

"An overview of sanitary surveys undertaken in Scotland"

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Abstract

Since 1 January 2006, the European Food Hygiene Regulation (EC) No. 854/2004 has required that a sanitary survey be undertaken to assess sources of pollution to bivalve mollusc fisheries before an area is classified for production.

The Community Reference Laboratory (CRL) Guide to Good Practice for the Microbiological Monitoring of Bivalve Mollusc Harvesting Areas (GPG) was produced by an EU expert working group to provide guidance and recommendations on the implementation of EC No. 854/2004, including the conduct of sanitary surveys (Anon. 2007).

Scotland has taken a lead by implementing the application of sanitary surveys to both new and existing production areas within their waters. By the end of 2008, 34% of classified production areas in Scotland had received or were undergoing sanitary surveys. From a survey undertaken by the CRL, it was shown that Scotland's was one of the more advanced programmes within the EU (R. Lee, personal communication). Significant lessons have been learned in the conduct and practical application of these surveys.

Challenges in data acquisition, harvester education and cooperation, and practical access to remote areas of coastline have been met and overcome, though some difficulties in achieving some of the legislative requirements and the GPG recommendations remain.

Keywords: bivalve mollusc; regulations; sanitary survey; pollution; microbiology

Introduction

The conduct of sanitary surveys, as specified in Regulation (EC) No. 854/2004, was set forth as a requirement in the European Food Hygiene legislation effective from January 2006 (European Communities 2004).

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Under the current legislation, the competent authority is required to:

- 1) Inventory pollution sources likely to contaminate a production area
- 2) Examine quantities of pollutants released according to seasonal variation of same
- 3) Characterise the circulation of pollutants
- 4) Establish a sampling programme, taking the above into consideration, that is representative of the area

This requirement, at present, only applies to newly identified fisheries. However, Scotland has undertaken to apply sanitary surveys to both new and existing production areas within their waters. By the end of 2008, 34% of classified production areas in Scotland had received or were undergoing sanitary surveys. From a survey undertaken by the CRL, it was shown that Scotland's was one of the more advanced programmes within the EU (R. Lee, personal communication).

Bivalve mollusc production in Scotland consists predominantly of mussel and Pacific oyster aquaculture, with a few farms producing native oysters, king scallops and queen scallops. There is some geographical variation in species grown, with long-line mussel culture predominant in Shetland and the majority of oyster production occurring along the western coast. There are currently 145 classified production areas in Scotland, with the bulk of these (86) occurring in Shetland and Argyll & Bute (Figure 1).

Wild shellfisheries are present along the west coast with razor clams, cockles, surf clams and common otter shell being the most commonly exploited species. All of the fisheries on the east coast are for wild harvest of surf clams and razors (Fife) or mussels (Highland Sutherland).

An implementation plan, as well as action plans for both existing and new production areas, were developed and standard procedures, based on the recommendations of the GPG,

established during the latter part of 2006 to lay the ground work for implementation of the regulation beginning in January 2007.

Two approaches to undertaking sanitary surveys have been used in Scotland: full sanitary surveys for aquaculture and long-term wild fisheries and restricted sanitary surveys for new or ephemeral wild fisheries. Both involve a desk study and a practical shoreline survey, with the approaches being based on the recommendations of the GPG.

Methodology

As a first step in the sanitary survey, the desk study collates existing information on the sources and quantities of faecal pollution to the production area and the potential circulation of contaminants. This data is sought from national datasets, local government agencies or other resources. For example, meteorological records are sought from the United Kingdom Meteorological Office, hydrographic charts are obtained from the UK Hydrographic Office, and information on sewage discharges is obtained from the Scottish Environment Protection Agency (SEPA) and Scottish Water.

This is followed up with a physical site survey (shoreline survey) to confirm information obtained during the desk study and determine whether other pollution sources are present in the area. Samples of both bivalve molluscs and water are collected and analysed for the presence of the bacterial indicator *E. coli*, and these results are used to provide an assessment of relative contamination levels around the fishery and to characterise any discharges of unknown composition. Significant watercourses are measured and sampled in order to characterise the bacterial load entering the production area on the day of survey. In cases where the data obtained during the desk study and shoreline survey are not sufficient to support determination of a sampling plan, a bacteriological survey is undertaken which involves repeat sampling of identified locations on the fishery over time. All data are then combined to inform the establishment of the sampling plan, which sets the sampling location, frequency, and method for each classified production area.

Full Sanitary Surveys

Thirty-one surveys were undertaken as part of the Scottish Sanitary Survey programme in 2007 and 2008, encompassing 51 production areas and 76 bivalve mollusc farms (Table 1). A mixture of new and established areas were selected for survey. Existing areas were prioritised using a risk matrix (see below). Where feasible, adjacent production areas were agglomerated with the areas identified for survey.

