Tackling invasive species through community action - Dr Matt Ashley(NE)

Precis of talk delivered to Salcombe-Kingsbridge Estuary Forum Sept'17

Pacific oyster monitoring & control in SW marine sites

The Challenge - Pacific oysters (aka 'rock oysters) *Magallana gigas (nee Crassostrea gigas)* are native to south east Asia and Japan. In 1965 the Ministry of Agriculture, Fisheries and Food introduced them from Canada to their fisheries laboratory at Conwy to find an alternative species to supplement the shellfish industry following the decline of the native oyster.

The trials confirmed the hardiness and fast growth of Pacific oysters in UK waters and commercial hatcheries and cultivation sites were established around the UK.

Pacific oysters were not considered capable of proliferation in northern Europe as water temperatures in excess of 20°C are necessary for reproduction. However, rising sea temperature, warmer summers and milder winters may be factors contributing to the spread of the species and in 1994, wild populations of Pacific oyster were recorded in Devon and further populations were found in Essex and Kent.

In recent years (in 1994, wild populations of Pacific oyster were recorded in Devon and further populations were found in Essex and Kent. In 2007 surveys in Ramsgate. Kent recorded densities much higher than expected. *) wild populations are becoming established. Density increasing rapidly and risk of reefs forming, previously only seen in France, Belgium…*

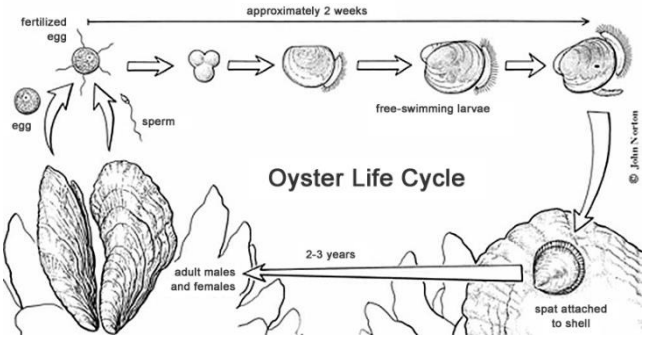
Resistance to disease and parasites as well as native oyster aquaculture operations being affected by Bonamia parasite infections and TBT scares in the 80s and 90s

In Oosterschelde, Holland, during the warm summers of 1975 and 1976, natural reproduction occurred. This developed into the colonization of the Oosterschelde and other Dutch estuaries in the 1980's (Nehring 2006)

- First introduced ~a century ago.
- An increase in commercial cultivation since the 1960s. Reproduction not considered possible unless water temperatures exceeds 20ºC.
- **1970s:** Wild populations occur in the Netherlands.
- **1990s:** Wild populations observed in Devon, Essex and Kent.
- **2007:** Ramsgate, Kent: Wildlife Trust and NE surveys identify higher population levels than expected.

- **2012 – 2013:** Oyster removal methods trialed in Kent.
- **2014 – 2015:** High densities recorded in Yealm, Helford and Fowey.
- **2016 – 2017:** Monitoring combined with removal methods in Devon and Cornwall in response to high densities.

Life Cycle in relation to UK conditions – what do existing studies tell us?

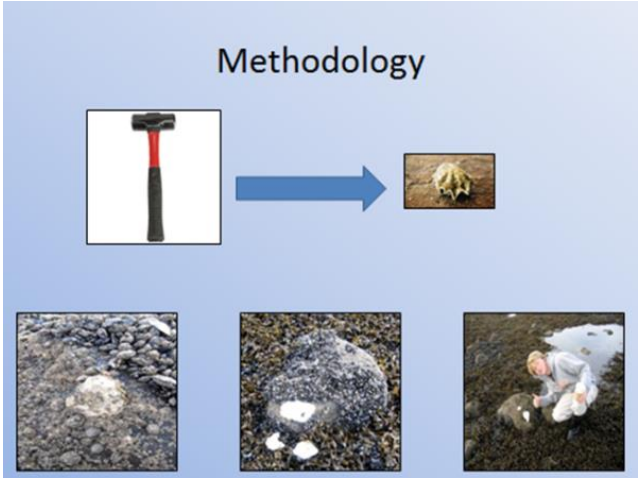


- Spawning was suggested to occur at 20ºC, but research suggests lower threshold temperatures are possible.
- Spawning at 16ºC (whilst often considered sub-optimal) is possible.
- Larvae have been observed to survive to metamorphosis and settlement at 14ºC in laboratory conditions.
- Larvae reported not to survive well in the wild below 15ºC, though observed in low densities at 13ºC**.**
- Conditions for settlement may not occur every year.
- Conditions are likely to be more common under effects of climate change.

