

BOOKS & ARTS

Time to can the tuna fisheries?

A tale of the endangered Atlantic bluefin tuna reveals how overfishing and unreported catches threaten to wipe out this majestic predator. But it stops short of offering original solutions, explains **Geoff Arnold**.

Tuna: A Love Story

by Richard Ellis

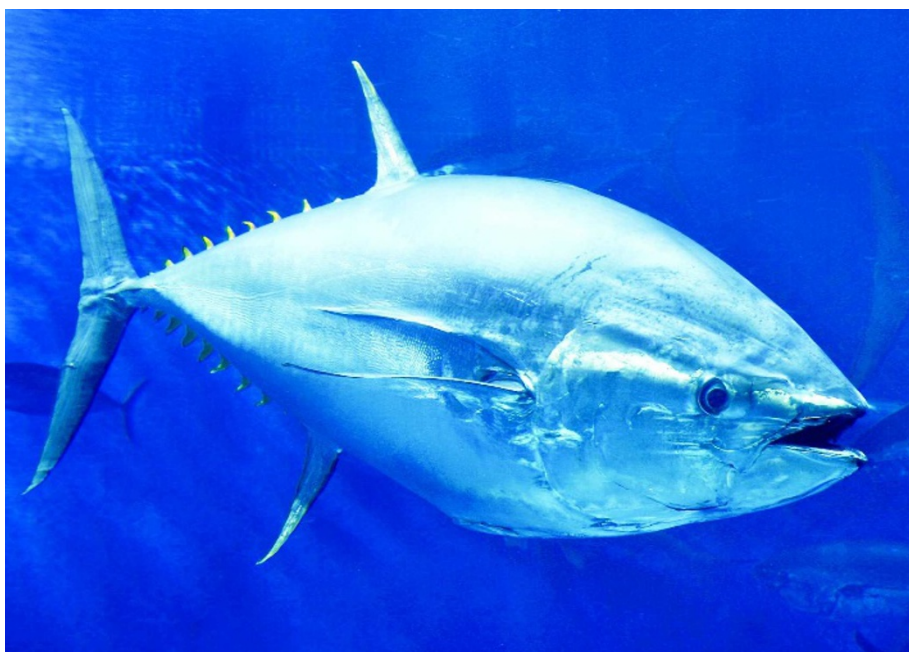
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Stocks of bluefin tuna are at risk of commercial and biological collapse worldwide, particularly in the Mediterranean Sea. Scientists are laying the foundations for better long-term management of tuna stocks by including electronic tag data, genetics and microchemistry in their assessment models. Despite their efforts, effective management action could come too late to save this majestic fish.

In his book *Tuna*, Richard Ellis makes an impassioned plea to rescue the bluefin before it is fished to extinction. *Tuna* lacks the discipline of Mark Kurlansky's *Cod* (Jonathan Cape, 1998) but Ellis conveys well the enthusiasm people have for these superbly evolved top predators that are a source of great wealth as well as prized sushi and sashimi.

Much can be learned about fish behaviour from electronic tagging. When I was involved in tracking individual plaice and cod using sonar in the North Sea in the 1970s, the process was arduous and slow. Acoustic tags could transmit for several days, but following them with a small research vessel meant bad weather often stopped the work first. To overcome these constraints we developed small data loggers, which recorded fish depth and sea temperature every few minutes without the need for tracking. Fishermen returned recaptured tags for a small reward and the data allowed us to deduce the vertical and horizontal movements of groups of fish over many months. Some 30 years on, new sensors under trial will soon allow feeding and spawning to be studied in free-ranging fish at sea, rapidly filling important gaps in biological knowledge.

Evolving tag technology has made a major contribution to tuna biology. Thirty years ago, Frank Carey built large acoustic tags at the Woods Hole Oceanographic Institution in Massachusetts, and later used them to demonstrate that tuna, swordfish and some sharks can regulate the temperature of some parts of their bodies. Recent electronic tagging programmes have revealed transoceanic migrations of bluefin tuna in the Atlantic, Pacific and Southern Oceans, and shown the widespread dispersion and overlap of Atlantic bluefin populations that



R. WILDER/MONTEREY BAY AQUARIUM

Calls are being made for a global ban on bluefin tuna fishing before it is too late.

segregate to discrete spawning grounds in the Mediterranean and Gulf of Mexico.

Much of this story can be gleaned from Ellis's book, which deals mainly with bluefin tuna but includes yellowfin, skipjack, albacore and bigeye tuna. The chapter about sport fishing, describing millionaires such as popular author Zane Grey who pursued giant bluefin with a rod and line from small boats, is exciting and enjoyable. Other chapters dealing with biology, systematics, commercial fisheries, marketing and ranching are less well focused. Material is distributed haphazardly with much repetition, some sections of text are repeated verbatim and the use of references is erratic. Catch statistics and quotas pop up everywhere and at least six chapters discuss assessment and management of tuna stocks without synthesis. Although the footnotes are models of clarity, the main text is occasionally pretentious, and the lack of a glossary makes it difficult to resolve apparent contradictions in the use of some technical terms. Happily, the book is well illustrated and Ellis's line drawings are excellent.

