Submission by DigsFish Services to DAWE on the revised Prawn Risk Analysis"Draft Risk Review"

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Thank you for the opportunity to provide input into the "*Review of the biosecurity risks of prawns imported from all countries for human consumption*" Draft Report dated 30 September 2020 (DAWE 2020). This review was undertaken following the failure of the sanitary measures implemented following the previous prawn IRA (Biosecurity Australia 2009) which allowed an exotic incursion of white spot disease (WSD) into cultured prawns and wild crustacean fisheries in Moreton Bay in SE Queensland in late 2016 (Diggles 2017, Scott-Orr et al. 2017, Biosecurity Queensland 2020).

As DigsFish Services has undertaken dozens of successful and effective risk analyses for aquatic animal pests and diseases over the last 2 decades (see http://www.digsfish.com/publications.html for some examples), we are well qualified to provide technical input into the DAWE (2020) document in the hope that our input will greatly improve its chances of meeting Australia's ALOP and successfully preventing future incursions of exotic crustacean diseases. Our observations on the technical aspects of this review are included in the dot points below.

- The document is very large (345 pages) and needs a short executive summary of the results at the front of the document where Table 18 could also be summarised.
- This risk review process is long overdue. The lack of regular review of this document and the quarantine processes informed by this document (coming 11 years after publication of the previous prawn IRA (Biosecurity Australia 2009)) is responsible (at least in part) for the white spot disease outbreak in SE QLD, due to the cumbersome approach to what is actually a rapidly evolving situation where new diseases of cultured prawns are emerging internationally on a regular basis. Given the ever evolving disease situation in this area, this document should either be made a living document, or more appropriate and reliable risk reduction methods (i.e. cooking) should be employed for all imported prawn products to reduce the risks from new and emerging diseases to within Australia's ALOP.
- The risk review process is slow and unresponsive– with this document coming nearly 4 years after the white spot disease incursion in SE QLD and 11 years after the previous IRA. Such an unwieldy review process leaves Australia wide open to threats from new and emerging diseases, especially if inappropriate or unreliable risk reduction methods are applied (e.g. diagnostic batch testing - see the problems with this risk reduction method in the review by the Inspector General of Biosecurity (Scott-Orr et al. 2017)).
- In fact, the review of quarantine concerns for imported prawns by the Inspector General of Biosecurity (Scott -Orr et al. 2017) is not cited at all in DAWE (2020). This appears to be an unforgivable oversight given how the IGB report detailed many serious problems with quarantine and testing processes that were originally developed and informed based on the outcomes from the previous IRA. The outcomes and recommendations of Scott-Orr et al. (2017) should be mentioned in several sections, particularly including sects 5.1.8, and 14.4.4).
- The initial updated hazard list (Table 1) is reasonably comprehensive, however several emerging diseases (namely HINV, MrGV, MrTV) are eliminated from risk assessment based on incorrect assertions that there is "*insufficient evidence that (the disease) causes disease in adult prawns*" (see page 16), or "*insufficient evidence that (the disease) would be associated with imported prawns due to these primarily affecting larval stages*" (see page 18). The statements used to eliminate these emerging diseases from further consideration are inconsistent with factual statements in other parts of the document (e.g. in section 4.2.1 under life cycle stage) that "*Prawns that survive disease outbreaks can become reservoirs of infection in later lifecycle stages*" (page 55). By eliminating these emerging diseases from further consideration based on erroneous logic, and with known pathways for these agents to enter the Australian environment in large quantities (multiple 100s of tonnes of imported prawns may be used as bait or burley each year, as shown by Kantar Public (2019) and outlined on pages 65-68 of DAWE 2020), this leaves Australia vulnerable to

incursions from these new and emerging disease agents unless conservative risk mitigation methods are adopted (e.g. cooking of all imported prawn products prior to retail sale).

