Seasonal microhabitat use patterns in Japanese sea cucumber
_Apostichopus japonicus_ in Funka Bay, Hokkaido, northern Japan

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Abstract: An investigation was conducted to determine the seasonal distribution patterns of the Japanese sea cucumber _Apostichopus japonicus_ (green type) in Usujiri, Funka Bay of Hokkaido, Japan. Bimonthly SCUBA surveys was conducted from December 2009 to October 2010. Results showed that medium to large sized sea cucumbers (>100 mm in standard body length) showed significant seasonal change in distribution patterns. They were distributed on the upper surface of rocks and sandy seabed during low temperature season and retreated to the under surface of rocks and the bottom underneath rocks during high temperature season. Conversely, small sized sea cucumbers were distributed under surface of rocks and bottom underneath rocks year round. These results suggest that the sea cucumbers change microhabitats seasonally at this study site, and it is related to the individual body size.

Key words: Aestivation; Distribution; Microhabitat; Sea cucumber

The Japanese sea cucumber _Apostichopus japonicus_ (Selenka, 1867) is distributed along the coast of Japan and Korea from 35°N to Far Eastern Russia at least 44°N latitude where it is highly appreciated as a fishery resource (Choe 1963; Hamel and Mercier 2013; Sloan 1985). This species inhabits rocky bottom of about 0–100 m depth and is sometimes found on adjacent sandy bottom.

In the most parts of middle and southern Japan, this species change their activity level and microhabitat use seasonally; they are most active at low temperatures in winter when they can be found on sand and rocks, and feeding continually (Choe 1963). As the water temperature increases, their activity level decreases; most of them seem to migrate to sheltered microhabitats (e.g. dark and cool spots under rocks), and they stop feeding and moving, and eventually reach a state of aestivation, that allows them to survive periods of heat stress (Mitsukuri 1903; Choe 1963). It was reported that, once it was considered that sea cucumbers might not aestivate due to the low temperature (e.g. Kinoshita and Tanaka 1939), indicated that they may not show clear seasonal change in microhabitat use in the region of Hokkaido of Japan. However, in contrary it was also reported that, a possibility of aestivation from a viewpoint of metabolism even in Hokkaido (Tanaka 1958a); although these reports were based on limited observations, and seasonal distribution pattern of the sea cucumber has never been elucidated in detail in Hokkaido.

Since there are many differences in environmental conditions between Hokkaido and the