# Rock Lobster Biotoxin Management Plan

June 2023

Department of Natural Resources and Environment Tasmania

Tasmanian Government

# Contents

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# Summary

The rock lobster biotoxin management plan was first developed by the then Department of Primary Industries Water and Environment (DPIPWE) in 2013 in response to widespread biotoxin blooms on the east coast of Tasmania that affected several non-traditional vector species such as rock lobster. These blooms were associated with the Paralytic Shellfish Toxin (PST) producing phytoplankton species *Alexandrium tamarense/catenella*.

A biotoxin risk assessment for Tasmanian seafood classified rock lobster as a moderate risk for PST for consumption of whole lobster (Hallegraeff et al 2018). This risk applies primarily to consumers of the rock lobster hepatopancreas as this is the tissue where PST accumulates. Rock lobster tail meat is considered low risk due to negligible PST accumulation (Turnbull et al 2018).

The rock lobster biotoxin management plan is a risk management tool used by government Department of Natural Resources Tasmania (NRE Tas) and the rock lobster industry to manage the known risk of PST in Tasmanian rock lobster. The biotoxin management plan described below incorporates sentinel monitoring as a means of indicating the potential for PST risk in a rock lobster fishing area. PST sentinel monitoring using mussels has proven to correlate well with rock lobster PST uptake during bloom events. The adoption of the sentinel monitoring program described in the rock lobster biotoxin management plan mitigates the PST biotoxin risk in rock lobsters to low.

Biotoxin management plans are required by the bivalve shellfish sectors to meet food standard regulations for food safety and market access. These plans are reviewed annually and updated to meet these requirements. Whilst there is no food standard applied for PST in rock lobster several key export markets stipulate the bivalve regulatory limit of 0.8mg saxitoxin (STX) equivalents /kg.

The document was previously updated in June 2020 (Rock Lobster Biotoxin Monitoring and Decision Protocols, June 2020). The biotoxin management plan applies to the commercial rock lobster sector in Tasmania. Public health warnings are issued from the Department of Health (DoH) regarding any risks to the recreational sector, affected zones maybe closed to fishing based on public health advice. Updates in this document reflect current fishery management practices which are reviewed and updated annually.

# Background

Biotoxins are produced by a variety of algae and can accumulate in the tissues of filter feeders (including bivalves such as mussels). The presence and relative risk of biotoxins fluctuates, and if rock lobsters predate on filter feeders when biotoxins are present, biotoxins can accumulate in the hepatopancreas[1].

Blooms of the toxic dinoflagellate *Alexandrium catenella* have recurred in the winter on the east coast of Tasmania since 2012. Paralytic shellfish toxin (PST) associated with *A. catenella* is a causative agent of

[1] The hepatopancreas is the digestive gland in lobsters that fulfils the function of the liver and pancreas in mammals. It is also known as the 'tomalley', or 'mustard' due to its brown-yellow colour, and can be eaten in moderation, though there is the risk of ingesting elevated levels of PSTs, even after cooking (cooking and boiling do not degrade PSTs).

paralytic shellfish poisoning (PSP). In humans the peripheral nervous system is affected; symptoms include tingling and numbness of extremities, progressing to lack of muscular co-ordination, respiratory distress, and muscular paralysis leading to death by asphyxiation in extreme cases. There is no known antidote.

PST was detected in the hepatopancreas of southern rock lobster (*Jasus edwardsii;* hereafter referred to as 'rock lobster') during the 2012 bloom at levels above the maximum limits (MLs) [2] for bivalves. This warranted active management of this risk, and a specific biotoxin management program for rock lobster caught on the east coast of Tasmania was developed and has been in place since 2013.

Since 2012 a significant body of research has occurred to underpin the Tasmanian rock lobster risk management program, including studies on: exposure risk of PSTs from the consumption of hepatopancreas; the effect of processing on PST toxins in rock lobster; tissue uptake and depuration (purging) of PSTs in rock lobster; and field validation of monitoring (Hallegraeff et al., 2018, Madigan et al., 2018, Madigan et al., 2017, McLeod et al., 2018, Turnbull et al., 2020, Turnbull et al., 2018, Turnbull et al., 2021a, Turnbull et al., 2021b, McLeod et al., 2012). Consumers of rock lobster HP during bloom events are most at risk of serious illness. Cooking does not destroy the toxins however reduction of HP tissue during preparation reduces the levels of exposure to PST toxin, depending on the method (Turnbull et al 2018).

Mussels are currently sampled at sentinel sites at regular intervals to detect the presence of any biotoxins. If biotoxins above a certain threshold are detected, the gut contents of rock lobster are sampled. Field validation of the PST toxin monitoring program confirmed the effectiveness of the combined use of the sentinel program and site-specific sampling of lobsters as a cost-effective strategy to manage the PST risk in the Tasmanian commercial lobster fishery (Turnbull et al 2021a).

The management of the rock lobster monitoring biotoxin program is jointly managed and funded by government and industry. A levy is used to determine annual monitoring costs to industry based on the number of samples taken with an agreed split of 70:30 between industry and government respectively.

Risk management in rock lobster is supplemented with data from the Shellfish Market Access Program (ShellMAP) for bivalves that incorporates testing of bivalve PST levels and phytoplankton monitoring.

# Objectives

The objectives of the Rock Lobster Biotoxin Management Plan are to:

1. Ensure that the risk of a Tasmanian rock lobster exceeding any import standard for PST is as low as possible to allow continued access to export markets;

[2] MLs for PSTs in bivalves are used as proxy for other seafood as they have been well defined in terms of PST effects with epidemiological case studies and mouse models. Bivalve values for PSTs are prescribed in Food Standards Code Australia and New Zealand (FSANZ) and are similar for international standards for PSTs in bivalves (Table 1).

2. Monitor PST levels in sentinels (e.g., mussels) and rock lobsters (e.g., the hepatopancreas) to detect whether they exceed food safety thresholds that could be a public health or market access risk
3. Guides the management of risk areas (e.g., closed when PST levels exceed food safety risk thresholds, and opened again once PST levels drop below those thresholds).

# Biotoxin zones and sampling rationale

Government in consultation with industry and researchers divided the east coast of Tasmania into eight rock lobster biotoxin management zones (Figure 1). These zones are based on fishery activity and biotoxin risk profiles. The highest risk zones on the east coast, based on historical sentinel data, are the Maria Island and Storm Bay zones. Samplers monitor PST levels fortnightly in mussel sentinels across each zone from June to December inclusive each year. Extensions to the biotoxin monitoring season may occur during high bloom years or when circumstances indicate that it is necessary to monitor larger areas.

