

Expert Panel Review of the draft report on

The Review of biosecurity risks of prawns imported from all countries for human consumption, September 2020

for Department of Agriculture, Water and the Environment

Expert Panel

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Executive Summary

This Review provides advice to the Department of Agriculture, Water and the Environment (the Department) on suggested amendments to its Draft Report on the *Review of biosecurity risks for imported prawns for human consumption*, September 2020. The Expert Panel commends the Department for its comprehensive analysis of the existing scientific knowledge, noting that some of the information needs updating.

The Expert Panel reviewed the Draft Report and submissions by stakeholders, as well as consulting with three aquatic disease experts on the pathogenicity and inactivation of a number of pathogenic agents to understand how best to manage the biosecurity risk of these hazards. We also consulted with the Department on its risk management actions in recent years.

The Panel agrees that the Department has identified biosecurity measures, that if implemented effectively, would provide an Appropriate Level of Protection (ALOP) for Australian prawns and other susceptible species from exotic disease threats. Some re-organisation of the material in the Provisional Final Report should help to make it clear that the proposed biosecurity measures are robust and defensible under the World Organisation for Animal Health (OIE) *Aquatic animal health code* (OIE Code) and the World Trade Organization's Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement).

A major concern raised by Australian stakeholders is that the past measures which were in place up until 2017 failed because of poor behaviour by a small number of importers. The success of the new biosecurity measures that have been put in place since 2017 and any proposed new measures for prawns and prawn products exported to Australia in the future will depend on the implementation of rigorous pre-and post-border monitoring and testing, particularly where prawns are imported uncooked and frozen.

It is evident that the Department has, and is continuing to, undertake detailed testing and monitoring in support of the proposed biosecurity measures that are outlined in the Draft Report. These actions were in response to the outbreak of White Spot Syndrome Virus (WSSV) in prawns in 2016 in south east Queensland and follow on from recommendations in the Inspector General of Biosecurity's report on *Uncooked prawn imports: effectiveness of biosecurity controls* (Scott-Orr, Jones and Bhatia, 2017) (hereafter referred to as the IGB Report 2017).

The strength of the Draft Report is its comprehensiveness. This is also its weakness, as it is difficult for the reader to achieve an overview of key issues, as is evidenced by a number of the comments in stakeholder submissions about the proposed biosecurity measures. A range of concerns raised by stakeholders had been addressed in the Draft Report, but were not easy to find. Stakeholder confidence will be improved if the Provisional Final Report highlights the key areas of concern and how they are to be addressed - potentially in a new chapter.

The Expert Panel has made a number of suggestions for the Department to consider in its preparation of the Provisional Final Report. These are listed throughout the body of the Review. We have also made the following recommendations.

Recommendations

The Provisional Final Report:

1. Addresses the top-level issues raised by the submissions to the 2020 Draft Report (Appendix 2)
2. Provides more detail on the pre-export and on-arrival testing programs, and the associated monitoring and compliance program
3. Gives a clearer account of the potential economic impacts of disease introduction to Australia
4. Emphasises that the 'very low' risk rating for WSSV does not assume that recreational fishers will comply with the voluntary code not to use imported prawns for bait or berley
5. Includes the design and implementation plan for a random batch testing program to monitor for other exotic diseases (CMNV, DIV1, EHP, IMNV and TSV) in prawns imported for human consumption
6. Outlines the Department's extensive actions undertaken since the 2016 incursion, including its response to the recommendations of the IGB Report 2017, and future planned activities
7. Acknowledges that, on the balance of probabilities, the use of imported prawns for bait and berley by recreational fishers is the likely pathway of the 2016 disease incursion
8. Indicates how the biosecurity arrangements for imported prawns are consistent with that taken for other imported meat products (beef, pork and chicken).

The Department:

9. Ensures that the biosecurity measures given in the Draft Report are properly resourced and monitored.

1. Introduction

The Department of Agriculture, Water and the Environment (the Department) released its Draft Report on *Review of the biosecurity risks of prawns imported from all countries for human consumption* in September 2020 for stakeholder feedback and comment.

Submissions from trading countries, importers, exporters, fishing and aquaculture businesses and other interested parties raised a number of scientific, technical and trade issues. An Expert Panel was appointed by the Department to undertake a review of the Draft Report and consider:

- A. Relevant matters relating to the likelihood of entry and exposure to diseases associated with prawn imports have been properly considered, including emerging diseases;
- B. Relevant matters relating to the likely economic consequences of a disease incursion have been properly considered; and
- C. That the conclusions of the draft prawn import review report are scientifically reasonable, based on the material presented, including consideration of material contained in stakeholder submissions to the draft report.

The Expert Panel's advice will assist the Department in its preparation of the Provisional Final Report. Section 2 (A) – (C) addresses the matters listed above and Appendix 1 lists the ten pathogens of interest.

Stakeholders raised a range of issues in their submissions. The Expert Panel addressed some of these in the body of the report below. Appendix 2 contains a more specific list of issues and the Expert Panel's suggested response or action by the Department.

2. Suggestions and Observations

(A). Relevant matters relating to the likelihood of entry and exposure of hazards associated with prawn imports have been properly considered, including emerging diseases

Identifying Potential Pathogenic Agents

The Draft Report identified a large number of pathogenic agents that can affect aquatic resources (fish, crustaceans, molluscs). It concluded that only ten of these, listed in Appendix 1, were currently considered to be of economic and environmental importance in relation to prawn biosecurity and these pathogenic agents were retained as hazards. In general, the submissions did not challenge this shortlist of ten hazards and the Expert Panel accepts the Draft Report has correctly focused its risk assessments on these ten.

