



Queensland Harmful Algal Bloom

Operational Procedures

July 2026

Prepared by: Department of the Environment,
Tourism Science and Innovation.

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July 2026

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Introduction

Harmful Algal Blooms (HABs) are common seasonal phenomena occurring throughout Queensland in fresh, estuarine, and coastal marine waters. The organisms largely involved in these outbreaks include cyanobacteria, diatoms, and dinoflagellates. In some instances, blooms of marine macroalgae may be potentially hazardous. HABs may be potentially toxic thus posing a direct threat to human and animal health. Consequently, a HAB may have economic (significant increase in water supply treatment costs or need to use alternative supply, closure of oyster areas, etc.) and social impacts (disrupt recreational use of the waterway). HABs may also have deleterious effects on aquatic ecosystems.

The Queensland Harmful Algal Bloom Response Plan outlines the contingency plan for responding to HABs within the capacity of local response agencies:

- Department of the Environment, Tourism, Science and Innovation (DETSI)
- Department of Health (QHealth)
- Department of Primary Industries (DPI)
- Local governments (LGs)
- Water storage operators (WSOs)

This document outlines a standard operational procedure to follow given the identification and/or receipt of a public enquiry regarding a potential HAB. It builds on the Queensland Harmful Algal Bloom Response Plan that outlines the roles and responsibilities of the various response agencies with the capacity and expertise to deal with specific HAB incidences and provides contact details and operational methods to ensure that the enquiry is handled by the appropriate agency within a consistent response framework. The information presented here is based largely on the National Protocol for the Monitoring of Cyanobacteria and their Toxins in Surface Waters (Jones et. al 2002), Phytoplankton Methods Manual for Australian Freshwaters (Hötzel and Croome 1999), Guidelines for Managing Risks in Recreational Waters (NH&MRC 2008), Manual on Harmful Marine Microalgae (Hallegraeff et. al 2003), and the Monitoring and Sampling Manual (DES 2018).

Response plan contacts

There are several potential response agencies including state and local governments, and water storage operators that have jurisdiction and/or interest in HABs. These agencies and their roles in HAB response are outlined in the Queensland Harmful Algal Bloom Response Plan (2023).

At times there may be situations where more than one agency will have primary responsibility to respond to a potential HAB incident. This may not necessarily be reflected in the response plan. Three potential scenarios are:

- HABs detected in natural waters within the boundaries of National Parks or State Forests: DETSI assumes the response agency role in this scenario.
- HABs detected in areas in or around licensed oyster areas: DPI assumes the response agency role in this scenario as part of their QSWAMP activities. It is likely; however, they will liaise with DETSI officers during the bloom response as required.
- HABs detected in natural waters within urban areas: Local Governments assume the response agency role in this scenario. They may liaise with DETSI officers should they lack adequate local resources to deal with the bloom response.

The contact details for the response agencies identified above are given in Table 1.

Table 1. Response agencies contact information

Response Agency	Contact Details																						
Department of the Environment, Tourism, Science and Innovation (DETSI)	Pollution Hotline: 1300 130 372 (24 hours a day, 7 days a week)																						
Department of Primary Industries (DPI)	DPI Call Centre Phone: 13 25 23 (8.00 am to 5.00 pm Monday to Friday)																						
Queensland Health	During Business Hours Director of Environmental Health Services Public Health Units <table> <tr> <td>Toowoomba</td><td>07 4631 9888</td></tr> <tr> <td>Cairns</td><td>07 4050 3601</td></tr> <tr> <td>Bundaberg</td><td>07 4150 2780</td></tr> <tr> <td>Townsville</td><td>07 4750 4020</td></tr> <tr> <td>West Moreton</td><td>07 3810 1500</td></tr> <tr> <td>Brisbane Northside</td><td>07 3250 8509</td></tr> <tr> <td>Brisbane Southside</td><td>07 3000 9145</td></tr> <tr> <td>South Coast</td><td>07 5509 7212</td></tr> <tr> <td>Sunshine Coast</td><td>07 5479 4655</td></tr> <tr> <td>Rockhampton</td><td>07 4920 6989</td></tr> <tr> <td>Hervey Bay</td><td>07 4197 7277</td></tr> </table> After Hours 0412 422 181 or Pager: 1300 555555 92859 0413 880 212	Toowoomba	07 4631 9888	Cairns	07 4050 3601	Bundaberg	07 4150 2780	Townsville	07 4750 4020	West Moreton	07 3810 1500	Brisbane Northside	07 3250 8509	Brisbane Southside	07 3000 9145	South Coast	07 5509 7212	Sunshine Coast	07 5479 4655	Rockhampton	07 4920 6989	Hervey Bay	07 4197 7277
Toowoomba	07 4631 9888																						
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South Coast	07 5509 7212																						
Sunshine Coast	07 5479 4655																						
Rockhampton	07 4920 6989																						
Hervey Bay	07 4197 7277																						
Water Storage Operators	Sunwater Green Square North Level 9, 515 St Pauls Terrace Fortitude Valley, Qld 4006 Phone: (07) 3120 0000 sunwater.com.au Seqwater 5/200 Creek Street Spring Hill Qld 4000 Phone: 1300 737 928 seqwater.com.au Gladstone Area Water Board 136 Goondoon Street Gladstone Central Qld 4680 Phone: (07) 4976 3000 gawb.qld.gov.au																						

