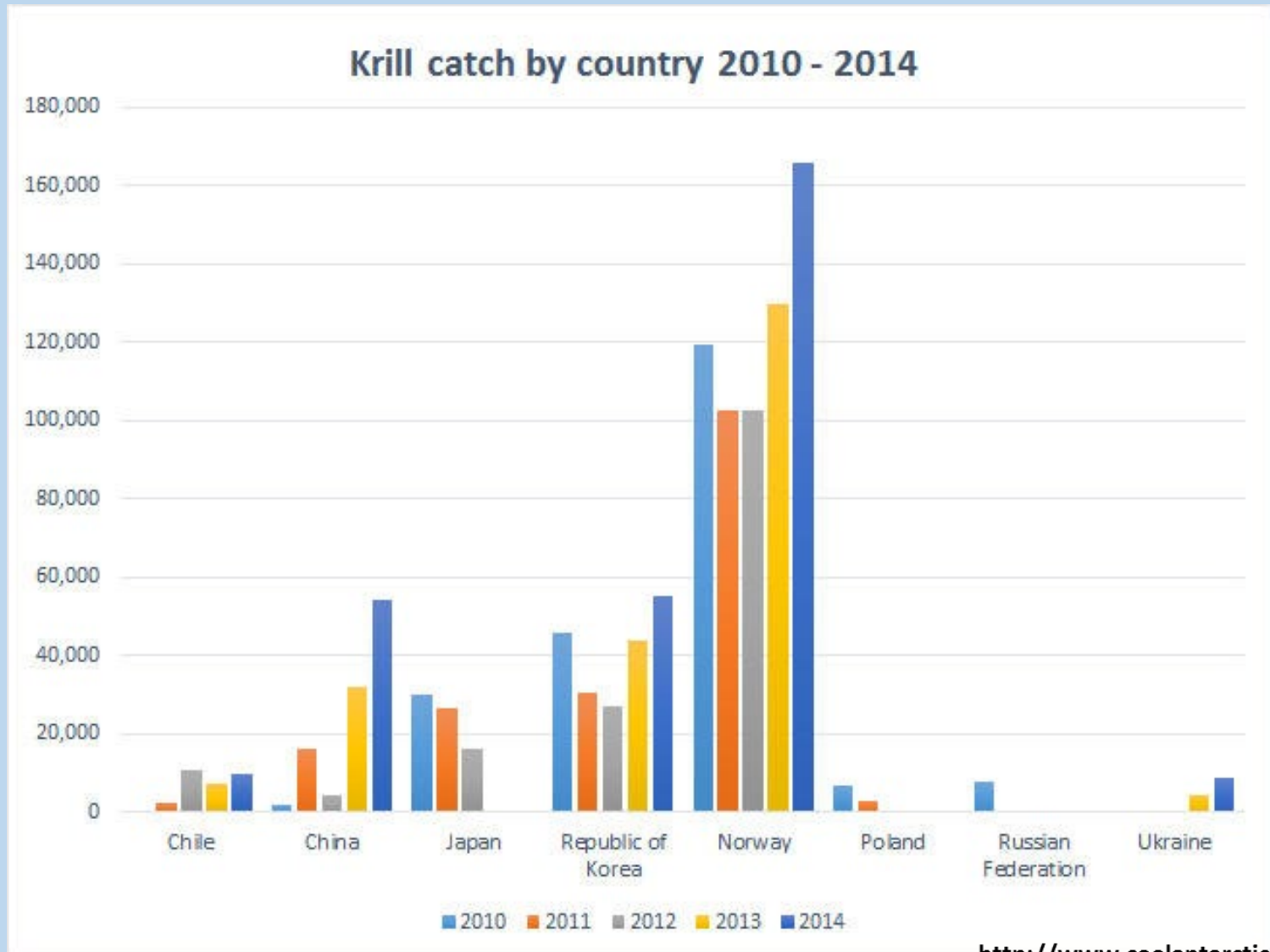
As with toothfish, CCAMLR oversees quotas for krill fisheries as well

Krill used for fish food, bait, oils and coloring, and a small percentage for human consumption

[2022 magazine article](#)