The ShellMAP biotoxin monitoring program for bivalves tests for biotoxins weekly in high risk areas and monitors phytoplankton monthly in all shellfish growing areas. These results are reported weekly in the biotoxin news which is distributed to NRE Tas staff and those listed in the contacts section. Results from the biotoxin news are used as an additional management tool to understand bloom activity in areas where rock lobster is harvested.

Rock lobster sentinel monitoring frequency increases from fortnightly to weekly during peak bloom activity as per the flow chart in Figure 4.

Sentinels are used to trigger biotoxin sampling in lobsters when MLs exceed bivalve triggers of 0.8mg STXequiv./kg. Closure of a biotoxin zone for lobster fishing activity is instigated when the PST levels in lobsters exceed 0.5 mg STXequiv/kg. Management zones are closed for sampling and remain closed until results indicate levels in lobsters are safe for harvest i.e. below 0.5 mg STXequiv/kg.

This strategy results in 95% confidence that PST levels are below MLs in 97.5% of the lobster population during a biotoxin bloom (Turnbull et al 2021a).

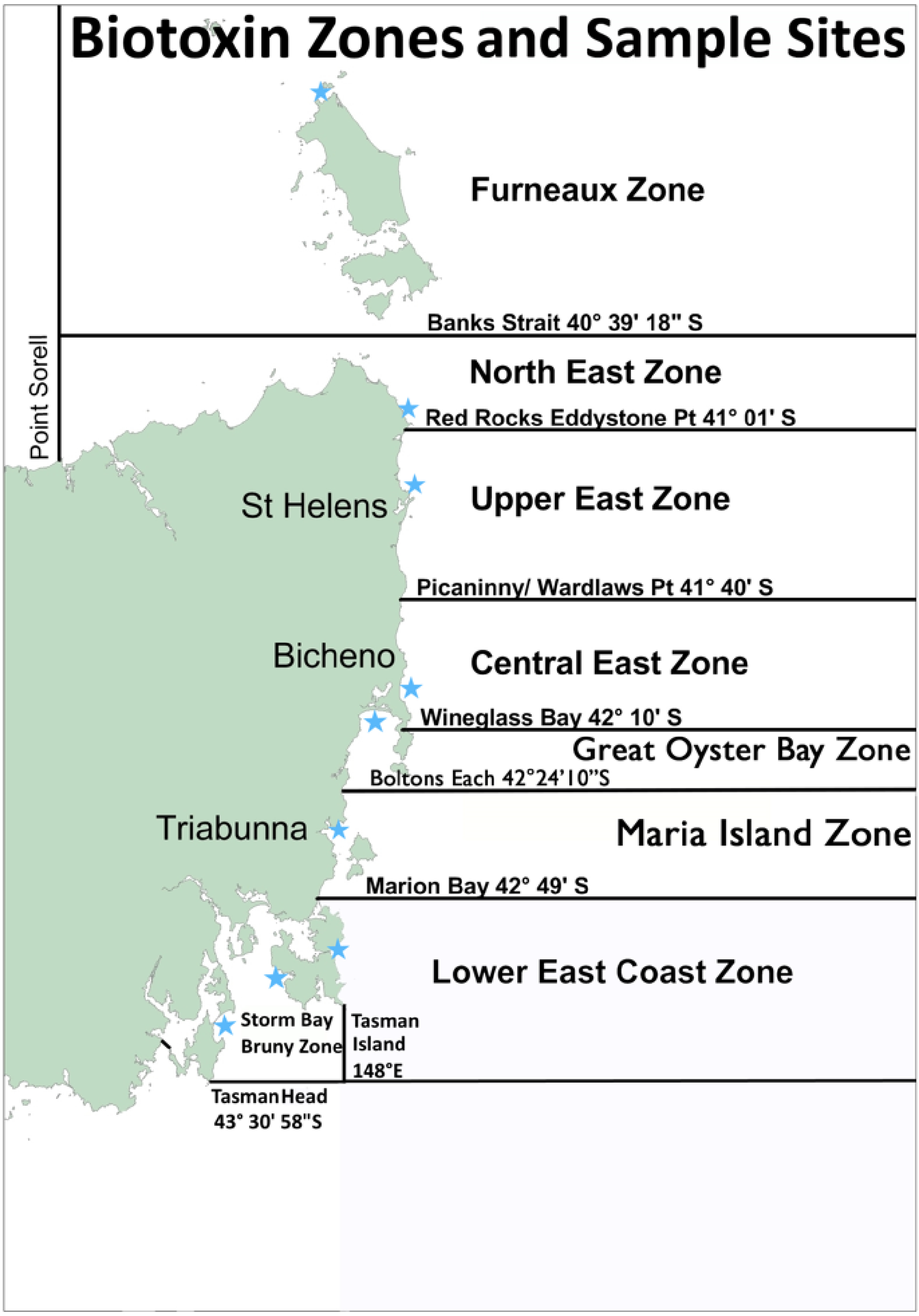
Table 1: Trigger values for testing and closure from sentinel monitoring programs

| Sentinel descriptor | PST trigger value | Program | Action |
|---|---|---|---|
| Phytoplankton | 1000 cells/L PST producing species[1] | ShellMAP | Review mussel sentinels sampling if required |
| Other Bivalve shellfish | 0.8mg STX equiv./kg | ShellMAP/Scallops | Review nearby fishing activity on case-by-case basis. Possible actions sample mussel sentinels in biotoxin zone or close fishery to sample lobsters |
| Mussel Flesh | 0.8mg STX equiv./kg | rock lobster | Close fishery and sample lobster |

| | | | |
|---|---|---|---|
| Rock lobster hepatopancreas | 0.5mg STX equiv./kg | rock lobster | Keep fishery closed |

[1]These include: *Alexandrium catenella*, *A.minutum*, *A,tamerense*, *A. ostenfeldii*, *Gynmodium catenatum*

Reopening an area for lobster fishing when a bloom has passed is considered on sentinel response (whether PST levels are falling or rising in mussel sentinels) and the correlation (rising or falling) in lobsters flesh results. IMAS research on lobster depuration rates demonstrated that it takes 15-27 days for biotoxin levels in a rock lobster hepatopancreas to decrease from twice the bivalve regulatory limit to below the bivalve regulatory limit (Turnbull et al 2021a). Depuration to the bivalve ML occurred faster in mussels, confirming mussels as a good indicator of both uptake and depuration in lobsters (Turnbull et al 2021a).