Response procedures

The main elements of a response to a suspected HAB includes:

1. **Receiving the public inquiry:** it is important that members of the public can easily report a potential HAB or to seek general information regarding HABs. As individuals may regularly deal with certain authorities, it is easier to capture the inquiry through existing channels than to create a specific contact address just for HABs. Many of the key authorities have call centres or “hot lines” to deal with phone inquiries, local officers to deal with counter inquiries, and web sites to deal with general information. The response plan contacts (see section 2.) provides a guide to government and non-government agencies and their areas of responsibilities to help a person dealing with a public inquiry to quickly identify and contact the most appropriate authority to handle the inquiry. The matter would then be referred to that appropriate authority for action and follow up with the inquirer.
2. **Provide general advice:** if the inquirer is simply seeking general information regarding HABs, that person will be contacted by the appropriate authority’s response officer situated in the same area as the inquirer (local response officer) and provided with the requested advice. If the local response officer does not have sufficient knowledge to fully respond, they will seek the necessary information from the relevant agency’s expert. Channelling responses through a local network will ensure consistency with other local responses as well as opportunity to add any regional aspects to the issue at the time. The web sites of the authorities are linked to avoid duplication or confusion of information.
3. **Inspect the bloom:** if the inquirer were reporting a potential HAB, the matter would be referred to the local response officer who will contact the inquirer to confirm details of the possible HAB. The officer will then inspect the site to determine if it is a likely HAB. Often visual inspection by an experienced officer will determine if the bloom is potentially harmful or just a general water quality or water weed issue. If the officer believes it may be a HAB, he/she will arrange for the sample to be sent to the appropriate laboratory, usually in Brisbane, for analysis to confirm it is a HAB and quantify any toxins present. The officer will also contact the inquirer to advise of his/her findings and action. Each authority will determine the most relevant and optimal methods for sampling and analysis of HAB, and the appropriate risk assessment framework against which analysis results will be interpreted.
4. **Analyse the bloom:** the appropriate laboratory will analyse samples from the HAB to determine the species present and their relative concentration. The results of these analyses are reported back to the local response officer, along with advice as appropriate.
5. **Communicate the findings:** the local response officer will report the findings back to the inquirer, along with advice on how to manage the HAB if on private property. Also, if the HAB is in a waterway that is open to public access, a representative of the response agency (according to that agency’s established protocols) will provide advice to the local community through the general media. The local response officer may also erect appropriate signage at the site to warn the public of the HAB. Media articles should provide information on the causes of HABs and practical measures to mitigate their recurrence.

6. Clear the bloom: in many cases there is little that can be done to safely remove the bloom from the waterway. Where the algae are washed ashore by waves, tides, or wind (i.e. *Lyngbya majuscula*) this material can be collected and disposed subject to permitting approvals. The local response officer will arrange for removal where necessary.

