

Towards interactive 3D of living fishes underwater

MASTS/WHOI Bridge Programme Report

By Amy Scott-Murray

I visited WHOI between June 13 and 30 2014, at the invitation of Hanumant Singh of the Deep Submergence Laboratory. We planned to investigate the practice and application of photogrammetry with fish specimens. Also at WHOI for the project were John Galbraith and Erica Fruh of NOAA, from the East and West Coast divisions respectively.

We made a total of 73 fish digitisations which are detailed on the attached spreadsheet.

Our initial plan had been to investigate the use of light-field cameras in photogrammetry. These turned out to have little to offer in the short term but may well prove to be of value once this project progresses to imaging in seawater. Instead, the specimens provided by the NOAA visitors proved an excellent opportunity to perfect my technique and refine my existing equipment. The experience of working through such a large number of specimens suggested many new design elements which are being incorporated into the next generation of photogrammetry equipment.

The data we collected have not yet been completely processed but indicate a strong relationship between wet weight and photogrammetrically reconstructed volume.

At WHOI we also had access to a state of the art CT scanner with an operator who is accustomed to imaging fishes. We CT scanned the majority of our fish specimens as a 'ground truth' measure for comparison against the photogrammetric scans.

Most importantly, collaboration within the group Hanu assembled has led to a redefining of the scope of my work, and a much greater understanding of how it could be applied to real research problems.

In the short term we are collecting 3D images of common American fisheries species as an interactive reference to help with ID. (Marine Scotland staff have independently suggested a similar reference detailing their commonly found species; this would be an excellent collaborative project as there is significant overlap in the Atlantic region.)

In the long term we aim to produce equipment which can be towed in the water and image fish specimens as they pass through it. This would generate, as a minimum, information on biomass and organism size. It will also allow us to work towards the eventual goal of obtaining specimen ID from in-situ scans.

This was a massively positive, successful and helpful visit. All the participants are keen to repeat it, ideally for a longer duration in future.