- Figures 1-3 have very small font that cannot be read – these need larger font and/or if possible should be placed on their own pages (landscape if necessary)
- Estimates for overall risk are based on an annual risk for any given year. However actual risk in the real world accumulates over time. Risk should therefore be expressed as a probability of an event occurring in a given time period (e.g. 1 event every 7 years (e.g. WSSV), 10 years, 50 years, or 1 in every 100 years).
- My knowledge, experience and interactions with recreational fishers throughout Australia over the past 30 years indicates that value added products such as battered and crumbed prawns, dimsums etc., while not necessarily suitable as bait, are still highly likely to be used as berley. Furthermore, berley is more likely to be eaten by crustaceans (particularly crabs but also prawns) as the objective of berley is to scent the water with large numbers of very small food particles to attract fish to an area (not to feed them), which of course also attracts scavengers such as crabs through olfactory and gustatory cues. Indeed, this is likely to be the reason why several small (non-commercial) crab species such as mangrove swimming crabs (*Thalamita crenata*), smooth handed crabs (*Pilumnopeus serratifrons*) and mangrove crab (*Metapograspus frontalis*) are now carrying WSSV virus in areas of northern Moreton Bay that are far remote from prawn farms (see Biosecurity Queensland 2020, Diggles 2020b), because they were being exposed on a regular basis by feeding on WSSV positive imported crustacean bait and burley products placed into the environment by recreational anglers during the recent biosecurity breakdowns at the international border which were described in detail by Scott-Orr et al. (2017). Because of this, the unrestricted risk of exposure via the berley pathway for many diseases (CMNV, DIV1, IMNV, LSNV, TSV) is NOT negligible for value added products, as purported in the draft document, and instead most likely exceeds the ALOP given the large quantity of imported prawn products that are still being diverted into this high risk pathway (Kantar Public 2019, DAWE 2020).
- For many diseases (CMNV, DIV1, IMNV, LSNV) it is assumed that cooking may "*reduce, but not completely inactivate the disease agent in imported prawn tissues and that sufficient viable virus to cause disease may still be present*". The document then states that "*therefore, cooking is not expected to reduce the likelihood of entry*". This is not logical or truthful, as even partial inactivation of some of the disease agent titre in a product via the heat of cooking must reduce the likelihood of exposure and establishment of the disease agent by some level (possibly to below the minimum infectious dose in some circumstances), even if the actual level of risk reduction is not known.
- Removing the head and shell of a prawn would make no difference to the titre of a disease agent if it also occurs in the prawn tail flesh (e.g. IMNV, DIV1, TSV) and the prawns are imported and sold (as normally is the case) by weight (instead of by individual). This is because more individual prawn tails would be shipped in a given unit quantity to make the required weight. However, removal of the head of prawns infected with YHV1 and YHV8 is likely to reduce risk as these disease agents show tissue trophism for organs in the head.
- For WSSV, the draft report mentions on page 227 the outcomes from the Federal department's investigation into the cause of the initial WSD on the Logan River in 2017. The draft RA declares that the origin of the outbreak has not been determined, and lists several possible entry pathways including:
    1. via uncooked imported prawns being used as bait
    2. via imported aquatic feed or feed supplements
    3. through diseased broodstock or their progeny
    4. via a human element, including the importation of associated equipment; or
    5. that the virus was present in Australia, potentially in the environment at very low levels, but had not been detected previously.

  This section of the RA (sect 14.2.2, subheading mechanism of spread) is inaccurate and misleading as the epidemiology of the disease outbreak on the Logan River (Diggles 2017) and subsequent discovery of a slightly different strain of WSSV in wild populations of prawns and crabs in northern Moreton Bay (70 km to the north of Logan River) (Oakey et al. 2019, Diggles 2020b) means that several of the potential pathways

can be confidently ruled out, including 2 (imported feed), 3 (broodstock), 4 (no newly imported equipment was found on the farm which experienced the index case of the 2016-17 outbreak) and 5 (clearly the virus was being bought onto the farms in water from the Logan River, and WSSV was not present in the Logan River area in any significant quantity until the late 2016 growing season, otherwise the farms would have experienced WSD outbreaks sooner due to the lack of treatment of intake water). Furthermore, both of the WSSV strains that are being detected in Moreton Bay have relatively small genomes with several deletions typical of more recent WSSV strains isolated from parts of Asia and the Middle East, particularly China (Oakey and Smith 2018, Oakey et al. 2019). The Australian strains of WSSV thus have a modern "shrunken genome", which is very different to the longer genomes possessed by ancestral WSSV strains isolated from the original panzootic in Asia (Kawato et al. 2019, Oakey et al. 2019) and which would be expected if the virus emerged naturally and spontaneously in Australia. Hence by a process of elimination, by far the most likely source of the WSD outbreak on the Logan River and Moreton Bay appears to be 1, i.e. via one or more introductions of uncooked imported WSSV positive prawns being used as bait in Moreton Bay and/or in the Logan River including within the inlet channels of the index case prawn farms (Diggles 2017, 2020a, 2020b). This is also the most plausible explanation for the presence of WSSV in several small (non-commercial) crab species such as mangrove swimming crabs (*Thalamita crenata*), smooth handed crabs (*Pilumnopeus serratifrons*) and mangrove crab (*Metapograspus frontalis*) which are now known to be carrying WSSV virus in areas of northern Moreton Bay that are far remote from prawn farms (see Biosecurity Queensland 2020, Diggles 2020b). This is because after the biosecurity breaches at the international border (Scott-Orr et al. 2017) these small crab species were being exposed to WSSV on a regular basis by feeding on bait and burley placed into the environment by recreational anglers.