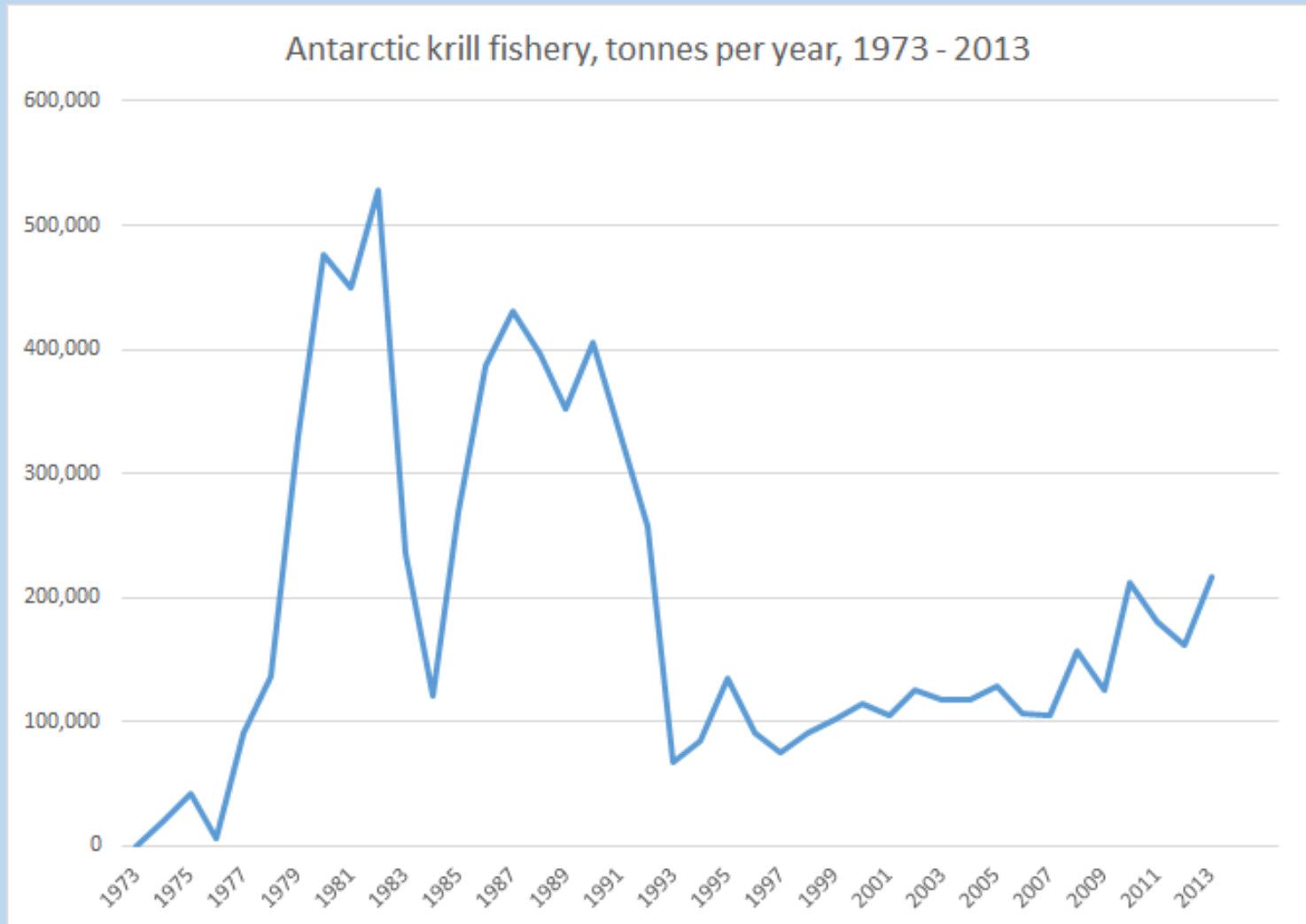


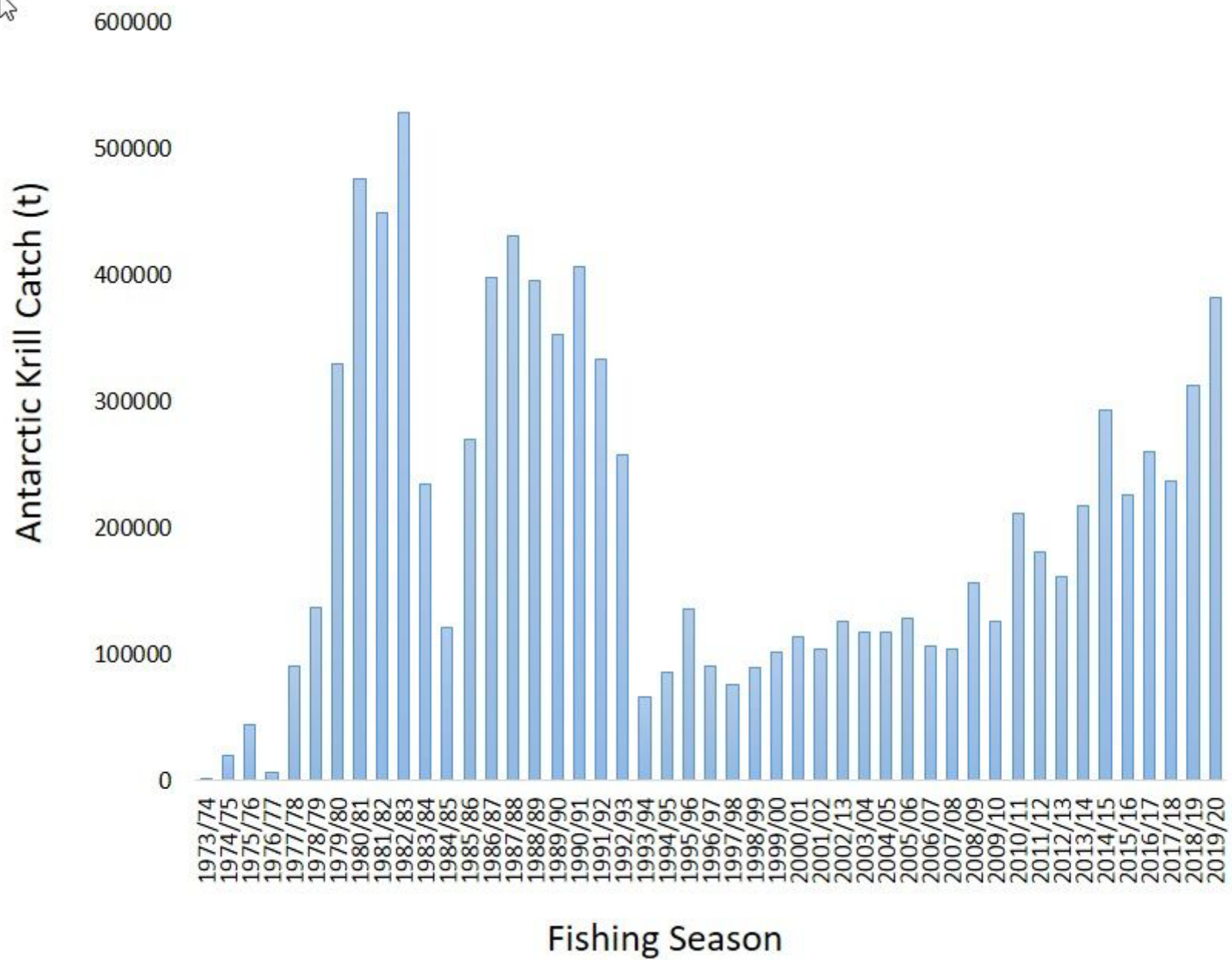
The krill fishery in Antarctica began with the Soviet Union in the 1960s, followed by Poland, Chile, and South Korea. Now Norway has the largest fishery, but China and Russia have been increasing their takes



