Working towards better water quality in partnership with agriculture

Shellfish Association of Great Britain

SEAFISH the authority on seafood

A clear solution for farmers
ENGLAND CATCHMENT SENSITIVE FARMING DELIVERY INITIATIVE

FWAG Farming & Wildlife Advisory Group

NORTH WYKE RESEARCH

Background

UK agriculture spends around £400million/yr on inorganic fertiliser and around 90 millionT/yr of farm manures are returned to the land. Whilst providing a valuable source of nutrients to crops, manure applications can pose a significant risk to the environment in terms of diffuse water pollution. This loses money for farmers and can also have a potentially devastating impact on local shellfisheries.

There are many similarities between farmers and shellfishermen: they both grow food and rely on water. However, what a farmer does upstream can affect a shellfisherman downstream and can be costing them both.

Shellfish, gathered and cultivated in estuarine and coastal waters, must meet strict standards in order to protect human health. This is achieved through the Classification of shellfish harvesting areas and testing of 'end-product' samples. Nutrients entering coastal waters from the land may contribute to algal blooms, whilst faecal microbes from livestock are readily accumulated by shellfish. These contaminants can render shellfish unfit for consumption and lead to closure of harvesting areas for extended periods putting the livelihoods of shellfishermen at risk.

Agriculture is not the only threat to shellfisheries and significant public money has been spent on waste water improvements from sewage discharges. Most of these major sources have now been cleaned up – yet in many areas the water remains contaminated. This has lead to concerns about diffuse catchment pollution sources and agriculture in particular. This leaflet provides examples of how farmers can work with and help shellfishermen whilst also reducing losses of valuable nutrients from the land.

The Issue: There are two key problems: **nutrients** and **faeces** entering the water courses.

Nutrients leached from the land can fertilise the sea potentially contributing to algal blooms which, if severe, can be detrimental to the ecosystem and the shellfish. In some cases Harmful Algal Blooms (HABs) consumed by shellfish can render them poisonous to consumers. Dung, deposited by outdoor livestock, and manures applied to land, are a source of faecal microbial pollution which can contaminate streams and rivers. In certain catchments sewer misconnections may also be a source of faecal loading. These can all contaminate filter feeding shellfish with Faecal Indicator Organisms (FIOs e.g. *E. coli*) and pathogens (e.g. *E. coli* 0157 and *Cryptosporidium*) thus giving rise to a potentially serious public health risk.

The level of FIOs sampled in shellfish waters is used to give those shellfish growing areas a Classification (Ref. 1). If high levels of *E. coli* are recorded then this can have very serious economic impacts on shellfish growers as they are then required to either re-lay by moving stock to cleaner water or heat treat the shellfish rather than sell them direct to the market. Where such 'downgrades' in Classifications take place then ultimately this is likely to put the shellfish farmer out of business as the extra work involved in relaying, or the lower price received for heat treated shellfish, will often make the farm financially uneconomic to run.

The Environment Agency (EA) is also tasked with protecting shellfish waters from contaminant sources. The EA have a commitment in England and Wales to achieve at least a Class B status for all shellfish waters – a Classification level at which most farms are financially viable as only a simple shellfish purification process is required. Over £80m has been spent since 2000 in removing faecal contamination from public waste water discharges to improve shellfishery quality. Although at first some improvement was noted, in recent years it has become apparent that Classification status is decreasing and that agricultural inputs remain significant in many catchments and may dominate in some catchments at certain periods. Future water quality improvements are likely to be driven by the Water Framework Directive which is designed to enhance the status and prevent deterioration of aquatic ecosystems whilst promoting the sustainable use of water.

