

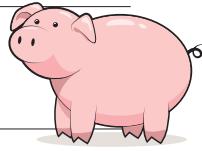
NEWS IN FOCUS

AUTISM A Nobel laureate champions unorthodox theories **p.743**

ETHICS How big a sin is copying from your own work? **p.745**

PHYSICS The slippery question of whether supersolid helium exists **p.748**

MODERN MEAT From livestock to lab cultures **p.752**



P. NICKLEN/NATL GEOGRAPHIC/GETTY

Nikumaroro Island, part of the Republic of Kiribati, is surrounded by waters rich in tropical tuna species.

FISHERIES

Islands champion tuna ban

Pacific nations to restrict fishing across a vast swathe of international waters.

BY CHRISTOPHER PALA

A bold move by eight Pacific island nations to preserve the world's last large stocks of tuna is expected to face strong resistance this week at a meeting of the Western and Central Pacific Fisheries Commission (WCPFC) near Honolulu, Hawaii.

By leveraging agreements with foreign fishermen in their own territorial waters, the islands have banned fleets that fish with purse-seine nets — mechanized nets that can capture entire schools of tuna in a single haul — from operating in a region of international waters roughly the size of India. The area, known as the Eastern High Seas (see map, overleaf), will still be fished by hook-and-line, which is considered biologically more sustainable. The islands will also cut the time that purse-seiners can spend fishing in their territorial waters by

nearly a third. The restrictions, agreed to by the eight nations in April, are scheduled to take effect on 1 January 2011.

Marine biologists say the development is a major step forward for efforts to halt the global decline of bigeye, yellowfin, skipjack and other tropical tuna species. In October this year, Britain turned the entire Exclusive Economic Zone around the Chagos Islands, in the centre of the Indian Ocean, into a no-take zone, making it the first area rich in tuna that has been closed to fishing. At 3.2 million square kilometres, the Eastern High Seas is six times larger.

“These are the most far-reaching ocean-conservation measures ever,” says Daniel Pauly, a leading fisheries scientist at the University of British Columbia in Vancouver. “For the first time since

man has been fishing out the open oceans, we’re going to see a reversal of the decline of pelagic species in two big areas.”

At the meeting this week, the world’s major fishing nations, including the United States, are expected to challenge the measures. By treaty, the United States is technically exempt from the restrictions, but two years ago it chose to side with the island nations in the closing of two smaller pockets of international waters to foreign fleets.

This time, conference sources predict a less sympathetic attitude. “We’re not totally settled in our positions,” says Charles Karnella of the National Oceanic and Atmospheric Administration, who heads the US delegation. “We’re renegotiating our treaty and how the closure is dealt with will be part of our talks.”

Ships from the United States operate under the South Pacific Tuna Treaty, in which the ▶

➔ **NATURE.COM**
For more on fisheries and the challenges they face, see:
go.nature.com/mckets

TUNA FACTS

Bigeye at risk

Second only to the dwindling bluefin in economic importance and vulnerability, the bigeye tuna (*Thunnus obesus*) is the deep diver of the tuna family. It typically spends most of its day foraging for fish and squid at depths of several hundred metres. At night, it rises closer to the surface, following its prey. Adults can reach 2.5 metres long and weigh up to 180 kilograms.

Prized for the texture, taste and colour of

its meat, the bigeye is replacing bluefin as the most expensive tuna for sushi.

Adults are caught by hook-and-line vessels in numbers that researchers say are sustainable. But teenage bigeyes like to swim with schools of the same-sized, adult skipjack when these assemble in huge schools around fish-aggregating devices used by the purse-seine fleet. All end up in cans.

Although juvenile bigeyes are not preferred



by canneries, purse-seiners use the devices to increase their take of skipjack.

Environmentalists and Pacific islanders have called for the devices to be banned to spare the bigeyes.

► US government pays most of their licence fees and provides US\$18 million in foreign aid to 14 island nations. In exchange, the US fishing fleet, now set at 40 ships, has unlimited access to the region.

Should the United States decide not to abide by the new closures, US purse-seiners could find themselves fishing there virtually alone, contributing to the depletion of bigeye tuna at a time when fisheries scientists are calling for a 30% reduction in bigeye catch to avoid the collapse of stocks, which have fallen from 1.2 million tonnes to 500,000 tonnes since 1952 (see 'Bigeye at risk').

MARINE HAVENS

Sari Tolvanen, a Greenpeace International oceans campaigner attending the meeting, points out that the closure area is bordered on both sides by no-take areas created when former US president George W. Bush named the islands of Wake, Johnston, Jarvis, Howland, Baker and Palmyra Atoll as a Marine National Monument in January 2009.

"It would be shameful if the Obama administration did not follow the Bush administration's example and opted out of the conservation measures taken by the Pacific island nations," she says.

The decision to end purse-seining in the Eastern High Seas was taken by the Parties to the Nauru Agreement (PNA), eight Pacific island nations in whose waters 80% of the region's tuna is fished. They comprise the Federated States of Micronesia, Kiribati, the Marshall Islands, Nauru, Palau, Papua New Guinea, the Solomon Islands and Tuvalu.

Although no nation can legally restrict fishing in the high seas, the PNA countries have jointly amended the standard contracts they sign with foreign fleets with a stipulation that the fleets refrain from fishing in some international waters, in order to remain eligible for licences within waters directly controlled by the islands.

The regulations are made enforceable by the use of radio transponders, which reveal the positions of the licensed ships at all times. The first such measures, which began in 2008, closed smaller pockets of international waters that were being used as refuges for vessels fishing illegally. The extension of the ban to the Eastern High Seas is seen as potentially far more important because this region is large enough to have an impact on species preservation.

Officials from the PNA say that once they have succeeded in ending purse-seining in the Eastern High Seas, they will ban longliners

— a different type of fishing vessel that catches about the same tonnage as a purse-seiner — from the area, effectively turning it into the world's largest marine reserve.

An important factor that will determine the effectiveness of the ban is the extent to which fish stay within the protected area. John Hampton, head of the fisheries programme at the Secretariat of the Pacific Community (SPC), co-authored a study conducted farther to the west. This found that half the skipjack tuna there spend their entire lives within a radius of 675–750 kilometres (J. Sibert & J. Hampton *Mar. Pol.* 27, 87–95; 2003). A new SPC study under way in the Central Pacific focuses on bigeye tuna, with 15,000 tuna tagged so far, he says. It will provide information on tuna movement and

"These are the most far-reaching ocean-conservation measures ever."

mixing with adjacent areas, rates of mortality and other important population parameters.

"With good tagging data, we'll have a better understanding of the way the tuna move, and that will help us predict

the effects of the closures on the population levels," he says.

Pauly predicts that because the individual tuna that do not travel long distances will survive in greater numbers, their offspring will have a genetic advantage over those that do range more widely, enhancing the conservation value of the refuges. "It's going to make the islands and the seamounts much more important, more attractive to these fishes," Pauly says.

Because this is the first time that anyone has tried to end fishing in a large body of international waters, it could establish a precedent, observers say. Until now, the world's seas have been fair game to the international industrial fishing fleets, with the commissions that theoretically have the power to restrict them strongly influenced by the fleets themselves.

"The closures would raise legal issues if they weren't justified as conservation measures," says Satya Nandan, chairman of the WCPFC. "Our stocks are relatively healthy and we want to keep them that way." ■

NEW REFUGES FOR TUNA

The eight nations of the Parties to the Nauru Agreement aim to ban the most damaging form of tuna fishing across a large section of adjacent international waters.

