RISK ANALYSIS – AQUATIC ANIMAL DISEASES ASSOCIATED WITH DOMESTIC BAIT TRANSLOCATION

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RISK ANALYSIS – AQUATIC ANIMAL DISEASES ASSOCIATED WITH DOMESTIC BAIT TRANSLOCATION

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OBJECTIVES:

1. Assessment of disease hazards in translocation of bait in Australia, and to expand the NAAH-TWG paper (OOS 24-06) on identification of hazards of bait and berley use into a full risk analysis (RA).
2. Conduct qualitative risk assessments to determine disease risks associated with identified hazards.

NON TECHNICAL SUMMARY:

OUTCOMES ACHIEVED TO DATE

This Risk Analysis (RA) examined the risk of disease introduction associated with domestic translocation of bait and berley products within Australia. A commodity identification process found that information on the types of commodities used in commercial and recreational fisheries is generally available, however details of the quantity of each commodity used is scarce as this information is not captured by State fisheries departments. The list of species most widely used as bait or berley included representatives from 17 families of saltwater fishes, 16 families of freshwater fishes, 16 species of prawns, 13 species of crabs or nippers, 13 species of freshwater and saltwater crayfish/lobsters, at least 32 species of molluscs (gastropods, bivalves, and cephalopods), 23 families or species of annelids, 4 species of echinoderms and 1 ascidean.

Hazard identification for the disease agents reported from these commodities identified at least 80 diseases of potential concern, including 30 viruses, 8 bacterial diseases, 20 protozoan diseases and 21 metazoan diseases from finfish, crustaceans and molluscs, as well as one fungal disease from finfish. From the preliminary list of 80 potential hazards, 44 disease agents were classified as diseases of concern that required detailed risk assessment.

The 44 diseases of concern were placed into 35 different categories and detailed risk assessments were undertaken. The outcomes of the risk assessments indicated 21 diseases for which the unmitigated risk exceeded the ALOP (see summary table). Two diseases were classified as high risk, namely EHNV of finfish and AVG of abalone. Three diseases were classified as moderate risk, including EUS of finfish, and infection of molluscs with *Bonamia* and *Perkinsus*. Sixteen diseases were classified as low risk, including VER of finfish, goldfish ulcer disease, microsporidian infections of finfish and crustaceans, infections of live finfish, molluscs and crustaceans with introduced digeneans, nematodes and cestodes, infections of live finfish with introduced copepods and *Caligus epidemicus*, infection of finfish and annelids with myxosporeans, viral infections of freshwater crayfish, GAV, SMV and WTD of prawns, infections of crustaceans with *Hematodinium* spp. and *Sacculina* spp., infections of molluscs with Haplosporidians and infections of molluscs and annelids with *Marteilia sydneyi*.

Several options for mitigation of these risks to within the ALOP were presented. These and other options for risk mitigation should be examined in more detail and prioritised, preferably by a national working group including representatives from all states and territories (with stakeholder involvement wherever necessary), in order to develop the most appropriate and effective options for risk mitigation during the risk management and risk communication phases of this risk analysis process.

The emergence of a virus similar to Ostreid Herpesvirus-1 (OHSV-1) was recorded in Pacific oysters in NSW during the latter stages of development of this RA. While OHSV-1 like viruses of oysters are significant and worthy of inclusion in the RA, virtually nothing about this disease in Australia has been published at this time. Because of this, the OHSV-1 like virus remains omitted from the RA at this time, but it should be included in the RA during the next phase of the project once more information becomes available. Data gaps were also identified for disease agents of pipis, cockles, callianassids, bait crabs, cephalopod molluscs, annelids, echinoderms, and ascideans, all of which are commonly used as bait. Active disease surveillance should be implemented in a structured manner to fill in the data gaps identified in this RA. The importance of active surveillance was highlighted when a detailed risk analysis was undertaken for a hypothetical unknown virus from finfish. Indeed, there remains a risk of transfer of unknown disease agents, even in the absence of their identification, and disease surveillance is the only way to minimize these risks whenever significant quantities of bait are being translocated to new geographical regions.

KEYWORDS: **bait, burley, disease, parasite, translocation, risk assessment**

RA Summary table. Commodities potentially harbouring disease agents that require additional risk management. ✓✓✓ = high risk, ✓✓ = moderate risk, ✓= low risk, X = within ALOP.