The Draft Report detailed the risk assessments for each of the ten hazards and determined the overall unrestricted risk associated with the importation of prawns intended for human consumption. If the overall risk was 'negligible' or 'very low', then the risk was considered to achieve Australia's Appropriate Level of Protection (ALOP). If the overall risk was 'low', 'moderate', 'high' or 'extreme', then Australia's ALOP was not achieved. Of the ten hazards,

only “*Candidatus Hepatobacter penaei*” (“*Ca. H. penaei*”) achieved Australia’s ALOP without any treatment, other than the standard requirements for prawn products to be either cooked or frozen - no fresh, chilled prawn products are imported into Australia.

For those nine hazards where the unrestricted risk did not achieve Australia’s ALOP, the Draft Report assessed specific treatments or activities to determine if they would reduce risk to ‘very low’ or ‘negligible’. Treatments/activities were assessed progressively and the residual risk that remained after more stringent biosecurity measures were applied – cooking or freezing, shell and head removal and deveining – was calculated.

Two hazards, white spot syndrome virus (WSSV) and yellow head virus (YHV1), had a greater unrestricted risk than for the other seven hazards so required more stringent biosecurity measures to reduce risk to a level that achieves Australia’s ALOP (‘very low’ or ‘negligible’). For these two hazards, all imported, uncooked prawns need to be tested for the presence of these two viruses.

Updates to Biosecurity Measures

The Draft Report acknowledges that incremental changes to biosecurity measures are possible without a formal import risk analysis being released. This point should be emphasised more clearly in the Provisional Final Report, given that a number of submissions were concerned that the comprehensive review of biosecurity measures for prawns has taken some years.

The Department’s ongoing scrutiny of international literature and intelligence from exporting countries satisfies the Expert Panel that the Department has the capacity to detect changes in the status of the potential pathogens or the emergence of new pathogenic agents and make timely adjustments to biosecurity measures.

The proposed new biosecurity measures identified in the Draft Report give the option of importing raw, frozen prawns providing a number of import requirements are met. The extent to which this achieves Australia’s ALOP, and gives the Australian industry confidence in the biosecurity measures, are critically dependent on the testing regimes to detect existing and emerging diseases, both pre-, at- and post-border.

The Panel’s discussions with the Department revealed that many stakeholder concerns about testing and monitoring for emerging diseases have been, or are in the process of being addressed, but were not explicitly discussed in the Draft Report. The Expert Panel suggests that the Provisional Final Report would be strengthened if all the information relating to monitoring, sampling and testing of both existing and emerging pathogens was brought together in a separate chapter. This information would include an update on activities undertaken by the Department since 2016. Specific issues are detailed further in Section C below.

Recommendation 2:

The Provisional Final Report provides more detail on the pre-export and on-arrival testing programs, and the associated monitoring and compliance program.

Detection of Emerging Diseases in Imported Prawns

The Draft Report notes that certain pathogenic hazards will be monitored for any changes in available information due to the uncertainty associated with new and emerging pathogenic agents. The Department informed the Panel that it is undertaking testing of imported prawns for decapod iridescent virus 1 (DIV1), covert mortality nodavirus (CMNV) and *Enterocytozoon hepatopenaei* (EHP) to gather further information about the significance of these hazards overseas. We support this work and note that information from this work, coupled with intelligence on disease outbreaks in exporting countries, should help prioritise where and when this testing occurs.

We suggest that the Department initiates annual random batch testing to monitor if biosecurity measures are performing as expected and to help identify changes in risk profile (see below).

The Expert Panel was advised by one aquatic disease expert that CMNV was not a potential threat in prawns imported for human consumption, as the movement of this virus overseas is attributed to the movement of live animals. However, evidence from other members of the genus suggests that CMNV may not be completely inactivated by freezing and may still be present in imported prawns. It has been reported that CMNV is often associated with co-infections with WSSV and acute hepatopancreatic necrosis disease (AHPND). This aquatic disease expert also informed the Panel that CMNV has had no impacts on wild fisheries in those countries where it has been detected in aquaculture ponds and there are no known environmental impacts. CMNV is not listed as a notifiable disease with the OIE or in Australia. All the scientific advice indicates that the risk to Australia from CMNV in frozen, deveined and head and shell removed, uncooked prawns is reduced to a level that achieves Australia's ALOP. However, due to the wide host range of this virus and its emerging status, random batch testing for this virus from countries with known outbreaks would be prudent.

The biosecurity risk associated with DIV1 in imported frozen, de-headed and de-shelled prawns is estimated to achieve Australia's ALOP. Recent testing by the Department on imported shipments have returned negative results. Random testing should continue on an annual basis to provide confidence and early warning should this disease increase its spread in exporting countries. EHP was considered to achieve Australia's ALOP following head and shell removal and deveining or through cooking.

Expert advice to the Panel suggested that it would be beneficial to initiate random testing for two other potential pathogens, IMNV and TSV. The Department confirmed that molecular testing is currently available in Australia for CMNV, DIV1, infectious myonecrosis virus (IMNV) and Taura syndrome virus (TSV) through the Australian Centre for Disease Preparedness (formerly known as Australian Animal Health Laboratory, AAHL).

Continuing cooperation with overseas laboratories can also provide mechanisms for validating tests with other new or emerging pathogens. Testing for these new pathogens could 'piggyback' on the existing proposed sampling for WSSV and YHV1 and would ensure cost efficiency with respect to collection of samples. The Expert Panel acknowledges that

the additional testing may not be a condition of current import permits and could incur additional expense to the Department, or in the future, to the importer.

Another aquatic disease expert interviewed by the Panel drew attention to three additional pathogens, Hepatopancreas and digestive tract necrosis virus (HINV), *Macrobrachium rosenbergii* Golda virus (MrGV) and *Macrobrachium rosenbergii* Taihu virus (MrTV), as worthy of further consideration. The interviewee noted that these pathogens had been rejected by the Department as hazards, as there was a *lack of evidence* affecting adult prawns. In view of recent reports in the 'grey' literature that these diseases may be affecting adult prawns in some countries, the Panel suggests the Department give further consideration to any new information that may affect whether these pathogenic agents are considered hazards and require a full risk assessment to determine if they achieve Australia's ALOP.

