FAQs – Swan River *Alexandrium* algal bloom and Paralytic Shellfish Poisoning

Background

Since 2019, two large *Alexandrium* algal blooms have occurred in the Swan and Canning rivers.

The first occurred only in the Swan River between Pelican Point and Herne Hill, from February to May 2019 and was caused by *Alexandrium minutum*. As a precautionary measure, over the course of the bloom the Department of Health advised the public not to fish for or consume fish, crabs or shellfish from the affected Swan River areas. Public health warning signs were erected by local government authorities at key Swan and Canning river jetties, boat ramps and popular fishing locations.

The second bloom began in December 2019 and persisted for 18 weeks through to late April 2020 affecting both the Swan and Canning rivers. Both *A. minutum* and *A. pacificum* were recorded during this event and paralytic shellfish toxin (PST) reached 11 times the Australian New Zealand Food Standards Code (ANZFSC) maximum levels in mussels. PST in crabs also reached 2.1 times these same levels. During the peak of this bloom, there was a significant yellow plume evident between the Old Swan Brewery and Matilda Bay.

During this second bloom the Department of Health issued warnings lasting 23 weeks before being lifted at the end of May 2020. The warnings remained in place longer than the bloom event as it takes some weeks after a bloom collapses for toxins to reduce to acceptable levels within mussels and crabs.

Since then, *Alexandrium* has been detected in the Swan River during each summer season, however densities have not approached the peaks seen in 2019/20. Material educating fishers on how to reduce risk of exposure to Paralytic Shellfish Toxins (PSTs) has been created and disseminated (see below), warning signs are erected at key locations each crab season, and updated information is provided to primary stakeholders (e.g. Recfishwest).

This fact sheet provides information relevant to *Alexandrium* blooms in the Swan and Canning rivers, as well as other general health, fishing and other issues relating to *Alexandrium* and Paralytic Shellfish Poisoning (PSP).

What is the current fishing and health advice?

Recreational fishing remains open for blue swimmer crabs (1 December – 30 August) and year-round for fish throughout the Swan and Canning rivers. To reduce your risk of PSP please remove the head,

guts (mustard) and gills from crabs caught in the Swan and Canning rivers prior to freezing, cooking or eating them.

All crabs must still be landed and transported whole to your home*, unless you plan to eat them immediately.

*Home means your principal place of residence as per Regulation 3 of the *Fish Resources Management Regulations 1995*.

Department of Health advises not to eat shellfish including mussels, oysters, clams, pipis, scallops, cockles and razor clams from the Swan and Canning rivers, at any time as their safety cannot be guaranteed. Shellfish are filter feeders which easily uptake contaminants, and urban waterways can contain heavy metals, microbial and other contaminants that may affect shellfish quality.

Only shellfish purchased from commercial outlets are subject to stringent testing and quality assurance processes to make sure they are safe to eat.

The public is advised to pay attention to caution and warning signs displayed in the Swan Canning Riverpark and to watch out for *Alexandrium* updates in the media. Advisories will be published on the Department of Health News webpage and/or the Department of Biodiversity, Conservation and Attractions' Monitoring and Reporting page for the Swan Canning Riverpark.

Where are harmful algae caution signs displayed?

During the crabbing season, harmful algae "caution signs" are installed at popular fishing spots, jetties and boat ramps along the Swan and Canning rivers to alert the public of the risk algae can pose via consumption of shellfish and crabs. Even if a sign is not erected at the place you recreate or fish, you are still advised to thoroughly clean crabs caught or collected and to not eat any shellfish.

How do I clean blue swimmer crabs properly?

Remove all blue swimmer crab head, gills, guts (crab mustard) prior to freezing, cooking or eating blue swimmer crabs. See photo sequence and video below:

1. Anaesthetise the crab by putting on ice for five minutes before the cleaning process.

2. Turn the crab over, pry up the belly plate and remove.

3. Put your thumb between the top shell and bottom shell and peel off carapace. Keep the guts in the shell and discard them.

4. Turn the crab over, put your thumbs in the middle, press down and break into two halves.

5. Pull off the mouth parts.

6. Remove the gill filaments from both sides of the crab

	
7. Clean out all guts (mustard) remnants with running water.	8. Cleaned blue swimmer crab ready to cook or store at your home*.

*Home means your principal place of residence as per Regulation 3 of the *Fish Resources Management Regulations 1995*.

How do I clean blue swimmer crab video link

What is Paralytic Shellfish Poisoning (PSP)?

