



Marine Biotoxin Monitoring
and Response Manual for
Non-Commercial Shellfish

Prelims

Original

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Disclaimer

IMPORTANT DISCLAIMER

Every effort has been made to ensure the information in this manual is accurate.

NZFSA does not accept any responsibility or liability whatsoever for any error of fact, omission, interpretation or opinion that may be present, however it may have occurred.

Website

A copy of this document can be found at:

<http://www.nzfsa.govt.nz/consumers/food-safety-topics/marine-biotoxin-alerts/index.htm>

Review of Manual

This Manual will be reviewed, as necessary, by the New Zealand Food Safety Authority. Suggestions for alterations, deletions or additions to this manual, should be sent, together with reasons for the change, any relevant data and contact details of the person making the suggestion, to:

Assistant Director (Production and Processing)

New Zealand Standards Group

New Zealand Food Safety Authority

P O Box 2835

Wellington

Telephone: 04 463 2500

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Amendment Record

It is important that this publication is kept up-to-date by the prompt incorporation of amendments.

To update this publication when you receive an amendment, remove the appropriate outdated pages, destroy them, and replace them with the pages from the new issue. Complete instructions will be given on the covering letter accompanying the amendment. File the covering letter at the back of the publication and sign off and date this page.

If you have any queries, please ask your local verifier.

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1 PURPOSE

This manual provides information and procedures for management of risks associated with shellfish toxicity arising from toxic phytoplankton, in order to reduce the adverse health effects that could result from human consumption of toxic shellfish and exposure to aerosolised biotoxins.

2 REFERENCES

Food Act 1981

Animal Products Act 1999

Fisheries Act 1996

Regulated Control Scheme for Bivalve Molluscan Shellfish

Public Health Services Handbook

Manual for Public Health Surveillance in New Zealand

Non-Commercial Marine Biotoxin Monitoring in New Zealand

Risk-Based Programme Enhancement, NZFSA, May 2003

3 DEFINITIONS

ASP	Amnesic Shellfish Poisoning – caused by Domoic Acid in shellfish
DHB	District Health Board
DSP	Diarrhetic Shellfish Poisoning The DSP toxins group that cause DSP includes okadaic acid, DTX1, DTX2 and DTX3. Note that a hydrolysis step may be required to detect some of these.
DTX	Dinophysin toxin
Event	An Event occurs when Phytoplankton analytical results reach or exceed trigger levels for flesh testing; or shellfish analytical results reach or exceed regulatory limits for toxins
HPO	Health Protection Officer
IAIS	Industry Agreed Implementation Standard
MoH	Ministry of Health
MBTC	Marine Biotoxin Technical Committee
NSP	Neurotoxic Shellfish Poisoning
NZFSA	New Zealand Food Safety Authority
NZFSAVA	New Zealand Food Safety Authority Verification Agency
Phytoplankton	Micro-algal species that live in the water column
PSP	Paralytic Shellfish Poisoning
RIS	Respiratory irritation syndrome – symptoms of sore throat, eye and nose irritation and dry coughing caused by aerosolised brevetoxins produced by some Karenia (Gymnodinium) species. Asthmatics are especially vulnerable.

RSS	Regional Shellfish Specialist
Sampling Officer	Person contracted to a DHB or Sampling Provider to collect shellfish and/or phytoplankton samples for analysis
Sampling Provider	Person or organisation contracted to the NZFSA to provide services relating to sampling of shellfish and/or phytoplankton for analysis, as part of the New Zealand non-commercial marine biotoxin monitoring programme
TSP	Toxic Shellfish Poisoning: includes PSP, NSP, ASP and DSP
Turnaround Time	The time from receipt of a sample by the contracted analytical laboratory to the production of a report giving results of analysis of that sample

4 INTRODUCTION

4.1 Background

New Zealand shellfish have been monitored for the presence of marine biotoxins since January 1993 when shellfish toxicity was first detected in New Zealand.

Since 2002, NZFSA has been responsible for monitoring the safety of non-commercially harvested shellfish from harmful marine biotoxins through contracts with DHBs and other agencies for sampling and management services, and through contracts with science providers for analytical and advice services.

DHBs issue warnings to the public about the risks of consuming non-commercial shellfish when toxicity in shellfish exceeds pre-determined limits. DHBs are contracted by the Ministry of Health to issue these warnings. NZFSA also maintains a web site advising the public about areas subject to warnings.

DHBs also manage marine biotoxin monitoring programmes in commercial shellfish harvesting areas under contract to the shellfish industry via local marine biotoxin management plans. These local plans are required by the Animal Products Regulated Control Scheme for Bivalve Molluscan Shellfish.

Data from both programmes are shared in the FoodNet database administered by the NZFSA.

4.2 Marine Biotoxins of Public Health Concern

Table 1: Marine Biotoxins of Public Health Concern Routinely Found in New Zealand

Toxins	Poisoning Syndrome	Symptoms	Warning Level	Analytical Test Method
Saxitoxins	Paralytic Shellfish Poisoning (PSP)	Numbness and tingling around the mouth, face or extremities; difficulty in swallowing or breathing; dizziness; double vision. In severe cases, paralysis and respiratory failure within 12 hours of consuming shellfish	0.8mg/kg	Mouse bioassay
Domoic Acid	Amnesic Shellfish Poisoning (ASP)	Diarrhoea and vomiting, within 24 hours of consuming shellfish (mild cases), and/or confusion, memory loss and disorientation within 48 hours of consuming shellfish (Severe cases)	20mg/kg	HPLC
Okadaic Acid and its esters (DTX1, DTX2, DTX3)	Diarrhetic Shellfish Poisoning (DSP)	Diarrhoea, nausea, vomiting and abdominal pain, within 12 to 24 hours of consuming shellfish	0.16mg/kg	ELISA

Neurotoxic Shellfish Poisoning (NSP) cases may have occurred in 1993 from an unidentified algal source (believed to be a *Karenia* species) and brevetoxins were found in some shellfish harvested at that time, however no significant NSP toxicity has been detected since. Some *Karenia* species may also cause respiratory irritation syndrome. In the event of significant blooms of likely causative species (refer Appendix 1) shellfish should be tested for the presence of NSP.

Other substances such as Yessotoxin, Pectenotoxin and Gymnodimine have been monitored for historically because they failed mouse bioassay tests which were used to test for DSP. However more toxicological work has been done over time and these are not known to be of any human health significance and are no longer monitored for in the public health monitoring programme. (Some continue to be monitored for in the commercial monitoring programme to meet market access requirements.)

4.3 DHB Responsibilities

Health Protection staff in DHBs are responsible for the public health management of marine biotoxins in commercial and non-commercial areas. This includes: opening and closing commercial growing areas, domestic market product recall pursuant to the Food Act 1981, and warning the public when non-commercial harvesting areas exceed public health warning limits for the collection and eating of shellfish and when there is a risk of Respiratory Irritation Syndrome (RIS). (RIS is a condition caused by inhalation of fractured toxic algal cells in sea spray. This is known to be associated with some *Karenia* species and may occur when a bloom coincides with onshore winds and a surf beach for example.) Most DHBs also have responsibility for and are contracted to undertake sample collection in their areas.