(B). Relevant matters relating to the likely economic consequences of a disease incursion have been properly considered

The value and volume of the domestic prawn industry and of imports can be used, in part, as indicators of the likely consequence of a disease incursion, both on local production and on inbound trade. Added to these is the cost of monitoring, surveillance, testing and management measures.

The Expert Panel suggests that relevant economic information about the size of the domestic prawn industry and the volumes of imports be brought together in one section of the Provisional Final Report and that similar metrics be used (either tonnes *or* kg). At present, import data is given on page 53 of the Draft Report, while domestic industry figures are given on page 83, and the cost of biosecurity infrastructure on prawn farms is on page 86. There is also no information on the volume of Australia prawns that are processed overseas (see below), nor what proportion these are, as a proportion of total imports. Where relevant, the information could still remain in different sections, but the Provisional Final Report would be strengthened by also having it summarised in a common section on economic impacts.

The Department provided the following data - the Expert Panel suggests that it be included in the Provisional Final Report. The volume of aquaculture and fisheries production of the domestic prawn industry is around 25,000 tonnes and a similar volume of prawns is imported (see Table 1). Domestic production consisted of 19,012 tonnes of wild-caught prawns (2017-18) and 4,630 tonnes of farmed prawns (2018-19), worth around \$360 million. Some of these prawns enter the Australian supply chain; < 6% are exported to South-East Asia for processing and then reimported to Australia; and other prawns are exported for overseas consumption. Industry stakeholders have forecast that the domestic farmed prawn industry is set to grow by up to 20,000 tonnes over the next five years, or even higher, if large projects on the drawing board in northern Australia go ahead.

Table 1: Volume of imported prawns across calendar years (data sourced from the Department, March 2021)

	2016	2018	2019	2020
Commodity	Volume (tonnes)	Volume (tonnes)	Volume (tonnes)	Volume (tonnes)
Cooked	9,588	15,755	12,289	11,494
Uncooked (raw) prawns	17,125	8,635	8,443	7,752 ^a
Breaded, battered and crumbed	1,876	3,087 ^b	2,388	2,318
Dumpling and dim sum-type product	774	1,119	761	750
Other prawn products ^c	2,395	859	1,037	1,815
Total	31,757	29,454	24,918	24,128

^a Import conditions for deveining of uncooked prawns implemented in July 2020

^b Import conditions for breaded, battered and crumbed prawns implemented in September 2018

^c Other prawn products refers to all shelf stable prawn products including dried shrimp, prawn crackers and shelf-stable prawn paste. An import permit is not required for these goods.

The figures for imports in Table 1 include Australian-caught prawns processed overseas and re-imported into Australia. In 2019-20, this was 7.8% of the total imports, down from 9.9 % in the period of 2017-2019.

When all relevant information is brought together, it is evident that trade impacts (both domestic and imports) of biosecurity measures can be considerable. Data from the Department for frozen, raw prawns (Table 1) shows the new biosecurity measures introduced in 2017 did lead to a considerable drop in volumes imported. The magnitude of imports of raw prawns is yet to recover.

The extent of economic impacts on the Australian industry of an exotic pathogen outbreak can also be affected by the time it takes for aquaculture harvests to recover and on the impact of mortality in wild populations. While the Draft Report refers to some overseas data that suggest that recovery in aquaculture can occur by restocking with resistant species, this was undertaken using prawn species not present in Australia. Further, one stakeholder submission provided data that suggested that mortality of prawns in Morton Bay was affected by WSSV. Given the importance of wild-caught prawns to the Australian industry (currently more than 75% of production), the Department needs to reconsider its comments on impacts on local production in light of new data provided in submissions and adjust if necessary.

Also relevant to economic impact are the changes in local production costs (page 86 of the Draft Report) through extra biosecurity measures to prevent incursion from wild populations to farms, plus the possible loss of production. The Expert Panel suggests that there is an opportunity to discuss the continuum of biosecurity and that no border can be risk free, either in practice or in terms of international trade rules (see Section 2C).

There are no data provided on the cost/benefit of biosecurity measures. The Department indicated to the Expert Panel that its risk assessments focus on whether a biosecurity measure achieves ALOP, if it is operationally implementable, and if it can confirm that the measure would be properly implemented and would deliver the desired effect.

The Expert Panel agrees that the biosecurity measures outlined in the Draft Report offer a range of options to manage the biosecurity risk to importers, exporters and therefore consumers. It is a commercial decision as to what product type is imported into Australia and it is a user pays system, so the importers may determine whether the cost of importation makes the process worth it for them or not.

The Expert Panel encourages the Department to make the intent of this advice explicit in the Provisional Final Report, possibly as a preamble to Chapter 16 (Proposed biosecurity measures for imported prawns). Frozen, raw prawns are used extensively in, and often preferred by the Australian catering and service industries for use in many different seafood products and meals (e.g., Asian cuisines). The current Australian production cannot meet consumer demand, so the proposed biosecurity measures allow importers to meet the demand for this type of product.

Recommendation 3:

The Provisional Final Report gives a clearer account of the potential economic impacts of disease introduction to Australia.

(C). That the conclusions of the draft prawn import review report are scientifically reasonable, based on the material presented, including consideration of material contained in stakeholder submissions to the draft report

Biosecurity measures and treatments to reduce risk in prawns

The proposed biosecurity measures for the importation of prawns for human consumption into Australia give importers the choice of importing frozen cooked, or head and shell removed plus deveined uncooked prawns, or prawns processed into a value-added product to meet market demand. To reduce the risk of the ten identified hazards entering and infecting aquatic resources, the Draft Report proposes that all uncooked prawns imported for human consumption be subject to the following attestations under the official certification from a Competent Authority (CA) in the exporting country.

