EVALUATION OF SPATIAL DISTRIBUTION OF FLATFISH BY LASER SCANNING

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Introduction

Fish distribution in a tank is a reliable indicator of culture conditions. In one side, the distribution of fish reflects water quality gradients in the tank or preferential areas related with hydrodynamic pattern, feeding or social hierarchy, among others. In another side, nowadays, a rational use of resources (water, space) is an aim for sustainable aquaculture, therefore it is important to achieve the maximum homogeneity in fish distribution, which guarantees an equal use of resources by fish population. Pelagic species play an already studied role in the rearing tank by generating turbulence and thus becoming vectors for water homogeneity (Rasmussen et al 2005, Lunger et al 2006). But the role of benthonic species has not been studied yet. Flatfishes, as benthonic fishes, set up a rather stable layer on the bottom of the tank, which will likely affect flow behaviour. So, in this group of species, fish distribution becomes a crucial factor for the maintenance of optimal rearing conditions. If the final goal is to improve fish distribution the first step is to assess the influence of different tank conditions on it. The aim of the present work is to propose a method to evaluate spatial distribution of flatfish in a raceway using a laser scanner to improve tank design and fish management.

Material and Methods

The profile of the layer composed by the flatfish located on the bottom of the tank was revealed by using a laser projected to the tank base. The line drawn by the laser beam showed the profile of the fish layer. A picture of this line compared with a picture of the tank bottom without fish, allowed to accurately calculate the thick of the fish layer in a transversal section of the tank. As several pictures were taken every 10cm all along the tank, a map of fish distribution was obtained and mean height and standard deviation in each transect was calculated. The device was evaluated in a shallow raceway (330cm long, 100cm wide and 12cm water depth) with turbot. A transversal laser line (Lasiris SNF 20 mW, wavelength 440-710nm) was projected, in a 45º angle, on the water surface. Digital images (2592x1944 pixels) of each section were captured by a camera placed in the opposite side of the laser also at 45º of the water surface. Reference points were obtained from the empty tank with several rectangular objects of a known height. Intersection of laser beam with water surface was used as reference point in each picture.

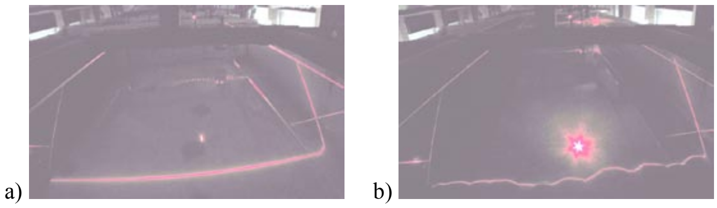

Figure 1*: Laser line projected to the tank bottom a) without fish, and b) with fish*

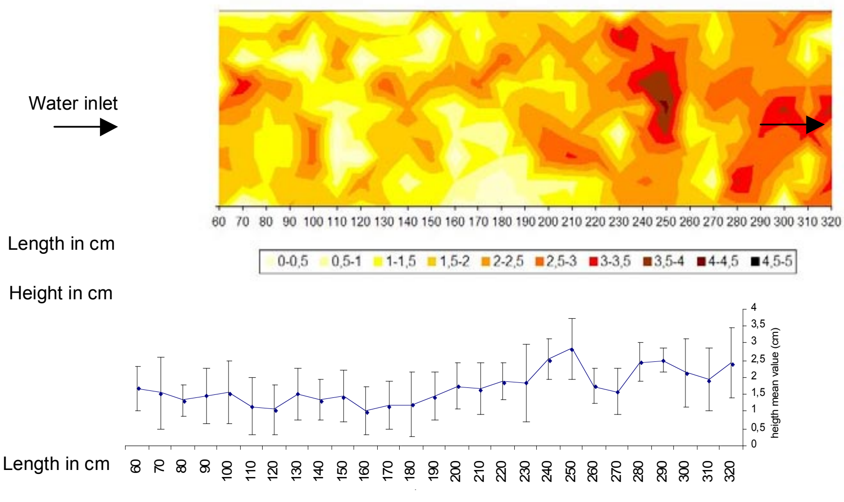

Figure 2: *a) Flatfish distribution in a raceway and b) height mean value and standard deviation of fish at each section on the longitudinal axis of the tank*