DHBs that are also Sampling Providers are responsible for maintaining a local marine biotoxin management plan that contains:

- agency and personnel contact details at local and national levels
- a list of commercial and/or non-commercial shellfish gathering areas and their locations
- a map showing the marine biotoxin sampling sites (both phytoplankton and shellfish collection sites) for each commercial and/or non-commercial gathering area
- procedures, including safety precautions, for sampling each site
- the frequency of shellfish and phytoplankton monitoring for each commercial and/or non-commercial gathering area
- procedures for phytoplankton and shellfish sample collection and dispatch (this should include what environmental data is to be collected at each site e.g. temperature, salinity etc)
- contingency plans for e.g. bad weather, unavailability of regular staff
- procedures for notifying results to industry

- procedures for issue of TSP and RIS public health warnings
- locations for signage to be erected
- draft media statements and wording for signage
- procedures for detention and recall of harvested product in accordance with IAIS and NZFSA recall protocols for domestic market product
- surveillance procedures for closed commercial and/or non-commercial areas
- procedures for providing TSP information to Medical Practitioners.

Where both commercial and non-commercial areas are under the jurisdiction of a single DHB, a single, integrated plan may cover both types of harvesting areas.

4.4 Responsibilities of Non-DHB Sampling Providers

Each Sampling Provider (this section applies to non-DHB Sampling Providers) must document and maintain a local marine biotoxin sampling plan that contains:

- agency and personnel contact details at local and national levels
- a list of non-commercial shellfish gathering areas and their locations
- a map showing the marine biotoxin sampling sites (both phytoplankton and shellfish collections sites) for each non-commercial gathering area;
- procedures, including safety precautions, for sampling each site
- the frequency of shellfish and phytoplankton monitoring for each non-commercial gathering area
- procedures for phytoplankton and shellfish sample collection and dispatch (this should include what environmental data is collected at each site e.g. temperature, salinity etc)
- contingency plans for e.g. bad weather, unavailability of regular staff
- procedures for notifying results to industry
- protocol for communication with local and neighbouring DHBs

4.5 Funding

The NZFSA, through specific marine biotoxin contracts with DHBs and Sampling Providers, funds both routine and Event-related non-commercial marine biotoxin monitoring activities.

Regulatory activities such as actioning food recalls as a result of marine biotoxin closures of commercial growing areas are funded separately by NZFSA.

The MoH funds the public health activities listed below. However funding for these activities is via the general contracts between the MoH and each DHB, for the provision of public health services as specified in the Public Health Services Handbook.

The MoH funded public health activities can be summarised as follows:

- Issue of public warning, posting of signage and associated media response during marine biotoxin Events
- Investigation of suspected toxic shellfish poisoning cases and sampling and analysis associated with such investigations
- Data entry of all case investigation details.

4.6 Marine Biotoxin Technical Committee

NZFSA and the New Zealand Seafood Industry Council (SeaFIC) have a standing technical committee. Although the MBTC's primary focus is on commercial shellfish, it also considers those elements of the non-commercial and commercial programmes that are interlinked.

The MBTC deals with the following matters:

- Amendments to the National Marine Biotoxin Management Plan
- Approval of changes to local marine biotoxin management plans for commercially harvested shellfish, such as sample site location, sample species and sampling frequency
- Review of opening and closure criteria
- Laboratory specifications and approval of analytical methodology.

The MBTC also runs annual marine biotoxin science workshops and acts as a focal point for research information exchange both in New Zealand and overseas.

The Technical Committee can be contacted through:

The Senior Programme Manager (Seafood)

New Zealand Food Safety Authority

P.O. Box 2835

Wellington

5 PROCEDURES

5.1 General

5.1.1 Programme Overview

The key components of the non-commercial marine biotoxin monitoring system are as follows:

Weekly phytoplankton sampling at suitable sites to provide early warning of shellfish toxicity.

Weekly shellfish flesh testing for PSP toxins at sites with significant previous history of *Alexandrium catenella* and *Gymnodinium catenatum* induced PSP contamination.

Surveillance and investigation of TSP cases.

5.1.2 Monitoring for Paralytic Shellfish Poison (PSP)

PSP is monitored for using combined flesh sampling and phytoplankton sampling in North Island areas where there has been recurrent significant (up to 30mg/kg) PSP toxicity, principally from *Alexandrium catenella* and *Gymnodinium catenatum*. In the South Island, these species have not been found to cause shellfish toxicity, although there has been one incident where *Alexandrium minutum* caused PSP toxicity exceeding the warning level.

5.1.3 Monitoring for Domoic Acid

Domoic Acid is not monitored for directly by testing shellfish, instead water samples are taken and are checked for *Pseudonitzschia* species phytoplankton. Some of these are highly toxic, others less so, and some are non-toxic. (Refer Appendix 1 for trigger levels for individual species). Because the individual species are difficult if not impossible to differentiate under a light microscope, a genetic probe may be done to determine the species present. More detail on this is found under the section "Actioning Phytoplankton Results".

5.1.4 Monitoring for Diarrhetic Shellfish Poison (DSP)

DSP is monitored for using phytoplankton samples. When the trigger levels in Appendix 1 are breached, flesh samples should be taken and analysed for DSP as soon as possible. Generally mussels are the preferred species for sampling for DSP.

5.1.5 Sampling Safety

It is essential that Sampling Providers carry out sampling in a safe manner. The rule “if in doubt, don’t go out” must be applied.

The local marine biotoxin management or sampling plan must address safety issues associated with each marine biotoxin sample site, and specify safety procedures, equipment and competency requirements for sampling personnel, including compliance with the relevant statutory requirements of the Department of Labour (Occupational Safety and Health) and of the Maritime Safety Authority.

Procedures should also address safety measures for sampling during an RIS Event.

5.1.6 Sampling Officers

Sampling officers are the people who physically take the shellfish or water samples for the non-commercial monitoring programme.

DHBs should ensure that sub-contractors are provided with suitable identification so fisheries staff can identify them as people authorised to take shellfish samples by a Food Act or Animal Products Act Officer. The Fisheries Act 1996 sections 89 (2) (g) and 89 (2) (ha) permit such duly authorised people to collect in excess of the normal recreational limits as samples.

Sampling Providers act under the direction of the NZFSA Senior Programme Manager Animal Products who is an officer appointed under the Animal Products Act.

Sampling officers must be trained in shellfish and phytoplankton sampling and monitoring activities by an HPO, RSS or Sampling Provider. The amount and type of training will depend on where and how samples are to be taken, and must be documented in the local management or sampling plan.

Sampling officers should have their field activities reviewed no less frequently than annually by an HPO or Sampling Provider. This could involve accompanying them while on a sampling run and checking with the laboratory as to the condition of samples received and

completeness of documentation. The laboratory is required to notify DHBs and Sampling Providers of insufficient or out of specification samples when they are received so the DHB can take corrective action.

DHBs and Sampling Providers must record training and review details (what, by whom and when) for all sampling officers and make such records available to the NZFSA, on request.

5.2 Phytoplankton Monitoring

5.2.1 Selection of Phytoplankton Monitoring Sites

Selection of routine monitoring sites is primarily the responsibility of the NZFSA, in consultation with the phytoplankton laboratory, DHBs and Sampling Providers. These sites are specified in the sampling contracts NZFSA has with providers of services.

The following factors are considered when selecting phytoplankton monitoring sites. Sites should be:

- Representative of common water bodies and located at points where blooms are likely to persist.
- Accessible in most weather conditions.
- Relatively free of land runoff.
- Clear of the surf zone wherever possible.
- Be sited to protect significant shellfish gathering areas. (This does not mean that they need to be sited right in those areas as there may be locations that better represent what is happening more widely in an area while still representing the gathering area.)