- All uncooked prawns are frozen and have had the head and shell removed (the last segment and tail fans permitted)
- Have been deveined (removal of the digestive tract to at least the last shell segment)
- Have been inspected and graded in premises approved by and under the control of the CA
- Are free from visible signs of infectious diseases
- Are fit for human consumption, and
- Are in packages marked with the words “For human consumption only. Not to be used as bait or feed for aquatic animals”.

These measures reduced the risk for eight of the hazards, but for WSSV the risk only reduces from extreme to high, while the risk rating of moderate for YHV1 did not change. Thus, for WSSV and YHV1, the Draft Report has proposed additional treatments to reduce the risk to a level that achieves Australia's ALOP. As the hazard is also located in the body (proteins) of the prawn, this is more difficult to achieve.

For uncooked, frozen, head and shell removed prawns the biosecurity measures to manage the risk for WSSV and YHV1 also include:

- Product from each batch (refer to section on batch testing) has been found post-processing to be free of WSSV and YHV1, based on the sampling and testing method recognised by the OIE for demonstrating absence of disease
- On arrival in Australia, each batch of uncooked prawns will be subject to seals intact inspection and testing for WSSV and YHV1 at a screening laboratory approved by the Department.

In addition, the CA in the exporting country can certify that:

- Breaded, battered and crumbed prawns, have had the head and shell removed, and have undergone a par-cooking step after the prawn has been coated to ensure the coating is set and fully adheres to the prawn
- Dumpling and dim sum-type products have had the head and shell removed and have been processed to the extent that no discernible pieces of meat are salvageable as a dumpling, spring roll, samosa, ball or other dim sum product
- Cooked prawns have had a cooking time necessary to achieve coagulation of the proteins and no raw prawn meat remains.

Thus, the Draft Report supports batch testing, monitoring and compliance of frozen, head and shell removed and deveined prawns as an acceptable alternative to cooking of whole prawns. It accepts that some fishers will probably continue to use frozen prawns for bait and berley, even though a public education and awareness campaign advising against using imported prawns for bait continues. However, stakeholders need to be reassured that the proposed biosecurity measures are not dependent on complete compliance by fishers.

Recommendation 4:

The Provisional Final Report emphasises that the 'very low' risk rating for WSSV does not assume that recreational fishers will comply with the voluntary code not to use imported prawns for bait or berley.

Cooking versus Testing for Disease

It is clear in the scientific literature that cooking for human consumption (to the point of coagulation of all protein) does not inactivate WSSV completely, as the virus is located throughout the prawn and deep in the protein of the tail. According to a recent study (Aranguren *et al* 2020, cited by the Department), complete inactivation of the virus occurs when prawns are boiled at 100°C for 1min. This would require the prawn to be cooked to a point where the product would no longer be visually acceptable or palatable.

Stakeholders in general showed an acceptance of the need for shell and head removal and deveining. Where Australian submissions disagreed with the recommended biosecurity measures were that the majority strongly supported the need to cook all prawn imports, as it both reduced the viral load and it deters the use of the product by recreational fishers as bait or berley, which has been identified as a major pathway for disease spread. They disputed that batch testing, monitoring and compliance for WSSV and YHV1 free imports would give adequate reduction in risk. The IGB Report 2017 demonstrated quite clearly that non-compliance had been a major problem and there was no pre-export and on-arrival testing at that time, so it is understandable that Australian stakeholders remain sceptical in the absence of an explicit update on new procedures.

The Expert Panel accepts that cooking alone will reduce the risk of WSSV to very low, but that other biosecurity measures can also provide equivalent risk mitigation, so that raw prawn imports also achieve Australia's ALOP under the specified conditions.

Batch Testing and Traceability

The unit of testing is the 'batch'. It forms the basis for determining the size of samples taken from a shipment (100% of batches from each imported shipment of raw prawns are sampled) and also can enable or limit the traceability of imported product back to particular farms or ponds from which diseased prawns may originate. A clear understanding of what is a batch assists transparency and can build confidence in stakeholders that Australia's ALOP is being met in prawn imports.

'Batch' was only defined in Appendix 4 of the Draft Report and this can be easily missed by stakeholders. The Panel suggests such a critical definition be given in the Provisional Final Report as a more explicit statement in the proposed new chapter on sampling and testing.

Stakeholders also raised concerns about the adequacy of batch testing, in which up to five prawn samples are pooled before testing. The Panel received advice from an aquatic disease expert that this is now much less of an issue than even a few years ago, given the high sensitivity of modern PCR and genomic testing.

Sampling for batch testing

The sampling procedures (random or systematic sampling, sample size) all need to be adequate to ensure that stakeholders have confidence in the testing procedure to detect the prevalence of the target hazard.

The sampling design implemented by the Department gives 95% confidence that WSSV and YHV1 will be detected in a batch, if it is present at a prevalence of 5% or greater. This design has been statistically reviewed and appears to meet the testing requirements. It may be desirable by some stakeholders to increase the required standard to 98-99% confidence, but this would require a significant increase in pre-export and on-arrival testing and cost.

The Expert Panel suggests that the Department ensures that its testing regime, including batch sample strategy, is fit for purpose. The Provisional Final Report needs to give clear guidance on why a 5% prevalence of pathogen detection was chosen rather than 2% as suggested by some stakeholders. If the 5% prevalence does not make a material difference

in detection, but is more cost effective than 2%, this needs to be clear. This issue was a particular sticking point for a number of submissions, so clarity is required on how the sampling procedure provides confidence that Australia's ALOP is being met.

The Department should reconsider the sample size of batch testing for the presence of WSSV and YHV1 and allow for some of these prawns to be tested for a range of other diseases (e.g., CMNV and DIV1).