The Impact

A Class downgrade will have a significant impact on a shellfish business. Whilst many European countries have a high percentage of Class A waters where growers can sell direct to the market, in England and Wales these form only ~1% of beds placing businesses at a disadvantage compared to foreign imports as many major retail chains will only buy product from Class A waters. Shellfish from Class B waters require purification which involves a typical capital installation cost of £50,000 to £150,000 and may incur additional operational costs of more than £400 per tonne of product (Ref.1). When high and unexplained numbers of *E. coli* are found in shellfish flesh it can result in closures to beds, preventing harvesting and causing economic hardship. A downgrade from Class B to C could mean farm operations are no longer viable. Whilst the majority of harvest beds in England and Wales are Class B, recently the number of Class A beds has decreased from 9 to 5 whereas Class C beds have increased from 29 to 44.

Member States	UK	Spain	Holland	Denmark	Ireland
Grade A waters	1.5%	33.6%	100%	62.6%	38%
Grade B waters	87%	55.4%	-	37.4%	62%

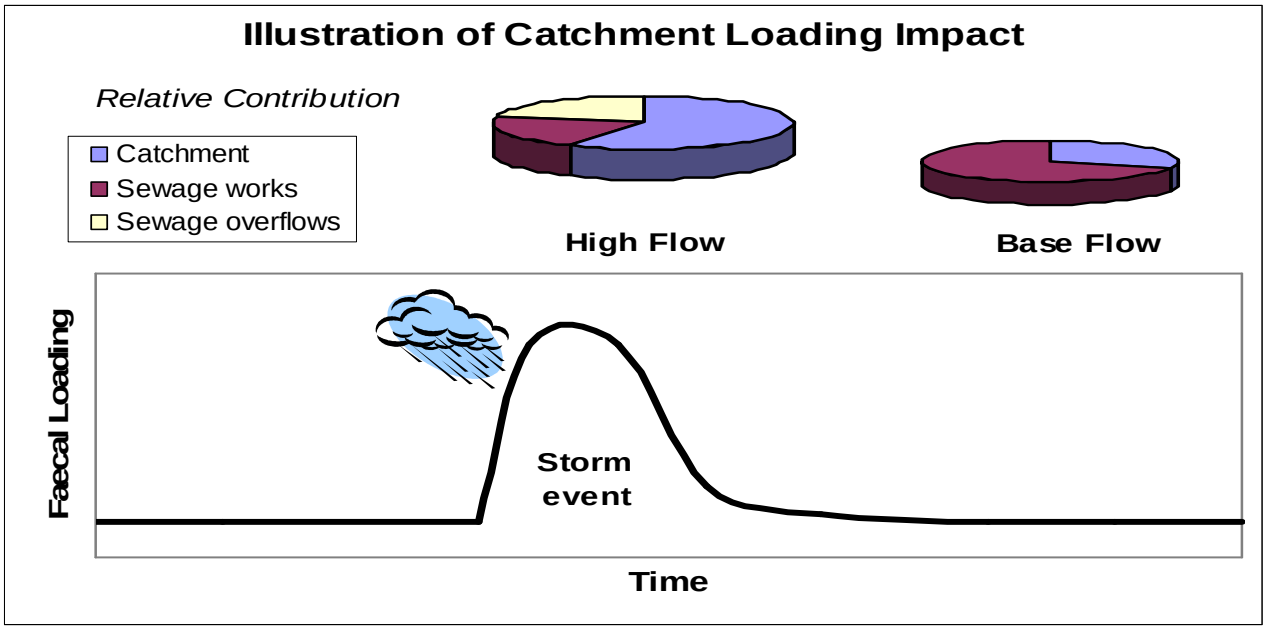
What are the sources of microbial contaminants?

There are multiple sources of microbial contaminants of human and animal origin with each catchment forming a unique combination and pattern of pollutant loading in response to rainfall

events. Human point sources include discharges from sewage treatment works and Combined Sewer Overflows (CSOs), along with diffuse sources from septic tanks and pleasure craft. Animal sources include agricultural livestock, wildfowl and even dogs. Despite human sewage and animal sewage having different risks to human health the current Classification system does not distinguish between them as it uses the faecal indicator *E. coli*.

How do we know where contamination comes from?

