

Invertebrates

Pipi and cockles

Filter feeding shellfish – cockles and pipi – increasing suspended sediment loads

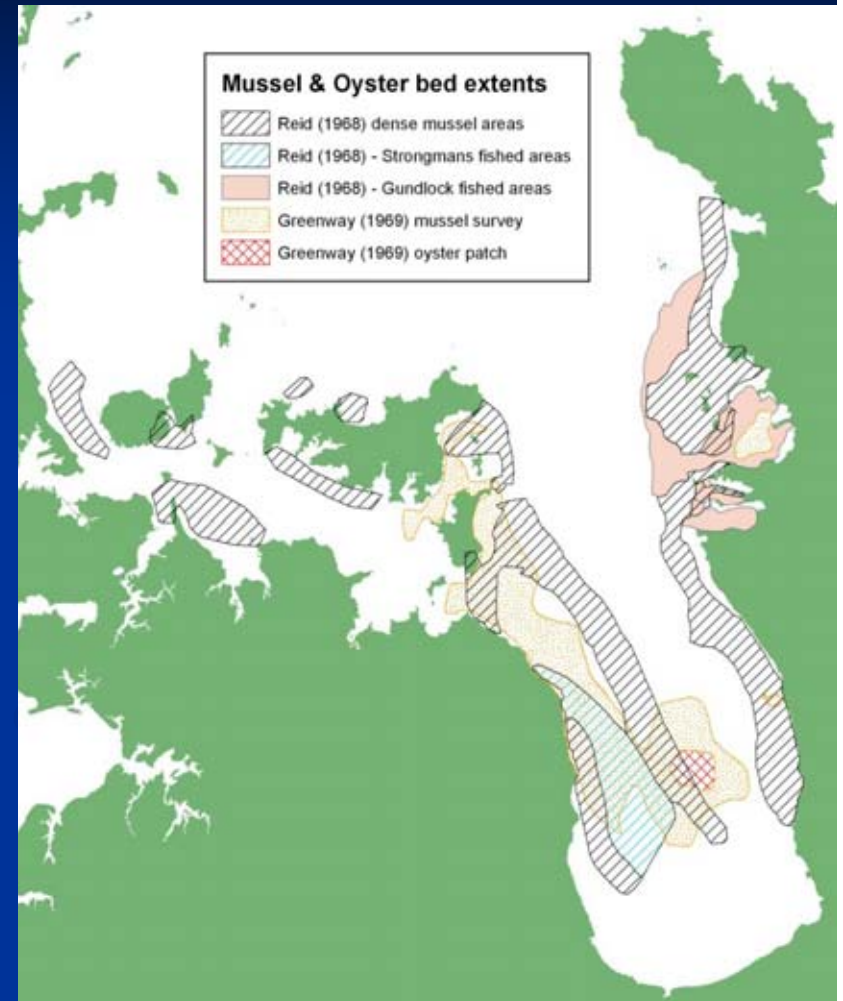
- Responses → decreases in clearance rates, oxygen consumption, and growth
- Numerous anecdotal accounts of substantial declines in abundance around New Zealand
- Anderson (2008) – clear sediment preference curves - the optimum mud percentage for pipi 3.4% (confidence intervals (CI), 3.3, 3.5), cockles more tolerant at 11.3% (CI 7.7, 14.8)
- Review of MFish intertidal shellfish time series by Grant & Hay (2003):
- *“Overall, the majority of sites surveyed over the various studies show decreasing trends in inter-tidal infaunal bivalve abundance. However, the small quantity of robust data available makes generalisation to the Hauraki Gulf Marine Park as a whole inappropriate. We note that observation of the depletion of infaunal inter-tidal shellfish stocks in the Hauraki Gulf Marine Park region appears to be supported by a substantial body of anecdotal evidence”*

Toheroa and scallops..

- Toheroa
 - Substantial populations declines, fishing strong driver; lack of recovery since fishing ceased decades ago..
 - Possible theories → ongoing poaching, vehicle traffic: environmental changes, both oceanic and land-based
- Scallops:
 - Observations of large scale scallop mortalities in the Kaipara Harbour, after periods of heavy rain-fall, extensive brown water discoloration (Nesbit 2003). Scallop shell death assemblages
 - Tank-based experiments showed strong negative responses of gill tissue to increasing suspended sediment concentrations (Stevens 1987)
 - Scallops held in Near Bottom High Turbidity (NBHT) layer in Tasman Bay ceased feeding, scallops outside continued to feed (Gillispie & Rhodes 2006)

Green-lipped mussels

- Substantial dredge fishery, 1920s – 1960s, in inner Hauraki Gulf and Firth of Thames
- Fishery ceased in mid 1960s, as populations gone
- No recovery (targeted surveys for green-lipped mussels in 2003 using acoustics and video) after more than 40 years
- Experiments suggest the fine sediment nature of the seafloor is preventing re-establishment of beds – lack of settlement surfaces for larvae, and/or settlement cues
- Green-lipped mussels provide important ecological functions as a biogenic habitat e.g. nursery habitat, biodiversity and secondary productivity



Paua and Kina

Larval and settlement phases

- Mortality rates of kina larvae increased with suspended sediment concentrations, but decreased with age. Paua similar, but older larvae continued to experience high losses when exposed to sediments.
- Argued that even transient exposure would result in substantial mortality effects (Phillips and Shima 2006)
- Kina adults and juveniles more abundant on wave-exposed reefs. New recruits undetectable at sheltered reefs. Lab-based experiments showed that fine sediment concentrations \rightarrow 1/3 to 2/3 that of field measures inhibited larval settlement, reduced survival of both recruits and juvenile kina (Walker 2007)

