

PB3) The Environmental Effects of Water Movement on the Abalone Marine Aquaculture Area

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1. 서론

The marine aquaculture cage systems use more intensive energy in the limited area than natural ecosystems to increase the productivity. In particular, it is known to change the marine environment around farms (aquaculture areas) due to the large and dense facilities and intensive food supply (and excretion). In this study, we investigate the change of characteristics of seawater movement according to the increase of facilities and discuss the effects on the aquaculture environment in terms of geochemical process.

2. 재료 및 방법

To analyze the variability of the water movement, geochemical process and environmental characteristics around the abalone marine aquaculture area, seasonal hydrographic survey were carried out and time series datasets of hydrodynamic were collected in the study area simultaneously.

3. 결과 및 고찰

According to the preliminary results from hydrodynamic data, the seawater movement in the study area was characterized by tide and tidal current with a semi-diurnal cycle. However, the distortion of tidal current velocity along water depth was observed in the vicinity of abalone aquaculture cage. The minimum and maximum velocity of tidal current were measured at the surface and middle layer respectively. The change of the vertical structure of current velocity seems to be related to the increased abalone aquaculture facilities (cages). Eventually, the increased current velocity at the middle layer would influence the vertical velocity shear increase at the bottom layer. The periodical variation and high concentration of the suspended particulate matter at the bottom layer and the inside of the abalone aquaculture facilities can be explained by the increased shear velocity at the bottom layer. The decreased current velocity at the surface layer by the dense and massive abalone aquaculture facilities can also be related to the main cause of environmental degradation in the study area due to the restriction of water-mass exchange. The results of the water quality parameters (dissolved oxygen, chemical oxygen demand, nutrients, suspended particulate matter, etc.) analysis indicated that the changes of environmental condition are closely related to the current velocity. From the preliminary results, the extent of the environmental impact on the abalone aquaculture area seems to be highly correlated to the change of seawater movement as well as geochemical processes such as the amount of organic matter and the concentration of nutrients. Further research for the interaction of the hydrodynamic and geochemical processes including the variation of the sea surface temperature is essential to understand the environmental effects on the abalone aquaculture area.