Freshwater algae: procedure for sample collection and handling

Access point for sample collection

HABs can be extremely patchy in distribution, both spatially and temporally. Buoyant species tend to accumulate near or at the shoreline at the downwind or downstream end of reservoirs or river reaches. Therefore, depth-integrated, open water sampling is preferred. The selection of sampling sites will depend on several factors including prevailing winds, the position of stream inflows and the proximity to potential nutrient input sites. Open water sampling provides, in general, a better representation of the true or average algal population of the water body. Staff working from a boat can achieve open water or mid-stream sampling.

Sample collection

Water samples for phytoplankton identification and enumeration

Ideally sampling should be conducted from a boat. Depth integrated samples are recommended for open water sampling where a representative sample of the water column is desired. The samples should be collected using a flexible hose-pipe sampler. A rigid pipe can be fitted with a one-way valve, which tends to simplify the operation of withdrawing the pipe and sample from the water. The length of the sample pipe should reflect the appropriate depth to which the cells are likely to be mixed. This may vary from approximately 2–10 m depending on the degree of stratification and exposure of the water body to the influence of wind. When the mixing status is unknown, a 5 m pipe is recommended, however a 2 m pipe may be more appropriate in shallower areas.

The inner diameter of the pipe should be at least 2.5 cm and flexible pipes are generally more practical than rigid pipes for pipe lengths greater than two metres. The recommended method for the use of the hose-pipe sampler is shown below:

The following equipment is needed to take samples:

- integrated hose-pipe sampler–5 m length of 2.5 cm diameter plastic piping with a weighted collar at one end (see Figure 1.)
- a cord attached to the hose and boat
- a rubber cork to fit one end of the hose
- a bucket
- a sample bottle and lid (minimum 200 mL capacity)

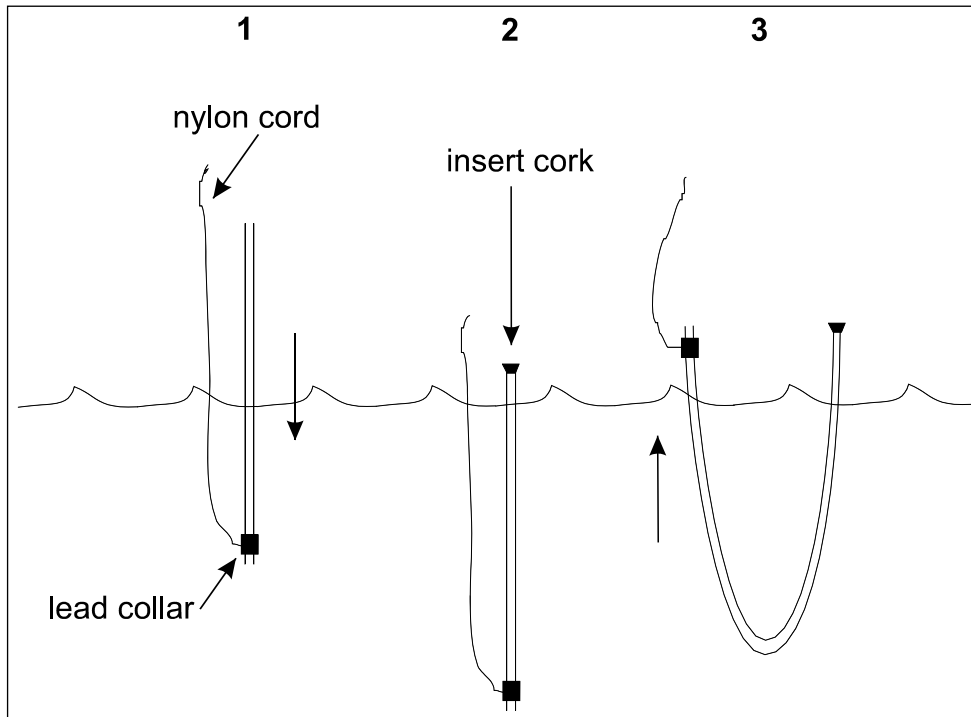


Figure 1. Procedure for use of an integrated hose-pipe sampler

The procedure for collecting the sample is as follows:

1. Attach a cord to one end of the hose and the boat to prevent accidental loss of the hose.
2. Holding the hose at the top end, rapidly drop the weighted end of the hose-pipe into the water to a depth of ca. 5 m.
3. Return hose to the boat without inserting the rubber cork.
4. Rinse the hose and the bucket.
5. Repeat the procedure, but this time insert the cork into top end of the hose (so that the end is held in the hand).
6. Pull the bottom end of the hose to surface using the cord, so that the tube is in a U-shape (see Figure 1).
7. Lower the weighted end of the hose into a bucket and remove the cork. Ensure that the entire contents of the hose are emptied into the bucket.
8. Mix the contents of the bucket and then transfer part of the contents into a sample bottle, leaving a 25 mm gap at the top of the bottle. Discard the rest of the contents of the bucket.

