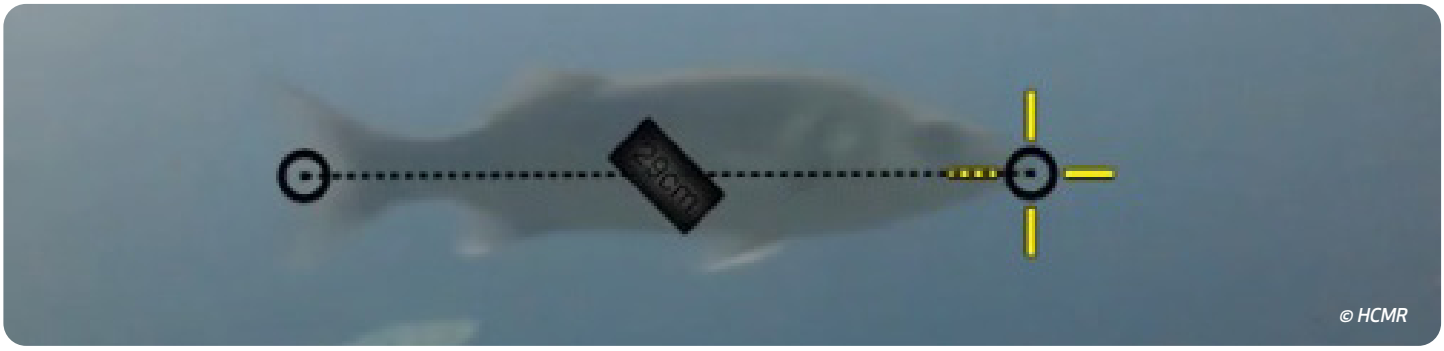
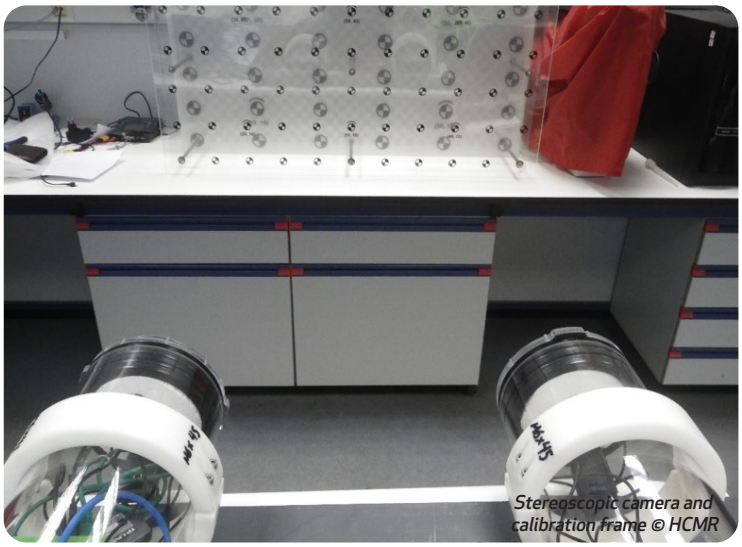
A STEREOSCOPIC METHOD TO MEASURE FISH SIZE



SUMMARY

This output concerns the first application of a semi-automated sampling method to perform fish size determination using stereoscopic camera technologies in Mediterranean species. This sampling technique is less invasive than traditional methods and causes minimal disturbance to the fish, leading to improved welfare. Although systems using stereoscopic cameras for size and abundance estimation are not new, technological advancements in the last decades have enabled the development of this more sophisticated system.

KNOWLEDGE NEED


Stereoscopic camera and calibration frame © HCMR

Growth monitoring, achieved through estimates of weight and length, is among the most important monitoring traits in aquaculture. This observable outcome of the growth process is influenced by many parameters. Changes in nutrition, environmental conditions and genetics all contribute to effects that can be inferred by close monitoring of weight progression through time. In addition, weight estimates are crucial for feed management. The ability to obtain accurate estimates of size is of paramount importance, not only in terms of profitability but also because these estimates can support management decisions. Obtaining growth estimates from large populations in cages is challenging due to on-site constraints in defining sound experimental protocols for representative and precise sampling. The most commonly used techniques for measuring fish length / weight are based on sampling of specimens on-site which requires experienced personnel and induces stress on the fish groups. The few non-invasive methods that have been developed so far are lacking accuracy and are not extensively used.

POTENTIAL IMPACT

- Improved fish welfare due to improved husbandry conditions.
- The spatial segregation of the sub-systems (camera system and desktop application) allows for remote operation, which further reduces personnel and equipment requirements, leading to improved sustainability of the aquaculture industry.
- More accurate sampling as the fish are less stressed and so there is less effect of the sampling on physiological traits.

EATiP - Strategic Research and Innovation Agenda (SRIA) Thematic Area 2 - Technology & Systems; Goal 4. To see the full list and descriptions of the thematic areas and goals, please visit: **bit.ly/3hBDpGH**

UNDERLYING SCIENCE

This semi-automated sampling method is based on principals of stereoscopic computer vision and photogrammetry. The stereoscopic camera system uses a set of two high-definition web cameras, connected to a mini computer board and enclosed in appropriate submergible housing. The conceptual framework of this system relies on the stereoscopic camera recording synchronized, partially overlapping video streams. These are fed as an input to a photogrammetry application (**VidSync**), which requires an operator to manually indicate the tip of the snout and the fork of the tail of the targeted individual on the stereoscopic (left and right) images. The length of the fish is then automatically computed.

RESULTS

- The semi-automated stereoscopic camera system was calibrated and tested for functionality in the lab, yielding measurements of acceptable accuracy.
- The first trials of the system (calibrated and used in the air) indicated a measurement error of ± 5 % depending on the object's angle to the camera sensors and the distance of the object from the cameras. Generally, smaller angles result in higher accuracy in measurements. Increasing the distance between the cameras and the object reduces the accuracy because the precision of the manual input declines proportionately.
- The accuracy of the method seems to be significantly affected by user input.

END-USERS & POTENTIAL APPLICATIONS

END-USER 1: Aquaculture farmers
APPLICATION: Monitoring of stock growth and overall performance while avoiding unnecessary stress, thus improving the health and welfare of fish stock.

END-USER 2: Aquaculture scientists
APPLICATION: Use of a less disruptive method to estimate the growth of fish in cages during research experiments.

STATUS

Technology Readiness Level (TRL) 2 - technology concept formulated

- The next steps will aim to reduce the errors associated with user input while further automating the whole process. Within the EU-funded H2020 project **PerformFish** (GA 727610) the technology is being further developed with specialized Artificial Intelligence-based software.

AT A GLANCE

TITLE: A stereoscopic method to measure fish size

KNOWLEDGE TYPE: Report

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PATENTS OR OTHER IPR EXPLOITATIONS: No

Designed and developed by AquaTT

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