

Solent Water Quality Conference 2010



Microbiological Water Quality and Bivalve Molluscs

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Overview

In this presentation microbiological water quality and its significance for bivalve molluscs is considered, with reference to the requirements for monitoring shellfish waters and bivalve mollusc harvesting areas. Examples of past achievements in improving water quality as reflected in the results of monitoring bivalve molluscs in the Solent are given. Current issues concerning microbiological water quality are highlighted to provide a better understanding of the challenges in maintaining favourable microbiological water quality and successful targeting of improvements necessary to support shellfish production in the future.

Significance of Faecal Pollution

Faeces from both humans and animals can be a source of pathogens that may be transmitted to man via contaminated bivalve molluscs. Although human faeces may be seen as presenting a higher risk, several pathogens that infect humans can be present in animal faeces.

A comparison of human and animal faecal indicator concentrations excreted in the faeces of warm-blooded animals indicates that many birds, agricultural livestock and domestic animals (e.g. gull species, cattle, sheep, pigs and dogs) excrete daily loads of faecal indicator bacteria of a similar or higher order of magnitude than that of humans. Animal inputs to river catchments draining to coastal water fisheries may, therefore, present a potential source of contamination representing a potential public health risk.

Within the Solent there are many sewage discharges (both continuous and intermittent) impacting upon shellfisheries. Despite many of the continuous discharges having been re-located away from the shellfish growing and harvesting areas and others receiving an improved level of treatment, there are some which still require further improvement. In addition to this and owing to a legacy of combining surface water drainage and foul and sewage in the same sewerage network, heavy rainfall often overloads the sewerage network and leads to spills from 'storm overflows'.

Diffuse pollution associated with runoff following spreading of bio-solids (manures and sewage sludge) on agricultural land may also contribute to microbiological loads in shellfish waters.

Many of the estuaries and inlets used for shellfish cultivation and harvesting are also used for sewage disposal. Shellfish are efficient sieves; oysters can filter 10-24 litres per hour. Pathogens may be concentrated and retained and depuration/purification is not 100% effective. Some shellfish are eaten raw or lightly cooked and outbreaks of disease are therefore possible.

Legislation & Monitoring

The Shellfish Waters Directive limits chemical and bacterial levels in designated waters in order to protect shellfish and this helps to protect consumers' health indirectly. Under this Directive there is an obligation to "endeavour to observe a Guideline" microbiological standard (in shellfish flesh).

Under European Hygiene Regulation (852-4/2004) identification and monitoring/classification of shellfish production areas is required. This is based on time series assessment of bacterial indicator *Escherichia coli* (*E. coli*) data in shellfish flesh as *E. coli* is present in animal and human faeces in large numbers. The standard test does not differentiate between animal or human *E. coli* and therefore the effectiveness of *E. coli* is limited as indicator of the presence of viruses which may persist much longer in the environment.

Shellfish beds are classified A, B, C (or prohibited). Each level of classification specifies any post-harvesting controls necessary before bivalves can be placed on the market for human consumption. Ministerial commitments have been given to maintain and improve water quality to support "at least a B hygiene classification" for all shellfish waters.

In the Solent and its tributaries nearly all classified bivalve mollusc production areas fall within designated shellfish waters.

Improvements to Date and Future Challenges

Implementation of EC Directives (notably the Bathing Water, Shellfish Waters, Urban Waster Water Directives), has delivered substantial improvements in coastal microbiological water quality to date. However there are still some class C areas and vulnerable class B areas which require improvement and protection. Future legislative challenges include achieving and maintain compliance with European Directives, and in particular development of appropriate microbiological standards under the Water Framework Directive. The Water Framework, Marine Environment Strategy and revised Bathing Water Directives are expected to delivery further improvements in the future.

Pollution events as a result of accidents and emergency discharges perhaps as a result of failed sewage treatment facilities or infrastructure will continue to occur from time to time.

The principle cause of non-bacterial acute gastroenteritis from food including shellfish is norovirus (NV). Investigations into bivalve mollusc-associated outbreaks suggest that the health risks posed by NV contaminated shellfish are dose-dependent. Level of sewage treatment is therefore important in areas impacted by human effluents. In recent years molecular methods have become available for detection of NV in sewage, sewage effluents, and shellfish. Although these methods are sensitive and now quantitative, they do not provide information on virus infectivity. Viral monitoring is needed to further inform future management and investment decisions.

'Active management' regimes for fisheries in response to periods of poorer water quality have been suggested by some. However as with bathing waters, these would require provision of appropriate real time information and development of reliable predictive tools.

Climate change is also likely to have an affect on water quality. In the UK wetter areas are predicted to become wetter and drier areas drier. Seasonally more rainfall is anticipated in winter and summers will be drier but with more extreme rainfall events. Climate change may lead to more significant sewer overflow and diffuse pollution events and possibly lead to the appearance of other pathogens.

Conclusion

Poor microbiological water quality has the potential to impact on public health. Significant improvements to coastal discharges have taken place over the last couple of decades as a result of the implementation of European legislation targeting bathing, shellfish waters and urban waste water treatment. Implementation of food hygiene controls on bivalve mollusc production has increased food safety. There is still scope for further improvements to improve areas of lower microbiological water quality and to ensure continued compliance of better areas. Effective measures are also needed to prevent pollution from occurring and monitoring of sewer overflows to evidence performance is required. Further water quality improvements and investigations will be delivered under the water company investment plans for 2010-2015.