Of a total 44 production areas in Shetland, 24 (55%) have been surveyed to date. Similarly, 50% of production areas in Argyll & Bute (21 of 42) have been surveyed. Together, Shetland and Argyll & Bute contain 58% of classified shellfish production areas in Scotland (Figure 1).

Prioritising Surveys for Established Fisheries - Risk Matrix System

A risk matrix was developed to prioritise existing fisheries for survey based on public health risk. Factors considered were:

- Human population within 2km of production area
- Species (oysters vs. all other species)
- Classification for previous 3 years (assessed for each year)
- Changes in classification status
- Outbreaks of illness
- Individual monitoring results above classification limits

Each factor was given an arbitrary score of 0, 2 or 4 depending on whether its value was considered to be of low, medium or high risk. These scores were then tallied and the production areas ranked by their total score. Production areas with higher scores were targeted first for sanitary survey.

Restricted Surveys

Wild fisheries in Scotland tend to be exploited in an episodic fashion depending upon how much biomass is available for harvest, so where applications have been received for new classification a restricted survey is undertaken in the first instance.

Restricted surveys are intended to address basic requirements in an efficient manner - giving policy makers at Food Standards Agency Scotland sufficient information to inform establishment of monitoring points and classification areas without expending valuable resource on a potentially short-lived fishery. A total of 23 applications for classification of wild bivalve mollusc fisheries have been received, with 14 surveys completed to date.

Once the fishery has been classified for three years, it will be included in the full sanitary survey programme in the same manner as existing fisheries (ie. By priority of risk).

Findings to date

Many areas in Scotland are remote, with little in the way of human population. Despite this, some remote areas were found to, at times, have monitoring results consistent with a C classification. In areas with low population densities, sewage discharges (both raw and septic tank-treated) are sometimes found very near bivalve mollusc production sites. These are generally associated with individual, or small groups, of dwellings although community sewage discharges do occur.

Agricultural pollution appears to be a major contributor to high levels of faecal contamination found in bivalve molluscs in many parts of Scotland. Sheep and cattle rearing is the predominant agricultural activity in the areas near bivalve mollusc fisheries with sheep far outnumbering cattle. Livestock are rarely fenced away from streams and in most places have free access to the shoreline.

Due to the lack of firm data from other agencies regarding potential sources, amounts and seasonality of contamination to the fisheries in Scotland, the findings of the physical shoreline survey are of paramount importance in providing a robust and accurate assessment of local pollution sources. For example, for the surveys conducted during 2007-2008, physical shoreline surveys revealed, on average, twice the number of discharges as were captured within the permit system and reported by SEPA (Table 2). Up to 28 individual discharges have been observed in areas with only 3 reported discharge permits.

Challenges

Several challenges have been encountered in trying to meet these requirements for Scotland.

1) Developing an accurate inventory of sources of faecal pollution is a challenge where small and diffuse sources are the predominant drivers of contamination. Agricultural census data is collected by the Scottish Government, but due to data protection concerns cannot be provided in sufficient detail to be useful for determining the amount of pollutants entering the sea near the fisheries. No data are available on the timings, amounts and locations of sludge and slurry application to land, again confounding requirements to quantify sources of faecal pollution. Additionally, seasonal variation in both livestock numbers and slurry application is not captured or reported.

2) There are many crude sewage and septic tank discharges from private homes near bivalve mollusc fisheries. These areas are often remote, and historically there was no requirement to register private sewage discharges in Scotland. Data available on sewage discharges is incomplete, with no microbiological data collected and reported for discharges.

3) There are very few gauging stations on Scottish rivers and large streams. As a consequence, there is little data available on flow rates. In general there is also no microbiological data available for freshwater sources.

4) Little information is available on the hydrodynamics of specific sea lochs, particularly in vicinity of bivalve mollusc farms which tend to be located away from main shipping traffic. Little is known about tidal flows around many areas of the coast and assessing transport of contaminants in areas near the shore is confounded by the lack of knowledge about small scale, nearshore currents and water movement.

5) Establishing the location and extent of wild bivalve mollusc beds has often not been possible, particularly for sub-tidal fisheries. In most cases, no information has been available regarding the extent and density of stock in a given area and harvesters have been reluctant to provide information. For some sub-tidal fisheries, establishment of a representative monitoring point with a tolerance has not been adequate to ensure stock is available for routine monitoring purposes.

6) Sampling plans must be both representative and practically achievable by the local food authority (LFA). In some cases, worst case scenario sampling is not possible due to the intertidal nature of the fishery.

Conclusion

While much has been accomplished toward implementing the use of sanitary surveys in Scotland, there is opportunity to improve the quality of information obtained for use in surveys. Much of what is known about contaminant levels and pollution sources has come from the physical shoreline survey, underscoring its importance as a critical part of the overall sanitary survey in Scotland. However, the shoreline survey only provides information on conditions on the date of survey and does not provide much information about seasonal variation in faecal bacterial levels. Consequently, it is not possible to meet the legislative requirements relating to the assessment of seasonal variation in sewage discharges and diffuse sources of faecal contaminants at this point in time.

