



New Aquaculture Tool Developed to Estimate Fish Density with Echo-Sounders

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Researchers are creating a tool that will enable fish farmers to generate more precise estimations of the number and size of their fish stock.

Reliable methods for estimating the number, size, or biomass, of fish in a cage remains a challenge in aquaculture. The most common approach involves taking on-site samples— a costly, time-consuming, and inaccurate method. More reliable methods are needed so that fish farmers can better manage their stock.

As part of the EU-funded PerformFISH project, researchers from SINTEF Ocean (SINTEF, Norway) and the Hellenic Centre for Marine Research (HCMR, Greece) are contributing to the development of new methods for biomass estimation of farmed fish kept in net pens.

The methods developed by SINTEF and HCMR exploit echo-sounder technology. This technique relies on regularly transmitting an acoustic pulse and analysing the return signal after it has bounced off one or several targets. Time intervals between transmission and reception, as well as signal intensity, are analysed. This is a similar approach to the one used in sonar systems. The technology is already used as part of “fish finders” for commercial or recreational fishing and is now being applied more and more to aquaculture. However, the aquaculture context poses new challenges.



A small test cage is lifted with a crane into a net pen for salmon farming and filled with fish. Picture by SINTEF Ocean (September 2020).

As Dr Walter Caharija, lead researcher from SINTEF Ocean explains:

“In the open water, echo-sounding technology is used to find shoals of fish. They might give some estimate of the size of a shoal, but it’s the location that’s more important. In aquaculture, fish farmers already know where their fish are located but it is important to know the density of fish in the cage. In a 3D marine environment, with hundreds of fish swimming in all directions, it is difficult to get a good head count!”

The research team is conducting trials to understand how echo-sounders interact with the layers of fish that are found in a typical aquaculture cage. The main challenge is to account for a “shadowing effect”: some fish are “invisible” to the echo-sounder because they are hidden behind other fish in the cage.

The researchers conducted experiments using two small test cages, each containing a known amount of fish. They placed the cages at different distances from each other and from an echo-sounder, and

then measured the echogram results produced from the interaction of the echo-sounder with the fish. By comparing these raw echogram results to the real fish density in the cages, the team can calibrate the tool so that it will provide a reliable estimate of fish density for fish farm managers.

Dr Walter Caharija continues:

“We are making exciting progress and I am looking forward to developing this further. We are building a foundation from which we are learning how to utilize an echo-sounder to better estimate biomass in a production net pen. Together with HCMR, our partner from Greece, our next steps will involve further data analysis and refining our methods before we move to more concrete dissemination and exploitation plans.”

His colleague, Espen Eilertsen adds:

“Kongsberg Maritime, a renown echo-sounder provider and manufacturer, is showing great interest in our PerformFISH activities and we are having a mutually beneficial and productive dialogue.”

For more information and to follow developments across the PerformFISH project, please visit performfish.eu.

Notes for Editors

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This work has been carried out in the framework of the EU-funded project, PerformFISH which aims to ensure sustainable growth of the Mediterranean aquaculture industry, based on consumer perceptions and real market requirements.

The PerformFISH consortium of 28 partners represents leading organisations in their respective fields of work from 10 different European countries. The project is coordinated by University of Thessaly, Greece. AquaTT is the project dissemination partner.

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SINTEF is an independent, non-commercial organisation. SINTEF Ocean conducts research and innovation related to the ocean space. Using the vision “Technology for a better society” SINTEF’s ambition is to further advance Norway’s leading position in marine technology and bio-marine research. sintef.no

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