One aquaculture expert the Expert Panel interviewed indicated that the Australian Centre for Disease Preparedness had worked with the Department to review the proficiency of testing laboratories in exporting countries to meet the OIE standards. This gave the Panel confidence that some oversight is being provided to monitor that pre-border testing can meet the requirements of the proposed biosecurity measures. We note that on-arrival testing also adds further validation of the prevalence of the hazard.

Recommendation 5:

The Provisional Final Report includes the design and implementation plan for a random batch testing program to monitor for other exotic diseases (CMNV, DIV1, EHP, IMNV and TSV) in prawns imported for human consumption.

Test Results in Australia for WSSV since 2016

The Expert Panel suggests that the Provisional Final Report provides an update on the results of on-arrival testing for WSSV in imported prawns undertaken since 2017. The Department informed the Panel that since the resumption of trade in July 2017, 1.23 per cent (31/2,530) of consignments have been found positive on-arrival for WSSV. For the financial year to date, 0.81 per cent of prawn consignments (5/619) tested positive for WSSV on-arrival (current 18 March 2021). The Department advised that it monitors the performance of all trading partners and provides feedback to overseas authorities seeking corrective action as necessary. The Department is also working with its trading partners to ensure overseas suppliers remain compliant with Australia's import conditions.

The risk rating of WSSV and YHV1 with the application of head and shell removal in combination with pre-export and on-arrival testing has been estimated as 'very low'. The results from independent on-arrival testing supports this risk rating.

The Department informed the Panel that it has also undertaken testing of imported prawns sold in Australian supermarkets since May 2018. The most recent testing conducted in July 2019 found no evidence of WSSV in the 35 samples tested (data sourced from the Department, March 21). Testing in 2018 found 2 out of 101 samples, both from the same exporter, tested strong positive. The importer elected to dispose of the remaining 40 cartons that were in storage.

Concerns have been raised by stakeholders and by the Inspector General Biosecurity (IGB Report 2017) that detected WSSV-positive prawn shipments that were re-exported were being returned to Australia in a different shipment. Shipments re-exported from Australia due to WSSV detection should have their packaging marked to identify the product as

having been rejected. In light of these concerns, consideration also needs to be given to following up on Recommendation 12 of the IGB Report 2017 to ensure penalties for non-compliance by importers are set at an appropriate level.

In summary, confidence in Australian stakeholders is dependent on the quality of the monitoring and compliance programs that support truthful reporting and sampling. The Expert Panel recommends that reporting arrangements are strengthened for batch testing. There needs to be improved governance in relation to batch identification pre-export to ensure product is not being falsely claimed as one batch and that the origin of the prawns is traceable through improved pre-export recording systems. Pre-export testing laboratories must be approved by the Certifying Authority in that country and conform to recognised standards. Testing certificates should be provided for each batch.

Recommendation 6:

The Provisional Final Report outlines the Department's extensive actions undertaken since the 2016 incursion and in response to the recommendations of the IGB Report 2017.

Disease pathways and the Biosecurity Continuum

The Expert Panel agrees with the Department that the source of the 2016 outbreak of WSSV cannot be known definitively. However, we suggest that on the balance of probabilities, the most likely route is through the use of imported raw prawns for bait and berley. The Provisional Final Report would be improved if it updated the Department's assessment of the likely pathway using updated information provided by stakeholders. At the very least, it should discard a number of alternative pathways.

Recommendation 7:

The Provisional Final Report acknowledges that, on the balance of probabilities, the use of imported prawns for bait and berley by recreational fishers is a likely pathway of the 2016 disease incursion.

As raw prawns have greater appeal as bait than cooked prawns, the pre-export and on-arrival testing should ensure the risk of WSSV and YHV1 remains very low. However, all jurisdictions have a role in regulating recreational fishing and better education around bait sources and use will assist in addressing this pathway. Aquaculture operators, aquariums and aquatic research institutions also need to improve their general biosecurity protocols and not use imported seafood as a food source, unless specifically imported for that use. This issue is similar to swill feeding for pigs, where the inclusion of meat or meat products is prohibited in Australia, due to the threat from Foot and Mouth Disease (FMD).

Biosecurity is not the sole responsibility of the Federal Government. The Expert Panel suggests that the Provisional Final Report comment on the need for a range of complementary post-border biosecurity measures, as biosecurity cannot be only managed at the border. State and Territory Governments, peak industry bodies and individual industry players all have a role in ensuring local production includes strategies to prevent the introduction and spread of disease, if a problem arises in the future.

Appropriate Level of Protection (ALOP) – Consistency among commodities

A number of submissions raised the issue of consistency with the application of ALOP in allowing non-viable, frozen, uncooked, whole prawns to be imported into Australia, as there is a belief that other raw products, such as meat and salmon are greatly restricted. The Expert Panel found no inconsistency in the way the Department has applied the ALOP for prawn products.

The Department informed the Panel that not all meat imported into Australia is cooked. For example, uncooked beef is permitted from Japan and New Zealand. For pork products, the requirements are disease specific and include cooking for some diseases, but for others, removal of the risk tissue is sufficient to manage risk.

Recommendation 8:

The Provisional Final Report indicates how the biosecurity arrangements for imported prawns are consistent with that taken for other imported meat products (beef, pork and chicken).

The Queensland Government has directed that all prawn products from the WSSV control zone in the Logan Shire must be cooked (or irradiated in the case of bait prawns) before being sold outside this control zone. That is a reasonable biosecurity control, when understanding that some recreational fishers in south-east Queensland (and elsewhere) use raw prawns for bait and berley and is not inconsistent with the ALOP in determining that frozen, uncooked, shelled, de-headed, deveined prawns can be imported, so long as pre-export and on-arrival testing for WSSV and YHV1 is conducted. However, there is an opportunity for testing regimes to be developed for prawns from south east Queensland that enable raw prawns to be moved interstate if they meet ALOP requirements.