5.2.2 Collection of Phytoplankton Samples

Most phytoplankton samples taken in the non-commercial programme are taken by a grab or hose sampling method which provides an integrated sample for analysis.

An option may be to take discrete depth samples using a Van Dorn sampler. (Refer Appendix 2) Routinely a portion of each sample bottle is composited for analysis. In an Event situation, individual samples may be analysed to provide depth profiles which may provide useful information for management. Where a person managing an Event requires

depth profile information, they may request depth profile analysis directly from the phytoplankton laboratory after obtaining permission from NZFSA.

5.2.3 Handling and Dispatch of Phytoplankton Samples

The NZFSA contracts the phytoplankton laboratory to carry out analysis of shellfish growing water samples for phytoplankton species.

In collecting phytoplankton samples, the sampling officer must follow procedures set out in Appendix 2. When submitting a phytoplankton sample for analysis, the sampling officer must fill out the relevant section of the Cawthron Institute sample form (Appendix 5) and submit this along with the sample.

Each sample bottle must be labelled with the sampling date, name and phytoplankton site code and location of the sampling site, and the depth (if taken by random sampler) at which the sample was taken. Use labels that will not become detached and write on them with permanent markers.

Samples must reach the phytoplankton laboratory as soon as possible after collection, ideally within 24 hours and definitely within 48 hours of collection. Phytoplankton samples should not be iced or have chilly pads with them for transit because this may kill cells in live samples.

5.2.4 Notification of Phytoplankton Results

The NZFSA contracts the phytoplankton laboratory to notify DHBs and Sampling Providers by phone and fax when toxic phytoplankton numbers reach or exceed trigger levels for flesh sampling (see Appendix 1). The phytoplankton laboratory may also issue interim results when they identify suspected toxic species. However, DHBs and Sampling Providers should not initiate extra flesh sampling until toxic species are positively identified as being at or above trigger levels and with the agreement of NZFSA.

5.3 Shellfish Monitoring

5.3.1 Selection of Shellfish Sampling Sites

Selection of routine shellfish sampling sites is primarily the responsibility of the NZFSA, in consultation with DHBs and Sampling Providers.

Routine shellfish sampling sites in the non-commercial monitoring programme are specified in contracts with DHBs and with other Sampling Providers. Sites may be varied when Event sampling is underway. They may also be varied, in consultation with the NZFSA, for routine sampling purposes.

In selecting or relocating marine biotoxin shellfish sampling sites, the following factors are considered:

- the history of marine biotoxin and phytoplankton activity in each area
- coverage of major shellfish harvesting areas
- common water bodies
- shellfish species available
- amount of harvesting by non-commercial harvesters
- open seasons for seasonal fisheries
- areas closed because of rahui, Ministry of Fisheries directives, marine reserves and signposted sewage/faecally contaminated areas
- accessibility in all weather conditions
- major current flows
- retention zones and circular flow patterns
- areas where rivers have a major impact on salinity
- any other factors considered relevant.

DHBs and Sampling Providers should also consult with other relevant organisations and groups to obtain a complete picture of the shellfish fisheries in the area (e.g. NZFSA, Ministry of Fisheries, the shellfish industry, Maori representatives, coastal communities, boat operators etc.).

Research agencies may also be consulted for information on phytoplankton distribution, and on oceanographic, hydrographic and meteorological processes likely to have a bearing on the definition of common water areas.

Routine monitoring sites are, and will always need to be, subject to change to meet the needs of the monitoring programme.

5.3.2 Shellfish Species – General

For monitoring purposes, bivalve species are taken because they are much more susceptible to contamination than non-bivalve species due to their filter feeding.

Mussels are the preferred species for use for monitoring for PSP and DSP. They are used as a sentinel species in both New Zealand and overseas monitoring programmes. This is because they accumulate toxins quickly and depurate them quickly.

However, some other shellfish species may retain toxin much longer than mussels such as tuatua which retain PSP for long periods, and scallops which retain ASP.

DHBs and Sampling Providers must be aware that there are differences in biotoxin accumulation, retention and depuration between different shellfish species. Hence a number of species in a toxin-affected area may need to be tested and found safe before the DHB can lift public health warnings.

5.3.3 Tuatua

PSP is generally accumulated and depurated quickly from shellfish and its presence correlates well with the causative phytoplankton species. An exception to this is tuatua which although quick to accumulate the toxin, may retain it long after the phytoplankton responsible has disappeared from the water. Tuatua have been found to retain the toxin in the siphon which may account for this. In practice this means that tuatua need to be sampled and analysed to ensure they are below warning levels if present in an area a public warning has been issued for before a warning is lifted.

5.3.4 Scallops

Scallops do not always correlate well with other species regarding toxicity levels, especially in the case of domoic acid which is produced by *Pseudonitzschia* spp. This toxin, which causes ASP, appears to persist longer in scallops than in other species. This may be because the adductor muscle and roe is sampled, and the toxin detected will have migrated into the tissue from the gut and hence take longer to detoxify. (Most consumers eat only the muscle and roe from scallops, so normally, only the muscle and roe portions of non-commercial scallops are analysed.)

Because the gut and skirt of scallops can contain high levels of toxin at any time of the year consumers should be advised that these parts of the scallop should never be consumed.

A more detailed discussion on scallops can be found in the 2003 review document.

Because scallop samples are expensive to collect they will not be part of the routine monitoring programme. Instead in areas where scallops are present in significant quantities, genetic probes will be used to determine the species of *Pseudonitzchia* present over the period the scallop season is open. (Refer to Management of Marine Biotoxin Events below).

5.3.5 Non-Bivalve Species

Paua sampling (viscera only analysed) sites are not used in the routine monitoring programme, nor is sea urchin (kina) sampling carried out. Routine monitoring of bivalve shellfish normally covers these species. However, paua gut and kina are included, as a precaution, in the list of shellfish species that should not be consumed when public health warnings are issued.

Crabs and crayfish are not routinely sampled. These species may become contaminated when shellfish in their feeding areas take in high levels of toxin. Because such contamination is mostly confined to the gut, DHBs should advise consumers, as part of their public health warning, to gut crabs and crayfish before cooking.

5.3.6 Selecting Shellfish Flesh Analyses and Sample Sizes

There are a number of options for analysis of shellfish flesh samples. It is essential that the appropriate analyses be indicated on the form submitted with the sample. See the table below:

Table 2: Sample Sizes

Toxin	Test Methods	Flesh Sample Size
All (PSP, NSP, DSP, ASP)	PSP bioassay Domoic Acid HPLC DSP ELISA NSP (ether extraction) and bioassay	400 g flesh
NSP only	NSP (ether extraction) and bioassay	150 g flesh
Domoic Acid only	HPLC	12 shellfish
DSP only	DSP ELISA	12 shellfish
PSP only	PSP bioassay	150 g flesh
PSP & ASP	PSP bioassay, ASP HPLC	150 g flesh
PSP & ASP/DSP	PSP bioassay, ASP HPLC, DSP ELISA	150 g flesh

Note: A minimum of 12 shellfish is required to obtain a sufficiently representative, pooled sample. When requesting shellfish flesh analyses outside the routine sampling programme, please take careful note of the toxins produced by particular phytoplankton species (see Management of Marine Biotoxin Events) and make sure that flesh samples are clearly marked for analysis of that toxin only. If samples are marked for analysis of the wrong toxin, or for analysis of all toxins when only one is necessary, the public may be unnecessarily exposed to risk and/or the cost of the incorrect analysis may be recovered from the sampler.

