

## Canadian Shellfish Sanitation Program - Manual of Operations

### 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 Marine Water Quality Monitoring 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 (Rippey, 1991; Hackney and Pierson, 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) (Rippey, 1991). 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 released/discharges from wastewater

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treatment and collection systems, pulp mills, food processing establishments, 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 fecal pollution, sewage discharges from boats, wildlife fecal 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.

### 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.

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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 fecal 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 fifteen (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, 2007".

### **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.

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The requirements for conducting annual review surveys are:

- a) a file review to evaluate the changes in existing and new pollution sources;
- b) a shoreline sanitary investigation if deemed necessary; and
- c) a minimum of five (5) samples collected at each station for non-remote areas and two (2) samples for remote areas.

### 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

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point and non-point sources of pollution<sup>1</sup>.

- b) A minimum of five (5) samples shall be collected at each station for non-remote areas and two (2) samples for remote areas.
- c) The analysis of at least the last fifteen (15) water samples from each representative station and other field works will be undertaken as deemed necessary to determine the appropriate classification for the area.

### 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 authority for each classified shellfish area.

## 2.3 Classification of Growing Areas

### 2.3.1 Classification Versus Status of a Growing Area

The CSSP recognizes five classification categories:

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

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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, 2007.

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Specific area classifications, and their boundaries, are assigned to shellfish growing areas based on sanitary and water quality survey results. Recommendations for classification are reviewed by Regional Interdepartmental Shellfish Committees before adoption.

The status of a growing area is separate and distinct from its classification and may be open or closed for the harvesting of shellstock. Refer to Status in "Definitions" section of this Manual.

### 2.3.2 Approved Classification

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

- a) the median or geometric mean fecal coliform Most Probable Number (MPN) of the water does not exceed 14/100 mL, and not more than 10% of the samples exceed a fecal coliform MPN of 43/100 mL, for a five-tube decimal dilution test<sup>2</sup>; or
- b) the chemical levels meet the standards/tolerances outlined in Appendix II of this Manual and in the Fish Products Standards and Methods Manual, Appendix 3, Canadian Guidelines for Chemical Contaminants and Toxins in Fish and Fish Products.

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

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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, 2007.

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### 2.3.3 Conditionally Approved Classification

Conditionally Approved is the classification of a shellfish growing area which has been 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 released/discharges from wastewater treatment and collection systems, seasonal populations, non-point source pollution, or boating activity. The period meeting the Approved criteria (for other than seasonal boating activity) is conditional upon established performance standards specified in a Conditional Management Plan. A conditionally approved shellfish growing area which does not meet the Approved growing areas criteria is placed in closed status by the shellfish control authority.

An area may be classified as "Conditionally Approved" if the following conditions are met:

- a) when placed in open status, the area meets all of the requirements of an "Approved" area;
- b) conditions which will result in the area reverting to closed status, are:
  - 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) procedures have been followed as outlined in Appendix IX to develop and implement a Conditional

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Management Plan outlining the responsibilities and duties of all parties,;

- ii) all necessary measures have been taken to ensure that performance standards will be met; and
  - 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.
- b) The conditionally Approved area shall be immediately placed in the closed status when the criteria established in the Conditional Management Plan are not met. A conditionally approved area which has been placed in the closed status shall not be re-opened to shellfish harvesting until:
- i) the criteria established in the Conditional Management Plan are fully met;
  - ii) a time has elapsed which is sufficient, under environmental conditions, to permit natural biological cleansing of the shellfish; Note: With respect to conditionally approved areas based on performance of wastewater treatment and collection systems, under no circumstances will the affected area be opened sooner than seven (7) days after the release/discharge event ceased; and
  - iii) verification indicates that the bacteriological quality of the water and shellfish has again met the Approved area standards. For water quality, the median of the samples collected for the area in one survey cannot exceed 14 MPN/100mL and no more than 10% of the samples can exceed 43 MPN/100mL. In five (5) shellstock samples, only one (1) fecal coliform result may exceed 230 MPN/100g, and no result may



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exceed 330 MPN. Note: With respect to conditionally approved areas based on performance of wastewater treatment and collection systems, the area may return to the open status without verification sampling if a minimum of 21 days has elapsed since the release/discharge event ceased).