Tuna will leave readers appalled that Atlantic and Southern bluefin stocks are so close to collapse and that deliberate underreporting of catches by key fishing nations has been a major factor in the tuna's decline. However,

the book does not advance any original solutions and the logic of its concluding chapters is muddled. Ellis uses biblical sources to justify conservation and dismisses fisheries management in favour of farming, even though it has been impossible to get bluefin to spawn in captivity until very recently. It would have been more constructive had Ellis weighed the relative merits of both approaches, reiterated the continuing need for strong conservation of wild populations and summarized what can be done.

In March this year, chastened by criticism of its failure to manage the bluefin tuna fishery in the Mediterranean and eastern Atlantic, the European Commission instituted a strong monitoring and enforcement plan to prevent a recurrence of the substantial overfishing of bluefin recorded by European Union member states in 2007 (<http://tinyurl.com/6orrrz>). By mid-June, when the 2008 quota of 28,500 tonnes was exhausted, the European Commission called a halt to purse seine fishing, which uses the huge drawstring nets responsible for more than 70% of the total tuna catch. It also prohibited transshipment and transfer of fish to fattening cages from either EU or non-EU vessels.

Regrettably, the EC's apparently strong measures will almost certainly fail to achieve

stock recovery unless the International Commission for the Conservation of Atlantic Tunas (ICCAT), which sets the quotas, reforms the ineffective 15-year recovery plan it adopted in 2006.

When it meets in November this year, the ICCAT must adopt the measures advocated by its own Standing Committee on Research and Statistics (<http://iccat.int/scrs.htm>). These include closure of the Mediterranean throughout the spawning season, full enforcement of the increased minimum size for caught tuna, and a catch limit of 15,000 tonnes — less than a third of recent totals — for the next few years. It should also heed the call of the conservation group WWF, which is asking for a

three-year moratorium on bluefin tuna fishing (<http://tinyurl.com/5ehxtw>). With far too many fishing vessels, significant underreporting of catches by several EU countries and considerable illegal, unregulated and unreported fishing by neighbouring states such as Turkey, Croatia and Libya, time is fast running out for the Mediterranean bluefin tuna. Its loss would be an economic and ecological disaster. ■

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2001 discovery of a strange squid with spaghetti-like arms. A news kiosk features frequent ocean updates. Exhibit developer Jill Johnson hopes the displays will educate visitors and encourage them to be better stewards of the world's waters.

Looming over the hall is a full-scale model of a female North Atlantic right whale called Phoenix. Scientists have spent around 20 years tracking the real Phoenix, distinguishable by her unique scars. The 14-metre-long mother of three was recently spotted in the Gulf of Maine, and is one of an estimated 350 North Atlantic right whales left in the ocean.

One of the strengths of the Smithsonian is its vast collection of marine species, which the hall's curators were eager to display. Specimens are traditionally stored in alcohol, but a change in the fire regulations in 2005 meant that fire-safety experts would allow only a maximum of 38 litres of alcohol in the 2,000-metre-square space, explains Johnson.

The answer came from technology company 3M, based in St Paul, Minnesota. One of their non-flammable, non-toxic hydrofluoroether fluids, developed as a cleaning fluid and solvent, forms an envelope around samples to seal in the formalin preservative. 3M donated some 4,000 litres of the stuff to the museum, where it now surrounds various artefacts, including a coelacanth and her pup, a prehistoric fish that was thought to be extinct until its rediscovery in 1938.

The hall's specimens are the first to be displayed in the fluid, which, unlike alcohol, does not leach colour. "A lot of other museums are really interested in how this works out," Vecchione says.

One of the hall's stars is a seven-metre-long giant squid that rests majestically in a coffin-like tank filled with the liquid. Along with a three-metre-long male squid, it is on loan from the Spanish research organization CEPESMA. Transporting the pair across the Atlantic in 1,500 litres of formalin was quite a task. The US Air Force and Navy helped out with the trip, dubbed 'Operation Calamari'. Elizabeth Musteen, who coordinated the journey, was concerned about the weight of the cargo until an unimpressed Air Force representative chastised her: "Ma'am, I move tanks. I can do this."

Also on show is a hand-carved Tlingit canoe, some 8 metres long. The Pacific northwest tribe is one of many cultures represented in the hall that depend on the sea. As Johnson explains, "The main message is that the ocean, singular, is a global system that is essential to all life — including yours". ■

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Ocean exhibit makes waves

The Sant Ocean Hall

Smithsonian National Museum of Natural History, Washington DC

Opens on 27 September 2008

Geographers will tell you that there are four world oceans, or five if you count Antarctic waters. The designers of the new Sant Ocean Hall at the Smithsonian National Museum of Natural History, based in Washington DC, beg to differ. Although it acknowledges distinct ocean basins, the exhibit emphasizes that the world's waters are linked in a single ecosystem that influences all life on Earth.

The US\$49-million hall is due to open on 27 September and will house the museum's largest permanent display. A joint venture with the US National Oceanic and Atmospheric Administration, the hall explains oceanography, biology, ecology and anthropology.

It was inspired by aspects of the ocean in crisis, exploring the effects of oil spills, climate change and ocean acidification. Other sections highlight the ocean's bounty and the resources it provides.

Changing displays showcase scientific research, including the Census of Marine Life — a collaborative project to assess marine diversity — and curator Michael Vecchione's



An artist's impression of the Sant Ocean Hall shows its emphasis on the oceans as a single ecosystem.