NOTE: Some species of phytoplankton can cause skin irritation. If sampling from an area that has a high concentration of phytoplankton, minimise your contact with the water during sampling by wearing appropriate protective PPE including gloves. Hygiene precautions such as washing off any splashes and washing hands before eating or drinking should always be observed. When not in use, the hose-pipe sampler and bucket should be kept clean and stored in a dark shed or cupboard.

Where sampling from a boat is not practicable, bank or shoreline sampling should be assisted by using a pole-type sampler. The bottle is placed in a cradle at the end of an extendable pole and samples collected from 20–30 cm below the surface to avoid contamination of shoreline accumulated scums.

Samples for toxin analysis

Qualitative

Qualitative toxin analysis is generally performed by mouse bioassay and is performed when either more sophisticated techniques are unavailable, or the identity of the toxin is initially unknown. Samples for qualitative analysis may be collected from concentrated scums or by trailing a phytoplankton net (10–50 µm mesh) from a boat or casting the net from the shoreline. The volume of sample required is dependent upon the concentration of the cells. Up to 2 L may be required if cell concentrations are low. Advice should be sought from the analytical laboratory before collecting and submitting a sample for qualitative toxin analysis.

Quantitative

Quantitative toxin analysis is performed using a variety of methods suited to the type of sample and the toxin present. Samples are collected in the same manner as those taken for phytoplankton identification and enumeration and the volume of sample required is dependent on the type of analysis to be used. In general, at least 500 mL of water should be collected.

Samples for benthic algae identification and quantification

Under certain circumstances samples for benthic algae may be required. In most cases benthic samples are collected for qualitative analysis. Samples can be collected using a benthic sampler such as an Eckman grab, a rigid plastic corer (e.g. PVC or polycarbonate pipe), a rake or hook, or by hand. Duplicate samples at varying depths are collected by either grab or hosepipe and emptied into a container with a fitted lid. If large quantities of sediment/sample are collected, a sub-sample can be taken and stored in a smaller specimen jar.

Preservation, storage, and transport of samples

Samples for identification and enumeration

To ensure the sample remains in a condition suitable for identification and enumeration, Lugol's iodine preservative solution should be added to the sample as soon as possible after collection. Sufficient Lugol's iodine solution should be added to render the sample a colour resembling weak tea (i.e. 0.5 mL Lugol's iodine per 100 mL of sample). It is sometimes useful to retain a portion of sample in a live (unpreserved) state, as some species of algae may be easier to identify in this way. The analytical laboratory can advise on whether unpreserved samples are required.

Preserved samples are reasonably stable if they are stored in the dark. If samples are unlikely to be examined for some time, they should be stored in amber glass bottles or PET plastic bottles with an airtight seal. Polyethylene bottles tend to absorb iodine very quickly into the plastic and should not be used for long term storage. Live samples will begin to degrade quickly especially if there are high concentrations of cells present. These samples should be refrigerated and examined as soon as possible after collection.

Samples for toxin analysis

Careful handling of samples is extremely important to ensure an accurate determination of toxin concentration. Some toxins are readily degraded both photochemically, i.e. in light, and microbially. Samples should be transported in dark cold conditions and kept refrigerated and in the dark prior to analysis. **Lugol's iodine must not be added to samples for toxin analysis.**

Training and quality

It is essential that staff involved in the collection of field samples be trained in all facets of collecting, transporting, and delivering samples. Samplers should be aware of sample requirements including sample sites, types, and numbers at each water body. They should also be fully trained in the process of visual inspections and the need to collect samples of algal scum if present. Samplers should undergo continual training to ensure new procedures are learned and existing skills are refreshed.