★ Sentinel species sampling locations

Figure 1: Southern Rock lobster biotoxin zones and sentinel locations

Table 2: Sentinel mussel sample site location details

| Biotoxin zone | Location | Sentinel type |
|---|---|---|
| **Furneaux** | Palana | Fixed mussel line |
| **North East** | Georges Rock | Fixed mussel line |
| **Upper East** | Binalong Bay | Fixed mussel line |
| **Central East** | Bicheno | Fixed mussel line |
| **Great Oyster Bay** | Great Oyster Bay (northern end) | Shellfish Farm (mussel) |
| **Maria Island** | Spring Bay | Shellfish Farm (mussel) |
| **Lower East** | Pirates Bay | Marine Infrastructure |
| **Storm Bay/Bruny** | White Beach (east Storm Bay) | Marine Infrastructure |
| | Adventure Bay (Bruny Is) | Marine Infrastructure |

## Rock Lobster Sample Sites

Rock lobster samples are collected by samplers from appropriate rocky reef habitat that is in general proximity to the sentinel mussel sampling site wherever possible.

## Sampling Strategy Summary

Mussel samples (pooled sample of ~15 mussels) to be collected fortnightly from each site between May and December (or longer if a harmful algal bloom (HAB) extends beyond this period). Sample frequency to be increased (to weekly) if PST is detected.

If sampling of rock lobster is triggered in a zone, the zone will be closed to commercial rock lobster fishing. 5 rock lobster collected for individual analysis of PST levels in the hepatopancreas. The highest individual lobster PST result will be used to determine the open / closed status of the biotoxin zone in line with the decision protocols.

# Roles and responsibilities

The Wild Fisheries Management Branch (WFM) will oversee the rock lobster biotoxin management plan including monitor information, and task the collection of samples as required in consultation with the Tasmanian Rock Lobster Fishermen’s Association (TRLFA) and the Institute of Marine and Antarctic Studies

(IMAS) as appropriate.  Management units are closed and opened through statutory instruments under the *Living Marine Resources Management Act 1995*.  Such processes provide statutory rigour to closures, however, may require additional time to implement and may incur publication costs.  Opportunities for more cost-efficient processes will be considered wherever possible.

WFM will liaise with the rock lobster industry and the PST sampling team to share testing results, particularly when levels exceed agreed thresholds, co-ordinate the closure and opening of management areas as needed and confirm the sampling regime each season to align with planned open and closed seasons and catch cap areas. Currently, a Seafood Risk Management Officer liaises with the WFM rock lobster fisheries manager to achieve this.

The Department of Agriculture, Forestry and Fisheries (DAFF) is responsible for ensuring seafood processors comply with export standards that meet safe PST levels for rock lobster.

Product Integrity Branch of Biosecurity Tasmania (BT) is responsible for any domestic recall of rock lobster product that may contain elevated levels of PST.

# Rock Lobster Fishery Seasonal Closures

## Open and closed seasons

The rock lobster fishery has a number of open and closed seasons designed to ensure sustainability by protecting lobsters at vulnerable stages of their life cycle (e.g., while egg-bearing or 'berried', or soft-shelled after moulting), and manage competition between commercial and non-commercial fishers.

The open and closed seasons for the rock lobster fishery are set each year. As an example, the 2022/23 season dates are set out below, which are consistent with the previous four seasons for the open season dates and the previous six seasons for the closed season dates.

Table 3: Commercial fishery seasonal closures

| Area | Description | Sex | Date |
|---|---|---|---|
| ***Commercial fishery*** | | | |
| **All waters except the East Coast Stock Rebuilding Zone (ECSRZ)** | All State waters except those between Eddystone Point (North-east coast) and Tasman Point (South-east coast) | Both | Open 15 November 2023 |
| **ECSRZ and north eastern waters** | ECSRZ Eddystone Point (North-east coast) to Tasman Head, Bruny Island (South-east coast)<br>North eastern waters Point Sorell (North coast) to Eddystone Point (East coast) | Both | Open 1 March 2024 |
| **State-wide** | All State waters | Female | Closed 1 May 2024 |
| **St Helens Point south to Sandy Cape** | St Helens Point (North-east coast) south and west to Sandy Cape (west coast) | Male | Closed 1 September 2024 |
| **State-wide** | All State waters | Male | Closed 1 October 2024 |

[1] For current closures or changes check catch cap status updates at https://fishing.tas.gov.au/commercial-fishing/commercial-fisheries/rock-lobster-fishery/east-coast-catch-cap and https://fishing.tas.gov.au/commercial-fishing/commercial-fisheries/rock-lobster-fishery/north-east-catch-cap

Table 4: Recreational fishery seasonal closures

| Area | Description | Sex | Date |
|---|---|---|---|
| ***Recreational fishery*** [1] | | | |
| **All waters except the ECSRZ** | All State waters except those between Eddystone Point (North-east coast) and Tasman Point (South-east coast) | Both | Open 4 November 2023 |
| **ECSRZ** | Eddystone Point (North-east coast) to Tasman Head, Bruny Island (South-east coast) | Both | Open 2 December 2023 |
| **Eastern region** | Point Sorell down the east coast to Whale Head | Male | Closed 1 May 2024 |
| **All state waters** | | Female | Closed 1 May 2024 |
| | | Male | Closed 1 September 2024 |

[1]For current closure status updates check https://fishing.tas.gov.au/commercial-fishing/commercial-fishing-seasons

# Catch cap areas

The East Coast and North East Catch Caps are commercial catch management tools designed to support the rebuild of the East Coast rock lobster stock, and to manage effort in the North East of the State to ensure the stock does not decline in this area.

