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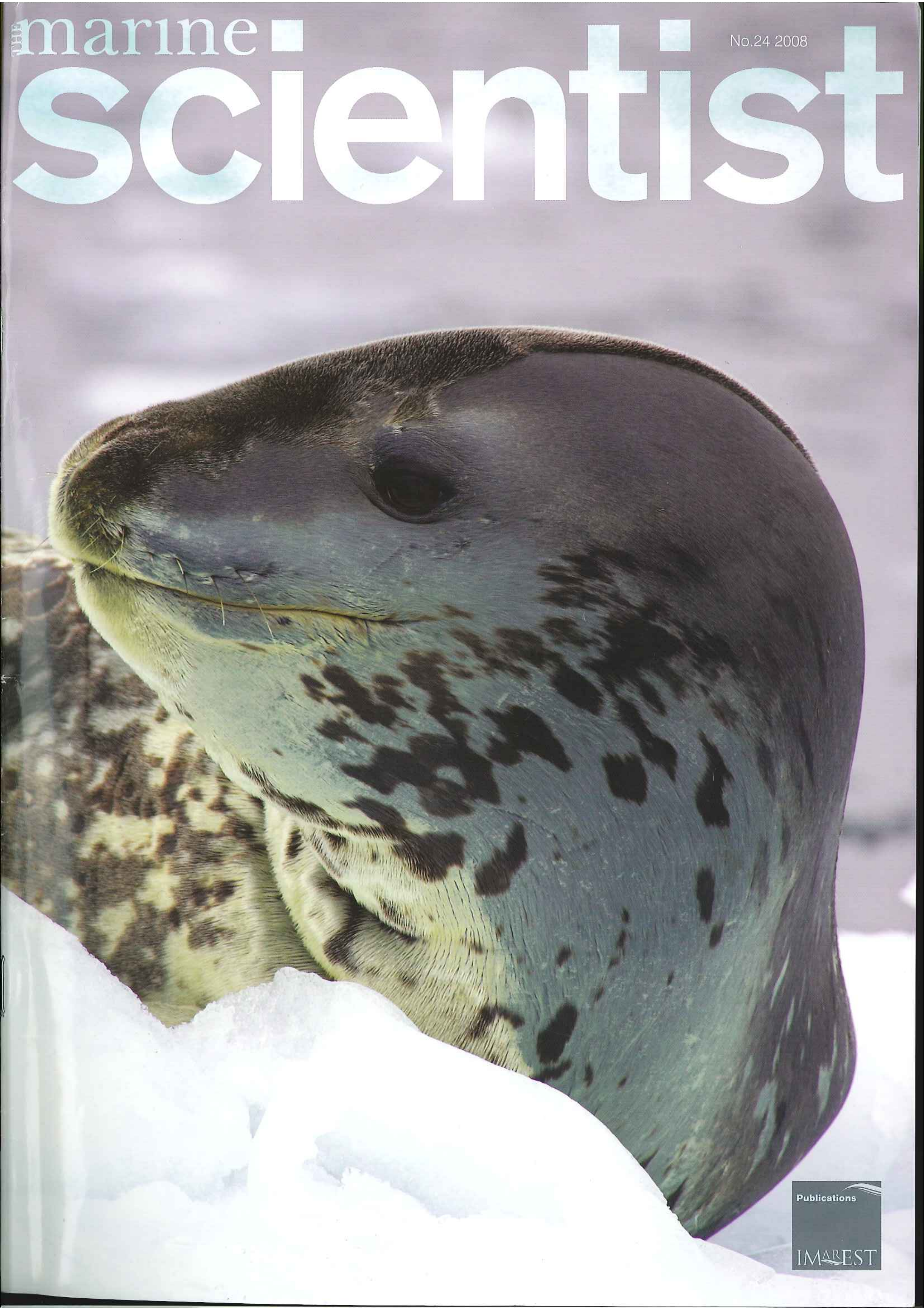


Publications
IMarEST

• Protected fish stage a comeback

IN BRIEF

European Marine Research data-base hits the web

EurOcean's info-base on marine research projects funded by the different European mechanisms related to either the European Commission, or other supporting marine research organizations, is now online. The info-base of the European Marine Research Funded Projects (EurOcean_MaP) gathers information on projects funded by COST, EUREKA, EUROCORES (ESF), 6th Framework Programme, INTERREG III, LIFE and SMAP, summing up a total of 543 projects available for consultation, free of charge. The infobase covers research projects partly or entirely related to marine science and technology. http://euroceanmrfp.addition.pt/

World Register Of Marine Species gathers pace

The new World Register of Marine Species (WORMS) now contains about 122,500 validated marine species names (experts having recognized and tidied up some 56,400 aliases - 32% of all names reviewed). It also contains some 5,600 images, hyperlinks to taxonomic literature and other information. The plan is to complete the register by 2010. Find out more at http://www.marine-species.org/

Dramatic evidence that protected fish populations can bounce back rapidly from the impact of years of heavy fishing has been obtained by a team of marine scientists working on Australia's Great Barrier Reef (GBR).

The team discovered that coral trout numbers rebounded by 31-75% on a majority of reefs which had been closed to fishing for as little as 1.5 to 2 years. A strict no-fishing policy was introduced across 33% of the total GBR area in 2004 forming the largest network of no-take reserves in the world.

'We were very agreeably surprised at the speed at which coral trout populations recovered — and also the sheer scale and consistency of the response,' Professor Gary Russ of ARC Centre of Excellence for Coral Reef Studies said.

Closed inshore reefs in the Palm and Whitsunday islands showed increases in coral trout population densities of 65 and 75 per cent respectively compared with paired reefs left open to fishing. Closed reefs offshore of the cities of Townsville (64%), Cairns (53%) and Mackay (57%) also showed marked improvements.

