

Development of Network Visualization Technique for Habitat Regeneration to Make Organisms in an Inner Bay Prosper in the Long Term

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1. Introduction

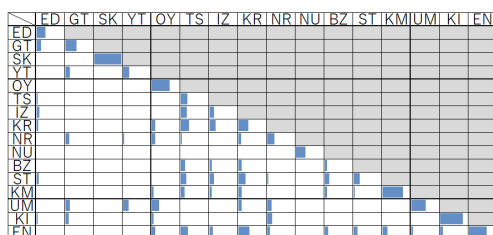
When regenerating habitats due to the decline of various organisms in port areas, spatial arrangement of habitats is required in consideration of the network among habitats formed by the movement of organisms instead of only increasing habitats. The network is an important system for organisms that maintain population persistence by moving between habitats for reproduction, growth, or adaptation to environmental disturbances (such as blue tides).

Here, we introduce a technique for estimating and visualizing the habitat networks based on the kinship of common snails (the Japanese mud snail *Batillaria attramentaria*) in the inner bay.

2. Estimation of Kinship in Snails

Microsatellite analysis (analysis to estimate the number of repeated DNA units) was performed on Japanese mud snails at 16 sites (15 individuals per site) inside and outside Tokyo Bay to estimate the degree of relatedness based on the concordance rate of genetic types (Table).

Table: Mean degree of relatedness of habitat pairs (the longer the blue bar (relatedness > 0), the more likely the network is to form)



3. Network Visualization

On the assumption that a network will be formed between habitats with a degree of relatedness exceeding 0,

the network structure was visualized by depicting the results of the network analysis on a map together with information on the population size of snails forming the networks and the grouping of habitats based on network characteristics by community analysis (Figure).

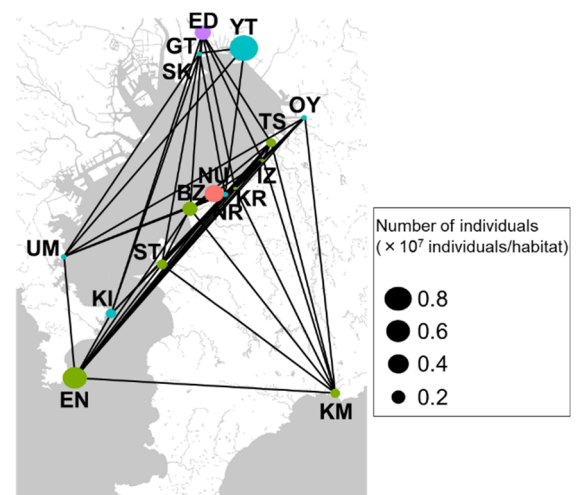


Figure: Network structure of Japanese mud snails inside and outside Tokyo Bay. (The circle size represents the total population of the snails per habitat, and the color represents the grouping.)

4. Conclusion

Results in the present study will be used in the future to identify the features of seascape (coastal habitats composed of various environmental types) that contribute to the enhancement of habitat networks of diverse organisms ecologically similar to Japanese mud snails. Based on the identified seascape features, it is expected that habitat-regenerating sites will be extracted, and this is effective in improving the persistence of organisms in an inner bay.