The current CCAMLR quota for total catch is set at 620,000 metric tons per yr

Thus, the krill fishery is cited as one of the most underexploited stocks

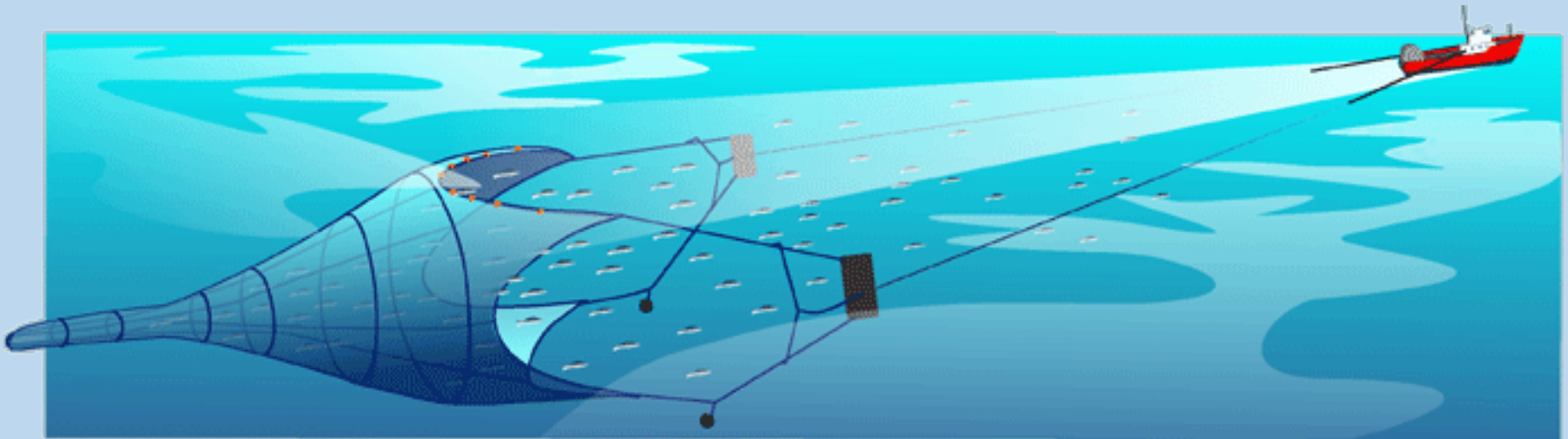




(Data source: www.ccamlr.org)

The fishery has been underexploited mainly due to difficulties in using krill as a product, and the cost of fishing in the Southern Ocean

However, fishing technology is improving and krill uses are increasing and the fishery is expected to continue growing in the future



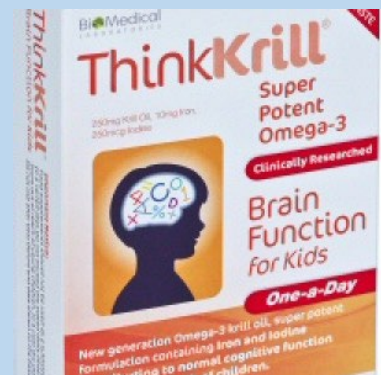
<http://www.gma.org/>

New method of continuous pumping

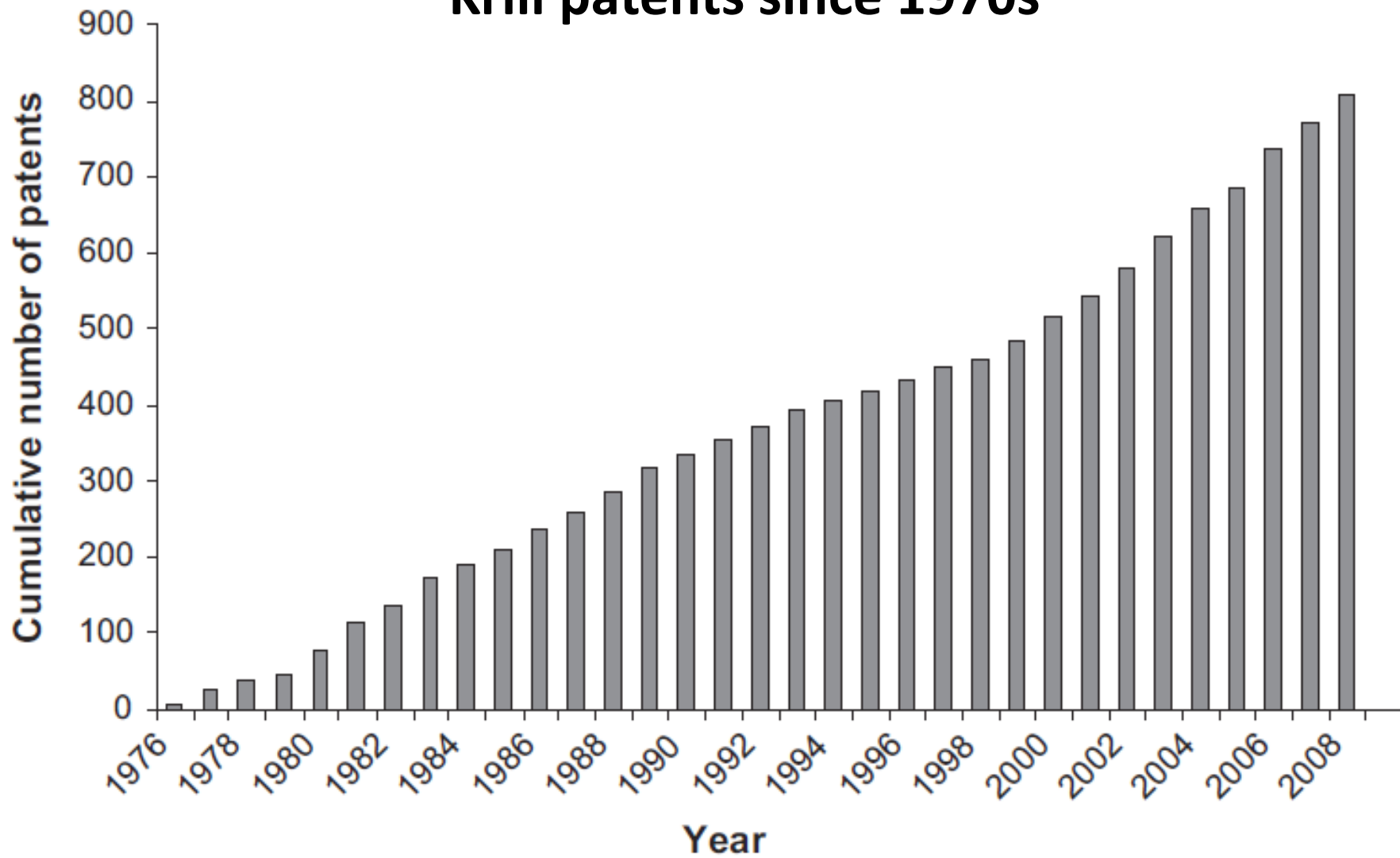
Krill products and patents for new products have been increasing every year, mainly for medical uses