- The establishment of WSSV in the Moreton Bay White Spot Disease Biosecurity Control Zone can thus be explained by at least 1 successful recent (post-2006 and pre-December 2016) WSSV incursion, most likely via imported prawns used as bait or burley, followed by a modest founder effect as that WSSV strain adapted to local conditions and hosts (Diggles 2020b).
- Sect 14.4.4 and Table 18 (Head and shell removal in combination with pre-export and on-arrival testing) has been proven to be moderate risk for WSSV, given that a WSD incursion occurred within around 7 years of implementing this method of risk mitigation (Scott Orr et al. 2017). Diagnostic testing after seals intact inspection to detect a sample prevalence as high as 5% (i.e. a sample of only 60 prawns out of any one shipment) remains insufficient to meet Australia's ALOP when it is known that many hundreds of tonnes of imported prawns are entering waterways as bait or burley. A 1 in 7 year probability horizon for incursions due to inadequate testing may be extended to a 1 in 15 or 20 year horizon by 2 x testing, but this still represents an unacceptably high level of risk to Australia's fisheries and aquaculture industries - and is a risk that certainly exceeds an ALOP of "Very Low" and far exceeds the domestic ALOP applied within Australia for products originating from the Moreton Bay White Spot Disease Biosecurity Control Zone.
- Proposed risk mitigation measures: Sect 16.2.1 – list should include DIV1
- Sect 16.2.2 and Table 18 – Several new diseases of concern were calculated to no longer exceed Australia's ALOP in uncooked frozen prawns following head and shell removal only (covert mortality nodavirus, DIV1, Laem-Singh virus, *Vibrio parahaemolyticus* strains containing Pir toxins), despite these agents being present in the prawn flesh, however *Enterocytozoon hepatopenaei* alone required additional risk mitigation (deveining) before the ALOP was met. Why, only *E. hepatopenaei* ? To be consistent, covert mortality nodavirus, DIV1, Laem-Singh virus, and *Vibrio parahaemolyticus* strains containing Pir toxins require additional risk management over and above head and shell removal in order to meet the ALOP.
- Why are each batch of uncooked prawns subject to seals intact inspection and testing only for the well established diseases such as WSSV and YHV1 ? Surely the other new emerging disease agents of concern pose a high risk and thus should also be tested for as a risk reduction measure, particularly covert mortality nodavirus and DIV1 , but also Laem-Singh virus, and *Vibrio parahaemolyticus* strains containing Pir toxins?
- WSSV was considered to meet Australia's ALOP following head and shell removal and testing both overseas and also after seals intact inspection in Australia. However, to be consistent with the previous trend in risk reduction shown in Table 18, and also to be consistent with the domestic ALOP demonstrated by State

Government jurisdictions within Australia (as shown by the legislation controlling movements of prawns out of the WSSV positive zone in SE QLD), H&S removal +2x testing should reduce the risk for WSSV to Low (not Very Low), and hence Australia's ALOP (of Very Low) should be achievable for WSSV only following cooking (which would then be consistent with the domestic biosecurity arrangements employed for prawn products originating from the Moreton Bay White Spot Disease Biosecurity Control Zone).