5.3.7 Dispatch and Handling of Shellfish Samples

The NZFSA contracts an approved marine biotoxin laboratory to analyse non-commercial shellfish samples for marine biotoxins. This laboratory is currently Agriquality's AquaBiotox™ laboratory.

Shellfish samples must arrive at the testing laboratory alive and in good condition, ideally within 24 hours and definitely within 48 hours of collection. The samples must be packed in chilly bins with ice packs and reach the laboratory at a temperature between 0 and 10 degrees Celsius.

Samples must not be frozen.

Sampling officers should collect routine samples of shellfish, wherever possible, to ensure that they arrive in the biotoxin laboratory on a Monday, Tuesday or Wednesday. Reactive samples may arrive on any weekday. Please contact the laboratory to make arrangements for receipt if samples are likely to arrive outside of normal working hours.

A properly filled out AgriQuality sample submission form must accompany all shellfish flesh samples. See Appendix 6 for a copy of the shellfish sample submission form. Labels showing site name, site code and shellfish species must be attached to each shellfish sample bag.

5.3.8 Notification of Results

NZFA contracts the approved analytical laboratory to notify DHBs and Sampling Providers by phone and fax when public warning limits are exceeded or when toxin levels are rising in areas not previously toxic.

Interim sample results for NSP and PSP that clearly exceed the regulatory limit but where samples require dilution to produce a final result must be notified as soon as the laboratory can confirm that the result will definitely exceed the public warning level. This allows appropriate action to be taken without delay.

5.4 Management of Marine Biotoxin Events

5.4.1 General

Once Phytoplankton trigger levels are exceeded or flesh samples show signs of toxicity we have an Event. Some Events come to nothing when flesh samples are taken; others result in detection of harmful levels of toxicity in shellfish. Public warnings should only be issued when toxin is detected in shellfish above the public warning levels specified in section 4.2.

5.4.2 Actioning Phytoplankton Results

Phytoplankton monitoring provides an early warning indicator of toxicity in shellfish. See Appendix 1 for the Phytoplankton Action Level Table. The detection level of toxic phytoplankton in water samples is 100 cells per litre.

In areas where phytoplankton is used as the only routine monitoring option, cell numbers at or above a trigger level should prompt immediate shellfish flesh sampling and analysis for the specific toxin produced by that phytoplankton species.

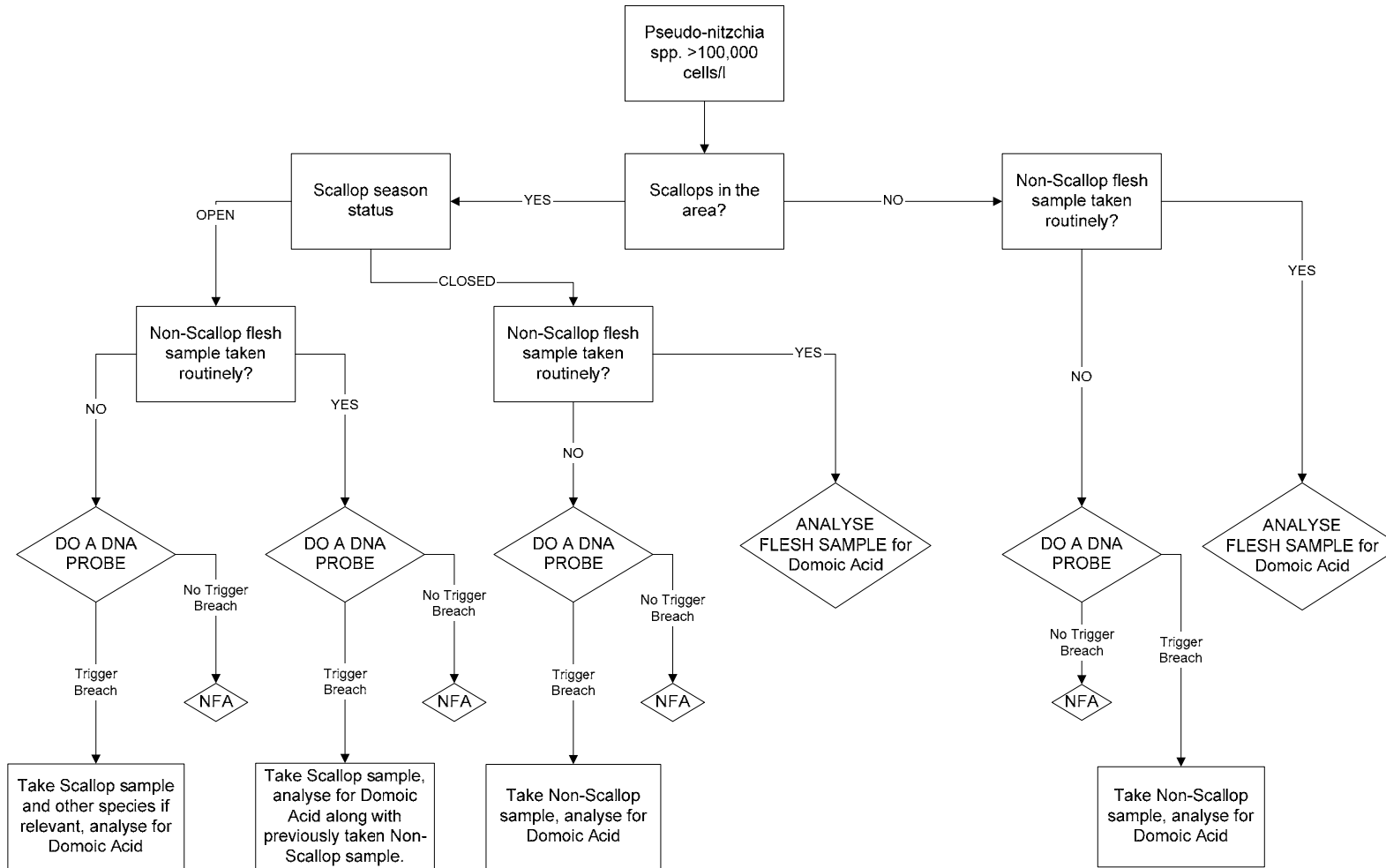
Genetic probes are required to distinguish the different proportions of *Pseudonitzschia* species present in water samples. Because these are more expensive to do than testing flesh samples, when *Pseudonitzschia* species are detected above 100,000 cells/l in plankton samples in areas where flesh samples are routinely taken (for example where routine PSP testing of flesh is undertaken) generally it is better to test a flesh sample if one is already to hand than to undertake a genetic probe. However if scallops are present in an area and the scallop season is open or if a special sampling trip is required to obtain a flesh sample, a genetic probe should be done preferentially. It should be noted that high domoic acid levels have only ever been found in mussels and scallops in New Zealand and it would therefore appear that analysing other species for it may not be worthwhile. However, more data is needed to confirm this, particularly for tuatua.

The table and diagram below provide guidance on whether to do a genetic probe or take flesh samples.