## East Coast Catch Cap

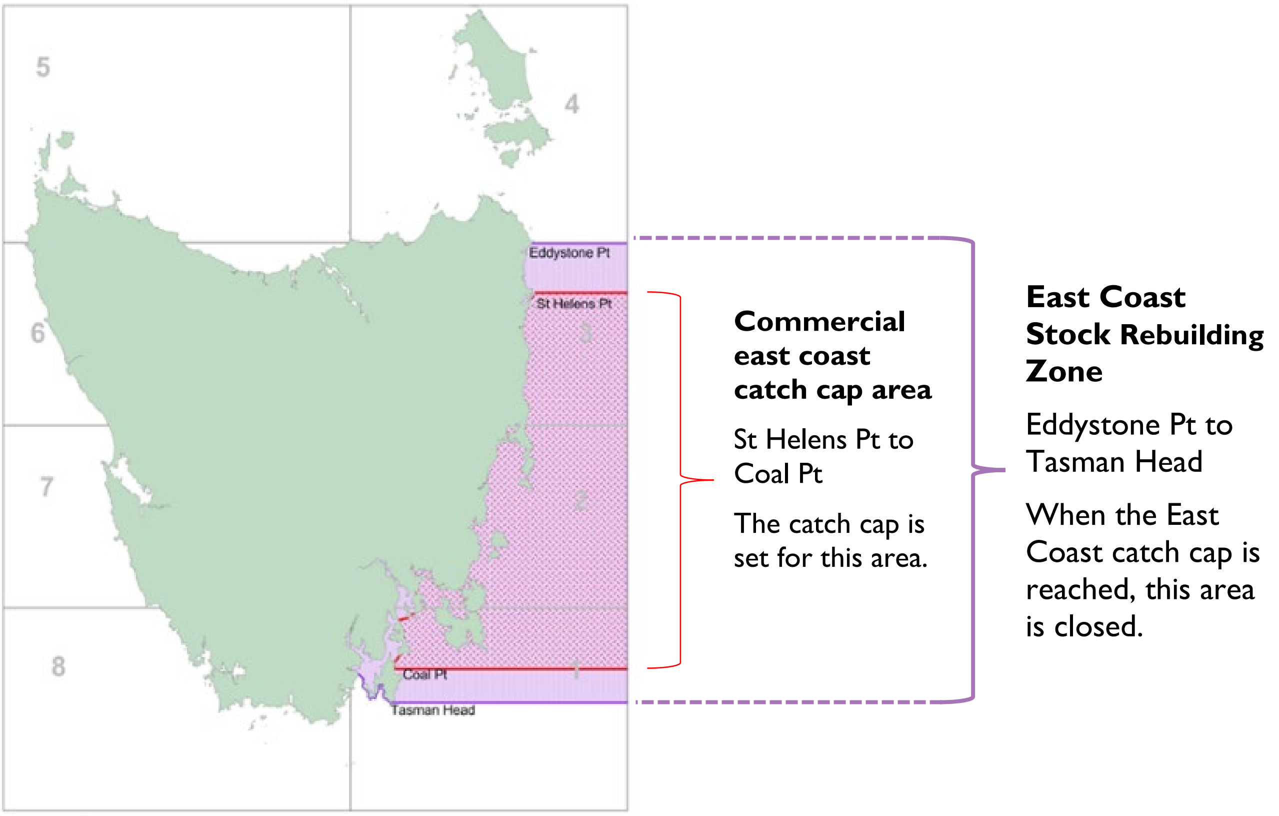



Figure 2: Southern rock lobster East Coast catch cap and stock rebuilding zone

The East Coast Catch Cap (ECCC) has been in place since 2014 and is the primary commercial catch management tool in the East Coast stock rebuilding strategy.

https://fishing.tas.gov.au/recreational-fishing/fishing-by-species/rock-lobster-and-crab/east-coast-rock-lobster-stock-rebuilding-strategy

## North East Catch Cap

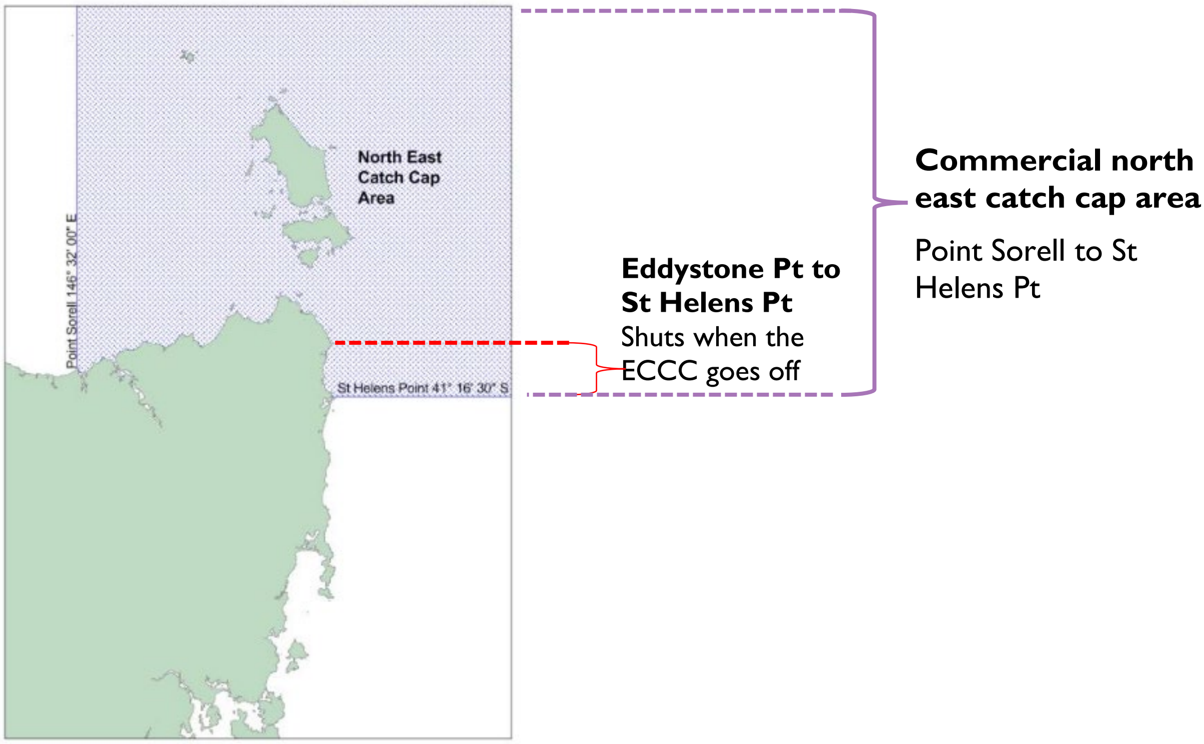



Figure 3: Southern rock lobster North East Coast catch cap

The North East Catch Cap (NECC) has been in place for five years with the objective of increasing biomass to a level greater than 20% of unfished biomass by 2026 and to manage the risk of excessive effort flowing into the region when the East Coast Catch Cap area is closed.