- Sect 16.2.4 Dumpling and dim sum-type products which contain uncooked prawns are highly likely to be used as burley, so to remain consistent with the ALOP they should be required to at least be tested as per uncooked prawns, or to be consistent with the domestic ALOP demonstrated by State Government jurisdictions within Australia, they must be cooked.
- Sect 16.2.5. Minimum standard for cooking should encompass sufficient heat/time to inactivate WSSV, but the existing guidance (>70°C core temperature for >11 seconds) has insufficient detail and will be subject to fraud. This critical step needs to be stated more explicitly – e.g. "uncooked prawn carcases must be placed in boiling water (100°C) and the water returned to the boil for at least x minutes (1-2 ?) in order to achieve a minimum 70°C core temperature for at least 11 seconds".
- Consequence assessments throughout the draft IRA (DAWE 2020) need to better take into account the full impacts on wild fisheries and the environment from exotic disease incursions. For example, recent studies of the impacts of WSSV in Moreton Bay in SE Queensland have found evidence that wild commercially important crustaceans (banana prawns *Penaeus merguiensis*, school prawns *Metapenaeus macleayi* and mud crab *Scylla serrata*) were dying from WSD in water bodies on and near prawn farms on the Logan River (Diggles 2020b). These data demonstrate that the introduction of exotic diseases can cause mortalities in naïve wild host populations (Diggles 2020b). Furthermore, as it appears that WSSV has established in Moreton Bay and is likely to remain permanently in this region (Diggles 2020b), domestic biosecurity controls enacted for commercial wild fishery products originating from the White Spot Biosecurity Area will likely remain in place for the foreseeable future. This means the economic impact on the commercial bait prawn and baitworm fisheries in Moreton Bay will be permanent, and will continue to accumulate over time, eventually exceeding that experienced by the aquaculture industry in the same area.
- Finally, given the high costs of production that apply to Australia's fisheries and aquaculture industries due to Australia's high standards of living, protections for workers (minimum wages, workers compensation etc.) and high environmental standards required by regulatory authorities, Australia's relatively disease-free status is one of the very few competitive advantages held by Australia's fisheries and aquaculture industries on the global marketplace. It is vitally important, therefore, that risk analysis for imported prawn commodities are effective and fully recognise that the consequences of exotic disease incursions are most likely to be extreme under most circumstances, as without exception they erode Australia's economic competitiveness and threaten our environment on a permanent basis, to the detriment of all future generations of Australians.

Conclusion

The proposed risk mitigation methods suggested in the current draft prawn IRA (DAWE 2020) for uncooked prawns imported from countries where WSSV and several other emerging diseases of concern are known to occur, rely on testing solely for WSSV and YHV1, and thus represent little change compared to the sanitary conditions that are currently implemented at the international border following the failed 2009 IRA (Biosecurity Australia 2009). The proposed risk mitigation methods detailed in DAWE (2020) thus largely rely on diagnostic testing procedures which has been demonstrated to have severe inadequacies which have failed to protect Australia from previous exotic disease incursions (Scott-Orr et al. 2017). The proposed risk mitigation measures are also inconsistent with Australia's domestic ALOP, and certainly do not meet Queensland's ALOP (which has been demonstrated to be a requirement for either cooking or gamma irradiation of prawns originating from regions where WSSV is endemic). The proposed risk mitigation measures for the international border thus cannot be relied upon to protect Australia's environment against not only WSSV, but also YHV1 and other known emerging diseases (e.g. decapod iridescent virus (DIV1), covert mortality nodavirus, Laem-Singh virus, and *Vibrio parahaemolyticus* strains

containing Pir toxins), as well as future (currently unknown) emerging diseases to a level of risk that meets Australia's domestic ALOP (Diggles 2020a, 2020b).

It is abundantly clear (and demonstrated by Australia's State Government jurisdictional biosecurity responses to the white spot disease incursion in SE Queensland) that uncooked imported prawn products cannot meet Australia's domestic ALOP for diseases of prawns used for human consumption under any circumstances (especially given that high doses of gamma irradiation are not considered a suitable sanitary treatment for prawns destined for human consumption). The only practical and cost-effective (indeed, least cost as cooking is much cheaper than diagnostic testing) sanitary method that meets Australia's ALOP for diseases of prawns imported for human consumption is one that requires all imported prawn products to be cooked to a minimum standard that will inactivate WSSV, YHV1, DIV-1 and the other listed diseases of concern.

Abbreviations

ALOP - Appropriate level of protection

DAWE - Department of Agriculture, Water and the Environment

DIV1 - Decapod Iridescent Virus 1

IRA – Import risk analysis

WSD - White spot disease

WSSV- White spot syndrome virus

YHV1 – Yellow head virus genotype 1

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