- c) In addition to the verification monitoring previously outlined, monitoring is required to confirm that the Approved classification criteria are being met when the area is in the open status. When the Conditional Management Plan is based on the operation and performance of a wastewater treatment and collection system, combined sewer overflows, or other point sources of pollution, monthly samples minimum five (5) are required during the period(s) when the area is in the open status. Alternatively, the minimum number of water quality samples may be supplemented with effluent samples provided that minimum frequency requirements are maintained. When the Conditional Management Plan is based on the effects of non-point pollution, such as rainfall events, stormwater run-off, and seasonal variations, a minimum of five (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 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 Interdepartmental Shellfish 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

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parties concerned, including the shellfish industry. If the cooperation of all interested parties is not assured, the federal partners will not approve the area for direct harvesting.

- g) Any failure to meet the conditions of the Conditional Management Plan must be immediately reported to and acknowledged by the federal partners.
- h) If at any time any party to the Conditional Management Plan fails to fulfill the requirements as set forth in the Plan, the Regional Interdepartmental Shellfish Committee (RISC) will determine whether the area classification or status will be changed.
- i) All data relating to the operation of a Conditionally Approved area, will be maintained in a file by the shellfish control authority or authorities.

### 2.3.4 Restricted Classification

Restricted is the classification of a growing area where the harvesting of shellfish is not permitted, except by licence issued under management of Contaminated Fisheries Regulations (DFO, 1990) due to contamination by fecal material, pathogenic micro-organisms, poisonous or deleterious substances, to the extent that consumption of the shellfish might be hazardous.

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

- 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, provided that the area is not contaminated to the extent where it would be classified as Prohibited;
- b) the median or geometric mean fecal coliform Most Probable

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Number (MPN) of the water exceeds 14/100 mL, and/or more than 10% of the samples exceed a fecal coliform MPN of 43/100 mL, for a five-tube decimal dilution test<sup>2</sup>; or

- c) the chemical levels exceed the standards/tolerances outlined in Appendix II of this Manual and in the Fish Products Standards Methods Manual, Appendix 3 - Canadian Guidelines for Chemical Contaminants and Toxins in Fish and Fish Products.

### *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 area classified as Restricted may be allowed on a limited basis by licence issued under the Management of Contaminated Fisheries Regulations noted above for the purpose of scientific investigation, food and bait purposes.
- b) If an area within a Restricted classification is to be used for depuration, the following criteria must be met:

The median or geometric mean fecal coliform (MPN) of water shall not exceed 88/100 mL and not more than 10% of the samples shall exceed a fecal coliform MPN of

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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, 2007.

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260/100mL, for a five-tube decimal dilution test<sup>2</sup>.

- c) The Restricted 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.
- d) Depending on the degree of contamination in the growing waters, it may not be possible to adequately deplete or naturally purify the shellfish. In these cases, no harvesting is permitted under any circumstances. These areas are classified as Prohibited Areas (see Section 2.3.6).

### 2.3.5 Conditionally restricted Classification

Conditionally Restricted is the classification of a shellfish growing area which has been determined by the shellfish control authority to meet, at a minimum, the Restricted classification criteria for a predictable period. These growing areas are subject to intermittent pollution caused by releases/discharges from wastewater treatment and collection systems, seasonal populations, non-point source pollution, or boating activity. The period meeting the Restricted criteria (for other than seasonal boating activity) is conditional upon established performance standards specified in a Conditional Management Plan. Harvesting is prohibited when a Conditionally Restricted shellfish growing area is in the closed status.

An area may be classified as "Conditionally Restricted" if the following are met:

- a) during those times when harvesting is permitted (i.e. in the open status of its classification) the area meets all of the requirements of a "Restricted" area;

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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, 2007.