# Sampling protocol for zones in and around catch cap areas

When a catch cap 'goes off' (e.g., its catch cap is caught), it will be closed to commercial fishing, generally for the remainder of the licensing year. In this situation:

- No lobster sampling occurs in the closed area, as no commercial fishing is occurring,
- Sampling (either sentinel or rock lobster, according to the protocol set out in the decision matrix) occurs in zones immediately adjacent to the catch cap area if these zones are either:
    - Currently open to fishing;

    - Will be opened to fishing within the next two to four weeks, to enable an early indication of the state of the PST levels;
    - The catch cap area will be opened to fishing within the next two to four weeks, to enable an early indication of the state of the PST levels; or
    - By agreement with industry and the Department, sentinel sampling for example may continue to allow the collection of ongoing monitoring information.

When a catch cap area is open to fishing:

- Sampling (either sentinel or rock lobster, according to the protocol set out in the decision matrix) occurs in zones in the catch cap
- Sampling also occurs in zones immediately adjacent to the catch cap area if these zones are either:
    - Currently open to fishing; or
    - Will be opened to fishing within the next two to four weeks, to enable an early indication of the state of the PST levels.

## Biotoxin decision matrix

This plan is based on a conclusion that any commercial rock lobster fishing occurring in a biotoxin zone must cease in that zone on the day that a ***rock lobster*** sample is taken for PST testing from that biotoxin zone. The risk of non-compliant lobster entering the market chain of supply is considered unacceptable at this time.[3]

The decision matrix includes a two-tier 'early warning' system of bloom activity from sentinel bivalve shellfish meat PST data and the ShellMAP biotoxin monitoring program. The decision matrix outlined below and in Figure 3 will be applied to each PST biotoxin zone.

When a decision to sample rock lobster is made, a process to statutorily close the fishery, inform fishers, allow boats fishing the area with pots in the water to leave the area and ensure all activity has ceased by sampling day, will be expedited. 2 days' notice is required so that sampling can proceed without risk of any catches after that date and possibly non-compliant lobster being in the supply chain.

If the recreational rock lobster season is open, public health warnings via DoH will be put out. These warnings will be relayed by NRE Tas on the Fishing Tas website and Fisheries Tasmania social media.

[3] Due to limitations of product traceability, there is a risk that large amounts of rock lobster may have to be recalled, which could have a significant negative impact on the industry, its reputation, and future market access. In the future, vessel monitoring systems (VMS), which were introduced to the commercial rock lobster fleet in November 2022, may improve the traceability of product, however, at this stage the management goal is still to have zero non-compliant rock lobster entering the supply chain.

## Decision matrix

The decision matrix provides decision rules for a range of scenarios, however, not all outcomes and contingencies can be foreseen. In such cases, decisions will need to be made in a manner that is consistent with the rationale behind the explicit management rules. For example, in cases when sentinel information or rock lobster results are trending consistently in an upwards direction, sampling may start earlier, if the bloom and PST results are increasing. Such decisions will be taken in consultation with the TRLFA.

The decision-making process to re-open a biotoxin zone will also consider any fisheries management issues, particularly adverse stock implications that could arise on reopening, if there is a risk of an extended period of localised concentration of fishing effort.

This means biotoxin zones may remain closed for fisheries management reasons even when the lobsters PST results would allow the zone to open under the decision matrix.

The decision matrix is as follows:

1) **Monitor the general status of algal bloom activity throughout the year** through sentinel data, from ShellMAP bivalve shellfish meat sampling (including wild scallop PST data) and water (phytoplankton) sampling program. Noting that the geographical distribution of shellfish farms is concentrated in lower east and south east regions.

   If there is evidence of bloom activity ***outside*** the high-risk period (June - December inclusive), initiate wild sentinel sampling under protocol 2.

2) **Monitor the status of algal bloom activity in each biotoxin zone from June** (start of the high risk period) onwards through the meat PST results from sentinel data collected specifically to inform this plan i.e mussels, scallop or other species. The frequency of sentinel sampling (weekly, fortnightly or monthly) will be determined on a risk based approach by WFMB. At this time, the only zone to be specifically monitored using sentinel data from the ShellMAP bivalve shellfish program is the Maria Island zone, using data from a shellfish farm located in the vicinity of Great Oyster Bay.

3) **Monitor sentinel meat PST results collected under (2) –**

   a) If sentinel meat PST levels are below 0.4mg/kg – no response/action taken other than continued monitoring of sentinel trends through fortnightly sampling.

   b) If sentinel meat PST levels are above 0.4mg/kg (but below 0.8mg/kg) – increase frequency of sentinel monitoring to weekly in affected biotoxin zone and adjacent zones[4]. Notify peak

[4] Generally, sentinel sampling in biotoxin zones that are open to fishing will increase to weekly sampling, while sentinel sampling in biotoxin zones that are closed to fishing will remain at fortnightly or have an appropriate variable sampling regime determined, dependent on the fishing activity and potential risk in the area.

bodies, Biosecurity Tasmania (BT) and Department of Health (DoH) that the biotoxin risk has increased through increased level of bloom activity. Continue to monitor sentinel data.

c) If sentinel meat PST results drop below 0.4mg/kg for 2 consecutive weekly sampling episodes – reduce sentinel monitoring frequency to fortnightly and notify peak bodies, BT and DoH.

**4) If a sentinel meat result collected under (2) is 0.8 mg/kg or greater, initiate rock lobster sampling in the affected zone**

This is a risk-based approach taking into account evidence about the potential toxin uptake rates in the mussels, algal counts, the rate that the bloom is intensifying and/or other information.

When the decision to sample rock lobster is taken - notify rock lobster fishers and processors that sentinel levels exceed threshold trigger levels and the fishery will be closed in the affected zone on a specific date to allow the collection of rock lobster samples for PST testing**.** Notify peak bodies, BT, ShellMAP, DoH and Commonwealth Department of Forestry and Fisheries (DAFF) of the fishery closure.

- **Fishery in biotoxin zones to be sampled closed by published notice[5] -** under the *Fisheries (Rock Lobster) Rules 2022***.**
- **Samples of rock lobster collected from biotoxin zones and assigned to laboratory for analysis.**
- **Continue to collect weekly sentinel data from zone and adjacent zones.**

**5) All rock lobster samples return below 0.5 mg/kg**

Fishery in that management zone reopened unless there is sentinel data indicating that the bloom activity has intensified significantly during the period between lobster sampling and receiving the results or there are relevant fisheries management implications that necessitate the zone staying closed. If zone is re-opened, revert to monitoring sentinel data. If zone stays shut, schedule next round of lobster sampling. Notify fishers, processors, peak bodies, BT, ShellMAP, DoH and DAFF of sample results.

