
A-631 Akira MIYAZONO and Hiroshi KURODA

Origin of seeds of *Karenia selliformis* red tide that occurred along the Pacific coast of Hokkaido in 2021

~ Consideration of the transportation route of the seeds from Kamchatka to eastern Hokkaido and the water temperature condition of the route ~

We investigated particles transported from the east coast of Kamchatka Peninsula to the coast of eastern Hokkaido by analyzing results of particle-tracking experiments of Kuroda *et al.* (2021a) that the origin is assumed to be the red tide on Kamchatka Peninsula occurred in 2020. The majority of the particles shed from Kamchatka Peninsula were transported southwestward along the Kuril Islands, partly through the Sea of Okhotsk and partly through the Pacific coast to the eastern Hokkaido coast. It is possible that *K. selliformis* that followed this pathway, which had lower water temperature conditions that were more severe than those along the eastern Hokkaido coast, could not survive. On the other hand, an extremely small number of particles were transported off the coast of eastern Hokkaido via a pathway that experiences milder water temperatures than the eastern coast of Hokkaido, and remained off the coast of eastern Hokkaido from early June to mid-August. This extremely vulnerable route might have been the transport route from the Kamchatka coast.

A-632 Akira MIYAZONO, Daichi ARIMA, Yoshinori NISHIDA, Tomoaki YASUNAGA, Ryo INAGAWA, Shinichi MOTOMAE, Yutaro ANDO and Takashi FUJIOKA

Fluctuations in dinoflagellates, diatoms, and tintinnid ciliates at ports along the Tokachi coast of the Pacific coast of Hokkaido and the appearance of diatoms off Hokkaido in years when the harmful red tide algae *Karenia selliformis* did not occur

The prevalence of dinoflagellates, diatoms and tintinnid ciliates in the Otsu Fishery Port and Tokachi Port on the eastern coast of Hokkaido and the occurrence of *Karenia selliformis* and diatoms off the coast of the Sea of Okhotsk and the Pacific Ocean in Hokkaido were investigated in the year after the *K. selliformis* red tide occurrence. The appearance of diatoms in Otsu Fishery Port and Tokachi Port was greatly affected by the

light environment, and the number of cells was high in June-September and low in September-November. At the beginning and end of dinoflagellate blooms in spring and summer-autumn, diatoms decreased and increased, respectively. A comparison of the size of dinoflagellates and loricae sizes of tintinnid ciliates suggested that the increase in tintinnid ciliates at the end of dinoflagellate blooms was not a predator-prey relationship. In 2022, *K. selliformis* will not appear on the coast or offshore of Hokkaido, and diatoms will appear at a density of 10^3 cells mL⁻¹ or more in the offshore area of the Pacific Ocean from August to September.

A-633 Shiori SONOKI

Development of a random forest-based classification model for large seaweed communities using the fishery acoustic method and underwater camera imaging

Hokkaido is a major kelp-producing region in Japan; However, in recent years, a decreasing trend in the number of fishermen and a reduction in production due to climate change has been observed. To assess the status of kelp species, obtaining both spatial and quantitative information is essential. Acoustic measurements provide information on distribution areas, but fall short in distinguishing the types of communities. In this study, we developed a random forest- based classification model for five large seaweed/seagrass species using acoustic measurements and underwater camera observations. The discrimination model for valuable and non-valuable kelp achieved high accuracy, whereas the models for Sargassum and eelgrass demonstrated moderate the accuracy, enabling accurate classification of the four communities based on fishing data.

A-634 Minoru SANO

Availability of natural increases for defining catch limits of sea cucumber *Apostichopus armata* in northern Hokkaido coastal areas

Population size, catch, and natural increase in the sea cucumber *Apostichopus armata* were estimated in three coastal areas of northern Hokkaido, Japan, based on dredging data (swept-area method) collected between 2008 and 2017. Natural increase was estimated as the difference in the population sizes of the two annual cohorts, where the population size of the second cohort was the difference between the overall population size and catch of the previous year. The results showed that population size decreased annually in areas where the mean annual catch exceeded the annual natural increase. Conversely, the

population size increased every year in areas where the mean annual catch was less than that of natural increase. Therefore, stock managers can use natural increase to define catch limits for *Apostichopus armata*.

A-635 Yasufumi HADA, Shotaro SAKIMURA and Koji MIYOSHI

Relationship between the high growth rate of sown scallops *Mizuhopecten yessoensis* in 2021 and environmental factors in the Okhotsk Sea coast off Hokkaid

We report the rapid growth of the Japanese scallop (*Mizuhopecten yessoensis*) in the coastal area of the southern Okhotsk Sea, Hokkaido, Japan, in 2021. Based on monitoring data for the past 29 years and previous studies, it was suggested that the high growth rate in 2021 might be promoted by a favorable feeding environment due to the intrusion of dichothermal water from the Okhotsk Sea to the coastal area, with optimum water temperature in spring and moderate current velocity for feeding.

A-636 Mitsuru TORAO

Low water temperatures decrease the motility of chum salmon fry after seawater transfer (short paper)

The effects of low water temperature on the motility of chum salmon *Oncorhynchus keta* fry after seawater transfer were examined in a rearing experiment. After freshwater rearing, chum salmon were reared in artificial seawater at 2°C, 4°C, and 8°C for 3 days. After rearing in seawater, the motion distance (MD), nearest neighbor distance (NND), and separation angle (SA) were measured via video analysis. The MD was 15% lower at 4°C and 50% lower at 2°C than at 8°C, which is the optimum water temperature range for chum salmon. NND was markedly greater in the 2 °C treatment. SA indicated the maintenance of the schooling structure and no significant differences among the three treatments were observed. These results suggest that the motility of chum salmon after seawater transfer is reduced at low water temperatures.

Effect of sea surface temperature on migration pathways and return rates of salmon to the Chitose River, Hokkaido, Japan (short paper)

The contribution of sea surface temperature (SST) to variations in salmon return rates was investigated for the Chitose River, located in the northern Sea of Japan, Hokkaido, Japan. Spearman's correlation coefficients between SST and salmon return rates were not significant in April in the Ishikari River off. This suggests that the variation in return rates was less affected by sea entry. In contrast, on the Sea of Okhotsk side, a positive correlation was observed in May and a negative correlation in late June, when SSTs were above the lower habitat limit (5°C) in May and reached the upper habitat limit (13°C) in late June. These results indicate that the variation in return rates may be related to the SST for the length of possible residence time on the Sea of Okhotsk side, which is a migratory pathway.