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# Using computer vision to study fish gill health in finfish aquaculture

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*I started my PhD journey with the Blue Economy CRC, driven by my curiosity about aquaculture's development and use of new technologies to bolster its growth.*

*Following my PhD, I wish to join the aquaculture industry to gain practical insights and address industry demands. I want to grow my career by supporting industry development.*

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## INTRODUCTION

Fish farmers use underwater cameras and computer vision technologies to monitor fish, improve feeding efficiency, and manage farms effectively. These systems can also be utilised to assess fish health, enhance fish welfare cost-efficiently, and reduce labour costs.

Gill disease is the most serious health issue in Tasmanian farmed Atlantic salmon [1]. It involves gill pathologies caused by infectious and non-infectious agents, such as amoebic gill disease (AGD) (caused by *Neoparamoeba perurans*), harmful jellyfish, and algal blooms [2, 3, 4]. Fish with gill disease exhibit respiratory distress, which manifests as increased ventilation frequency [5, 6]. Increased ventilation frequency can be observed as the rates at which fish open and close their mouths increase.

Manual gill health assessments are laborious and may affect fish welfare due to handling. Gill scoring requires additional training, which limits the number of staff available for these tasks. As the industry plans to move offshore, conducting regular manual checks at offshore fish pens will become even more challenging.

## AIMS

This PhD project aims to assess whether computer vision can detect variations in ventilation rates of farmed Atlantic salmon and if the estimated ventilation rates are associated with gill health scores. As a case study, it focuses on the farmed Atlantic salmon (*Salmo salar*) in Tasmania.

## METHODS

- Videos of farmed Atlantic salmon were collected at Tassal's feed centre using existing cameras within the fish pens. Videos of fish were recorded 1-2 days before Tassal's Animal Health Team undertook manual health checks.

- A computer vision model (Folkman et al., *in preparation*) will be used to analyse the videos to estimate fish ventilation rates. The Animal Health Team provided the gill score results.

- Multiple linear regression will be used to investigate the potential association between gill health scores and fish ventilation rates.
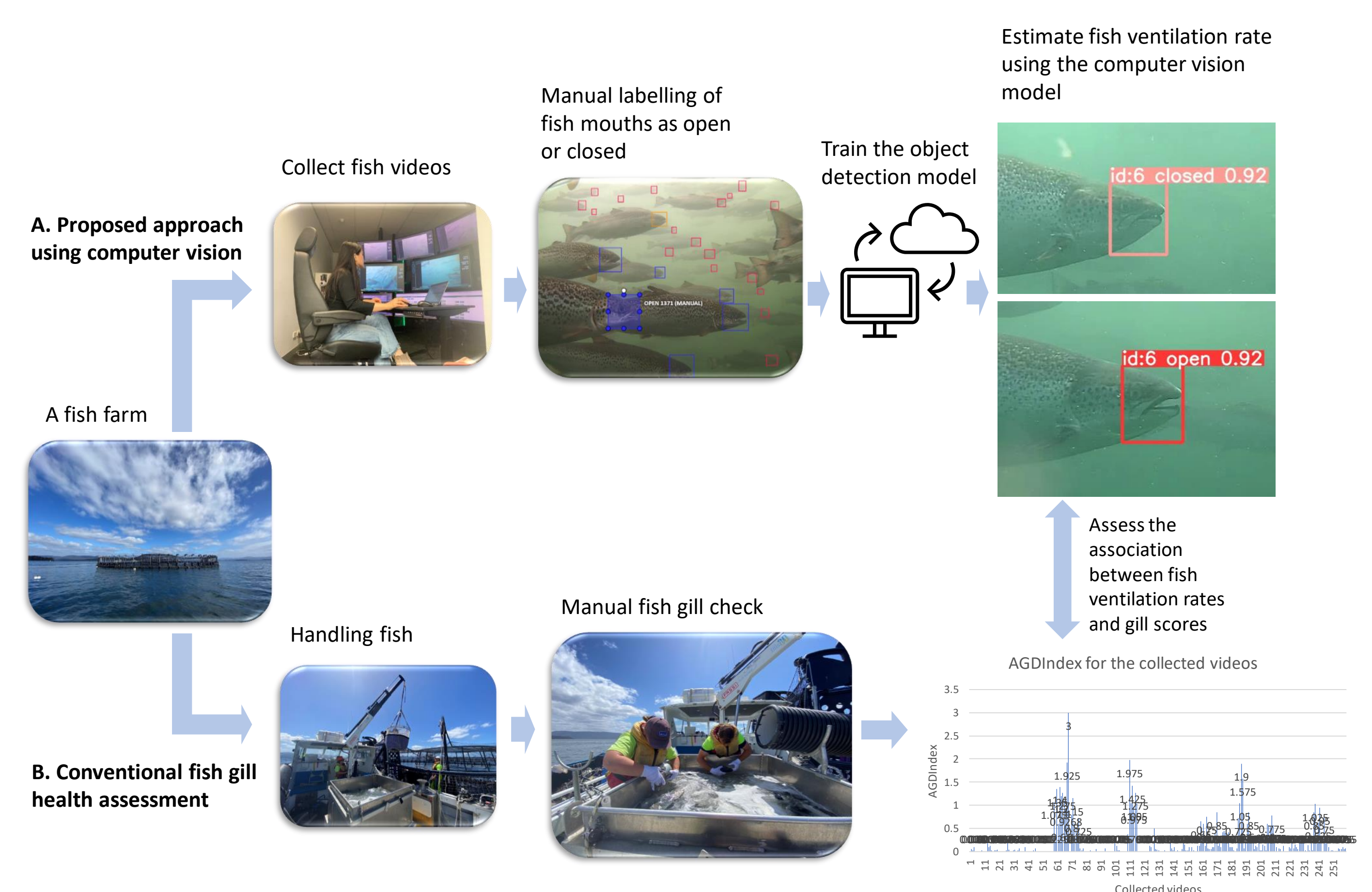


**Fig 1.** Using computer vision to assess the association between fish ventilation rates and gill health scores

## SIGNIFICANCE

**Investigating the relationships between fish ventilation rate and the incidence of gill disease infection can enhance understanding of fish health.** This knowledge will assist fish farmers in making informed decisions about fish health management strategies and interventions based on prevailing conditions.

**Using computer vision for fish surveillance in aquaculture farms will enable real-time fish monitoring and reduce the need for manual health assessments.** It will support monitoring of fish welfare in offshore farms, and contribute to a more cost-effective transition offshore.

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