**6) Any rock lobster samples return above 0.5 mg/kg but below 0.8 mg/kg.**

Evaluate sentinel data or other data to assess trends in algal bloom activity (increasing or decreasing) and use a risk based approach to determine whether the zone remains closed or can reopen. Given the average time lag (~3-5 days) between the date of sampling and assessment of the results, the risk based approach will focus on the likelihood that lobster PST levels may be increasing during this period. The risk assessment will consider the latest sentinel data, data on uptake and depuration

[5] A public notice can be published in at least one the following ways: in the *Gazette*; on a Departmental website; or in a State-wide newspaper.

rates from previous blooms, data from research projects and if applicable, previous lobster PST data for that zone. The zone will remain closed unless the risk of lobster PST levels increasing is assessed to be low.

Assess fishery management implications associated with re opening. If zone is to re-open revert to monitoring sentinel data. If zone stays closed, continue to monitor sentinel data and schedule next round of lobster sampling. Notify fishers, processors, peak bodies, BT, ShellMAP, DoH and DAFF of results and any fishery closures.

**7) Any rock lobster samples return 0.8 mg/kg or above.**

- Zone continues to be closed to rock lobster fishing.
- Continue to monitor sentinel data to assess trends in bloom activity and schedule next round of lobster sampling.
- Assess potential impact in adjacent zones based this data and sentinel data from each zone. Trigger additional sentinel sampling or lobster sampling in adjacent zones if warranted. Notify fishers, processors, peak bodies, BT, ShellMAP, DoH and DAFF of results and any fishery area (biotoxin zone) closures.

- **Further rock lobster samples collected.** Timing of resampling to be determined by Marine Resources, based on evidence that bloom is abating or to check trend in lobster PST levels.

- **Lobster PST results from further sampling –** go to protocols 5, 6 or 7 as appropriate.

When all biotoxins zone that have been closed are re-open, revert to sentinel monitoring under (2) or high-level monitoring under (1) as appropriate.

Rock lobster sampling may also be triggered prior to the start of a new open season in November / December based on the potential impact of any HAB activity in a zone during the closed season.

## Rock lobster decision rules and actions

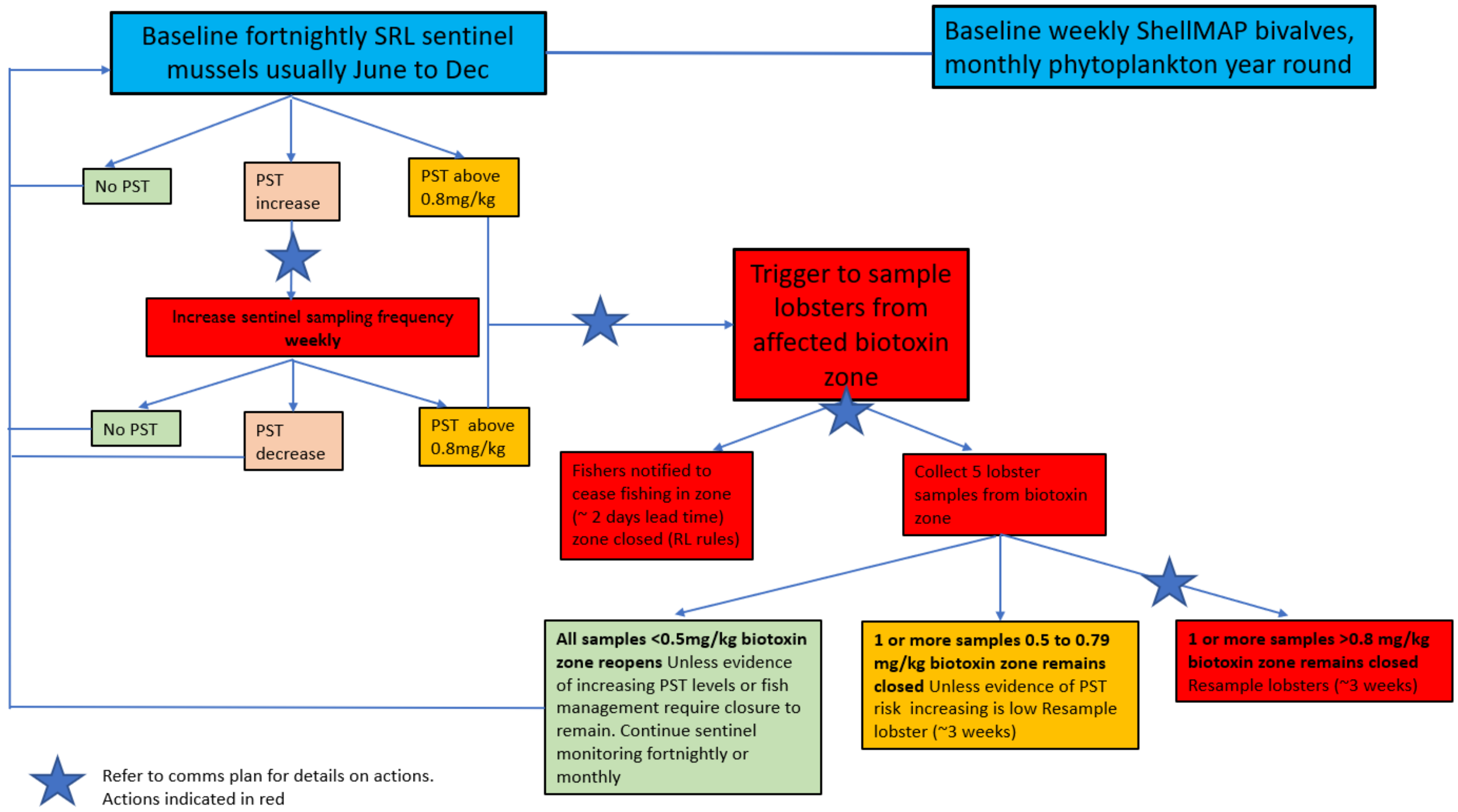



Figure 4: Rock Lobster decision tree and actions to close or sample in red or to open or remain open in green

# Appendix 1: Case Definitions for PST

### Paralytic shellfish poisoning (PSP)

***Causative toxins***: Saxitoxins (STXs), Gonyautoxins (GTXs) and C toxins (CTXs)

***Microalgal sources***: *Gymnodinium catenatum*, *Alexandrium* species (including *A. minutum, A. catenella*, *A. tamarense, A. fundyense, A. ostenfeldii*, plus others), *Pyrodinium bahamense* var. *compressum*, also freshwater species such as *Anabaena* spp., and *Microcystis* spp.

