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A biostratigraphic record of Anthropocene ecological change in one of the world's most invaded aquatic ecosystems, San Francisco, CA.

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Modification of ecosystems through the introduction of non-native species (neobiota) is one part of the major human impact on the biosphere. Neobiota are now present worldwide and often significantly outnumber native fauna and flora. In many places they have left a distinctive biostratigraphic record of anthropogenic changes to the biosphere in the 20th century. Few ecosystems have been as severely affected by the arrival of neobiota as San Francisco Bay. Some 234 introduced species comprising up to 97% of individuals and in some places up to 99% of the biomass are known to be present in the bay (Cohen and Carlton, 1998). Among the multitude of neobiotic species established are *Trochammina hadai*, a benthic foraminifer that is native to Japan and was introduced in 1983 (McGann 2008), and *Potamocorbula amurensis*, a bivalved mollusc native to the Amur River region of East Asia that was introduced in 1986 (Carlton *et al*. 1990). Here we present sediment core data showing the arrival and proliferation of *T. hadai* and *P. amurensis* in addition to three introduced ostracod species, *Spinileberis quadriaculeata*, *Eusarsiella zostericola* and *Bicornucythere bisanensis*. The introduction of *T. hadai* is thought to have occurred through ballast water exchange from trans-Pacific shipping, and has produced a major perturbation to the foraminiferal record of San Francisco Bay. Pb-210 radiometric dating has established a high-resolution chronology for the core and analysis of fly ash particles (Rose 2015) emitted from coal-fired power stations allow time horizons, and the chronologies they define, to be correlated to a further 18 cores collected across the bay. This quantifies both the temporal and spatial extent of a human-induced biostratigraphic assemblage of neobiota, one that is correlatable with a biostratigraphic record of changes to ecosystems across the world in the late 20th century.

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