How Bioinvasions Have Changed the Benthic Community; and a Recent Oyster Invasion

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Part 1: Extent and Impacts of Biological Invasions
Part 2: Invasions and Sediment Processes
Part 3: A Japanese Oyster in San Francisco Bay
Part 1:
Invasions in the Bay
234 exotic organisms in the San Francisco Estuary
- 165 in the Bay
- 83 in the Delta

Across many important habitats exotics account for:
- most or all of the common species
- most of the individuals
- most of the biomass
Accelerating Invasions

Cumulative Number of Exotic Species

A new species every 55 weeks before 1960.

A new species every 14 weeks after 1960.
Figure 17. Proportions of introduced and native species relative to total biomass (wet weight) of mollusks in major subareas of San Francisco Bay (averages from four to seven stations per subarea, three samples per station). These proportions assume that *Macoma balthica* is a native species, an assumption that may be invalid; see text.
Bankia in piling at Oakland, in for 5 mo in 1923
Major Impacts on Human Activities

- Infrastructure Impacts
- Indirect Impacts via Endangered Species
- Introduction of Pathogens
Part 2:
Invasions and Sediment
Part 2:
A Japanese Oyster in San Francisco Bay
Possible Vectors

- Larval drift from commercial oyster farms in other bays (e.g. Drakes Estero, Tomales Bay)
- Larvae carried in ballast water
- Spawning adults attached to a boat or ship hull
- Illegally planted adults (e.g. San Rafael)
- CDFG experimental cultivation (1981 and earlier)
- Spawning adults in bioaccumulation studies (RMP, BCTCP & LEMP 1991-2002)
Possible Impacts in SF Bay

• Alter intertidal/subtidal habitat

• Out-compete, impair the growth of native oysters

• Reduce phytoplankton biomass and productivity, limiting food for pelagic and benthic species