***Associated Health Hazards***: This group of toxins affects the nervous system by causing blockage of the sodium channels. In humans the peripheral nervous system is particularly affected; symptoms include tingling and numbness of extremities, progressing to lack of muscular co-ordination, respiratory distress, and muscular paralysis leading to death by asphyxiation in extreme cases. The fatality rate can be up to 10%. There is no known antidote.

***Clinical Case Definition***: The following neurological symptoms occurring within 12 hours of consuming shellfish:

- neurosensory;
- paraesthesia, i.e., numbness or tingling around the mouth, face or extremities;
- and one of the following neuromotor/neurocerebellar symptoms:
    - weakness such as trouble rising from seat or bed
    - difficulty in swallowing
    - difficulty in breathing
    - paralysis
    - clumsiness
    - unsteady walking
    - dizziness/vertigo
    - slurred/unclear speech
    - double vision

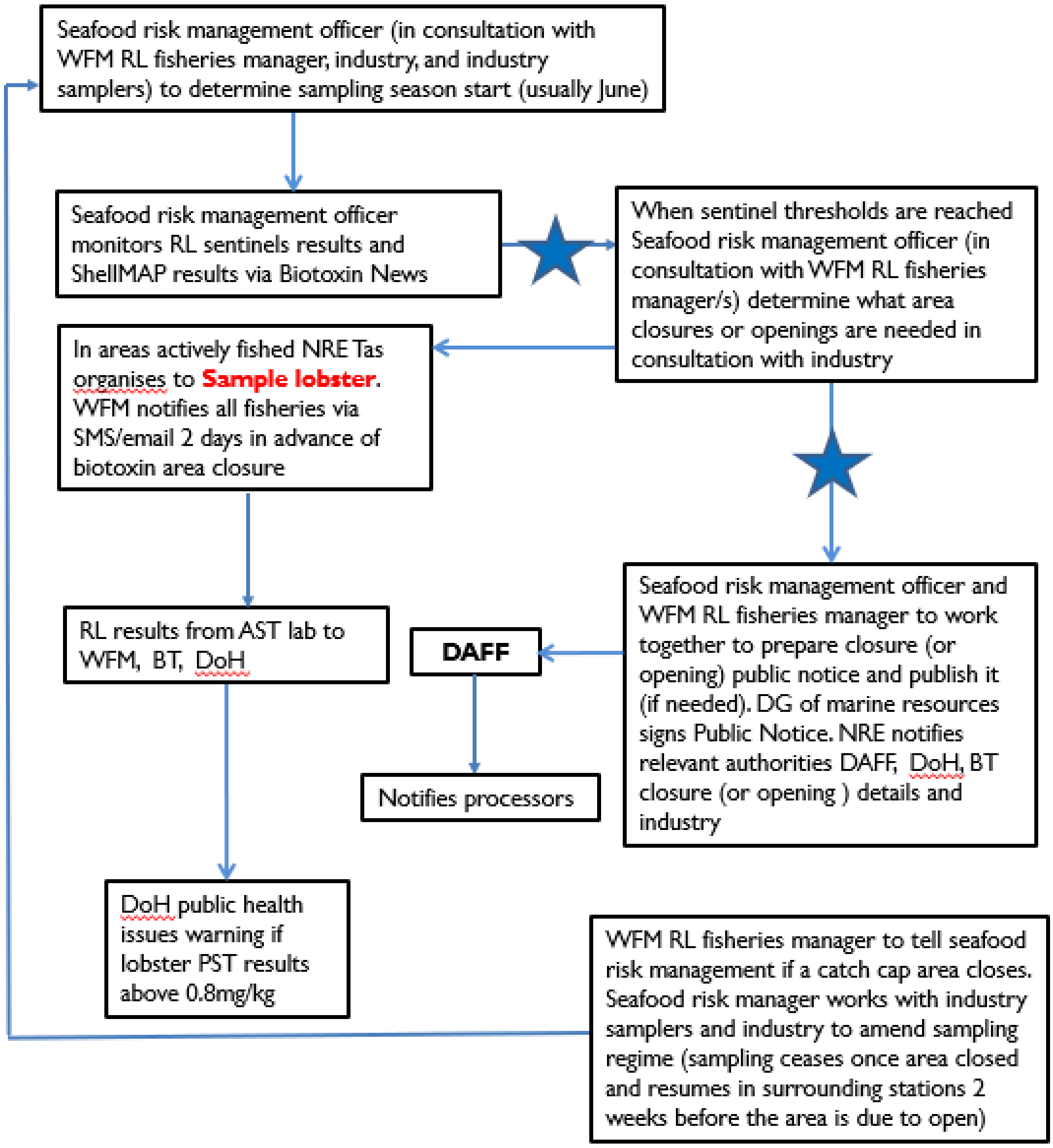
Source: ShellMAP Biotoxin management plan v5.2 April 2020

# Appendix 2: List of contacts

| Name | Organisation | Role | Contact details |
|---|---|---|---|
| Rene Hidding | TRLFA | CEO TRLFA coordination of sampling and communication with industry | ceo@trlfa.com |
| Shelly Alderman | DAFF | Export market access | Shelly.Alderman@aff.gov.au |
| Wetjens Dimmlich | NRE Tas Marine Resources Division, Wild Fisheries Management Branch | Wild Fisheries Manager<br>Fishery closures | Wetjens.Dimmlich@nre.tas.gov.au |
| Sonja Hempel | NRE Tas Marine Resources Division, Wild Fisheries Management Branch | Rock Lobster Management Office Assist determining season dates, fishery closure dates, catch cap areas, and sampling frequency in adjacent zones | Sonja.Hempel@nre.tas.gov.au |
| Deborah Gardner | NRE Tas Marine Resources Division, Wild Fisheries Management Branch | Seafood risk management officer<br>Sample results monitoring, risk management advice | deborah.gardner@nre.tas.gov.au |
| Karen Loone | NRE Tas Product Integrity Branch, Primary Produce Safety Program Biosecurity Tasmania | Program manager product integrity<br>Domestic product recall | karen.loone@nre.tas.gov.au |
| Chris Lyall | NRE Tas Product Integrity Branch, Primary Produce Safety Program Biosecurity Tasmania | Chief Inspector<br>Manager product integrity branch | Chris.Lyall@nre.tas.gov.au |
| Program manager | NRE Tas Marine Resources Division, Aquaculture Branch ShellMAP | Biotoxin news/data storage | rachel.brown@nre.tas.gov.au |
| Stewart Quinn | Department of Health | Senior Food Safety Officer<br>Public health alerts | stewart.quinn@health.tas.gov.au |
| Analytical Services Tasmania (AST)<br>Tim Jordan (section Head Organic Chemistry) | AST | PST testing facility | enquiries@ast.tas.gov.au |

