

## CHAPTER 2

### GROWING AREA SURVEY AND CLASSIFICATION

#### 2.1 Introduction

In order to minimize the potential health risks associated with consuming bivalve molluscan shellfish and to protect public health, it is necessary that the water quality in shellfish growing areas be surveyed and that actual and potential sources of pollution be identified. Following such surveys, the growing areas are classified as to their suitability for the harvesting of shellfish according to accepted water quality standards and general sanitary conditions in the growing area. The following sections describe the various types of surveys used to assess shellfish growing areas, and the principles used in assigning specific classifications to these areas.

Environment Canada's Shellfish Water Quality Protection Program is the first line of defence in the sanitary control of shellfish. The program is designed to identify and evaluate all sources of pollution to shellfish growing and harvesting waters. Since these waters are a pathway by which pathogenic micro-organisms and other contaminants are introduced into shellfish, the classification of growing areas with respect to their pollutant levels (actual and potential) is of paramount importance in determining the suitability of shellfish for human consumption.

There is extensive evidence of illness in humans associated with the consumption of contaminated shellfish (Verber, 1983; Cameron and Hackney, 1994). The more common of these illnesses include: typhoid, salmonellosis, gastroenteritis, infectious hepatitis, *Vibrio parahaemolyticus* and *Vibrio vulnificus* infections, paralytic shellfish poisoning (PSP), and amnesic shellfish poisoning (ASP) (Verber, 1983). The positive relationship between sewage pollution of shellfish growing areas and enteric disease has been discussed by Hackney and Pierson, 1994 and Burkhardt and Calci, 2000.

Pollution of shellfish growing areas can occur from a variety of sources and under many different conditions. Generally, pollution sources are divided into two broad categories: point and non-point. A point source of pollution enters the receiving water at discrete, measurable locations such as in discharges from sewage treatment plants, pulp mills, food processing plants,

sewage lift station overflows, etc. Non-point source pollution refers to contamination from sources related to the activities of man and to natural processes in the watershed which are diffuse or dispersed. Such sources do not enter at discrete, identifiable locations and are difficult to measure or define. The United States Food and Drug Administration (USFDA, 1995) has described eight types of non-point source pollution which may affect shellfish growing areas. These include urban runoff, agricultural runoff, animal faecal pollution, sewage discharges from boats, wildlife faecal matter, dredging operations, mining (e.g., leaching), and silviculture practices. Both point and non-point pollution sources can release chemical and/or microbiological contaminants of public health concern.

The following sections of this Chapter outline the requirements for growing area surveys and classification. For more specific information please refer to the "Manual for Growing Area Surveys for the Canadian Shellfish Sanitation Program" (in process).

## **2.2 Shellfish Growing Water Surveys**

Under the Canadian Shellfish Sanitation Program (CSSP), shellfish growing water surveys form the basis for assigning and maintaining the classification of an area as suitable for shellfish harvest. The type of survey required for a given area depends on prior knowledge of both water quality and pollution source types. Surveys are categorized as:

- ▶ comprehensive;
- ▶ annual review; and
- ▶ re-evaluation.

The requirements for each of these surveys are outlined in the following text.

### **2.2.1 Comprehensive Surveys**

The comprehensive survey is a detailed evaluation and assessment of all environmental factors including actual and potential pollution sources which affect the water quality in a shellfish growing area.

A comprehensive survey is conducted in areas where previous data are non-existent or obsolete, or where significant changes have occurred in the pollution status of the area

which may affect its classification.

The requirements for conducting a comprehensive survey are:

- a) a shoreline sanitary investigation designed to identify and evaluate all actual and (potential) sources of pollution affecting the shellfish growing area;
- b) an evaluation of the meteorological and hydrographic factors that may affect the distribution of pollutants throughout the area; and
- c) a bacteriological examination of the growing waters which is designed to determine the extent of faecal contamination, and provide quantitative data for the classification of growing waters. Where available, other bacteriological data/studies (e.g., sediment, shellfish analysis, pollution inputs) should also be considered for classification purposes.