Krill oil with high fatty acids can treat various medical conditions such as heart and liver disease

As fish stocks and fish oil products decline, krill is becoming a more sought after product by the fisheries



Krill patents since 1970s

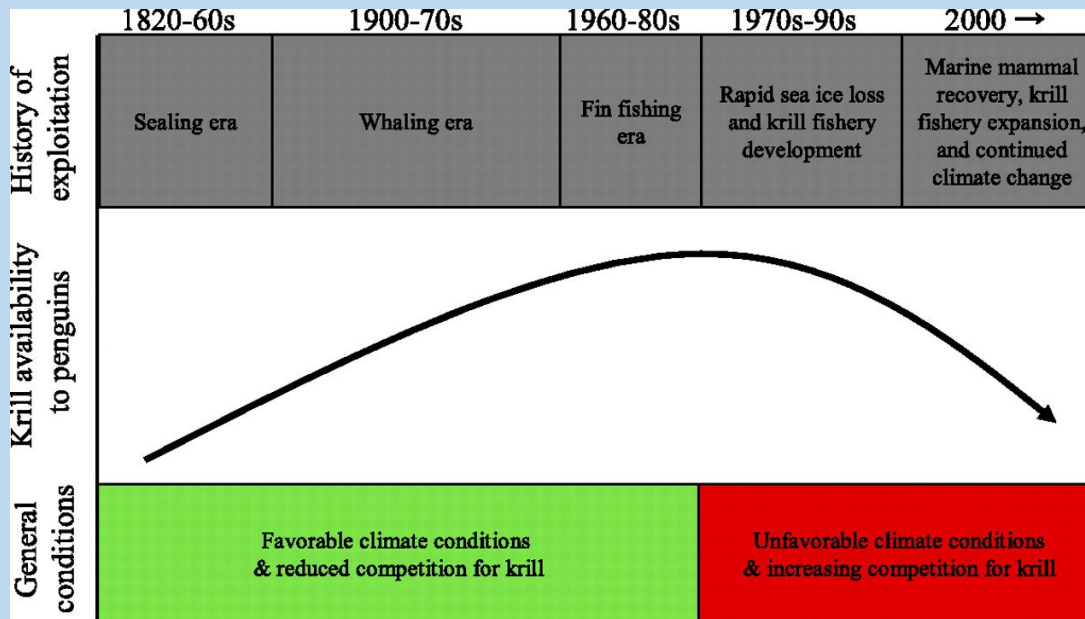


Since 2003, CCAMLR has required a notification process for any new fishing vessels in convention waters

Helps CCAMLR keep track of total catch

Use acoustic surveys to divide convention areas into zones where catch limits vary by zone

The SW Atlantic receives the most fishing and declines in sea ice and warming temperatures in the Antarctic Peninsula allows the vessels to extend their fishing season into winter



From Trivelpiece et al. 2011

Quiz

1. What have been the trends in krill fisheries in the Southern Ocean since the 1980s and what role does CCAMLR have in this?
2. How did CCAMLR respond to illegal, unregulated and unreported fisheries (IUU)?
3. What is the Catch Documentation Scheme (CDS) and has it been successful in reducing IUU?
4. Why is the Ross Sea considered to be the 'last ocean' and how is the recently approved MPA protecting it?
5. What new technologies are now being employed in the krill fishery and what factors are behind the large increase in patents associated with krill?

IDEA Survey

Log into: <https://uncw.campuslabs.com/eval-home/>

Please provide comments on need for textbook in class?

Also, usefulness of in class 'quizzes'--helpful or not?