Actions to be taken when >100,000 cells/l Pseudo-nitzschia species present:

Situation	Scallop Season Status	Action
No flesh samples taken routinely, no scallops in area	N/A	Do genetic probe before taking any shellfish samples
Flesh sample routinely taken and available for analysis, no scallops in area	N/A	Analyse flesh sample for Domoic acid, no genetic probe required
Scallops in area, no flesh sample taken routinely	Open	Do genetic probe before taking any shellfish samples
Scallops in area, non-scallop flesh sample routinely taken and available for analysis	Open	Do genetic probe before analysing flesh sample already taken or taking scallop samples
Scallops in area, no flesh sample taken routinely	Closed	Do genetic probe before taking any shellfish samples
Scallops in area, non-scallop flesh sample routinely taken and available for analysis	Closed	Analyse flesh sample for Domoic acid, no genetic probe required.

Actions to be taken when >100,000 cells/l Pseudonitzchia species present



Often there will be more than one toxic *Pseudonitzchia* species present. The table in appendix 1 divides the *Pseudonitzchia* species into two groups: those that are more toxic and those that are less toxic. The more toxic species should have their cell counts aggregated and if these exceed 100,000 cells/litre then flesh testing should be initiated. The less toxic species should also have their cell counts aggregated and if these exceed 500,000 cells/litre then flesh testing should be initiated. Unless either trigger level is breached, there is no need to initiate flesh testing. (i.e.: there is no need to try and aggregate species of lower toxicity with species of higher toxicity.)

5.4.3 Event Related Sampling

DHBs and Sampling Providers must consult the NZFSA before they undertake any non-routine sampling of phytoplankton or shellfish for non-commercial programme purposes.

Reasons for such non-routine sampling may include the following:

- to monitor the development or status of an Event
- to obtain more information about areas where toxins or toxigenic phytoplankton levels are rising towards or have exceeded a regulatory limit
- to define toxin-affected areas and species
- to ensure that previously toxin-affected areas are safe e.g. it may be necessary to take additional samples from other representative sites or shellfish species in previously toxin-affected areas before the whole area can be declared safe for public use.

Shellfish sampling undertaken in relation to an Event needs to be the minimum necessary to manage the Event. When Events are underway, routine weekly phytoplankton sampling should continue. This may be sufficient for tracking an Event, however, recognising the distances between sample points, additional phytoplankton sampling may be required. When significant toxicity is detected in shellfish from areas where phytoplankton samples are not routinely taken, water samples should be arranged (if possible), in conjunction with the phytoplankton laboratory, to ascertain the species responsible for toxin production.

Once it is clear which phytoplankton species is responsible for an Event, phytoplankton samples taken during Events (other than the routine monitoring samples) need to be marked for analysis only for the plankton species of concern.

Once shellfish samples have exceeded the public warning limits and an area has had a public warning issued, shellfish sampling within the affected area (Other than any samples routinely contracted for) should cease and water samples should be obtained and be used to track the area affected and progress of an Event. This is because water samples are easier to collect and simple to analyse, especially for a single plankton species. The focus should shift to the areas adjacent to the area subject to warning to ensure that any spread of the problem is detected. This may be done by taking water or shellfish samples as appropriate.

When the plankton results show that levels of the causative species of plankton have decreased below trigger levels, clearance flesh samples should be obtained from the affected area (see below).

Criteria for Issue of Public Warnings

DHBs must take prompt and effective public health action to discourage members of the public from gathering or consuming contaminated shellfish. The DHB should issue a public warning in the following circumstances:

Toxin levels in shellfish exceed public warning levels. (Refer section 4.2.)

Two or more cases of human illness have resulted from consumption of shellfish from an area, and symptoms are consistent with the clinical case definitions for PSP, NSP, ASP, or DSP. DHBs should use this criterion with caution and, if possible, obtain laboratory confirmation of shellfish toxicity before issuing a warning. However, they should take immediate action if, for example, the cases exhibit classic PSP symptoms within an hour of consuming shellfish.

5.4.4 Defining Affected Areas

DHBs are responsible for defining areas subject to public health warnings. It is thus essential that non-DHB Sampling Providers maintain timely and effective communication with their local DHB to enable the DHB to make well-informed decisions and be able to take prompt action to protect public health. Before making such decisions, the DHB should consult the NZFSA, and where commercial growing areas are involved, other relevant agencies including NZFSAVA Regional Shellfish Specialists and shellfish delivery centre representatives.

Generally, areas subject to warnings will extend to the next sample site below public warning limits unless there are geographic, hydrographic or historical reasons for closing smaller or larger areas.

When defining an affected area, DHBs must also take the following matters into account:

- phytoplankton information
- hydrography
- biotoxin results from adjacent areas
- any other relevant information.

When shellfish toxin levels are rising and approach the public health warning level, DHBs should immediately supply this information to industry representatives in the affected area.

5.4.5 News Media Coverage

During an Event, DHBs are responsible for issuing media statements to advise the public of areas shellfish should not be harvested from. They should use all media outlets with coverage in the locally affected area.

Appendix 3 contains suggested wording for such statements.

Once an Event is over and the area is free of toxicity, DHBs should issue media statements advising the public that the area is safe for shellfish gathering.

5.4.6 Signage

DHBs are responsible for ensuring that warning signs are posted in unsafe shellfish collecting areas and at access points (such as boat ramps). It is recommended that these signs clearly define the affected area and advise the public against consuming shellfish from within the area, and, where appropriate, be printed in languages other than English e.g. Maori, relevant Pacific and Asian languages.

DHB staff should pay regular (weekly or fortnightly) visits to all major non-commercial harvesting sites within an area subject to a public warning area, to ensure that signage is intact and to warn any people taking shellfish of the potential health consequences.

In contaminated areas where a substantial take of shellfish continues despite media publicity and other warnings, DHB staff should develop and use other strategies to encourage the public to heed public warnings.

Once areas are re-opened for shellfish gathering, the DHB should remove warning signs.

5.4.7 Communications with Local Maori and other Non-commercial User Groups

DHBs should develop effective communication strategies to ensure that local Maori and other user groups are aware when public warnings are issued about the safety of shellfish in local gathering areas. This will include contact with Iwi and community leaders to enlist co-operation and seek advice on the most appropriate ways of promoting the warning.

DHBs should develop and maintain networks and co-operative working relations with Iwi and provide technical expertise to support the Iwi's role in community education and encouraging respect for public health warnings.

5.4.8 Notification to Regulatory Agencies and Industry

When DHBs issue public warnings, they should notify the following agencies:

- The NZFSA
- All other DHB Public Health Units and Sampling Providers
- NZFSAVA Regional Shellfish Specialists and relevant Verification Agency staff. (Where commercial areas are affected only.)

When the toxin-affected area includes commercial sites, DHB staff should immediately send formal written notification of closures and subsequent re-openings to the appropriate delivery Centre Personnel. Product recall actions may also be required.

5.4.9 Notification of Medical Practitioners

When toxin levels approach those likely to result in illness, DHBs may write to medical practitioners in the affected area to advise them of the situation to let them know what sort of symptoms may be expected and to remind them of the need to notify the Medical Officer of Health of any cases. An example of such a letter is found at Appendix 4.

5.4.10 Shellfish Clearance Sampling

Before DHBs can issue a media statement advising the public that areas are safe for shellfish gathering, they should determine that the following requirements have been adequately addressed.

Two consecutive samples of shellfish should be taken at least 48 hours apart from the routinely sampled sites and species in the closed area. In areas where routine samples are

not taken, sampling should be as agreed with NZFSA in advance. Samples must be below public health warning limits for the toxin of concern before a public warning is lifted. It may be necessary to check other species in an area are also clear of toxin – a single sample of each species should be sufficient for this purpose and these should be taken at the same time as the second clearance sample from any routinely sampled sites.

