The origin, genetic makeup and population dynamics of the golden tide seaweeds *Sargassum horneri* in Korea

Seo Yeon Byeon¹, Sangil Kim², Sang Rul Park³*, Hyuk Je Lee¹*

¹Molecular Ecology & Evolution Lab, Department of Biological Science, Sangji University, Wonju 26339, South Korea
²Oceanic Climate & Ecology Research Division, National Institute of Fisheries Science, Busan 46083, South Korea
³Estuarine & Coastal Ecology Lab, Department of Marine Life Sciences, Jeju National University, Jeju 63243, South Korea

* Corresponding authors: hyukjelee@sangji.ac.kr or srpark@jejunu.ac.kr

In recent years, drifting and inundating brown seaweed (*Sargassum horneri*) biomass, called ‘golden tides’, has frequently drifted and accumulated along the southern coastlines of Korea, causing devastating impacts on the local economy and coastal ecosystems. In this study, based on combined analyses of mitochondrial (mt) DNA *cox3* gene and seven microsatellites, we investigated the genetic makeup of the floating *S. horneri* populations (*N*=14) in comparison to Korean benthic populations (*N*=5), and tracked their genetic sources. Given a shared mtDNA haplotype and oceanic circulation systems, the floating populations may have been originated from the southeastern coast of China (e.g. Zhoushan, Zhejiang province). Population structure analyses with microsatellites revealed two distinct genetic clusters, each comprising floating and benthic populations. High levels of inter-population differentiation were detected within Korean benthic samples. The floating populations from the same periods during a 2015-2018 year were genetically more different from one another than those from different periods. These results suggest that the floating populations might be of multiple genetic sources within geographic origin(s). Patterns of population dynamics, such as density, growth rate, mortality, and biomass we analyzed considerably differed between the two Korean benthic populations of Munseom on Jeju Island and Jindo on the South Sea. Overall, the results of our study will inform management efforts including the development of “*S. horneri* blooming forecasting system”, which will assist in mitigating ecological and economic damages on the Korean coastal ecosystems in the future.