Molecular techniques are now available to help differentiate between *E. coli* coming from human and other sources. This coupled with comprehensive catchment investigations and modelling assessments have highlighted the significant contribution from agricultural input in many catchments.



Under normal 'base' flow conditions human waste water sources may exceed catchment loads. However, under 'high' flow conditions catchment agricultural loads often dominate. Shellfish can quickly accumulate contaminants – therefore short term events can influence long term quality. With climate change and an increased potential for a greater number of more intense events this problem is only likely to get worse.

Reducing the impacts of diffuse pollution from agricultural run-off

There are a range of actions which can help reduce pollution threats. Remedial action will be farm specific and will require an individual set of priorities according to the local risks present and the resources available. Ref. 2 provides Defra Good Agricultural Practice guidance on manure management, whilst Ref. 3 is an inventory of methods for addressing diffuse pollution from agriculture with indicative costs for arable, dairy, beef, broiler and pig farms. This inventory provides options for a large range of actions to manage soil, livestock, fertiliser and manure as well as improvements to farm infrastructure. Some of the nutrient enrichment issues are being addressed in the actions required for Nitrate Vulnerable Zones (NVZs).

Manure management, livestock and farm infrastructure issues are the key areas that are likely to help reduce FIO loads. As an illustration some examples of the available options are noted as follows. These options have differing levels of resource requirements and/or capital costs and suitability of individual options will vary on a site by site basis.

Manure Management	Change from slurry to a solid manure handling system Adopt batch storage of slurry Increase the capacity of farm manure (slurry) stores Minimise the volume of dirty water produced Site solid manure heaps away from watercourses and field drains Site solid manure heaps on concrete and collect the effluent Do not apply manure to high-risk areas Do not spread slurry or poultry manure to fields at high-risk times
Livestock Management	Reduce the length of the grazing day or grazing season Reduce field stocking rates when soils are wet Move feed and water troughs at regular intervals
Farm Infrastructure	Establish and maintain artificial (constructed) wetlands Fence off rivers and streams from livestock Construct bridges for livestock crossing rivers and streams Establish riparian buffer strips

Links and References

Ref. 1 Classification of Shellfish Harvesting Areas – Issues. Seafish Factsheet FS31-08-09 (2009)

Ref. 2 Protecting our Water, Soil and Air: A Code of Good Agricultural Practice for farmers, growers and land managers (Defra, 2009). The Stationery Office, Norwich. ISBN 978 0 11 243284 5
www.tsoshop.co.uk/bookstore.asp

Ref. 3 An Inventory of Methods to Control Diffuse Water Pollution from Agriculture (DWPA) - User Manual. (IGER and ADAS, 2007). Defra Project ES0203. Free to download;
www.defra.gov.uk/foodfarm/landmanage/water/csf/documents/UserManual_Jan07.pdf

Help and Advice: To help establish the best actions for you and your farm, help and advice is available. Financial assistance may also be available according to the local designations in your area and the potential improvements you hope to make. Please contact the following organisations to find out more about financial assistance or for advice or information.

Farming & Wildlife Advisory Group

Contact: David Cliffe, FWAG National Specialist Resource Management.

Mob. 07753 220401 or Head Office Tel. 024 7669 6699

Catchment Sensitive Farming (CSF)

CSF support is available for priority catchments as listed on the Defra website.

www.defra.gov.uk/foodfarm/landmanage/water/csf/index.htm

North Wyke Research (part of Rothamsted Research)

www.northwyke.bbsrc.ac.uk/pages/Information%20leaflets.htm

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Case Study 1; River Avon, South Devon – a series of high *E. coli* readings (> 4,600) on a Pacific oyster farm resulted in a downgrade of a main growing area to Class C. As the shellfish must then be re-laid in cleaner waters this rendered the farm economically unviable.

STAGE 3 Early August 2006 – Cattle allowed to return to feeder streams resulting in increased *E. coli* levels.