References

Anon 2007. Good Practice Guide to the microbiological monitoring of bivalve mollusc harvesting areas: Technical Application. Issue 3; February 2007, Cefas, Weymouth.

European Communities 2004. Corrigendum to Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption. Off. J. Eur. Communities L 226, 25/6/2004, 83-127.

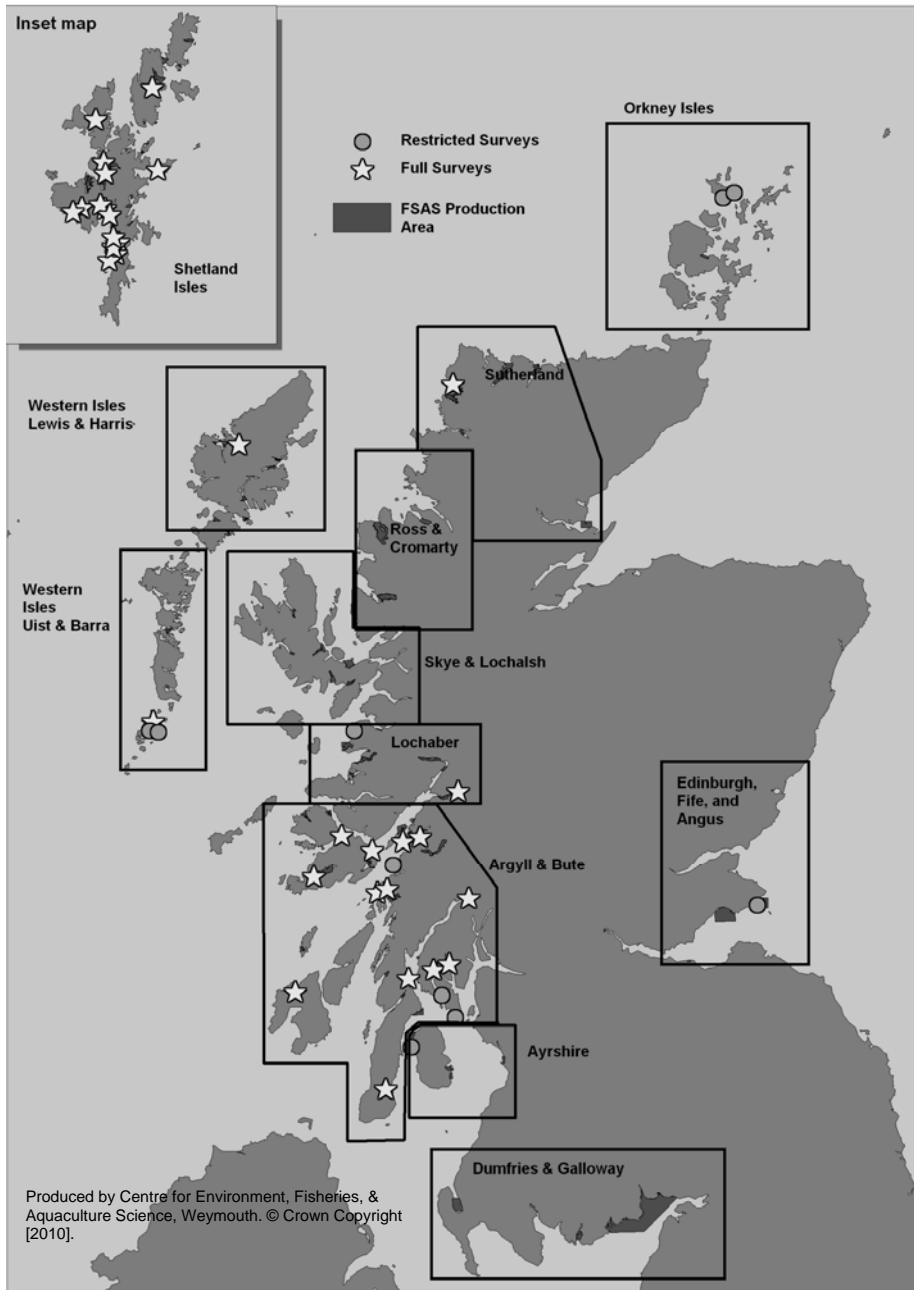


Figure 1. Map of production areas and surveys conducted to date in Scotland

Table 1. Sanitary surveys undertaken to date in Scotland

	Surveys	Number of beds/farms	Production areas
2007 Total	16	43	29
2008 Total	15	33	24

Table 2. Discharge records for 2007-2008 surveys

Survey Year	SEPA permits	Scottish Water records	Observed during survey
2007	68	42	127
2008	82	41	166
Total	150	83	293