Toxin levels should be decreasing or static in consecutive clearance samples. (Note: there may be some variation between patches of shellfish in an area, especially with species such as tuatua which retain PSP toxins in low levels for long periods. Some variation is to be expected and may not be indicative of new activity.)

No cases of human illness, notified to the Medical Officer of Health and consistent with the accepted case definitions for PSP, NSP, ASP or DSP shall have resulted from the consumption of shellfish gathered since the date of collection of the first clearance sample from within or adjacent to the closed area.

DHBs should ensure that species of shellfish sampled from an area for clearance purposes are representative of those species normally gathered from the area.

Shellfish and/or phytoplankton results from adjacent areas should also be evaluated for their potential impact on the area to be opened. Toxin/toxic algae levels should also be decreasing or static in adjacent areas. DHB staff may have to contact their colleagues in adjacent DHBs to obtain this information and assess its impact on their own area.

The cell counts of toxigenic phytoplankton listed in Appendix 1 must be below trigger levels and decreasing or static.

DHBs should also consider other relevant, available information such as the hydrography of the area, and the pattern of toxicity at sample sites, to assess the potential for a recurrence of toxicity. They may also impose other conditions or limitations if these are considered necessary.

In summary, the DHB must have sufficient information to make an informed and reasoned food safety decision.

5.4.11 Reversion to Routine Sampling After High Cell Counts

Once the cell number of a toxic phytoplankton species is below the trigger level then extra shellfish sampling should cease. However, in the case of a *Pseudonitzschia* species bloom, shellfish sampling for ASP analysis may be continued for two weeks after cell numbers drop

below the trigger level. *Pseudonitzschia* species often produce more toxin when the bloom “crashes” and shellfish may become more toxic as cell numbers decline.

5.5 TSP Case Investigation

Surveillance of TSP is an integral part of the non-commercial marine biotoxin monitoring programme. Health protection staff must investigate notified cases or suspected cases and record all details on the notifiable disease database (EpiSurv). The MoH's Manual for Public Health Surveillance in New Zealand contains case definitions, the case report form and instructions for completing this form.

5.5.1 Notification

All cases and suspected cases of toxic shellfish poisoning are legally notifiable to Medical Officers of Health pursuant to Section 74 of the Health Act 1956. Medical practitioners must notify any such cases promptly, so that public health staff can investigate without delay. This is especially important when shellfish in the area are already toxic and there is a high likelihood of illness occurring.

5.5.2 Investigation

Public health staff should investigate every suspected case. It is essential that all relevant sections of the standard case report form are completed, including precise details about when and where the shellfish were harvested.

If samples of the shellfish actually consumed by the ill person are not available for testing it is very important to obtain samples of the same species of shellfish from the same site as close as possible to the time of consumption by the ill person. If necessary, the investigating officer must contact other DHBs to ascertain marine farm numbers and to arrange sampling from the commercial source.

The investigating officer should assess information on the case report form against the clinical case definitions as given in the Manual for Public Health Surveillance in New Zealand. If officers require expert advice on assigning case status, they should consult epidemiologists at ESR Kenepuru Science Centre.

All data collected from suspected cases should be entered into EpiSurv, with sample results details added as they become available.

If faecal specimens provided by suspected cases are found to be positive for food or water borne pathogens, all the case data, plus these results, should be transferred to the food and waterborne disease section of EpiSurv.

5.5.3 Case-related Sampling

Officers investigating suspected cases must take any available, relevant food samples. Such samples may include the remains of meals, samples of commercial product from the same batch(es) as those eaten by the suspected case, and samples taken from the areas where the suspect shellfish were harvested. Samples must be large enough (at least 500 g flesh weight) to allow for both marine biotoxin analysis and analysis for other pathogens and toxins (bacterial, viral etc).

When suspected cases experience gastrointestinal symptoms, they should be asked to provide faecal specimens, so that bacterial and/or viral causes of illness can be investigated and possibly eliminated.

Investigating officers must submit TSP case-related food samples, including those that are sent for marine biotoxin analysis, with a standard food laboratory sample form. Samples requiring both marine biotoxin and microbiological analysis must be handled aseptically and split into two portions, with one portion going to the public health laboratory and the other to the marine biotoxin laboratory. The associated EpiSurv case number must be written on all forms accompanying these samples, to ensure they are clearly identified as case samples.

APPENDIX 1: Non – Commercial Phytoplankton action level table

These action levels apply only to non-commercial situations and relate to composite samples. Please note that this action level table has some minor differences to the commercial phytoplankton action level table and should not be applied to commercial growing area situations.

Phytoplankton Species	Toxin	Level in composite sample to trigger flesh testing (Cells per Litre of seawater) ¹
<i>Alexandrium minutum</i>	PSP	400
<i>Alexandrium ostenfeldii</i>	PSP	400
<i>Alexandrium catenella</i>	PSP	100
<i>Alexandrium tamarense</i>	PSP	100
<i>Gymnodinium catenatum</i>	PSP	100
² <i>Pseudo-nitzschia australis</i>	ASP	100,000 (Combined count of these 3 species)
² <i>Pseudo-nitzschia pungens</i>		
² <i>Pseudo-nitzschia multiseriata</i>		
² <i>Pseudo-nitzschia turgidula</i>	ASP	500 000 (Combined count of these 5 species)
² <i>Pseudo-nitzschia fraudulenta</i>		
² <i>Pseudo-nitzschia delicatissima</i>		
² <i>Pseudo-nitzschia pseudodelicatissima</i>		
² <i>Pseudo-nitzschia multistriata</i>		
³ <i>Karenia brevis</i>	NSP	1,000
⁴ <i>Karenia/Karlodinium/Gymnodinium Group</i>	NSP	250,000
<i>Dinophysis acuta</i>	DSP	500
<i>Dinophysis acuminata</i>	DSP	1 000
<i>Prorocentrum lima</i>	DSP	500

¹When the trigger level is exceeded, a shellfish sample should be taken as soon as possible after notification of the trigger level and submitted for analysis for the relevant toxin. In areas that are already subject to a public health warning, levels in excess of these trigger levels may be used to maintain warnings in place without taking further flesh samples.

²For *Pseudonitzschia* species, when the 100,000 cells/l level is exceeded, a DNA probe or shellfish analysis for domoic acid must be performed. In areas where scallops are present a genetic probe must be done during scallop season before undertaking any flesh analyses for domoic acid. Outside this period, if a flesh sample has been taken of another species this may be analysed for domoic acid instead of undertaking a genetic probe. In areas where scallops are not present, flesh testing of non-scallop species should be done instead of a genetic probe if a flesh sample has already been taken for another reason (usually routine PSP monitoring).

³*Karenia brevis* has not been isolated in New Zealand to date.

⁴The *Karenia*/*Karlodinium*/*Gymnodinium* group includes *Karenia bidigitata*, *Karenia brevisulcata*, *Karenia mikimotoi*, *Karenia papilionacea*, *Karenia selliformis*, *Karlodinium micrum* and *Gymnodinium impudicum*.

Note: If there is evidence of fish kills or RIS in the coastal area. Shellfish analysis for toxins should also be considered.

