

'Hot spot' fish areas being depleted

Dalhousie University researchers release study showing marine-life stocks declining

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New research by a Canadian university has brought previously unknown parts of the world's oceans into focus and is raising new concerns about the global decline of big species.

The study, released yesterday by the journal *Science*, found that the ocean contains a small number of "hot spots" where marine life concentrates and where stocks are declining dramatically.

But the finding has also opened a new window of hope because it points to a few key areas, in a vast, featureless ocean, where conservation efforts could be targeted for maximum effect.

By looking at 50 years of international fishing data for tuna and billfish, co-authors Boris Worm and Ransom Myers, both of Dalhousie University in Halifax, were able to map five hot spots of species richness and density in the world's oceans.

These zones of concentration are clustered mostly in the subtropics where ocean temperatures, currents, oxygen concentration and food sources converge, drawing in the bigger predator species.

The five different hot spots are off the coast of Florida, off Australia's east coast, south of the Hawaiian Islands, east of Sri Lanka and in the southeastern Pacific.

"The open ocean covers two-thirds of the planet and people usually envision it as a big, blue area on the map, where you see life only when you come close to the coastal rims," Dr. Worm said in a telephone interview.

"That's certainly not true. We've shown that the species that you find in the open ocean, like tuna and billfish, sharks and turtles, they appear to aggregate in certain areas, we call hot spots."

Dr. Worm said that two years ago he and Dr. Myers noticed areas of richness in the northwest Atlantic, off Canada's East Coast.

They wondered if that was a phenomenon they would find in other places.

Using decades of fishing data collected by commercial fishing fleets that were roaming globally, they were able to zero in on the five areas "of great global importance" that they are now calling hot spots.

"The second thing that astounded us was when we looked back in time, 50 years, using a unique global long lining data set collected by the Japanese fleet, was that those hot spots are the remnants of much larger areas," Dr. Worm said.

He said the five hot spots are shrinking, species diversity within them has declined by 50 per cent, and other hot spots that once existed have vanished, apparently because of overfishing.

"We could not identify a factor other than fishing that may plausibly explain long-term, global-scale declines," the researchers state in their paper.

"It's like a slow-motion disaster," Dr. Worm said of what is happening to fish stocks in the world's oceans.

"You know, a silent catastrophe which is beyond our reach because we can't really see it."

Dr. Worm said he hopes the discovery of hot spots will now help the public focus on the plight of the world's oceans.

"What we're trying to do with this idea of global hot spots is bring it to people's imaginations in a similar way that rain forests and coral reefs are," he said.

He said his findings were presented to the United Nations recently and he was encouraged by how interested fisheries experts were in the hot-spot data.

"They have a clearly defined goal to put high-seas marine parks into place. They just don't know where to put them. This points the way.

"This says . . . if you act now you can do something for our common global heritage . . . It is a hopeful message after all. Some areas are still there."

In addition to finding that big fish such as tuna aggregate in key areas, the researchers also discovered that zooplankton concentrates in specific zones.

Dr. Worm said that new zooplankton discovery came as a shock.

"Well, this was an amazing surprise to us . . . These are the tiniest animals in the ocean," he said.

"They are single-celled organisms, related to amoeba. They have nothing to do with large tuna and billfish we studied in the first place - and yet they showed the same patterns of

diversity . . . So that tells us there are some very general features in the oceans that make certain places extremely interesting to a wide range of species."

He said it's vital to protect those areas while they still have high biodiversity.

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