Final Observations

The Expert Panel concluded that overall, the Draft Report provides a comprehensive assessment of the biosecurity hazards to the Australian prawn industry. We note that since the outbreak of WSSV in SE Queensland in 2016, the Department has undertaken a range of activities to address the deficiencies detected in the biosecurity measures for prawn imports. In particular, it has identified the need to do on-arrival testing of 100 per cent of uncooked prawn consignments and for the procedures for sampling to be revised. The proposed biosecurity measures in the Draft Report codify these and other measures into the proposed import conditions for prawn products exported to Australia for human consumption.

If these new measures for the importation of frozen, raw prawns for human consumption are to meet Australia's ALOP, it is important that sampling, testing and ongoing review of the biosecurity measures be properly resourced. Confidence by stakeholders in the biosecurity measures needs to be re-established and they will expect that biosecurity hazards for prawns will not endanger the Australian industry. The Expert Panel believes that the Provisional Final Report has an opportunity to address the concerns of stakeholders

while proposing biosecurity measures that give importers the choice of equivalent biosecurity measures that meet Australia's ALOP.

Recommendation 9:

Ensure that the biosecurity measures given in the Draft Report are properly resourced and monitored.

References

Aranguren, LFC, Mai, HN, Nunan, L, Lin, J, Noble, B & Dhar, AK 2020, 'Assessment of transmission risk in WSSV-infected shrimp *Litopenaeus vannamei* upon cooking', *Journal of Fish Diseases* [epub ahead of print]. available at doi: 10.1111/jfd.13128

Scott-Orr, H., Jones, B. and N. Bhatia (2017): Uncooked prawn imports: Effectiveness of biosecurity controls. Review Report No. 18/01. Inspector-General of Biosecurity. Australian Government

Appendix 1: High priority pathogenic agents of prawns of concern for management of biosecurity risks (from Draft Report).

Agent	OIE listed (Y,N)	Australia's national disease list (Y,N)	Host range (Low, Medium, High)	Annual likelihood of entry ¹	Estimation of overall annual risk ²
<i>Candidatus</i> Hepatobacter penaei (Ca. H. penaei)	Y	Y	L	Very Low	Very Low
Covert Mortality Nodavirus (CMNV)	N	N	H	High	Low
Decapod Iridescent Virus 1 (DIV1)	N (proposed)	Y	H	High	Low
Enterocytozoon Hepatopenaei (EHP)	N	Y	L	High	Low
Infectious Myonecrosis Virus (IMNV)	Y	Y	L	High	Low
Laem-Singh Virus Monodon Slow Growth Syndrome (MSGS)	N	Y	L	High	Low
Taura Syndrome Virus (TSV)	Y	Y	H	High	Low
Vibrio Parahaemolyticus (AHPND)	Y	Y	M	Very Low	Low
White Spot Syndrome Virus (WSSV)	Y	Y	H	High	Extreme
Yellow Head Virus YHV (genotypes 1,8)	Y (YHV1 only)	Y (YHV1 only)	H	High	Moderate

1 – annual likelihood of entry in imported prawns

2 - overall annual risk in non-viable, farm-sourced, frozen, uncooked whole prawns intended for human consumption (unrestricted risk).

Appendix 2: Issues raised by stakeholders in submissions to the Draft Report that require further action

A. ALTERED RISKS IN DISEASE PATHWAYS

The Draft Report contains a comprehensive list and analysis of the pathways for the introduction and exposure of exotic hazards into Australia.

Key issues raised	Further action required
<p data-bbox="208 509 674 541">1. <i>Prioritisation of pathway risks</i></p> <p data-bbox="208 580 775 687">Likelihoods of entry, exposure and establishment are not ranked in order of priority for addressing.</p> <p data-bbox="208 727 837 834">Some submissions contend that the bait and berley pathway, in particular, is not properly assessed or understood.</p>	<p data-bbox="887 509 1865 616">The Provisional Final Report would benefit from a short summary (or table) that ranks pathway risks on the basis of current knowledge and understanding.</p> <p data-bbox="887 655 1928 1023">The Draft Report acknowledges that imported prawns and prawns intended for human consumption are widely used as bait or berley for recreational fishing, with ‘price and convenience’ a major driver. The Draft Report also acknowledges that exposure of wild crustaceans to bait and berley is possible. However, the Department considers that exposure to hazards within those commodities will differ depending on the specific pathogen. Accordingly, the biosecurity risk can be managed to a level which achieves Australia’s Appropriate Level of Protection (ALOP) through a stringent testing regime applied pre-export and post arrival, which reduces the likelihood of entry.</p> <p data-bbox="887 1062 1928 1382">To address industry concerns, the Provisional Final Report should further elaborate on the testing regime and its capacity to manage the biosecurity risks inherent with the bait and berley pathway. This could include advice provided by the Department about several activities and programs it manages to provide ongoing assurances about trade including retail testing of uncooked, de-headed, de-shelled and deveined prawns to confirm they are free of WSSV. The Provisional Final Report should also incorporate updated information and data from the recreational fishing survey if possible.</p>

Key issues raised	Further action required
<p data-bbox="203 276 857 379"><i>2. No clear indication from the Department on how new and emerging hazards will be addressed beyond 2020.</i></p> <p data-bbox="203 424 857 563">The Draft Report includes an expanded range of hazards compared with previous reviews but does not outline a process for monitoring new and emerging hazards.</p>	<p data-bbox="887 276 1928 416">A process outline in the introduction in the Provisional Final Report would be helpful in increasing confidence in the biosecurity risk analysis process, including why non-regulated reviews are undertaken instead of a full BIRA.</p> <p data-bbox="887 461 1928 858">The Provisional Final Report could also include advice provided by the Department about testing that it is undertaking to gather further information about the significance of emerging hazards such as CMNV, DIV1 and EHP and describe in more detail any other proposed random sampling programs for potential new hazards. The Provisional Final Report should also further elaborate on other activities carried out by the Department to monitor the emergence of new biosecurity risks including ongoing media and scientific literature feeds that it subscribes to, disease notification arrangements through the OIE and information obtained through regional networks such as the Network of Aquaculture Centres in Asia-Pacific.</p>

