

How sudden illumination in nighttime changes the behavior of schooling juvenile Pacific bluefin tunas in an open sea net cage?

Takuji Noda¹, Ko Fujioka², Hiromu Fukuda², Hiromichi Mitamura¹, Nobuaki Arai³

¹ Graduate School of Informatics, Kyoto University, Kyoto, Japan

² National Research Institute of Far Seas Fisheries, Fisheries Research Agency, Shizuoka, Japan

³ Field Science Education and Research Center, Kyoto University, Kyoto, Japan

Abstract

On the cultivation of Pacific bluefin tunas *Thunnus orientalis* in an open sea net cage, it is reported that sudden illumination in nighttime caused by car and fishing light can cause a harmful effect on the fish survival. In this study, behaviour response of schooling juvenile Pacific bluefin tunas (size: 210~250 mm) to the sudden illumination change in nighttime was monitored in an open sea net cage (12m x 12m in width, and 6m in depth) by using animal-mounted acceleration/angular velocity data loggers (200 Hz). Two types of illuminator were simulated: car light for 8 fish and fishing underwater light for 11 fish. When the car light was intermittently illuminated over the sea surface for more than 3 min (10 sec on and 10 sec off), the fish significantly increased the max/mean/standard deviation of acceleration and angular velocity with occasional burst, and decreased the similarity in movement cycle. However, no death was observed. The fishing underwater light was turned on and off for 30 sec and 1 min respectively, and the procedure was repeated for 5 times. The fish significantly increased the max/mean/standard deviation of acceleration and angular velocity with more occasional burst than the car light. The responsiveness to the illumination significantly decreased with the repeated times of illumination. One of the fish reached 230.5 m/s² in acceleration and 4333 deg/s in angular velocity, and died probably because of the collision to the net wall.

Keywords: *Thunnus orientalis*, Biologging, Data logger, Acceleration, Angular velocity, Illumination