Marine algae: procedures for sample collection and handing

Marine macrophytes

This procedure outlines methods for the collection and handing of marine macrophytes (i.e. large aquatic plants and algae). The most commonly occurring marine macroalgae known to be problematic in Queensland coastal waters is fireweed (*Lyngbya majuscula*). It is a marine cyanobacterium (filamentous blue-green algae), present in various coastal areas of Queensland and several other global locations. Toxicological tests from Moreton Bay have identified toxins that may occur separately or in combination in *Lyngbya majuscula* populations. The toxins identified from Queensland populations are Lyngbyatoxin A and Debromoplysiatoxin. *Lyngbya majuscula* toxicity is variable spatially and during the lifecycle; the severity of dermal toxicity depends on exposure and First Aid treatment should be followed as below.

Transportation of *Lyngbya majuscula* for the purpose of identification or toxin analysis must be in line with Australian procedures for the transport of 'dangerous goods' that are closely aligned with international standards contained in the 'UN Recommendations on the Transport of Dangerous Goods'. Queensland legislation, along with the other states and territories, is in line with the national code.

The following section outlines the road transport procedures with respect to the transport of *Lyngbya majuscula* in Queensland and provides additional information on collecting samples in the field and sample storage. It also outlines the health warnings and first aid advice concerning *Lyngbya majuscula*.

Health advice

Lyngbya is a contact irritant that can produce skin and eye irritation following direct contact. In severe cases, affected skin may blister and peel off. *Lyngbya majuscula* has the potential to irritate any part of the body with which it comes into contact. Thus, inhalation or ingestion of *Lyngbya majuscula* also may cause irritation to the respiratory and gastrointestinal tracts respectively. The severity of irritation will depend usually on the level of exposure.

People who have encounter *Lyngbya majuscula* may complain of a stinging, burning or itching sensation within minutes to hours after being exposed. Affected areas may appear red and swollen, and small blisters may form. Reddening and swelling of the conjunctiva of the eye and the mucous membrane of the nose may also occur if those parts of the body have direct contact with *Lyngbya majuscula*. In view of its potential to cause severe irritation, people should avoid areas affected by *Lyngbya majuscula* if possible.

Procedure for sampling/ handling *Lyngbya majuscula* by Queensland Parks and Wildlife Service / DETSI staff

QPWS Staff will take the samples and are instructed to wear protective clothing when handling *Lyngbya*. Wet suits, stinger suits, gloves, dive booties, and eye protection are required to be used when collecting samples from saltwater. Protective clothing (gloves & boots) is also required when working with *Lyngbya majuscula* that is deposited on foreshores. A facemask is also advised; especially if the rafts of *Lyngbya majuscula* are dry, as they have the potential to become airborne.

Fresh water should be carried on all field trips and be easily accessible for prompt treatment. If a member of staff is affected by *Lyngbya majuscula* (e.g. rashes, eye irritation) they are required to advise the Workplace Health and Safety Officer.

First aid treatment

The main aim of first aid treatment is to wash areas of the body that have encounter *Lyngbya majuscula* as soon as possible after exposure has occurred to remove any residual material.

Where skin contact has occurred, it is recommended that the area be washed with water and soap. If *Lyngbya majuscula* could be trapped in clothing (e.g. swimming costumes), the person should remove their clothing and wash the affected areas. If there is evidence that the eyes may be irritated, the person should be encouraged to flush their eyes with clean water.

If irritation persists, symptomatic relief with cool compresses is advisable. Medical attention should be sought if the eyes are affected or the extent and severity of irritation is causing concern. If a person complains of respiratory discomfort after swimming in affected water or breathing in dried algal matter, they should also be advised to seek medical attention. This is particularly important if the person has a pre-existing lung disease such as asthma.

Sample collection and storage

Sending toxic samples by approved road transport in Queensland can take up to three to four days from pick up to delivery so keeping the sample fresh and well protected determines the packing strategy. Samples being sent for identification and toxin analysis should be collected and packed as follows.

Samples for identification

When sending a sample to be identified, collect a small amount with a rake or garden fork, no more than a ten-cent piece is all that is needed. Place the sample with seawater into a small durable screw top plastic jar (a high density polyethylene is best). A 150 mL jar three quarters full is ideal. Refrigerate immediately after collection (samples will remain fresh for a few days).

