MARINE FISHERIES

Let sleeping fish lie

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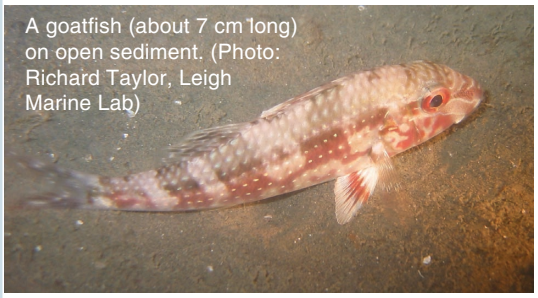
Video photography of sleeping fish has proved to be an effective way of estimating fish population sizes.

Many small marine fishes can be difficult to visually count and measure because of a mixture of cryptic colouration patterns and behaviours designed to avoid larger predators. We have experienced this trying to count juvenile snapper (less than 10 cm long) within habitats such as seagrass and horse mussel beds. We know that they are there because we have sampled them using other methods, but we see virtually none during daylight SCUBA searches of these habitats.

We need information on the absolute numbers of fish in an area to underpin applications such as management of fisheries and marine protected areas, habitat protection, and assessing habitat degradation. However, most sampling methods measure relative rather than absolute abundances. In other words, they account for only a portion of the fish in the sampled area, and we don't usually know the size of that portion.

During work on juvenile snapper and their habitats in Mahurangi Harbour (Auckland) we made an important discovery while doing some night diving. We encountered numerous small snapper sleeping on the seafloor. They were oblivious to the divers' powerful torch-lights, and could be measured in-situ. If we were careful, they could even be collected using small aquarium dip nets. The behaviour was also observed for other common inhabitants of estuaries including larger snapper, goatfish, gobies, and sand and yellow-belly flounders.

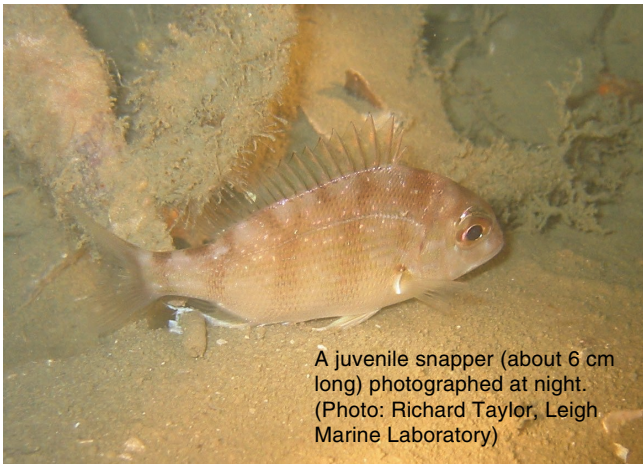


A goatfish (about 7 cm long) on open sediment. (Photo: Richard Taylor, Leigh Marine Lab)

This finding was significant as it meant that we now had a means of estimating the absolute numbers and size distributions of fish. With good water clarity, counts could be done by divers at night. However, dive counts are logistically difficult and time-consuming.

New research tool

To apply our finding more efficiently, we turned to a fish-sampling system originally developed to collect fish and habitat information in the difficult and diver-hostile environment of Foveaux Strait. The system, called a DUV (drop underwater video), consists of an underwater camera system attached to a towed device with a live cable link back to the support boat. Laser scaling of the seafloor, digital image recording, and video-linked GPS positioning allow the device to be towed just above the seafloor. This enables accurate measurement of seafloor features and fish abundances over almost all terrains, with no physical impacts on the seafloor.



A juvenile snapper (about 6 cm long) photographed at night. (Photo: Richard Taylor, Leigh Marine Laboratory)

We deployed a DUV system in Mahurangi Harbour during darkness. With oven-proof wax paper taped over the dive-torches to provide diffuse illumination, the system worked very well. The fish were completely unaware of its presence until the last moment (or not at all). The video laser system allowed us to determine the area surveyed, as well as fish lengths. We could also obtain habitat information from the video images.

Our new system yielded valuable information on snapper densities, population size frequencies, and habitat associations. Other data collected at the same time using different techniques will allow us to assess the effectiveness of the new approach. Preliminary work on adjacent coastal areas has shown that the system works well in other habitats. For example, trial night tows in a rocky reef area have allowed us to count snapper, John Dory, and big-eye (a nocturnal plankton feeder that hides in crevices during the day).

New technology combined with a better knowledge of fish behaviour makes this night-time underwater video system an exciting addition to our fish research tool-box. All our methods contribute to a better understanding of how juvenile fish use nursery habitats, with the eventual aim of ensuring that fish populations remain productive and healthy. ■

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