Paralytic shellfish poisoning (PSP) is a disease primarily caused by eating shellfish containing paralytic shellfish toxins (PSTs). PSTs are produced by some types of naturally occurring algae such as *Alexandrium minutum*, which are accumulated by filter-feeding shellfish. Crabs and certain fish also feed on shellfish, which may lead to bioaccumulation of PSTs in their organs and muscle tissue and could be dangerous if consumed.

What are the symptoms of PSP?

Symptoms of PSP are known to begin within minutes or up to 24 hours after eating shellfish impacted by PSTs.

Initial symptoms include tingling and numbness around the mouth which can spread to the face, neck, arms and legs.

Other symptoms include:

- nausea and vomiting
- headache
- weakness
- blurred vision or temporary blindness
- prickly sensation at the fingertips
- change in temperature sensation
- loss of balance
- difficulty speaking or swallowing
- in severe cases difficulty breathing, paralysis and death can occur.

What are the potential health risks of toxins produced by *Alexandrium?*

Alexandrium is a genus of microalgae containing several species that produce toxins known as Paralytic Shellfish Toxins (PSTs) that can be concentrated by filter feeding shellfish. Consumption of shellfish containing high levels of these toxins can result in PSP. In the worst-case scenario, this can cause muscular paralysis and death due to respiratory failure.

Crabs bioaccumulate PSTs in the viscera (guts). Consuming viscera, for example as 'mustard', is the greatest health risk and should always be avoided.
PSTs may also bioaccumulate in the muscle tissue of both crabs and some fish (albeit likely at very low levels not of health concern).

Testing for PSTs was undertaken in 2019 and 2020 to assess accumulation in selected species known to be targeted by recreational fishers in the Swan and Canning rivers (mussels, crabs and black bream). Within the bloom affected area PSTs were found in mussels and crab guts above the comparative health guideline level, but have only been detected in two crab flesh samples (which were both frozen) at very low levels that were not of health concern.

To date PSTs have not been found in edible flesh/ fillet of five types of fish tested in the Swan Canning Riverpark. Cooking, pressure cooking and/or freezing seafood does not destroy these toxins. Cooking crabs can potentially spread the toxin from the guts into the broth. Freezing whole crabs (viscera still in place) may result in toxins spreading to flesh during the thawing process.

What should I do if I feel sick, or experience PSP type symptoms?

Seek urgent medical attention, particularly if you have any difficulty breathing.

Is there an antidote for PSP?

No. There is no specific antidote for PSP. Seek immediate medical attention if you or someone you know experiences PSP symptoms.

In severe cases people are monitored in hospital and may need breathing support.

How long do PSP symptoms remain?

Evidence suggests that after 12 - 24 hours, regardless of severity, victims start to recover gradually and are without any residual symptoms within a few days. In severe cases weakness may persist for up to a week.

Is it safe for me to swim in and recreate on the Swan River?

Yes. Swimming, water-skiing and boating is OK, but as a general rule swimming should be avoided in areas of discoloured water as well as for several days after significant rainfall (e.g. >10mm). This guidance also applies for dogs swimming in the river. There may be some areas associated with this bloom, where a yellow to rusty discoloration of the water may be observed.

Can the *Alexandrium* algae cause skin irritations?

Not that we know of, but it is recommended to avoid swimming in discoloured water in the affected area or where surface scums are evident.

How do shellfish become contaminated?

Shellfish feed by filtering small food particles; including microscopic algae, out of the water. When shellfish filter microalgae that produce PSTs (e.g. *Alexandrium*), they accumulate these toxins in their viscera (guts). Shellfish are resistant to the PSTs but can transfer them on to other animals and humans that consume the shellfish.

What is the maximum safe level of PSTs in bivalve molluscs (shellfish)?

The Australian and New Zealand Food Standards Code (2017) define the maximum level of paralytic shellfish toxins (Saxitoxin equivalent) in bivalve molluscs equal to 0.8 mg/kg. In a strict sense, this level is only applicable to shellfish that are harvested for sale but may provide a comparative measure where other seafood are tested.

Does adherence to or comparison with ANZFSC maximum PST levels from testing in shellfish, crabs and fish guarantee their safety?

Whilst adherence to, or comparison with, ANZFSC maximum PST levels may provide some higher confidence that crabs and fish, taken recreationally in the same area and at approximately the same date, could be fit for human consumption; any such results should be treated with caution and considered indicative.

Unfortunately, due to the cost of testing, the lengthy time to obtain test results, and the limited number of tests reasonably able to be performed (in combination with changing environmental conditions, including bloom emergence and persistence over-time), the patchy nature of algal blooms and mobility of crabs and fish, testing cannot fully guarantee the safety of every individual crab or fish caught recreationally for human consumption.

