

THE IMPACT OF MICROBIOLOGICAL CONTAMINATION ON THE DEVELOPMENT OF SHELLFISH FARMING IN ENGLAND AND WALES

Introduction

- Bivalve molluscs obtain nutrients from the water column by filtration of small particulate material
- They concentrate many contaminants, including microbial pathogens
- These pathogens arise mainly from contamination of the environment with human or animal faecal material
- Such faecal contamination is the most significant cause of shellfish-associated human illness
- In the UK, viral gastro-intestinal illness predominates

Hygiene Controls

European Shellfish Hygiene Directive (European Communities, 1991)

- Implemented in England, Wales and Scotland under the Food Safety (Fishery Products and Live Shellfish) (Hygiene) Regulations 1998 (as amended).
- Extent of faecal contamination in shellfish is monitored using *Escherichia coli*
- Harvesting areas are classified according to the results of this *E.coli* monitoring
- Treatment processes for the shellfish are determined by the classification category
- Microbiological end-product standard: 230 *E.coli* /100g of shellfish flesh and absence of salmonella in 25g.
- These controls create financial pressures for industry and restrict the development of shellfisheries
- Outbreaks of viral illness associated with shellfish that fully comply with the current hygiene legislation still occur. This is at least partly due to the reliance on bacterial indicators of faecal contamination and partly to the fact that conventional depuration techniques do not completely and consistently remove viral contaminants (Doré and Lees, 1995)

Table 1: Classification criteria for shellfish harvesting areas

Category	Standard	Treatment required
Class A	<230 <i>E.coli</i> or 300 faecal coliforms	may go direct for human consumption
Class B	<4,600 <i>E.coli</i> or 6,000 faecal coliforms (90% compliance)	must be depurated, heat treated or relayed to meet class A requirements
Class C	<46,000 <i>E.coli</i> or <60,000 faecal coliforms	relay for 2 months in a designated class A or class B relay area-may also be heat treated
Prohibited	>46,000 <i>E.coli</i> or >60,000 faecal coliforms	harvesting prohibited

Relaying = relocating shellfish to an area with better water quality for hygiene purposes
Depuration = controlled process involves placing shellfish in a purpose-made tank filled with seawater for 42 hours. During this time, water is circulated through an ultraviolet disinfection unit while the shellfish naturally excrete the microbiological contaminants that they have accumulated in the harvesting area.
Heat Treatment = Approved process is to cook the shellfish meat at 90°C for 90 seconds

Harvesting Area Category	Proportion in 2001 Classification
Class A	4%
Class B	72%
Class C	21%
Prohibited	3%

Table 2: Classification of shellfish harvesting areas in England and Wales as at 1 September 2001: proportion in each category