APPENDIX 2 Phytoplankton sampling instructions



C A W T H R O N

Collecting Phytoplankton samples using the Hose Sampler

Equipment

Hose sampler	supplied by Cawthron
Clean bucket	rinse with seawater
Sample bottles	100ml plastic, 2 for each sample taken
Lugols Iodine	for preserving one of the samples
Polystyrene bins	6-pack chilly bins or cardboard box
Labels etc	green Cawthron labels and courier tickets

Method

Prepare hose	Remove bung from end
Collect sample	Lower weighted end first Hold top end securely Lower very slowly to maximum possible depth (max 15m, note depth on bottle) so as not to disturb any layers of phytoplankton in the water column Take care not to hit the bottom
Retrieve sample	Replace bung securely in top of tube and pull up.
Empty water into the bucket	
Fill sample bottles	Lower plastic bottle into bucket leaving a small air space at top. Fill two plastic bottles with sample water Leave one as it is, put four drops of Lugols iodine per 100ml into the other bottle immediately and cap securely. Invert gently to mix.

Label each bottle clearly with date, site name, phytoplankton site code and whether preserved or not.

Do not refrigerate

Contact: Cawthron phytoplankton laboratory, 0800 80 98 98

Collecting Phytoplankton samples using the van Dorn Bottle

Equipment

van Dorn sampler	supplied by Cawthron
Clean bucket	rinse with seawater
Sample bottles	100ml plastic, 2 for each sample taken
Lugols Iodine	for preserving one of the samples
Polystyrene bins	6-pack chilly bins or cardboard box
Labels etc	green Cawthron labels and courier tickets

Method

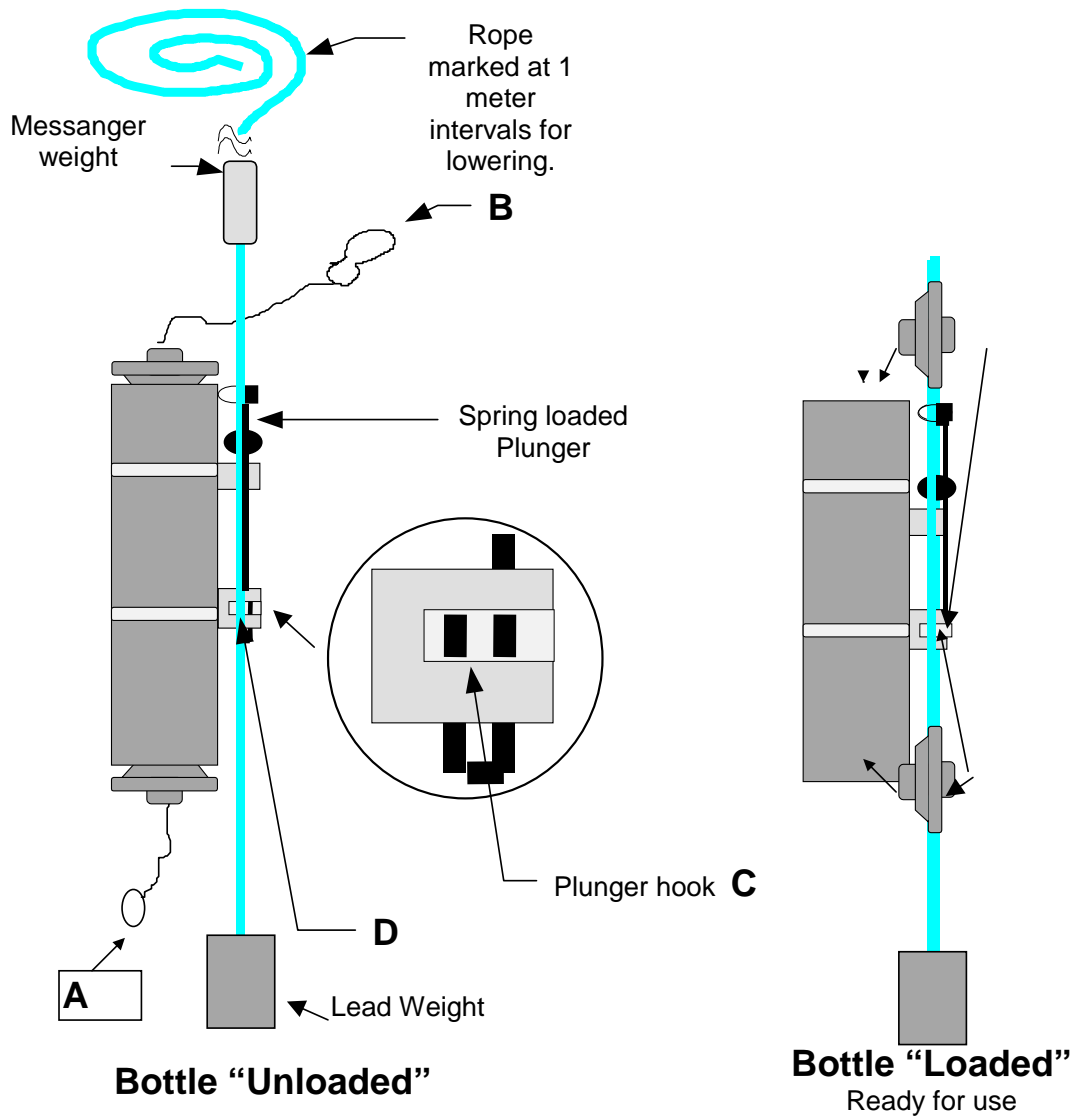
Check gear	Ensure rope is attached correctly, with the weight at bottom, and the messenger weight at the top
Set up sampler	Refer to the following instructions and diagram Hold top end securely Lower very slowly to maximum possible depth (max 15m, note depth on bottle) so as not to disturb any layers of phytoplankton in the water column Take care not to hit the bottom
Take sample	Slowly lower to the desired depth, reading the depth from the rope Drop messenger weight to close end caps You will feel through the rope when the end caps have been triggered. A jerk will often trigger stubborn end caps.
Retrieve sample	Haul sampler aboard Rinse bucket with small quantity of sample Empty remainder of water into bucket
Fill sample bottles	Lower plastic bottle into bucket leaving a small air space at top Fill two plastic bottles with sample water Leave one as it is, put four drops of Lugol's iodine per 100ml into the other bottle immediately and cap securely. Label each bottle clearly with date, site name, phytoplankton site code and whether preserved or not.

Do not refrigerate

Contact: Cawthron phytoplankton laboratory, 0800 80 98 98

How to set up van Dorn Bottle

- Lock bottom end cap open** Push spring-loaded plunger down
 Insert bottom loop A into groove in lower block D, securing the loop by guiding plunger hook C into hole in lower block, through the loop
- Lock top end** Place the top clip B onto rope A, close to block D cap open and clear of knot in loop A to avoid the clip catching on the knot in rope A.
 Clip B must be able to release freely when loop A is released
- Check rope run** Ensure main rope is secured at top of plunger, in order to hold bottle vertically during descent



APPENDIX 3: Suggested wording for media statement

The following phrases may be helpful in describing a marine biotoxin Event in the media. It is best to keep language as simple as possible.

Please use the term “non-commercial” rather than “recreational” in press statements and other forms of communication. Many people gather shellfish for traditional purposes or to provide basic food supplies – these activities are not “recreational”.

Paralytic Shellfish Poisoning (PSP)

“Symptoms of PSP include numbness and tingling around the mouth, face or extremities; difficulty in swallowing or breathing; dizziness; double vision; and, in severe cases, paralysis and respiratory failure. Symptoms usually occur within 12 hours of consuming shellfish.”

