



Oceans Apart, Part 1: Comparing Biogeographic Patterns of Estuarine Invasion in the Northeast Pacific and the Baltic Sea

H Lee II (1), D. Reusser (2)

(1) Pacific Coastal Ecology Branch, Western Ecology Division, NHEERL, U.S. Environmental Protection Agency, Newport, OR 97365 U.S.A. (2) Western Geographic Science Center, U.S. Geological Survey, Seal Rock, OR 97376 U.S.A.

The invasion of biogeographic regions by aquatic nonindigenous species is a phenomenon resulting from processes operating on a global scale leaving countries around the world grappling with how to understand, contain, and control this growing problem. In this study, we investigate the biogeographic patterns of known invaders in the Baltic Sea and U. S. Pacific coast to identify similarities and differences in the origin and taxonomic structure of the invaders. This comparison was greatly simplified by the advent of two regional invasive-species databases: the Pacific Coast Estuarine Information System (PCEIS), which synthesizes data on native and nonindigenous estuarine/coastal species on the U. S. Pacific coast, and the Baltic Sea Alien Species Database. We hypothesize that the Baltic Sea, the world's largest brackish-water body with a long invasion history, can serve to identify patterns of invasion in low-salinity regimes, as well as, to identify potential new brackish-water and euryhaline invaders in the Northeast Pacific.

Even though these two biogeographic regions are literally half a world part, they share a surprisingly high percentage of nonindigenous species. Of 51 nonnative macrobenthic species in the Baltic Sea, 23 (45%) also occur in estuaries of the U. S. Pacific coast. The native origins of these shared invaders are generally from two main areas: eight from the Northeast Atlantic (U. S. east coast) and nine from the West Pacific. The Ponto-Caspian region contributed only 2 species to both the Baltic Sea and the U. S. Pacific coast. In contrast to the native origins of nonoverlapping species, which are dominated by Ponto-Caspian invaders (19), with other invaders coming from the

Northeast Atlantic (5), Africa (3), the West Pacific (2) and the North Sea (1). The small number of Ponto-Caspian invaders on the U. S. Pacific coast reflects the freshwater composition of the region. Nonetheless, three Ponto-Caspian invaders are established in the higher-salinity (~10-25 psu) regions of the Baltic Sea. Given their invasion history in the Baltic Sea, these species (*Corophium curvispinum*, *Hemimysis anomala*, and *Palaemon elegans*) represent potential invaders in the brackish-water habitats of the U. S. Pacific coast.

Although the nonnative fauna of the Baltic shows considerable overlap with that of U. S. Pacific coast, the taxonomic composition of invaders in these two regions differ in several ways. Hydroids constitute a higher percentage and polychaetes a lower percentage of the invaders in the Baltic Sea relative to the U. S. Pacific coast, presumably reflecting the lower-salinity regime of the Baltic Sea. The nonnative amphipods in the Baltic Sea primarily belong to the family Gammaridae, in contrast to the predominance of corophiid amphipods on the U. S. Pacific coast. This difference may partly relate to the invasion histories of the Baltic Sea, where five of the six gammarids stocked in the 1950s were introduced in hopes of increasing fish populations.