When ready to send, place the sample into a zip lock bag and put it with 1–2 freezer packs (do not use free ice as it can leak) into a small plastic esky. Pad the spaces with absorbent material in case the sample leaks and tape up the package securely. This should last two to three days.

Samples for toxin analysis

Collect a small sample (50 g is enough, about a golf ball in size), three quarter fill a durable 250 mL plastic screw top jar with sample and seawater and freeze immediately. When ready to send, put the sample with one or two freezer packs (for two days of travel) into a small plastic esky and pad the spaces with absorbent material. Tape up the package securely. If the transport time is three to four days, you will need to use the appropriate amount of dry ice in the esky and allow for some ventilation for the dry ice.

Samples for sediment analysis

If sediment samples are required, the methodology of collection and storage depends on which analysis is being performed. The person who requisitions the sample will provide this information.

Sediment samples in general are taken from areas devoid of visible plant material and as such are not subject to the conditions placed on the transport of dangerous goods.

Sample packing and dispatch

For transportation purposes, *Lyngbya majuscula* is classed as a dangerous good. Dangerous goods are substances or articles with hazardous properties, which may, if handled incorrectly: explode, asphyxiate, burn, make explosive mixtures, poison, eat skin or metal, pollute the environment, or become unstable if mixed with other products.

Depending on its properties, each type of dangerous good is assigned a Number known as its UN (United Nations) number. It is also allocated a particular class number. In the case of *Lyngbya majuscula* it is Class 6.1

In Queensland the Transport Operations (Road Use Management – Dangerous Goods) Regulation 1998 governs the procedures required for the safe handling of dangerous goods. This set of regulations is based on the Commonwealth Dangerous Goods Code.

Consignors (the person sends the goods) have major responsibilities. Chief among them is the obligation to inform the person who will transport the product for you – known as the “prime contractor” – that the goods you wish to send are dangerous goods. The consignor must also ensure that the packaging for the goods is approved and appropriately marked. The consignor must supply the prime contractor with the following details about the goods:

- name
- class and/or subsidiary risk
- UN number
- packing group (see Classification below)
- number and type of packages being sent
- quantity of goods being sent

All this information goes on a shipping document (sample shipping document attached) that is attached to the package.

Classification

The Australian Dangerous Goods Code sets out the parameters of a toxic substance. For samples of *Lyngbya majuscula* always assume that it is toxic. The code also assigns dangerous goods to one of three packing groups; I (most dangerous), II or III (least dangerous) according to its' toxicity. For samples of *Lyngbya majuscula* always use packing group II (sample must be less than 500 mL and less than 500 grams) and follow the packing procedures outlined in the previous section.

Labelling

The following markings must be placed on the outside of the box/esky and on the shippers' declaration:

The UN Number and proper shipping name. This would be “UN2810 Toxic Liquid, Organic, N.O.S. (*Lyngbya majuscula*)” for *Lyngbya* and “UN1845, Dry Ice (and weight)” if also using dry ice. The weight of dry ice should be included after its name e.g. “UN1845, dry ice, 2 kg”.

A Class 6 (Toxic) label and, if including dry ice, a Class 9 (miscellaneous) label. The minimum size for each label is 15 mm x 15 mm (see attached labels – they can be photocopied and glued or taped to the box).

The name and address of the consignor of the dangerous goods.

If you have quantities less than 500 mL or 500 grams and the substance belongs to Packing Groups II or III then according to the regulations you do not need to place any markings or labels on the box. Even though the regulations state that markings are not required, it is strongly recommended to place them on the box as a warning to those handling and opening the package that it does contain dangerous goods.

Documentation

A shipper's declaration must be filled out for each consignment of dangerous goods. Contact your preferred courier for the relevant details to include.

Transport options

Australia Post will not transport toxic goods and sending samples by express air freight is not an option without staff being accredited with the required training. Therefore, packages containing *Lyngbya majuscula* will need to be sent with a transport company who will accept dangerous goods.

Marine phytoplankton

The procedures outlined in the previous section for the collection of freshwater phytoplankton should also be followed when collecting samples of marine phytoplankton. Samples being sent for analysis should be handled as follows:

Identify the sample location(s), label the samples, and package securely. Note: use three levels of sample containment; sealed for security.