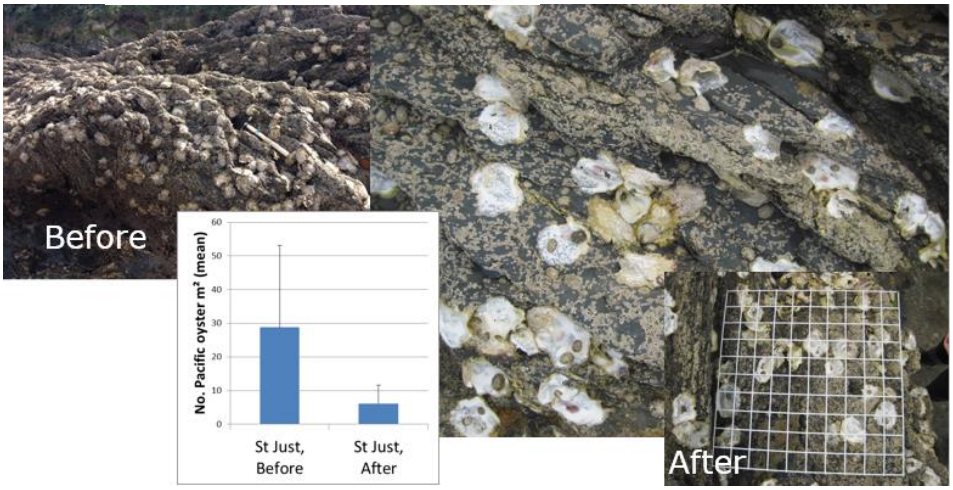
Establishment of wild populations

- Introduction of larvae from ballast water.
- Spawning stock attached to vessel hulls.
- Stock from aquaculture operations.
- Discarded oysters originally bought for consumption
- Larvae arriving from other areas.
- Conditions to allow spawning and settlement.

Pacific oyster monitoring and control



Welder's chipping hammer was found to be very effective at Yealm estuary event Feb '17

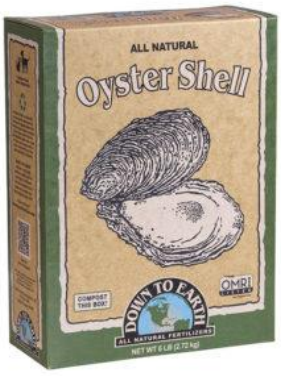


Management - *What is realistic and what can be achieved?*

- *Prevent the spread of populations rather than complete eradication.*
- *Do nothing and the problem will keep expanding.*

Trials appear to have been effective, as during the period of the trial, oyster numbers decreased within the trial area but increase in the three control sites. There was little change in shell size at the three control sites between 2012 and 2013, but at the trial site oyster shells were significantly smaller after the trial than they had been before the removal experiment.

Management: *Beneficial uses of removed oysters*



Blood, fish & bone – 'all-round organic fertilizer of choice - whether for feeding plants in beds and borders or applying with a wheeled distributor to the lawn. Old-fashioned it may be, but being organic it feeds soil bacteria and has produced for me a healthy and flourishing garden.' - *Alan Titchmarsh*

Growing Natural Capital: *Ecosystem service winners and losers from feral Pacific oyster populations*

+ve – use as fertiliser, biological filtration of estuarine waters

-ve – change is species, communities and habitat features, recreation & tourism – potential risk to health & safety, cost of removal once dense aggregations formed

Priority knowledge needs

- Trialling control of spread of wild populations.
- Monitoring of effectiveness of control methods.
- Identification of hotspots and control of settlement.
- Mapping of larvae transport pathways over sea basin and estuary scales to establish the source of populations, and future distributions.
- Genetic analysis of populations across sites to detect source population.

- Monitoring of contributing environmental factors (*degree days above threshold temperatures, water temperature, air temperatures, salinity, current strength, food availability, wind direction and strength*).

Plymouth Sound and Estuaries SAC case study - *Role of Partner Organisations and Volunteer Groups*

- Recording hotspots of settlement.
- Looking at settlement of juveniles (less than 6cm) and recording shell size of existing populations.
- Joining the local area team on surveys (all year) and population control events (winter).
- Building links with processors and developing solutions for effective clearance.

Precis prepared on behalf of:

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