*Specific Requirements for Comprehensive Surveys*

- a) Bacteriological monitoring should be conducted under varied environmental conditions. The number and location of sampling stations selected should be adequate to produce the data necessary to effectively evaluate all point and non-point sources of pollution.
- b) A minimum of 15 samples shall be collected at each station. In remote shellfish growing areas this requirement may be modified if warranted by the sanitary conditions in the area.
- c) In certain circumstances, an alternative sampling strategy, systematic random sampling, may be used. All sampling requirements, i.e. standards, sampling frequency, and data analysis are as outlined in the "National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish, 2002".

### **2.2.2 Annual Review Survey**

Annual review surveys update the classification of the area. They are conducted to confirm that sanitary conditions have not changed and that the classification is still valid.

The requirements for conducting annual review surveys are:

- a) a file review to evaluate the changes in existing and new pollution sources; and
- b) a shoreline sanitary investigation and/or bacteriological sampling at representative stations if deemed necessary.

### 2.2.3 Re-evaluation Survey

A re-evaluation survey updates the classification of the area requiring an in depth assessment of the elements of the comprehensive survey. The complexity and extent of a re-evaluation survey will be specific for each area.

The requirements for conducting a re-evaluation survey are:

- a) a complete re-evaluation of the classification of each shellfish growing area once every three years (this requirement may be modified in remote shellfish growing areas if warranted by the sanitary conditions in the area); and
- b) when the annual review shows that the sanitary quality of an area is likely to be significantly altered by changes in the pollution sources. In this case a re-evaluation of a shellfish growing area will be performed within one year.

#### *Specific Requirements for Re-evaluation Surveys*

- a) Bacteriological monitoring should be conducted under varied environmental conditions. The number and location of sampling stations selected should be adequate to produce the data necessary to effectively evaluate all point and non-point sources of pollution<sup>1</sup>.
- b) A minimum of 5 samples shall be collected at each station.
- c) The analysis of at least the last fifteen water samples from each representative station and other field works will be undertaken as deemed necessary to determine the appropriate classification for the area.

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<sup>1</sup> Requirements a), b), and c) will be different if systematic random sampling is used. Refer to the National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish, 2002.

#### 2.2.4 Documentation

- a) A report shall be prepared for each survey containing data and assessments for components of the surveys described in the previous sections.
- b) A file containing all pertinent sanitary survey information, including the dates and results of preceding surveys and reports is maintained by the shellfish control agency for each classified shellfish area.

#### 2.3 Classification of Growing Areas

The CSSP recognizes four major classification categories:

- ▶ Approved;
- ▶ Conditionally Approved;
- ▶ Closed; and
- ▶ Prohibited.

Specific area classifications, and their boundaries, are assigned to shellfish growing areas based on survey results.

##### 2.3.1 Approved

General definition - Shellfish growing areas may be designated as "Approved" if the area is not contaminated with faecal material, pathogenic micro-organisms, poisonous or deleterious substances, or unacceptable levels of marine biotoxins to the extent that consumption of the shellfish might be hazardous. The following conditions must also be met:

- a) the median or geometric mean faecal coliform Most Probable Number (MPN) of the water does not exceed 14/100 mL, and not more than 10% of the samples exceed a faecal coliform MPN of 43/100 mL, for a five-tube decimal dilution test<sup>2</sup>; or
- b) the biotoxin, chemical and bacteriological levels meet the standards/tolerances outlined in Appendix II and

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<sup>2</sup> If systematic random sampling is used, the standard is based on the use of the calculated 90<sup>th</sup> percentile. Refer to the National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish, 2002.

Appendix III of this Manual.

Evidence of potential pollution sources such as sewage lift station overflows, direct sewage discharges, septic tank seepage, etc., is sufficient to exclude the growing waters from the approved category.

