Germany, presented a microphone that consists simply of two tiny wires placed close together and heated electrically. The small flows of air molecules generated by sound waves cool the wires. "The temperature difference in the two wires depends directly on the velocity of the air particles," explains Hans-Elias de Bree, who developed the concept several years ago while still a student at Twente University in Enschede, the Netherlands. The microphone, which Sennheiser says could be realized in silicon, cannot respond to sound frequencies any higher than about 10 kilohertz, making it usable for telephones but not for high-fidelity recording. But it can stretch down to waves below 20 hertz, which are important in seismology. "A pressure microphone simply cannot do this," says de Bree.

Although no silicon microphones are yet produced commercially, researchers in the field are bullish about their prospects. In a few years, says Sessler, "nobody will use conventional microphones anymore, only silicon ones." **–ALEXANDER HELLEMANS**

Alexander Hellemans is a writer in Naples, Italy.

FISHERY MANAGEMENT

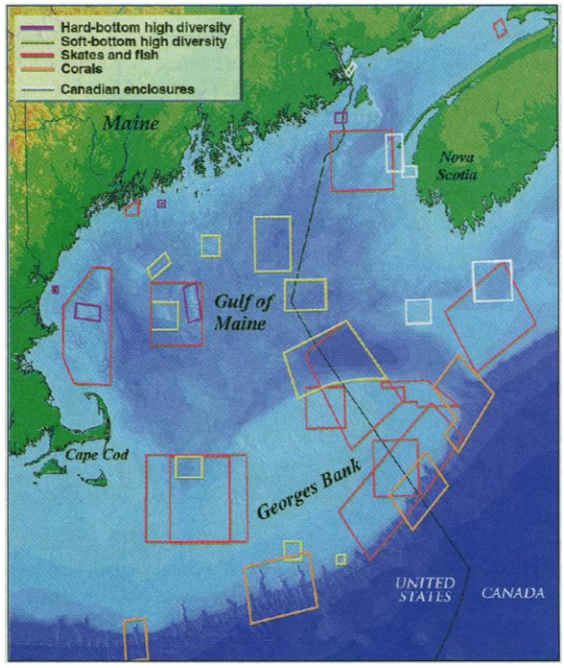
## Plan Would Protect New England Coast

**BOSTON**—For centuries, the gravel and sand of Georges Bank and the great canyons, muddy basins, and shallow ledges of the Gulf of Maine have supported one of the world's most productive fishing regions. But big boulders have historically protected a 1050-square-kilometer region at the bank's northeastern tip from dredging boats in search of scallops and trawlers hunting down groundfish. However, those boulders are becoming less of a deterrent against improved and sturdier gear. So when geologist Page Valentine of the U.S. Geological Survey in Woods Hole, Massachusetts, stood before his colleagues last month and defended his proposal to safeguard this rare, undisturbed gravel bed, he knew that he was also standing at the crossroads of science and politics.

Valentine's presentation was part of a 2-day workshop held at the New England Aquarium here to build support for Marine Protected Areas (MPAs), a controversial concept aimed at preserving biodiversity in coastal waters. The meeting, organized by Elliott Norse, founder of the Marine Conservation Biology Institute in Redmond, Washington, featured talks by 21 experts across a range of marine habitats and species and represented the marine community's biggest push for MPAs.

The discussion generated a map (see above) that nominated 29% of the ocean floor off the coast of New England and Canada's Maritime Provinces for protection, as well as 25% of pelagic (open-ocean) waters. The next step will come in the fall, when the scientists discuss the plan with government officials, commercial stakeholders, and environmental activists—meetings that are likely to be contentious. "The conservation groups will want to see if various species are covered. And various fishermen will be convinced that their livelihood is threatened," says Mike Pentony, an analyst for the New England Fishery Management Council, who was an observer at last month's workshop. The areas could be established by the National Marine Fisheries Service or under existing U.S. and Canadian laws to protect endangered species and habitats.

Existing MPAs in the United States cover only small regions in the Florida Keys and off the coast of Seattle, and there is no consensus among scientists on what they should protect or how. An MPA could merely be spared from oil drilling and sand mining, or it could restrict any activity with the potential to harm marine life, including whale watching and research. There are even protected areas in Georges Bank—about 14% of U.S. waters near New England are closed to groundfishing—but the lines have been drawn by regulators focused more on the welfare of economically important fish than on science. "Fisheries closures are for the simple purpose of rebuilding overused fish stocks," says Peter Auster, an ecologist at the University of Connecticut, Avery Point, "and they will be repealed when the target populations rebound." Norse and others say that the extensive research already done on the Gulf of Maine and Georges Bank makes them prime targets for MPAs.




**Bottoms up.** Researchers have pegged some three dozen pieces of the ocean floor off New England as priority areas for the protection of one or more types of benthic ecosystems.

As a first step toward that goal, the scientists at the workshop chose 36 areas that warrant closer attention. Some are particularly rich in biodiversity; others support fish nurseries or contain rare or fragile species like barndoor skates and corals. Any discussion of exactly how to protect them was postponed until the fall, and although the researchers all said they wanted to remain above the political fray, they agreed to adjust many of the boxes to make them more acceptable to competing interests, such as fishers. For example, Ransom Myers, a fish biologist at Dalhousie University in Nova Scotia, had proposed a protected area for the barndoor skate that included areas in the gulf where the skate has not been observed for many years. Although he argued that the larger regions might restore the skate to levels not seen in decades, the committee decided that a more reasonable goal might be preservation of existing habitats.

John Williamson, a former commercial fisher who serves on the New England Fishery Management Council, thinks that fisheries management "has embraced" habitat protection as a way to restore marine ecosystems crucial to many species, including commercially important ones. But he calls it "a delicate situation" and compares working with the fishing community to herding cats. In addition, he chides scientists for "talking in isolation."

To help break down those barriers, scientists hope to repeat the New England workshop in other regions, notably the Pacific Northwest. Ideally, workshop members say, scientific participation in future debates over ocean zoning also will help officials avoid the mistake made a century ago when beauty rather than ecological importance was the driving force behind the creation of national parks.

Norse admits that the process is far from perfect. "We're working with the best people and the best data," he says, "but there's still a lot that's arbitrary" about the recommendations. "It's art based on science." Still, he says, "it's good that we're doing this now and not in 10 years." **–KARIN JEGALIAN**

Karin Jegalian is a science writer in Cambridge, Massachusetts.

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