However densities of coral trout on the reefs left open to fishers showed little or no change in fish density. On only one closed reef was there a decline in the trout population — the Keppel Islands which, in March 2006, were hit by a devastating coral bleaching episode.

The results are very convincing, because we surveyed such a huge area – 56 reefs spread over more than 1000 kilometres from north of Cairns to the Capricorn-Bunker islands in the south,' said Dr Peter Doherty, Research Director of AIMS.

'The data from these reefs was remarkably consistent – and we were pleasantly surprised to observe such rapid improvements in fish densities. Though it is still early days, it certainly looks as if the no-take marine reserves are working as hoped.'

Professor Russ said: 'The GBR is an Australian and international icon, the largest and most complex of marine ecosystems. Our findings provide encouraging evidence that bold political steps to protect such ecosystems can be successful.'

Find the paper in the June 24 2008 online issue of Current Biology at: http://www.current-biology.com/

Coral trout populations have rebounded in closed areas of the Great Barrier Reef

Image courtesy of the Australian Institute of Marine Science

Scientists develop 'team' of robots for underwater research

While most underwater robots are solitary workers, Kristi Morgansen from the University of Washington has invented some robots with a difference: they work together as a team.

Over the past five years Morgansen, a University of Washington assistant professor of aeronautics and astronautics, has built three Robofish that communicate with one another underwater. Recently at the International Federation of Automatic Control's Workshop on Navigation, Guidance and Control of Underwater Vehicles she presented results showing that the robots had successfully completed their first major test. The robots were programmed to either all swim in one direction or all swim in different directions, basic tasks that can provide the building blocks for coordinated group movement.

'This success in indoor test tanks', she said, 'will eventually provide the basis for ocean-going systems to better explore remote ocean environments.'

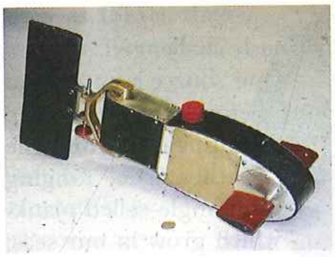
'Underwater robots don't need oxygen. The only reason they come up to the surface right now is for communication,' Morgansen said. Her robots do not need to come to the surface until their task is complete.

In the future, ocean-going robots could cooperatively track moving targets underwater, such as groups of whales or spreading plumes of pollution, or explore caves, underneath ice-covered waters, or in dangerous environments where surfacing might not be possible. Schools of robots would be able to work together to do things that one could not do alone, such as tracking large groups of animals or mapping expanses of pollution that can grow and change shape.

The Robofish, which are roughly the size of a 10lb salmon, look a bit like fish because they use fins rather than propellers. The fins make them potentially more maneuverable and are thought to create lower drag than propeller-driven vehicles. What is particularly novel with the Robofish is that they can communicate wirelessly underwater.

Again, Morgansen looked to natural systems for inspiration. The engineers worked with collaborator Julia Parrish, an associate professor in the UW's School of Aquatic and Fishery Sciences, to record patterns of fish schools' behaviour.

'In schooling and herding animals, you can get much more efficient manoeuvres and smoother behaviours than what we can do in engineering right now,' Morgansen explained. 'The idea of these experiments (with schools of live fish) is to ask, 'How are they doing it?' and see if we can come up with some ideas.'



A fin-propelled Robofish designed at the University of Washington. A penny in front of the robot gives a sense of its size (Credit: Image courtesy of University of Washington)

The team trained some live fish to respond to a stimulus by swimming to the feeding area. The scientists discovered that even when less than a third of the fish were trained, the whole school swam to the feeding area on cue.

'The fish that have a strong idea tend to dominate over those that don't,' Morgansen said. 'That has implications for what will happen in a group of vehicles. Can one vehicle make the rest of the group do something just based on its behaviour?'

Beyond finding the optimal way to coordinate movement of the robots, the researchers faced major challenges in having robots transmit information through dense water.

'When you're underwater you run into problems with not being able to send a lot of data,' Morgansen said. State of the art is 80 bytes or about 32 numbers per second, she said.

The energy required to send the information over long distances is prohibitive because the robots have limited battery power. What's more, signals can become garbled when they reflect off the surface or off of any obstacles.

Messages were sent between the robots using low-frequency sonar pulses, or pressure waves. The new results showed that only about half the information was received successfully, yet because of the way the Robofish were programmed they were still able to accomplish their tasks. Robots that can independently carry out two simple sets of instructions - swimming in the same direction or swimming in different directions — will allow them to carry out more complicated missions.

Now researchers are using the fish's coordination ability to do a task more similar to what they would face in the ocean. The Robofish pack's first assignment, beginning this summer, will be to trail a remote-controlled toy shark.

Co-authors on the recent study were UW doctoral students Daniel Klein and Benjamin Triplett in aeronautics and astronautics, and UW graduate student Patrick Bettale in electrical engineering. The research was supported by grants from the National Science Foundation and the Air Force Office of Scientific Research.

New Underwater Vehicles infobase goes online

EurOcean has developed a new online infobase on the Underwater Vehicles (UVs) used in Europe for scientific research. EurOcean has collected the general information on 67 underwater vehicles operating from Europe and this information is available online in the infobase. Four categories of UVs have been identified as following: ROVs (Remotely Operated Vehicles), AUVs (Autonomous Underwater Vehicles), Manned Submersibles and others. The detailed descriptors are being collected by EurOcean and validated by the operators of the vehicles.

Find out more at: http://euroceanuv.addition.pt/index.jsp