### **2.3.2 Conditionally Approved**

General definition - Conditionally Approved is the classification of a shellfish growing area determined by the shellfish control authority to meet the Approved criteria for a predictable period. These growing areas are subject to intermittent pollution caused by discharges from wastewater treatment facilities, seasonal populations, non-point source pollution, or boating activity. The period meeting the Approved criteria is conditional upon established performance standards specified in a management plan. A conditionally approved shellfish growing area is a closed area when the area does not meet the approved growing area criteria and is temporarily closed by the shellfish control authority. An area may be designated as "Conditionally Approved" if the following conditions are met:

- a) during those times when harvesting is permitted, the area meets all of the requirements of an "Approved" area;
- b) conditions which preclude harvesting in areas designated "Conditionally Approved" must be:
  - i) easily identified by routine measurement and reporting; and
  - ii) predictable and/or controllable.

#### *Specific Requirements*

- a) Shellfish can be harvested in conditionally approved areas only when:
  - i) an applicant has developed a harvesting plan as described in Appendix IX, "Protocol for Implementation of the Management of Conditionally Approved Areas";
  - ii) all necessary measures have been taken to ensure that performance standards will be met;

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- iii) precautions have been taken to assure that shellfish will not be marketed from the areas during any period when the area fails to meet the performance standards or before the shellfish can purify themselves of polluting micro-organisms; and
  - iv) a documented management plan for each conditionally approved area has been developed (refer to Appendix IX, "Protocol for Implementation of the Management of Conditionally Approved Areas"). This plan must contain a clear description of the responsibilities and duties of all parties.
- b) The conditionally approved area shall be immediately closed to shellfish harvesting when the criteria established in the management plan are not met. A conditionally approved area which has been closed shall not be re-opened to shellfish harvesting until:
- i) the criteria established in the management plan are fully met;
  - ii) a time has elapsed which is sufficient, under environmental conditions, to permit natural biological cleansing of the shellfish; and
  - iii) verification that the bacteriological quality of the water and shellfish has again met the approved standards.
- c) Monitoring requirements. In addition to the verification monitoring previously outlined, monitoring is required to confirm the Approved status when open. When the conditional area management plan is based on the operation and performance of a wastewater treatment plant(s), combined sewer overflows, or other point sources of pollution, monthly samples (minimum 5) are required during the period when the area is in the open status. When the conditional area management plan is based on the effects of non-point pollution, such as rainfall events, stormwater run-off, and seasonal variations, a minimum of 5 water samples shall be collected during the period when the area is in the open status.
- d) Seasonal closures based on the presence of boats may not require analysis of water and shellfish before

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reopening; however, there must be verification to ensure that the boats are no longer present.

- e) The conditionally approved area shall be evaluated at least once each year by the Regional Shellfish Area Classification Committee. The evaluation shall include the review of the annual report provided by DFO (or other agency by agreement with DFO), with input from CFIA and EC, documenting all data relating to the operation of the conditionally approved area.
- f) There should be a complete understanding of the purpose of the conditionally approved classification by all parties concerned, including the shellfish industry. If the cooperation of all interested parties is not assured, federal agencies should not approve the area for direct harvesting of market shellfish.
- g) Any failure to meet the conditions of the Management Plan must be immediately reported to and acknowledged by the shellfish control agencies.
- h) If it is discovered that a failure to meet criteria in the Management Plan has not been reported by the operator of the sewage treatment plant, the area will immediately revert to a closed classification.
- i) If at any time any party to the Management Plan fails to fulfill the requirements as set forth in the Plan, the area will immediately revert to a closed classification.
- j) All data relating to the operation of a conditionally approved area, including operation of sewage systems, will be maintained in a file by the shellfish control agency or agencies.

