PHYSICAL CHARACTERISTICS OF SEAWATER BEHAVIOR IN GAMAK BAY

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Gamak Bay is a semi-enclosed area of shallow water with a mean depth of 9 m and has both east and south channels to receive the seawater from outside (see Fig. 1). Gamak Bay also has an egg-shaped sea surface area of approximately 112 km^2. This bay is specifically well known as one of major oyster production areas since last few decades. Also, Fig. 2 represents a distribution of oyster farms in the bay, where the key denotes the amount of oyster production (kg) per hanging string of 100 m. Lee et al. (1990) classified the seawater in the bay into three distinctive water masses, that is, Yeosu Harbor waters, inner bay waters and outer bay waters, as shown in Fig. 2, based on their physical properties. We notice that oyster farms are densely distributed along with the strong flow while no farm exists around the northwest area of the bay. This implies that oyster farms properly take advantage of seawater behaviors in the bay. However, owing to an inappropriate management of fishing grounds and an inflow of partially treated sewage, the water quality is getting worse than before. In particular, recently a water front development is scheduled so that not only seawater behaviors but also the water quality is expected to largely alter. Thus, the status of oyster production area is threatened. Moreover, most of the contaminants come in through the northwest of the bay and even worse, a shoal existing in the mid of the bay makes it difficult to communicate between the inner bay waters and outside of the bay.

Lee et al. (2002) pointed out that these water masses seem to be closely related to the bathymetry. Lee et al. (1995) elucidated that tidal currents inside Gamak Bay were strongly affected by the wind. Cho et al. (1996) confirmed that a strong clockwise vortex was created at the northwest of the bay during easterly winds while an anti-clockwise vortex was created during westerly winds. Therefore a wind is more likely to be important in a semi-enclosed water region such as Gamak Bay because it controls seawater behaviors there. In particular, Lee et al. (2004) evaluated an autumn wind to play an important role for the growth of oyster.

In this study, a field observation has been conducted in order to assess seawater behaviors that affect the fishery environment of oyster farms in Gamak Bay. Tidal waves near the two channels at the northeast and south of the bay had almost the same amplitudes and phases. Water temperature responded sensibly to the tides, rising at high water and falling at low water, except for the northwest region. The currents more regularly varied in accordance with a tidal period as much as long are at the faster-flowing region. A considerable flow has been found near the seabed of the northwest of the bay

where is normally known to be a stagnant area and also it was opposite to the surface flow. Average moving speeds and directions of the flow at each station well coincided with the pattern of residual currents by a two-dimensional numerical model, except for the northwest region. The discrepancy for the northwest region is not clear yet but it is probably because the computational result represents only a spring tide and in addition, a northwesterly wind prevailed during the observation period.

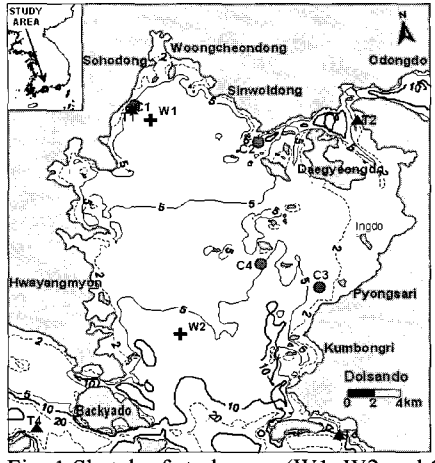

Fig. 1 Sketch of study area (W1, W2 and C1 are stations for currents and T1 and T2 are stations for tides).

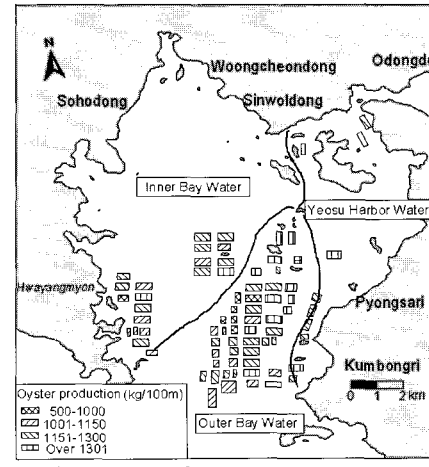

Fig. 2 Oyster farms and water masses distributed in Gamak Bay.

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