B. DESIGN AND IMPLEMENTATION OF BIOSECURITY MEASURES

Key issues raised	Further action required
<p data-bbox="203 1074 857 1177"><i>3. Pre entry processing of uncooked prawns does not address the biosecurity risks of many of the identified hazards.</i></p> <p data-bbox="203 1222 857 1353">A number of submissions say that the removal of the head and shell and de-veining of prawns is not sufficient to address all the risks.</p>	<p data-bbox="887 1074 1928 1246">The Draft Report generally acknowledges that pre-entry processing is not sufficient to address all hazards and includes consideration of additional biosecurity measures, such as pre-entry and on-arrival testing, to further reduce the risks for disease pathogens such as WSSV and YHV1. No further action is required at this stage.</p>

Key issues raised	Further action required
<p data-bbox="203 237 846 304"><i>4. Pre-entry assessment (visual inspection) is insufficient for disease prevention.</i></p> <p data-bbox="203 347 846 528">A number of industry submissions comment on the limitations of visual inspection and the heavy reliance on export country competent authorities to ensure this risk management measure is properly conducted.</p>	<p data-bbox="887 237 1928 491">The Draft Report acknowledges that pre-entry visual assessment is insufficient to reduce the risks associated with hazards entering Australia but does confer a high degree of confidence in exporting country Competent Authority certification arrangements that include visual inspection steps. The Draft Report should elaborate on exporting country certification arrangements and explain why they are a reliable risk management tool.</p>
<p data-bbox="203 569 846 639"><i>5. On-arrival monitoring system has failed in the past.</i></p> <p data-bbox="203 683 846 1043">Many submissions are critical of the Draft Report's confidence in the effectiveness of testing at the border which they claim has failed in the past due to inspection confusion, system rorting and testing failure. Some submissions suggest that inadequate resourcing is a major reason for failure, and one suggests that the resources needed to enforce import protocols should be cost-recoverable.</p>	<p data-bbox="887 569 1928 676">The Draft Report does not provide a clear explanation of how deficiencies in the testing regime will be addressed, nor the resources that would be needed to strengthen the testing regime.</p> <p data-bbox="887 719 1928 1230">The Provisional Final Report should further consider the recommendations put forward in some submissions seeking a clearer outline of the testing regime for each of the prawn categories, the justification for the categories and trigger mechanisms for increased surveillance of each of the categories. The Provisional Final Report should incorporate advice provided by the Department about the work that it has commissioned from the Australian Centre for Disease Preparedness (ACDP) and the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) to validate diagnostic test sensitivity and the imported prawn sampling design. The Provisional Final Report should also include information about the range of biosecurity measures that it has implemented in recent years to strengthen laboratory testing requirements for WSSV and on-arrival sampling procedures such as seals intact inspections.</p>
<p data-bbox="203 1272 763 1342"><i>6. Post entry biosecurity measures are inadequate</i></p>	<p data-bbox="887 1272 1805 1342">The Provisional Final Report should address the IGB 2017 report recommendations which proposed several additional post entry</p>

Key issues raised	Further action required
Some submissions claim that post entry biosecurity measures such as labelling and notifications for uncooked prawns sold at retail outlets not being used as bait have not worked to date.	biosecurity measures which could be used to monitor and minimise risks of any uncooked prawn product entering waterways.
<p><i>7. Opportunity for human error or deliberate criminal evasion</i></p> <p>Some submissions claim that no specific risk mitigation strategies have been implemented to address risks associated with laboratory testing, complex documentation, traceability, resourcing of inspectors, inspector safety and random sampling.</p>	The Draft Report outlines a number of changes that have been implemented since 2016 to address some of the now apparent weaknesses in the risk management regime. This includes the new seals intact inspection arrangement. However, the Draft Report does not seem to have addressed a number of the other changes recommended by the IGB 2017 report in this area. For example, the IGB 2017 report gave detailed consideration to the limitations associated with batch testing and the impact of pooling on the sensitivity of the diagnostic test. The Provisional Final Report should explain how PCR testing has advanced significantly in recent years to reduce the impact of pooling on diagnostic sensitivity.

C. ACHIEVING AN ACCEPTABLE LEVEL OF PROTECTION (ALOP)

Key issues raised	Further action required
<p><i>8. Inconsistency in the application of ALOP across different commodities</i></p> <p>Biosecurity measures applied to achieve an ALOP for pork, salmon, chicken, turkey and duck meat all include cooking.</p>	The Provisional Final Report should further elaborate on the process for assessing risk under international rules and how unique risk factors and scenarios are applied to each product being assessed. It would also be useful for the Provisional Final Report to explain why different (more restrictive biosecurity measures) are applied to other commodities (and sub-categories of those commodities).
<p><i>9. Inconsistency in approach with Australia's domestic arrangements</i></p>	The issue of apparent inconsistency in the application of policy within Australia could be further explained in the Provisional Final Report. This could include some elaboration on the application of biosecurity measures

<p>The restrictions imposed by Australian states and territories on the movement of product from disease affected areas within Australia are, in some cases, more stringent than the measures proposed by the Australian Government for imported uncooked prawns.</p>	<p>in different circumstances (e.g., national versus zone borders) and the factors that are taken into account when choosing a particular biosecurity measure (eg. feasibility, efficacy, costs etc).</p>
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D. DISEASE STATUS AND RISK RATINGS