Amnesic Shellfish Poisoning (ASP)

“Symptoms of ASP are diarrhoea and vomiting, usually within 24 hours of consuming shellfish, and/or confusion, memory loss and disorientation within 48 hours of consuming shellfish.”

Diarrhetic Shellfish Poison (DSP)

“Symptoms of DSP are diarrhoea, nausea, vomiting and abdominal pain, and usually occur within 12 to 24 hours of eating shellfish.”

Neurotoxin Shellfish Poisoning (NSP)

“Symptoms of NSP include numbness and tingling around the mouth, face or extremities; difficulty in distinguishing hot and cold objects; dizziness, difficulty in swallowing or breathing; and, in severe cases, paralysis. Symptoms usually occur within 12 hours, but may appear up to 24 hours after eating shellfish.”

“When a public warning is issued advising against the collecting and eating of shellfish this means:

- Do not collect bivalve shellfish such as mussels, toheroa, pipi, tuatua, cockles, oysters, scallops; do not collect kina.
- You may take paua and crabs but remove the gut before cooking.
- You may take crayfish, but do not eat the gut. Cook and eat flesh (preferably tail) only.”

“If you are in doubt about the safety of any shellfish you have purchased, please contact the retailer or wholesaler who sold it to you.”

During the scallop season, it is a good idea to add the following statement to all press releases:

“The public are advised NOT to eat the gut and skirt of scallops, even when these shellfish come from areas where there are no biotoxin warnings in place.”

APPENDIX 4: Suggested Wording for GP Letter

Dear Dr

TOXIC SHELLFISH POISONING

The XXX DHB Public Health Unit has issued a warning advising the public not to consume shellfish from the following area: XXX

This warning has been issued because of a bloom of XXX which is associated with XXX shellfish poisoning.

Symptoms of PSP include numbness and tingling around the mouth, face or extremities; difficulty in swallowing or breathing; dizziness; double vision; and, in severe cases, paralysis and respiratory failure. Symptoms usually occur within 12 hours of consuming shellfish.

Or

Symptoms of ASP are diarrhoea and vomiting, usually within 24 hours of consuming shellfish, and/or confusion, memory loss and disorientation within 48 hours of consuming shellfish

Or

Symptoms of DSP are diarrhoea, nausea, vomiting and abdominal pain, and usually occur within 12 to 24 hours of eating shellfish. **[Delete those that do not apply]**

Medical Practitioners have a vital role in alerting health authorities to the occurrence of potentially serious illness. They should consider the possibility of toxic shellfish poisoning in any case of illness that presents with acute onset of gastrointestinal or neurological symptoms following consumption of shellfish.

Toxic shellfish poisoning is caused by eating shellfish contaminated with toxin produced by toxic algae. Scallops, mussels, oysters, pipi, tuatua and other bivalve shellfish are the main vehicles of transmission, but illness is possible following consumption of crabs, lobsters, crayfish, paua, if the gut is eaten.

Presumptive diagnosis can be made on the history of consumption of shellfish immediately prior to development of clinical symptoms.

Actual or suspected toxic shellfish poisoning is notifiable to the Medical Officer of Health pursuant to the Health Act 1956 as a poisoning arising from chemical contamination of the environment. Medical Practitioners, in particular, should immediately report any suspected cases to the Medical Officer of Health in their local District Health Board. To assist the Medical Officer of Health's investigation, patients and/or caregivers should be asked to retain samples of suspect shellfish for analysis.

We appreciate your assistance in this important public health matter.

Yours faithfully

APPENDIX 5 Cawthron Institute Phytoplankton Laboratory Sample Submission Form

■ 98 HALIFAX ST EAST ■ PRIVATE BAG 2, NELSON, NEW ZEALAND ■ TEL 0800 50 25 25 ■ FAX 03 546 9464

PHYTOPLANKTON SAMPLE FORM FOR NON-COMMERCIAL SAMPLES



Water Sample	
Site Name	
Site Number	
Site Code	
Corresponding shellfish site code	



Sample Data							
Date Sample Taken		Time Sample Taken		Hours before high tide		Temperature on arrival	°C

Routine analysis (standard)	
Single species analysis	

Sampling method (please circle): **Hose** **Grab** **Van Dorn**

Please circle the depths sampled as appropriate below

Water Column Vertical Profile Data						
Depth (metres)	surface	3	6	9	12	15
Temperature (°C)						
Salinity (p.p.t)						
Visibility (secchi depth (m))						

Contact Information					
Samplers Name:		Ph 		Email	
Sampling Coordinator (HPO)		Ph 		Email	
Send Invoice To: NZFSA					

Comments: (eg state of tide, weather, wind strength / direction, dead fish / birds etc)
Visible Bloom? YES/NO – IF YES, Colour RED/PINK/GREEN/BROWN Odour?

APPENDIX 6 AgriQuality Shellfish Sample Submission Form



AquaBiotox™

To:
AquaBiotox™ Laboratory
AgriQuality Limited
Laboratory Services Auckland
131 Boundary Rd
Blockhouse Bay
AUCKLAND
NEW ZEALAND

Ph: (09) 626 8200
Fax: (09) 626 8282

AgriQuality Laboratory Job No.	
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Programme:

Non-Commercial	<input type="checkbox"/>
Commercial	<input type="checkbox"/>
Routine	<input type="checkbox"/>
Non-Routine	<input type="checkbox"/>

SUBMITTED BY:	
Samplers Name (print):	Signature:
Sample No. / I.D.	
Customer:	HPO:
Phone No.:	Fax No.:
Invoice to: NZ Food Safety Authority, PO Box 2835, WELLINGTON. Attention: Jim Sim, Principal Advisor (Shellfish)	

SAMPLING INFORMATION			
Site Number		Date Sample Taken	/ /
Site Name		Time Sample Taken	
Latitude		Date Sent to Lab.	/ /
Longitude		Time Sent to Lab.	
Sample Depth (Metres)		Date Received by Lab.	/ /
Surface Water Temp °C		Time Received by Lab.	
Salinity		Temperature on arrival °C	

SPECIES / PART TO ANALYSE (Tick as Required)				ANALYSIS REQUESTED (Tick as Required)			
Greenshell Mussel	MG	<input type="checkbox"/>	Scallop Roe and M & R (C export)	SR	<input type="checkbox"/>	PSP Mouse Bioassay	<input type="checkbox"/>
Blue Mussel	ML	<input type="checkbox"/>	Scallop, M & R (C domestic or NC)	SM	<input type="checkbox"/>	ASP (Domoic Acid) HPLC	<input type="checkbox"/>
Pacific Oyster	OY	<input type="checkbox"/>	Queen Scallop, M & R	QS	<input type="checkbox"/>	DSP & YTX LCMS	<input type="checkbox"/>
Dredge Oyster	DO	<input type="checkbox"/>	Tuatua	TU	<input type="checkbox"/>	NSP Ether Mouse Bioassay	<input type="checkbox"/>
Rock Oyster	RO	<input type="checkbox"/>	Pipi	PI	<input type="checkbox"/>	DSP - Check ELISA	<input type="checkbox"/>
Paua, Gut	PG	<input type="checkbox"/>	Cockle	CK	<input type="checkbox"/>	NSP/DSP Screen Mouse Bioassay	<input type="checkbox"/>
Water	WA	<input type="checkbox"/>	Other		<input type="checkbox"/>	Other (Specify)	<input type="checkbox"/>

COMMENTS OR SPECIAL INSTRUCTIONS
Please return Chilli-bin and freezer pads to :