Place the samples into a small plastic esky and pad the spaces with absorbent material in the event of sample leaks.

Documentation

The following markings must be placed on the outside of the box/esky and on the shipper's declaration: (1) the name and address of the consignor of the goods; and (2) advice of content; for example, Algae Samples.

Shippers are urged to mark and label containers as a caution to those handling and opening the package. A shipper's declaration must be filled out for each consignment.

Sediment samples

Sediment samples should be collected from phytoplankton bloom sites that are representative of the area being investigated. Sediment samples in general are taken from areas devoid of visible plant/bloom material and are not subject to the conditions placed on the transport of dangerous goods.

For nutrient and heavy metal analysis the standard protocol is to fill three 40–70 mL polycarbonate screw top containers (that have been acid washed in 10% hydrochloric acid and rinsed with distilled

water) with the top 5 cm of the sediment by simply scooping along the sediment surface. The sediment should completely fill the container, with any excess water poured off. The samples should be put on ice immediately and frozen as soon as possible. Secure the sample.

For genetic analysis the procedure is more demanding. Use a 20 mL syringe corer (a plastic syringe with the end cut off) to take three separate 5 cm deep cores of the sediment within 1 metre of each other at the sampling site. The sample is removed from the plastic syringe corer, making sure to keep the sediment core intact. Fill a 3 mL Eppendorf tube with sediment from the surface of the core, and another 3 mL Eppendorf tube from the sediment at the bottom of the core. After ensuring all 6 tubes are labelled, place into liquid nitrogen for storage prior to analysis. Note this is a specialised procedure and would only be carried out by DETSI/QPWS staff as directed.

Identify the sample location(s), label the samples, and place the samples into a zip lock bag and tape up the package securely. Note Use three levels of containment, sealed for sample security.

Place the samples into a small plastic esky and pad the spaces with absorbent material in the event of sample leaks. Dry ice should be added immediately after packing.

Documentation

The following markings must be placed on the outside of the box/esky and on the shipper's declaration: (1) the name and address of the consignor of the goods; and (2) advice of content; for example, Sediment Samples.

Shippers are urged to mark and label containers as a caution to those handling and opening the package. A shipper's declaration must be filled out for each consignment.

Shellfish samples

If potentially toxic marine phytoplankton is identified, samples of shellfish likely to be consumed from the area should be examined for the presence of toxins. Shellfish can accumulate and concentrate phytoplankton toxins such as Diarrhetic Shellfish Poisons (DSP) or Paralytic Shellfish Poisons (PSP) when relatively low number of phytoplankton are present in the water. Samples being sent for analysis should be handled as follows:

- Identify the sample location(s) and species sampled, label samples and place whole shellfish in zip lock bags and tape up package securely. Note: use three levels of sample containment; sealed for security.
- Place samples into a suitably sized cooler and pack with freezer bricks. Samples should be transported in cold conditions and kept refrigerated prior to analysis. For analysis, refer to Appendix 1, Queensland Government Laboratories available for analysis of HABs.
- Documentation as for algae samples and sediment samples.

Poisoning or potential poisoning of animals

Stock animals

Stock animals are often affected by algal blooms through the consumption of waters contaminated with cyanotoxins. All animal species are potentially susceptible. Fatal cases are on record for cattle, sheep, horses, pigs, dogs, and birds. The following information is intended as a guide to assist veterinary field officers investigate possible cyanobacterial poisoning episodes.

When recently dead animals (< 12 hours, preferably < 6 hours since death) are available for necropsy

- Carry out necropsy (postmortem examination)
- From each animal collect:
 - Formalin-fixed liver, kidney, heart, and lung specimens (plus specimens of any other organs and lesions)
 - Unpreserved stomach (rumen) contents, liver, and kidney
- Chill the unpreserved material (ideally chilled to 4°C)
- Collect bloom material using the procedures outlined in previous section.
- Submit samples to the nearest veterinary laboratory as soon as possible.

