

Evaluation of the influence of swans, *Cygnus cygnus* on the distribution of seagrass, *Zostera japonica*

*Yoshiyuki TANAKA¹, Fumiyuki SATO¹

1. Hachinohe Institute of Technology, Department of Life and Environmental Science

Distribution and biomass of seagrass are changed by various environmental factors. Grazing pressure by animals is one of the factors. It is pointed out that *Zostera japonica* growing on the shallow coast of Kominato in Aomori prefecture is affected by Grazing pressures of swans that come every winter. In this study, we investigated seasonal change of *Z. japonica* in the shallow area and seasonal change of biomass, and analyzed feces of swans, and evaluated the influence of swans on the distribution of *Z. japonica*. In July, October, November, December 2018, line transect survey was conducted to measure the presence or absence of seagrasses at 57 fixed points, and at some sites seagrass shoots within 20 cm * 20 cm frame were collected, shoot number and biomass was recorded. We also carried out aerial photographs using a drone. In February and March 2018, the feces of the swan was collected, the content of the feces was visually analyzed, and carbon and nitrogen stable isotope ratio analysis was also conducted. As a result of presence or absence survey, the distribution point decreased in November compared with October, and almost disappeared in December. A sharp decline was confirmed even in the Drone images. The shoot number of seagrass slightly decreased from July to October, while the weight of the underground part did not change much, whereas the weight of the aboveground part slightly increased. The shoots number of *Z. japonica* in October to November, the weight of the aboveground and the belowground decreased sharply. Plant pieces and seaweed pieces were confirmed as fecal contents in February and rice hulls were confirmed in March and in the isotopic ratio analysis, changes in food quality were confirmed between February and March. It is inferred that the influence of predation by swans and other migratory birds was great for wide range and sudden reduction of distribution and biomass. Because biomass of the *Z. japonica* becomes extremely small in December, it is reasonable to think that the swans during overwintering depends on bait other than the *Z. japonica*. It was suggested that in December and March before and after paddy fields were covered with snow, it depended on the heading of paddy fields.

Keywords: seagrass, swan, *Cygnus cygnus*