How long after a bloom do PSTs remain in shellfish, crabs and fish?

Even after a bloom ends, PSTs in crabs and some types of shellfish can remain for some time. PSTs in mussels may reduce quickly i.e.: within days to a couple of weeks, whilst crabs and some other shellfish and fish species may take much longer depending upon environmental conditions.

What factors contribute to *Alexandrium* blooms*?*

Waterways contain many different species of algae that will opportunistically take advantage of ambient conditions to proliferate and out-compete co-occurring species. Factors influencing blooms include temperature, turbulence, salinity, available nutrients and water clarity.

Alexandrium forms cysts which remain in sediments and provide a source from which the algae can multiply when environmental conditions are suitable.

Experience from the two recent *Alexandrium* bloom events in the Swan Canning Riverpark, indicates that *Alexandrium* growth is favoured by increased water temperatures, salinity and water clarity in early summer.

Should I consume shellfish that are collected recreationally?

Regardless of the presence/absence of *Alexandrium*, and/or PST's, people should avoid eating wild shellfish collected recreationally as their safety cannot be guaranteed. This is particularly the case in rivers, estuaries or other waterways where there is an increased likelihood of contaminant or nutrient inputs, which may result in elevated levels of algal toxins, bacteria, viruses, heavy metals and/or other contaminants within shellfish.

It is especially unsafe to eat wild shellfish from:

- marinas or other areas potentially subject to boat discharges,
- areas near outfalls from sewage, septic tanks, stormwater or industrial sites,
- areas affected by recent heavy rainfall, and
- areas affected by toxic algal blooms.

What shellfish are safe for human consumption?

Department of Health recommends only eating shellfish that has been harvested commercially under strict monitoring programs, that ensure waters are free from pollutants and toxins. These safety programs include routine testing of the animal as well as the waters to make sure the shellfish are safe to eat. Farmed shellfish purchased in supermarkets and other commercial outlets in WA are subject to a strict quality-assurance program to ensure they are safe for human consumption.

What factors lead to a decline of an algal bloom?

Algal blooms generally cease when:

- available nutrients in the water are depleted, and/or
- environmental conditions, such as light and temperature become unfavourable, or
- a virus, parasitic infection, or predation by zooplankton reduces the algal population faster than it can grow.

A heavy rainfall event may also assist to disrupt some algal blooms but can provide a catalyst for other algal blooms as conditions change to favour another species.

When do *Alexandrium* blooms start and how long are they likely to last?

Data from monitoring *Alexandrium* in the Swan and Canning rivers, indicates that *Alexandrium* may start to be detected in late spring, early summer as water temperatures, salinity and water clarity increase. Blooms are most likely between January and late March, but can start as early as late November.

How can I be safe if I choose to crab or fish from the river?

The public is advised to follow algal bloom caution and/or public health warning sign directions as displayed in the Swan Canning Riverpark and to watch out for further *Alexandrium* media updates.

Department of Health may issue a public health warning, if river conditions or factors override the current ‘caution sign’ advice. If the Department of Health needs to issue a public health warning, it will also later issue a media statement when conditions have returned to a satisfactory level, in terms of public health.

Cleaning viscera (guts) out of your catch before cooking will substantially reduce your risk of PSP.

When was an *Alexandrium* bloom first recorded in the Swan and Canning rivers?

Alexandrium has been recorded in the Swan River since 1983, but extensive *Alexandrium* blooms have only recently occurred within the river system (Swan River 2019 & 2020 and Canning River 2020).

Monitoring information web-link

DBCA is the Western Australian state government agency which undertakes management, and weekly phytoplankton (microalgae) and physico-chemical water quality monitoring through-out the Swan and Canning rivers.

For current monitoring information please refer to: Monitoring and reporting in the Swan Canning Riverpark | Department of Biodiversity, Conservation and Attractions. For a quick Google search type: ‘Microalgae activity report’ and click on the first link below.

How can we stop the spread of *Alexandrium* blooms?

Although research is being undertaken into different control methods once a bloom is detected it is very difficult to control.

What is the likely impact of the *Alexandrium* bloom on the rivers' ecosystem and wildlife?

Alexandrium produces potent neurotoxins which are toxic to some zooplankton and small fish. These impacts can influence the ecosystem dynamics. *Alexandrium* also has the potential to impact wildlife as toxins can accumulate up the food chain. Filter feeders such as mussels filter water and can remove the algae from the water column. The algae contain toxins which can accumulate in the mussels, and the mussels can then be consumed by other animals including crabs and fish. To date no negative effects on wildlife have been observed in association with this species in the Swan Canning Riverpark.