Depuration System



Heat Treatment



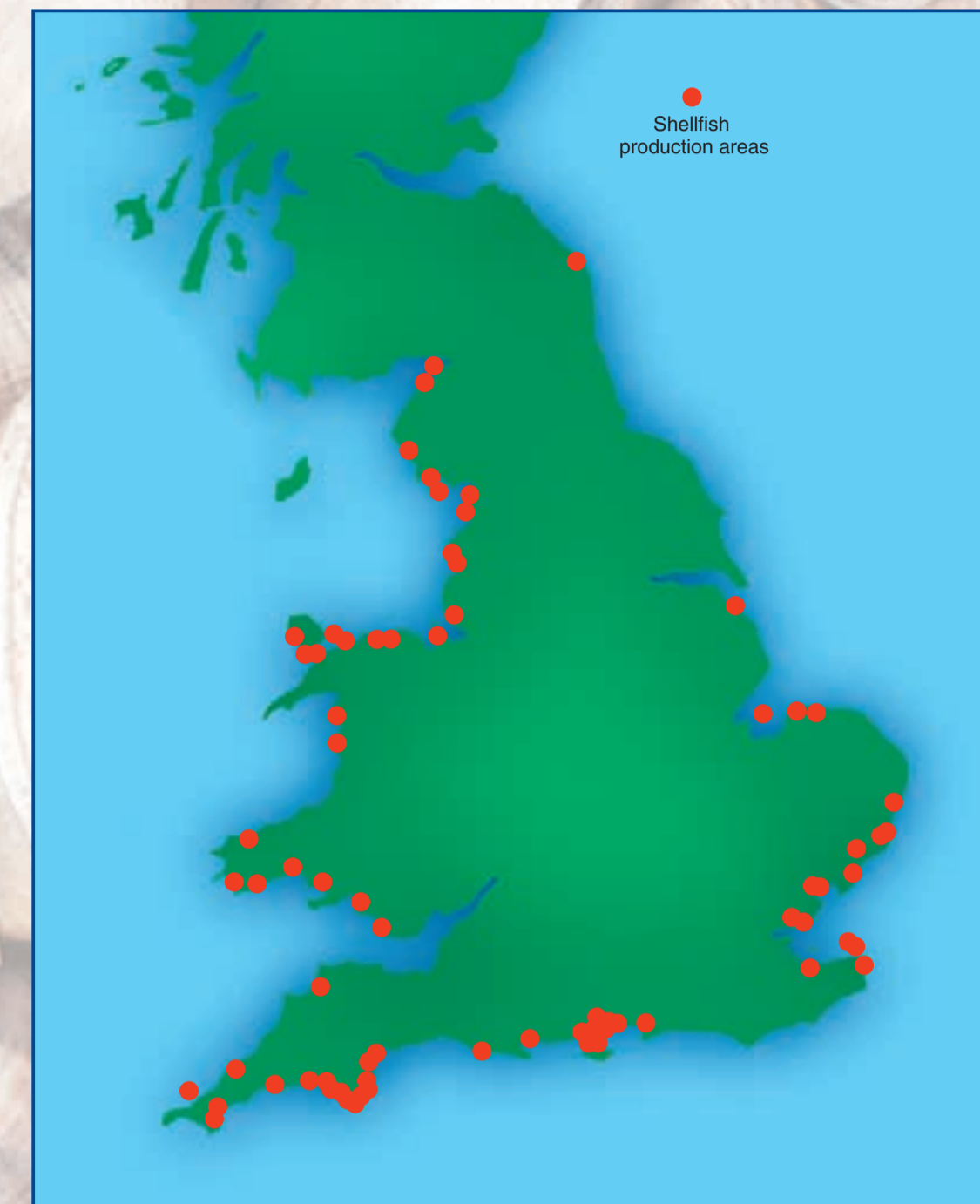
Pollution of the environment

Selection of a mariculture site from a shellfish hygiene perspective

- Visually inspect the surrounding area for outfalls, storm overflows, river and stream inputs and agricultural run-off
- Contact the local Environment Agency office for information on the location of consented outfalls/overflows and on water quality
- Contact the local Environmental Health Department (EHD) or Port Health Authority (PHA) to obtain up-to-date information on shellfish hygiene requirements and further information on water quality
- If other factors appear favourable, then undertake preliminary monitoring of shellfish of the species in question
- If monitoring indicates that the area may conform to a class A or class B classification then the EHD/PHA should be contacted regarding formal monitoring towards a provisional classification. Classifications are issued by FSA on the basis of advice from CEFAS Weymouth.



Shellfish farming operation



Designated shellfish production areas in England and Wales

Conclusion

- Mariculture in a Class C area may not be economically viable.
- The classification of areas only just conforming to the upper limits for class B may be more likely to change.
- As the extent of contamination reduces towards class A compliance, the risk of illness associated with harvested shellfish will also decline, although zero risk may be unobtainable for shellfish eaten raw.

CEFAS has produced a booklet giving guidance on many of the other aspects which should also be taken into account (Laing and Spencer, 1997).

References

- Doré W. J., D. N. Lees. Behaviour of *Escherichia coli* and Male-Specific Bacteriophage in Environmentally Contaminated Bivalve Molluscs before and after Depuration. *Applied and Environmental Microbiology*, 1995; 61: 2830 - 2834.
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- Food Safety (Fishery Products and Live Shellfish) (Hygiene) Regulations 1998. Statutory Instrument 1998/994. House of Commons Library, London.
- Laing I. and Spencer B. 1997. Bivalve cultivation: criteria for selecting a site. Lowestoft: Centre for Environment, Fisheries and Aquaculture Science.