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- b) conditions which will result in the area reverting to closed status are:
  - i) easily identified by routine measurement and reporting; and
  - ii) predictable and/or controllable

### *Specific Requirements*

- a) Shellfish can be harvested in conditionally restricted areas only when:
  - i) procedures have been followed as outlined in Appendix IX to develop and implement a documented conditional Management Plan outlining the responsibilities and duties of all parties;
  - ii) all necessary measures have been taken to ensure that performance standards will be met, and;
  - iii) precautions have been taken to assure that shellfish will not be depurated or relayed 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.
- b) Harvesting will immediately cease in a Conditionally Restricted area in the closed status. A conditionally restricted area in the closed status shall not be re-opened to shellfish harvesting (for depuration or relaying purposes) until:
  - i) the criteria established in the Conditional Management Plan are fully met;
  - ii) a time has elapsed which is sufficient, under environmental conditions, to permit natural

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biological cleansing of the shellfish; (Note: With respect to wastewater treatment and collection systems, under no circumstances will the affected area be opened for restricted harvesting sooner than seven (7) days after the release/discharge event ceased. The area may return to the open status without verification sampling if a minimum of 21 days has elapsed since the release/discharge event ceased.)

- iii) specific to harvest for depuration, verification that the bacteriological quality of the water and shellfish has again met standards. For water quality, the median of the samples collected for the area in one survey cannot exceed 88 MPN/100 mL and no more than 10% of the samples can exceed 260 MPN/100mL. Shellstock samples shall not exceed 2300 MPN/100g.
- iv) specific to harvest for long term relay, seven (7) days after the release/discharge event has ceased (without verification sampling).
- c) In addition to the verification monitoring previously outlined, monitoring is required to confirm that the Restricted classification criteria are being met when the area is in the open status. When the Conditional Management Plan is based on the operation and performance of a wastewater treatment or collection system, combined sewer overflows, or other point sources of pollution, monthly samples minimum five (5) are required during the period(s) when the area is in the open status. Alternatively, the minimum number of water quality samples collected from the conditional area may be supplemented with effluent samples provided that the minimum frequency requirements are maintained. When the Conditional Management Plan is based on the effects of non-point pollution, such as rainfall events, stormwater run-off, and seasonal variations, a minimum of five (5) water samples shall be collected during the period when the area is in the open status.

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- d) The Conditionally Restricted area shall be evaluated at least once each year by the Regional Interdepartmental Shellfish 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 Restricted area.
- e) There should be a complete understanding of the purpose of the Conditionally Restricted classification by all parties concerned, including the shellfish industry. If the cooperation of all interested parties is not assured, federal partners will not permit harvesting of shellfish.
- f) Any failure to meet the conditions of the Conditional Management Plan must be immediately reported to and acknowledged by the federal partners.
- g) If at any time any party to the Conditional Management Plan fails to fulfill the requirements as set forth in the Plan, the Regional Interdepartmental Shellfish Committee will determine whether the area classification or status will be changed.
- h) All data relating to the operation of a conditionally restricted area will be maintained in a file by the shellfish control authority or authorities who are signatories to the Management Plan.

### 2.3.6 Prohibited Classification

Shellfish shall not be harvested from prohibited areas for any purpose, with the exception of harvesting for seed, spat, bait and for scientific purposes, all of which may be collected under special license.

- 1) The following areas shall be defined as prohibited areas:

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- a) the area within a minimum 300 metre radius around industrial, and sanitary sewage outfalls;
  - 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 fecal material or other poisonous or deleterious substances), it may not be possible to adequately deplete 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.

### 2.3.7 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.

### 2.3.8 Documenting the Classification



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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 file reports and minutes of the regional meetings.

### 2.4 Sub-tidal and Offshore Areas

Sub-tidal shellfish growing areas within five (5) km of land and which are located well removed from pollution sources and other sanitary concerns are at a very low risk of becoming contaminated with fecal coliform bacteria. The sanitary quality of such areas used for direct shellfish harvesting may be more appropriately assessed by evaluating actual and potential pollution sources in the area, coupled with occasional bacteriological testing of the shellfish at the establishment level.

When the Regional Interdepartmental Shellfish Committee is satisfied on the basis of information submitted to it by DFO, EC and CFIA that the waters from which such shellfish are taken are of such a nature as will ensure that the shellfish are wholesome, the said committee will recognize the area acceptable for sub-tidal harvesting and its boundaries.

Offshore areas beyond five (5) km from land are considered acceptable for subtidal harvesting unless otherwise closed.