What does the algal bloom look like?

The visual impact of the algae is a yellow to rusty discoloration of the water. Department of Health generally advises people not to swim in areas of discoloured water or after heavy rainfall events.

What actions are being taken to reduce the bloom and the human health risks?

Since 2019, an interagency Incident Management Team (IMT) chaired by DBCA and including Department of Health (DoH) and the Department of Primary Industries and Regional Development (DPIRD) has overseen the response to the blooms including communications.

DBCA monitor the Swan Canning Estuary water quality weekly, to inform river management actions regarding algal blooms.

DBCA, with the assistance of the DPIRD have collected mussels, blue swimmer crabs and black bream in the Swan River. These species were tested for PSTs to increase an understanding of the potential impacts of *Alexandrium* upon these species.

Toxin testing is indicative only and is not designed to confirm that crabs, fish and mussels are safe for human consumption, as there are other factors in large urban catchments (e.g. local sources of pollution, stormwater runoff etc.) that can influence whether it is safe to consume seafood from the river. Where additional toxin testing is undertaken, DoH will provide further advice regarding the continued safety to consume seafood caught in the Swan and Canning rivers.

In the past DBCA has investigated different approaches to control algal blooms. Each type of algae is unique, and DBCA, DoH and DPIRD have funded research into the local *Alexandrium minutum* affecting the Swan and Canning rivers. This has provided characterisation of the local toxin profile and increased confidence that PSTs are isolated to the viscera (guts) of blue swimmer crabs. The research also yielded promising results using augmented clay to remove *Alexandrium* from the water column.

What other river management initiatives help prevent *Alexandrium* and other algae from spreading?

Algae are a natural part of the river system, and algal blooms are quite common in nutrient rich river systems. Controlling nutrients that enter the river system helps to reduce the likelihood of nuisance and toxic algal blooms.

DBCA and its partners use constructed wetlands, foreshore plantings, and different landcare initiatives in the catchment, to help reduce nutrients such as nitrogen, and phosphorus entering our rivers. Fewer nutrients in the water, means, less nutrients for algae and fewer blooms.

Additionally, DBCA also run free behaviour change programs such as: 'RiverWise gardening workshops', to assist residents and land managers to use fertiliser more responsibly.

DBCA also provide artificial oxygenation to around 14 kilometres of the upper Swan and Canning rivers through four oxygenation plants. This oxygenation zone provides a refuge area for aquatic wildlife at times of the year when there is low oxygen in these parts of the river, which also helps to reduce nutrient release from the sediment and with processing of nutrients that enter the river system.

Development that occurs in the river requires that proponents manage disturbance and contain any sediment that is generated to the immediate area using silt curtains, whilst monitoring for *Alexandrium* if at a large enough scale. This is important, as *Alexandrium* forms cysts which remain in sediments and provide a source from which the algae can multiply when environmental conditions are favourable. Sediment disturbance may bring buried cysts into the water column and promote their growth.

DBCA and DPIRD work together to remove any dead fish from the river when fish kills occur, as they can produce and contribute harmful bacteria into our rivers.

What can Perth residents do to help slow down the algae's spread and prevent future outbreaks?

Reduce your fertiliser use and only fertilise when required (e.g. plants are browning) and at the right time of year. Having a waterwise garden, that doesn't use a lot of fertiliser, or water, helps to reduce nutrient losses to rivers and wetlands and saves people money. DBCA supports the 'RiverWise gardening' workshops' that are delivered by Josh Byrne.

These workshops provide a great forum for people to; better understand how they can make positive changes to their practices that will help their gardens and the rivers. Refer to the River Guardians website for more information: https://www.riverguardians.com/.

People can also pick up after their dogs, rake up lawn clippings/ leaves and put them in their green wastebin to reduce the nutrient load being washed into our drains, which ultimately flow into our rivers.

Not all parts of the Swan and Canning rivers or other waterways are always monitored for algal blooms and anyone who sees or suspects an algal bloom in a waterway should report this to the Department of Water and Environmental Regulation (DWER) ALGALWATCH during office hours on 6250 8064 or to the relevant local government authority for assessment.

For further information on *Alexandrium*, please contact Department of Health on 9222 2000 or refer to the web pages provided on the DBCA, DPIRD and DoH websites.

www.dbca.wa.gov.au/algal-bloom

www.dpird.wa.gov.au/alexandrium

Algal blooms monitoring

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