### **2.3.3 Closed**

General Definition - A growing area where the harvesting of shellfish is not permitted, except by special licence for specific purposes, due to contamination by faecal material, pathogenic micro-organisms, poisonous or deleterious substances, or unacceptable levels of marine biotoxins to the extent that consumption of the shellfish might be hazardous.

Shellfish growing areas are classified as "Closed" under any of the following conditions:



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- a) the shoreline sanitary survey, other monitoring program data or other events, indicates that the area is contaminated, or has the potential to become contaminated;
- b) the median or geometric mean faecal coliform Most Probable Number (MPN) of the water exceeds 14/100 mL, and/or more than 10% of the samples exceed a faecal coliform MPN of 43/100 mL, for a five-tube decimal dilution test (see footnote 2); or
- c) the biotoxin, chemical or bacteriological levels exceed the standards/tolerances outlined in Appendix II and Appendix III of this Manual.

#### *Specific Requirements*

- a) No shellfish shall be taken from these areas except by licence under the Management of Contaminated Fisheries Regulations (DFO, 1990) whereby the shellfish must be subject to a decontamination plan (e.g., for depuration, natural relaying, container relaying or canning), which has been accepted by the shellfish control authority. Such areas must meet the criteria outlined below (see also Chapter 10 Policy and Procedures for Controlled Relaying and Depuration). Harvesting from closed areas can be allowed on a limited basis by licence for the purpose of scientific investigation, for seed, or for spat.
- b) The "closed" classification (or any sub-classification) will not be revised upward without at least a re-evaluation survey report indicating improvements in sanitary conditions and water quality and upon meeting the appropriate classification standards.
- c) Depending on the degree of contamination in the growing waters, it may not be possible to adequately depurate or naturally purify the shellfish. In these cases, no harvesting is permitted under any circumstances. These areas are defined as Prohibited Areas (see Section 2.3.4).
- d) If an area within a Closed classification is to be used for Depuration or for Short-term Container Relaying the following criteria must be met.
  - i) The median or geometric mean faecal coliform MPN

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of water does not exceed 88/100 mL and not more than 10% of the samples exceed a faecal coliform MPN of 260/100 mL, for a five-tube decimal dilution test (see footnote 2).

- e) If an area within a Closed classification is to be used for Natural and Extended Container Relaying it must not be within a Prohibited Area.

#### **2.3.4 Prohibited**

General definition - shellfish shall not be harvested from prohibited areas for any purpose, with the exception of seed and spat which may be collected under special license.

- 1) The following areas shall be defined as prohibited areas:
  - a) the area within a minimum 300 metre radius around industrial, municipal and sewage treatment plant outfall discharges;
  - b) the area within a minimum 125 metre radius around marinas;
  - c) areas where due to the degree of contamination in the growing waters (i.e., waters having excessive concentrations of faecal material or other poisonous or deleterious substances), it may not be possible to adequately depurate or naturally purify the shellfish.
- 2) The following areas are prohibited unless defined otherwise by the Regional Interdepartmental Shellfish Committee:
  - a) subject to b), the area within a minimum 125 metre radius from wharves, finfish net pens, floathomes or other floating living accommodation facilities; or
  - b) the area within a minimum 25 metre radius from a floathome or floating living accommodation facility located within a shellfish tenure/lease where a zero effluent discharge and appropriate waste management are a condition of the aquaculture license/lease and where verification, compliance and enforcement by the licensing agency is reported annually to

Environment Canada.

**2.3.5 Process for Classification - Role of Regional Interdepartmental Shellfish Committees**

Environment Canada will present survey results and recommendations for classification to the appropriate Regional Interdepartmental Shellfish Committee as soon as practical after the surveys are completed. The Committee will consider the information and classify the area.

**2.3.6 Documenting the Classification**

All classifications will be documented in the survey reports (comprehensive, annual review, and re-evaluation). Final decisions by the Regional Interdepartmental Shellfish Committee will be reflected in the reports of the comprehensive and re-evaluation surveys and minutes of the regional meetings.