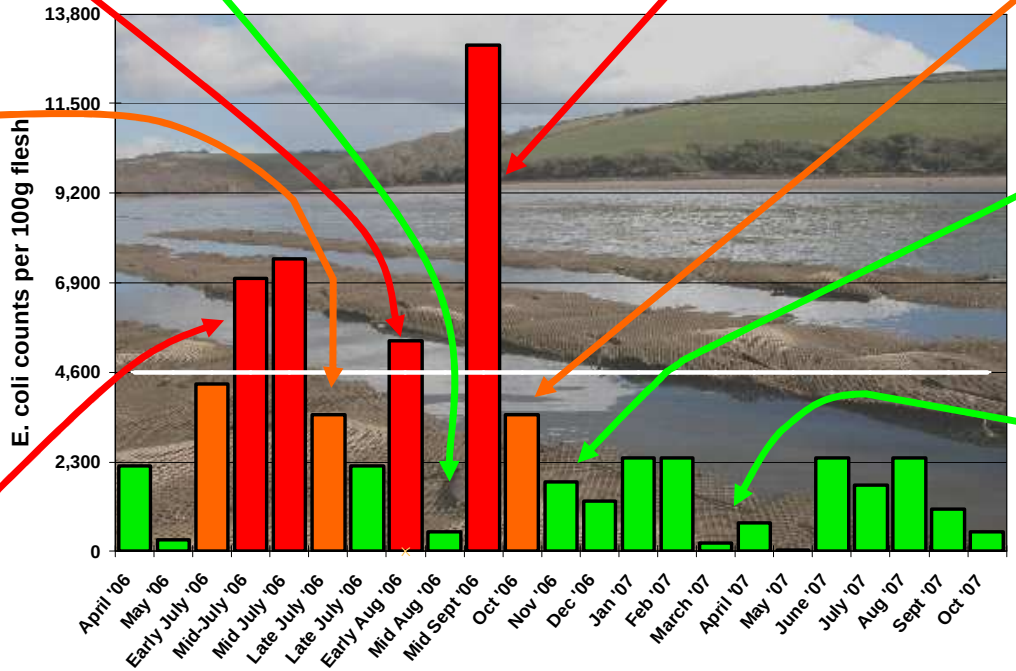
STAGE 4
Mid August 2006 – Electric fence installed by the farmer along stream margins followed by a drop in *E. coli* readings in early September.

STAGE 5 Mid September 2006 – After high *E. coli* readings investigations showed that electric fence had been trampled by cattle.

STAGE 6 October 2006 – *E. coli* levels drop as cattle taken in for the winter.

STAGE 7
Over winter 2006 permanent fencing and gravity fed water system to concrete troughs installed using existing stream.

STAGE 2 Late July 2006 - Cattle excluded by the farmer with a consequent drop in *E. coli* levels.



STAGE 1 Early/Mid July 2006 - A series of high *E. coli* readings traced to cattle migrating into feeder streams above the shellfish farm.

STAGE 8
Cattle reintroduced in March 2007. New water system excludes cattle and helps ensure *E. coli* levels remain low.

Result – Funding from CSF, Local Authority and the Estate owner allowed the installation of a modern water system that reduced impacts and possible liabilities for the farmer through polluting waterways. Site returned to B Classification and shellfish farm returned to financial viability. Water quality improved along the length of the estuary and public health was protected both in terms of shellfish and water use.

Case Study 2; Farmyard Run-off and Stream Protection

Photo from a Catchment Sensitive Farming (CSF) case study in the Salcombe/Kingsbridge estuary in South Devon showing an area where input from a farmyard with adjacent stream could have impacted on a designated shellfishery. CSF helped with advice on separating clean and dirty water on the farm to reduce the quantity of slurry requiring storage and thereby protecting the stream from contamination with dirty water and cattle faeces. For more detailed information about this Case Study please contact the South Devon CSF Officer on Mob. 07748 105971 - E-mail: Lizbe.Pilbeam@naturalengland.org.uk

An illustration of a catchment where farmers worked to help shellfishermen by keeping cattle out of streams and fencing-off buffer zones is shown in Case Study 1.