



“No good science – no good fisheries management – end of story!”

Dr John McKoy
Chief Scientist – Fisheries

New insights on orange roughy

New research on orange roughy is beginning to shed light on some longstanding puzzles, and suggests recruitment to the fishery is poorer than stock assessment models indicate.

The groundbreaking research, by NIWA fisheries scientists Drs Matt Dunn and Ian Doonan, includes new hypotheses about spatial population structure, the locations of nursery grounds, and the first direct estimate of pre-recruit abundance.

“What we’ve done is to go back to the biology of the fish to try to explain patterns that have not been accounted for by mathematical stock assessment models,” says Dr Dunn.

The scientists drew on a vast dataset of orange roughy measurements accumulated over more than 13 000 trawls since the early 1980s. “This is the largest dataset of its kind in the world, with 846 000 measurements from the Chatham Rise alone,” says Dr Dunn.

From these data, they identified the locations of orange roughy nursery grounds for the first time. Juveniles were found initially occupying a narrow depth range around 850 m close to the spawning grounds, shallower than the adults, which average 1150 m. On the Chatham Rise, NIWA oceanographers Drs Graham Rickard and Phil Sutton showed that juvenile orange roughy were confined to the warm side of a thermal front, discovered at 1000 m depth.

Locating the nursery grounds enabled the scientists to make an estimate of the abundance of pre-recruitment orange roughy. Preliminary results suggest that the number of young fish entering the fishery each year is considerably lower than estimated in the stock assessment model, which assumes constant recruitment. Moreover, the absence of fish smaller than about 23 cm on the Chatham Rise suggests that virtually no juveniles have survived from spawnings in the late 1980s and early 1990s, when spawning aggregations were

rapidly fished down. Further analysis is needed to test these hypotheses about recruitment.

Looking at the spatial structure of orange roughy populations, the scientists found that they’re very unevenly distributed with respect to size. The bigger fish dominate the seamounts, where most fishing activity is concentrated, while smaller fish are confined to areas of flatter seabed. This spatial structure needs to be incorporated into stock assessment models, says Dr Dunn.

Dr Pamela Mace, Chief Scientist at the Ministry of Fisheries, which funded the research, says “thanks to this fantastic effort, we’ve gained more insights into orange roughy population dynamics this year than in the last several years spent trying to get a model to fit selected subsets of the data.”

FUNDER:

- Ministry of Fisheries



“We’re focusing on biology to explain patterns and trends in the stocks” – Dr Matt Dunn, fisheries scientist.