When sick animals are available for examination

- Carry out clinical examinations and record findings
- From each animal collect:
 - 20 mL blood into a plain tube and allow it to clot for serum before chilling to 4°C.
 - 5 mL blood into an EDTA anticoagulant tube then chill to 4°C.
- Make 2 thin blood smears from the EDTA blood within 30 minutes of blood collection. Do not chill these. Protect them from formalin vapour in a sealed contained (bottle or zip-locked plastic bag).
- Collect bloom material using the procedures outlined in section 4.
- Submit samples to the nearest veterinary laboratory as soon as possible requesting clinical biochemistry and haematology analyses of blood samples.

Dealing with sick animals

In most cyanobacterial poisoning cases, most affected animals die within a short time of becoming ill (minutes to 2 days), despite treatment. There are no specific effective treatments available. Very early veterinary treatment with activated charcoal or bentonite as a drench by stomach tube at a dose rate of 5 g kg⁻¹ body weight may be helpful in preventing further absorption of toxins from the gastrointestinal tract but cannot guarantee survival in all cases. Activated charcoal is costly and usually appropriate for only valuable animals. Bentonite is a somewhat less effective, but a much cheaper alternative.

Wildlife

Fish and water birds are the most affected wildlife. The information below is a summary that may be applied with some slight modifications to most types of wildlife suspected of being affected by algal blooms. It is strongly advised that advice be sought from the nearest DETSI office, or a suitably qualified technician prior to the collection and submission of samples for analysis.

Sample collection

At least three whole individuals (of the same species) of approximately uniform size, if possible, should be collected.

If analysis of the organs (such as gills, livers etc.) is to be performed by the laboratory, the animal should be dissected and the organs separately packaged, labelled and preserved before dispatch. In such cases it is recommended that a dissection be performed promptly by a suitably qualified and experienced person (such as a biologist or biological laboratory technician). Cross-contamination of samples can occur if dissection is done without proper care.

Packaging

Wrap specimens in aluminium foil with the dull side of the foil inwards. Seal the package to make it watertight using a plastic bag and waterproof tape. Freeze as soon as practical and submit to the nearest veterinary laboratory immediately including information on the location and time the sample was taken, and the nature of the analysis required.

Communication strategy

It is important to make the public aware of the issues related to HABs and the existence of the Multi-Agency Response Plan that outlines the roles and responsibilities of the various response agencies so that these agencies can be effective in dealing with future HAB incidents. The following strategies may assist in raising awareness at high risk periods of the year to maximise the public's capture of the information.

- Just prior to high-risk periods (usually the warmer months of the year i.e., October–May): raise awareness through public media, newsletters, fact sheets, web sites, and community environment groups (i.e., Waterwatch, Landcare, Coastcare, etc.). Focus on the identification/detection of HABs, the potential dangers they pose, and the local contact arrangements outlined in the response plan.
- All year round: raise general awareness of HABs through public media, newsletters, and web sites. Focus on the causes and practical measures to mitigate their re-occurrence.

Communication channels

Several potential communication channels have been used effectively to inform the public on HAB issues; these include but are not restricted to:

- Warning/information signs at beaches, jetties, lakes, reservoirs, river recreation sites etc
- mainstream news media and advertising, including local newspapers and television
- pre-recorded telephone information lines
- community newsletters and public meetings
- specialist newsletters including Health Waterways Happenings
- Queensland Government Websites; other relevant websites
- brochures, posters, pamphlets, and fact sheets
- displays at community and scientific events
- awards

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Appendix 1: Queensland Government laboratories available for the analysis of harmful algal blooms

Organisation
Department of the Environment, Tourism, Science and Innovation Water Planning Ecology Ecosciences Precinct 41 Boggo Road, via Loading Dock 3, Joe Baker Street Dutton Park Qld 4102 Phone 0484 346 116 Algae identification and quantification
Queensland Health Queensland Public Health and Scientific Services 39 Kessels Road Coopers Plains Qld 4108 Phone 3096 2826 Algae identification and quantification Toxin quantification
Department of Primary Industries Biosecurity Sciences Laboratory 39 Kessels Rd Coopers Plains Qld 4108 Phone 3708 8708 Veterinary pathology services

Appendix 2: Recipe for Lugol's iodine solution

Lugol's solution is made by mixing 20 g of KI with 200 mL distilled water, then dissolving 10 g of pure iodine in this solution. Glacial acetic acid (20 g) is added a few days before use. The solution must be stored in the dark in a glass bottle, dispose within 12 months.

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