# Appendix 3: Communication flow chart

**PST communication and actions flow chart**




★ Refer to rock lobster decision tree

WFM (Wild Fisheries Management)
BT (Biosecurity Tasmania)
DoH (Department of Health)
DAFF (Department Agriculture Forestry Fisheries)
RL (Rock Lobster)

# Appendix 4: AST Lab submission form for samples

**Analytical Services Tasmania** — **Biota, Filter and Other Sample Submission**

Analytical Services Tasmania
18 St Johns Avenue New Town 7008
Phone: (03) 6165 3300
Email: enquiries@ast.tas.gov.au
Website: www.analyticalservices.tas.gov.au

**AST Job No:**

*(AST Office Use Only)*

## 1. Safety: Customer Duty of Care (must be filled in and signed)

Staff at the laboratory must be informed of the hazardous nature of any samples submitted. The following information must be completed before samples will be received and processed.

Please advise of all known **HAZARDS**:

☐ No known hazard
☐ Corrosive ☐ Animal products ☐ Sewage ☐ Petroleum / Hydrocarbons
☐ Toxic X☐ Fish Products ☐ PCB ☐ Contaminated site: detail below ☐ Other: detail below

Please detail the nature of the hazards present in sample(s): _Shellfish meat for PST testing

Signed: ____________________ Date: ____________________

## 2. Customer Details

Customer Name: Wild Fisheries Management Branch, NRE Tas

*NOTE: The customer is the person or company who will incur charges for samples submitted to the laboratory for analysis.*

Customer Address *(New Customers Only)*: ____________________

Person to direct invoice to: Commercial.Fisheries@nre.tas.gov.au\

Submitted by: ____________________ Phone (submitter): ____________________

Report to
Sonja Hempel Email: Sonja.Hempel@nre.tas.gov.au
Wetjens Dimmlich Email: Wetjens.Dimmlich@nre.tas.gov.au
Deborah Gardner Email: Deborah.Gardner@nre.tas.gov.au
James Parkinson Email: James.Parkinson@nre.tas.gov.au
Kylie Cahill Email: kylie.cahill@utas.edu.au
ShellMAP Email: shellmap@nre.tas.gov.au

Commercial Fisheries Email : Commercial.Fisheries@nre.tas.gov.au

Alison Turnbull Email : alison.turnbull@utas.edu.au Phone : 0418 348 450

Other information: ____________________

## 3. Job Details

Project Name: WFM RL Biotox - Central east zone - Bicheno

AST Quote No: Customer Purchase Order No: ____________________

*Turnaround time is 10 working days unless otherwise negotiated*

## 4. Chain of Custody: from sampler to laboratory

Are these sample(s) subject to LEGAL proceedings? No X☐ Yes ☐

Are these QUARANTINE sample(s)? No X☐ Yes ☐ complete information below

Country of Origin: ____________ Import Permit Number: ____________

Quarantine Entry No: ____________ Quarantine Movement*: ____________

*(*Only required if AST is not listed on Import Permit)*

| Relinquished by: | Date | Time (24h) | Received by: | Date | Time (24h) |
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**PLEASE ATTACH EXTRA SHEETS IF THERE IS INSUFFICIENT SPACE TO INDICATE THE ANALYSES REQUIRED**

Sentinel Species PST Testing — Page 1 of 2

| **Enter Sample ID below** (maximum of 17 characters)<br><br>**Enter analysis categories for each sample in boxes to the right.**<br><br>**# Enter specific details of tests required in lower section.** | | | | | | | | | | | | | | | | | **Sample type**<br><br>Eg Biota<br>Filter<br>Oil | **Date Sampled** | **Time Sampled**<br>(24 hour) | Metals # | Anions # | Pesticides / Herbicides # | TPH / BTEX in Oil # | PCB in Oil | PAH in Filters | Hold before analysis *** | Hold after analysis *** | ***** Samples placed on hold will be kept for three months only, unless subject to legal proceedings**<br><br>Other analytes are available on request: please contact laboratory staff: 6165 3301<br><br>**Other Parameters** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B | I | C | H | E | N | O | | M | U | S | 1 | | | | | | **Mussels** | | | | | | | | | | | **Paralytic Shellfish Toxins** |
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**# Select analyte(s) by ticking the box or circling individual analyte(s)**

| | |
|---|---|
| **Metals**<br>□ Standard suite (air filters): Al, As, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, Zn<br>□ Standard suite (biota, other): As, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, Zn<br>□ Hg<br>□ Other analytes available: Al, B, Ba, Be, Ca, K, Mg, Mo, Na, P, S, Sb, Se, V<br>Note: AST does not analyse metals in oil samples.<br><br>**Anions, Water Extractable**<br>□ $Br^-$, $Cl^-$, $F^-$, $SO_4^{2-}$ | □ **OC/OP Pesticides:** a-BHC, b-BHC, d-BHC, g-BHC, Aldrin, Chlordane, Chlorpyrifos, p,p'-DDT, p,p'-DDD, p,p'-DDE, Diazinon, Dieldrin, Dimethoate, Disulfoton, Endosulfan I, Endosulfan II, Endosulfan sulphate, Endrin, Endrin aldehyde, Ethyl parathion, Famphur, Heptachlor, Heptachlor epoxide, Hexachlorobenzene, Malathion, Methyl parathion, Phorate, Sulfotep, Thionazin<br>□ **Other Pesticides/Herbicides (Select as Required):** 2,4-D, Alphacypermethrin, Atrazine, Boscalid, Clopyralid, Dicamba, Fenitrothion, Haloxyfop-methyl, Hexazinone, MCPA, Metalaxyl, Metsulfuron-methyl, Pendimethalin, Permethrin, Picloram, Prometryn, Simazine, Sulfometuron-methyl, Terbacil, Triclopyr<br><br>□ **TPH in Oil:** C6-C9, C10-C14, C15-C28, C29-C36 Fractions (% of Total TPH)<br>□ **BTEX in Oil:** Benzene, Toluene, Ethylbenzene, o,m & p-Xylene (% of Total TPH)<br><br>□ **PAH in Air Samples/Filters:** USEPA Priority Suite, 16 Analytes |

# Appendix 5: References

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Tasmanian
Government

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