<p><i>10. Check and clarify the disease status of importing countries</i></p>	<p>A number of submissions raised issues in relation to which diseases are present in importing countries. According to OIE data, a number of these diseases are not present in some countries. The Provisional Final Report needs to check and verify the official disease status of each exporting country.</p>
<p><i>11. Report on disease testing in Australia</i></p>	<p>A number of submissions requested that Australia demonstrate evidence of absence of listed prawn diseases. Update the Provisional Final Report with any testing results for the 10 prawn diseases in the report.</p>
<p><i>12. Minimum cooking standards to make viruses non-viable</i></p>	<p>Explain further the cooking process and estimated risk reduction. Explain further the par cooking step for BBC products and the estimated risk reduction.</p>
<p><i>13. The biosecurity status of wild stocks from exporting countries seems to be accepted as low, but there is little evidence given in the report for such a statement</i></p>	<p>Further justification required for the general statement about wild stocks being disease free. What testing is undertaken in importing countries to support this statement, where diseases have been reported in wild populations?</p>
<p><i>14. Traceability of prawn product within the importing country needs to be addressed</i></p>	<p>The Draft Report makes no comment on traceability in-country to ensure sourced product is from the reported location. Explain the monitoring and compliance regime.</p>

E. TESTING REGIME

<i>15. Sampling design for testing is not well explained</i>	Provide a more detailed explanation of the scientific justification for the test sampling design for on-arrival batch testing, including design prevalence and test sensitivity. Include recent testing results in the Draft Report.
<i>16. The Draft Report does not indicate whether cooked prawn imports are randomly tested to ensure import conditions are being met.</i>	Need to indicate in the Provisional Final Report how the Department monitors compliance of cooked product.
<i>17. Different qPCR methods have different sensitivities and an explanation of the method used is required</i>	Describe in greater detail the qPCR testing methods and the probability estimates for a positive sample. Explain how false negatives are considered and addressed.
<i>18. What testing is undertaken for imported cooked prawn product on-arrival to ensure correct labelling and sourcing requirements?</i>	Describe the testing regime for cooked prawns, including survey design. Provide any compliance assessments completed in the Draft Report

F. MONITORING AND COMPLIANCE

<i>19. Monitoring and compliance regime for pre-export and on-arrival testing</i>	Describe and discuss the protocols in place to monitor pre-export batch categorisation (i.e. ensure no mixing occurs) and the compliance strategy to check that importing countries are adhering to the arrangements. Document the monitoring and compliance regime for prawns marked as being cooked from high-risk countries.
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Appendix 3: Expert panel biographies

Joanne Daly (Chair)

BSc (Hons), PhD, PSM, FTSE, GAICD

Dr Joanne Daly is a consultant in agricultural sciences. She has extensive experience in research, research management and governance in the areas of agricultural sciences, evolutionary biology and biosecurity. She worked in CSIRO (1984-2015) where she held a range of senior and executive roles in entomology, agricultural and food sciences, and in national research collections. She has a PhD from the Australian National University (1979) in evolutionary biology.

Joanne has had extensive experience in biosecurity. She is a Director of Plant Health Australia (2015-). In CSIRO, her portfolio of responsibility included strategic oversight of biosecurity research activities and facilities in both plants and animals (1994-2010). She has been a member of a range of government advisory bodies in agricultural biosecurity, including Biosecurity Advisory Council (2010-2013) and Quarantine and Export Advisory Committee (2005-2009). She is a member of the Advisory Committee on Chemical Scheduling for the Therapeutic Goods Administration (2019-).

She was Chair of the Science Reference Panel for yellow canopy syndrome in sugarcane (2016-2020) for Sugar Research Australia and a Commissioner for the Australian Centre of Agricultural Research, ACIAR (2009-2015). She has had a number of roles in the use of online approaches to identification of species, biodiversity. She was Chair of the international Global Biodiversity Information Facility (2009-2013). Joanne chaired the 'Expert Working Group on Security Australia's Agricultural Future' for the Australian Council of Learned Academies, as a Fellow of ATSE.

Steve McCutcheon

BEd, Grad Dip Public Law, GAICD

Steve has worked with the food and agriculture sectors for his entire career. From 1997 to 2007, he held senior leadership roles within the Australian Government Department of Agriculture relating to animal and plant health and food safety. In 2007, he was appointed Chief Executive Officer of Food Standards Australia New Zealand (FSANZ) and remained in that role until 2017. Throughout his 20 years in public sector leadership roles, he was a member and/or chair of national committees related to animal health, plant health and food safety and leader of Australian Government delegations to multilateral and regional consultations on food safety and food standards.

Steve is currently a Non-Executive Director and Chair of Plant Health Australia Limited, Non-Executive Director and Chair of Valmar Support Services Limited, Acting Chair of the FSANZ Board and a member of the Governing Board of the Joint Accreditation System of Australia and New Zealand (JAS-ANZ). He has been a member of the Department of Agriculture, Water and the Environment's Scientific Advisory Group since 2016.

Will Zacharin CF

BSc (Hons), MSc, Grad Dip Bus Mangt, GAICD

Will currently works as a private consultant specialising in the areas of fisheries and biosecurity. He spent 20 years as a Senior Executive with the Department of Primary Industries and Regions South Australia, with his last 9 years as the Executive Director, Biosecurity SA from 2010 to 2019, responsible for animal and plant pest and disease management. During this period, he was the South

Australian Government representative on the National Biosecurity Committee. Will has also been involved in fisheries science and management throughout his public service career and was the Executive Director, Fisheries for a period of 10 years. In 2019, he was appointed a member of the Department of Agriculture, Water and the Environment's Scientific Advisory Group. Will holds post graduate qualifications in science and business.