

学 位 論 文 要 旨	
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題 目	<p>Population ecology of the portunid crab <i>Charybdis bimaculata</i> (Decapoda: Brachyura) in Kagoshima Bay, Japan 鹿児島湾におけるフタホシイシガニ（十脚目・ワタリガニ科）の個体群生態学的研究</p>
<p>The portunid crab <i>Charybdis bimaculata</i> is abundant in semi-enclosed bays in Japan, among which Kagoshima Bay, southern Japan is a unique deep-water habitat of this species where it is one of the dominant decapods in terms of catch per haul and considered as an emerging commercial species. However, its biological aspects have not been sufficiently studied. The present study, therefore, aims to provide detailed information on reproduction i.e., the oocyte development, ovarian maturation, embryonic development, histologically confirmed size at sexual maturity, and spawning and hatching season of <i>C. bimaculata</i> in Kagoshima Bay, southern Japan as a representative deep-water body. Moreover, this is the first detailed study on the growth of this species that thoroughly described the recruitment, growth parameters and longevity in deep water. Additionally, this study estimated the spatiotemporal distribution of <i>C. bimaculata</i> in this unique habitat.</p> <p>Monthly sampling was conducted at 8 stations established in the bay during 2019-2021. Additional laboratory samples collected during 2006-2018 were also used. Sampling was attained using a training vessel Nansei-Marun with a 10 min. pre-set tow duration. The effective tow duration was determined and the catch per unit effort was calculated following Fulanda & Ohtomi (2011). At each haul, target species were sexed based on the shape of the abdominal flap (i.e., wider, horseshoe-shaped in females and narrower, pointed-shaped in males). Ovaries were macroscopically classified as one of three maturity stages based on the shape and color of the ovary. Ovarian maturity status was then confirmed by histological observation. The growth patterns and longevity were estimated using the length-frequency method from a total of 8,265 individuals collected over three study periods: 1990s, 2010s, and 2020s at the central basin and one study period 1990s at the channel area. Sampling was carried out using commercial small-scale seiners in 1995-1996.</p> <p>Six sequential oocyte developmental stages were confirmed by histological examination. <i>C. bimaculata</i> exhibited asynchronous-type ovarian development. Therefore, ovarian maturity status was determined from the most advanced oocyte found in the ovary. Females having oocytes evidencing either germinal vesicle breakdown or migratory nucleus were defined as mature. The size at sexual maturity was estimated to be 21.8 mm in carapace width based on the 50% maturity size. The spawning season was determined from May to November when mature females occurred. Microscopic observation confirmed four sequential embryonic developmental stages. The majority of females with final-stage embryos had mature ovaries signifying continuity of reproduction. Asynchronous-type ovaries, continuous reproduction, and consecutive broods suggest multiple spawning in a single spawning season. The incubation period was estimated to be under one month. Recruitment was estimated to occur between September to November in this bay. Recruitment seemed to be synchronized with the peak spawning season with a time lag of 2–4 months. Growth was appositely delineated by the von Bertalanffy growth function for both sexes. The growth equations revealed that males had lower K values and higher asymptotic sizes than females. Spatial and temporal comparison in growth parameters between the same sexes found no statistical differences except in one case. Longevity was estimated to be ~1 year. <i>C. bimaculata</i> showed wide spatial and bathymetric distribution in the bay, however, this crab was found to be predominant in the central bay (~180 m) having silty sediment.</p>	