

Seasonal changes of cladoceran community in Lagoon Notoro-ko, Hokkaido in 2014

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Marine cladocerans exhibit a very low diversity with only eight truly oceanic species, which belong to a family Podonidae with an exception of a species in the genus *Penilia*, in contrast to the prosperity of cladocerans in fresh water environments. Marine cladocerans are widely distributed from tropical to boreal waters and seasonally abundant in estuaries and neritic waters. Marine cladocerans, like most of their fresh water species, alternate between gamogenetic and parthenogenetic reproductions and increase their biomass within a short limited period with an important role in seasonal local zooplankton community. Annual cycles of abundance have been reported for many populations of marine cladocerans from tropical to temperate waters, which exhibit distinct patterns of abundance in relation to temperature and salinity. However, available biological and ecological information of marine cladocerans in the area of Okhotsk Sea is very limited. The present study aimed to clear the species composition, timing of the appearance and abundance of the marine cladocerans in Lagoon Notoro-ko opening into the Okhotsk Sea and analyzed the life cycle, reproductive strategy and ecological niche of the component species. Sampling was conducted at the deepest site (21 m water depth) of Lagoon Notoro-ko (44°3' 2.1' N, 144°9' 38.8' E) during a period from 8 May to 10 December 2014. Zooplankton, collected by vertical haul from a depth of 15 m to the surface using a 45-cm diameter 100- μ m mesh NORPAC net, were preserved in 5% (v/v) buffered formalin. All cladocerans were sorted under a dissecting microscope and classified to species level. Vertical profiles of temperature and salinity were recorded using a CTD. Water temperature and salinity of the site during the sampling period ranged from 2.6 to 22.4°C and from 30.3 to 33.6 psu, respectively. From a view point of the vertical profiles of water temperature and salinity, some effects of the Soya Warm Current (SWC) started from June with a peak in August and September, and then dropped in temperature as a consequence of the flow of the East Sakhalin Current (ESC) in late October. Five species from the family Podonidae were identified in Lagoon Notoro-ko, namely, *Evadone nordmanni*, *E. spinifera*, *E. tergestina*, *Podon leukarti* and *P. polyphemoides*. Although cladocerans occurred over an entire period of the observation, total biomass increased with the increase in the effect of the SWC with a peak in summer and decreased with the influence of the ESC in general. One of the dominant species, *E. nordmanni*, appeared during the entire warm period from June to December with a maximum density of 1,297 indiv./m³ in July. The timing of the appearance of the additional dominant two species, *P. leukarti* and *P. polyphemoides*, were different each other. The maximum densities of *P. leukarti* and *P. polyphemoides* were 660 indiv./m³ in June and 4,109 indiv./m³ in October, respectively. The species *E. spinifera* and *E. tergestina* appeared during a short periods from August to September and from September to October, respectively, with low densities less than 100 indiv./m³. In the present study gamogenetic individuals carrying resting egg in their hemocoel were found in three species, *E. nordmanni*, *P. leukarti* and *P. polyphemoides*, together with more prevalent parthenogenetic females. The resting egg production is considered as an effective reproductive strategy for the maintenance and survival of population in the lagoon under the effects of the inflow currents in the cold boreal area. The occurrence of different species may primarily be regulated by abiotic factors such as temperature, salinity and the effect of the current flow into the lagoon in addition to their reproductive life cycles.