Commodity type	**Disease agent requiring risk management**						
FINFISH	**EHNV**	**EUS**	**VER**	**GUD**	**Microsporidians**	**Myxosporeans**	**Digeneans cestodes nematodes copepods+**
Live finfish	✓✓✓	✓✓	✓	✓	✓	✓	✓
Whole fresh dead finfish	✓✓✓	✓✓	✓	✓	✓	✓	X
Frozen whole finfish	✓✓	X	✓	X	X	X	X
Frozen fish fillets	✓	X	X	X	X	X	X
Frozen fish heads	✓✓	X	✓	X	X	X	X
Frozen fish guts/offal	✓✓	X	X	X	X	X	X
CRUSTACEANS	**Viruses of FW crayfish**	**GAV**	**SMV**	**WTD**	**Microsporidians**	***Hematodinium* spp.**	***Sacculina* spp.**
Live prawns	X	✓	✓	✓*	✓	X	X
Live crayfish/ lobsters	✓	X	✓	X	✓	?	X
Live crabs	X	X	X	X	✓	✓	✓
Whole fresh dead prawns	X	✓	✓	✓*	✓	X	X
Whole fresh dead crayfish / lobsters	✓	X	X	X	✓	?	X
Whole fresh dead crabs	X	X	X	X	✓	✓	X
Frozen whole prawns	X	X	X	X	X	X	X
Frozen whole crayfish / lobsters	X	X	X	X	X	X	X
Frozen whole crabs	X	X	X	X	X	X	X
Frozen prawn tails	X	X	X	X	X	X	X
Frozen crayfish / lobster tails	X	X	X	X	X	X	X
Frozen prawn heads	X	X	X	X	X	X	X
Frozen crayfish / lobster heads	X	X	X	X	X	X	X

Commodity type	Disease agent requiring risk management						
MOLLUSCS	**AVG**	***Perkinsus olseni***	***Bonamia* spp.**	***Marteilia sydneyi***	**Haplosporidians**	**Digeneans**	
Live molluscs	X	✓✓	X	X	✓	✓	
Live oysters	X	✓✓	✓✓	✓	✓	✓	
Live abalone	✓✓✓	✓✓	X	X	✓	✓	
Whole fresh dead molluscs	X	✓✓	X	X	X	X	
Whole fresh dead oysters	X	✓✓	✓	✓	X	X	
Whole fresh dead abalone	✓✓✓	✓✓	X	X	X	X	
Frozen whole molluscs	X	✓✓	X	X	X	X	
Frozen whole oysters	X	✓✓	X	X	X	X	
Frozen whole abalone	✓✓	✓✓	X	X	X	X	
Frozen mollusc meat	X	✓✓	X	X	X	X	
Frozen abalone meat and viscera	✓✓	✓✓	X	X	X	X	
ANNELIDS	***Marteilia sydneyi***	**Myxo-sporeans**					
Live annelids	✓	✓					
Fresh dead annelids	✓	✓					
Frozen annelids	X	X					
Freeze dried annelids	X	X					

+ = introduced species, as well as *Caligus epidemicus*, * = freshwater prawns (*Macrobrachium* spp.) only, ? = unknown, as marine crayfish/lobsters in Australia have not been actively surveyed for *Hematodinium* spp. at this time.

Acknowledgements

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Background

The committees responsible for aquatic animal health within Australia had long recognised the need to assess the disease risks associated with translocation of bait and berley within Australia. In 2003, the Primary Industries Health Committee (PIHC) and Aquatic Animal Health Committee (AAHC) determined that:

1. A risk assessment would provide a basis for determining where resources need to be allocated and where regulation may be needed. In this regard jurisdictions would need to assess the feasibility of regulation versus codes of practice.

2. A national approach was required. Risk assessments should be used as a basis for developing the approach.

Since then the issue has remained a high priority with PIHC and AAHC (and now the Animal Health Committee (AHC)). After funding was obtained, this project was undertaken to expand the NAAH-TWG paper (OOS 24-06) on identification of hazards of bait and berley use into a full risk analysis (RA).

Need

Translocation of aquatic animals or products of aquatic animal origin is frequently identified as a key event that precedes major outbreaks of disease caused by pathogens that were previously unknown in that region or species (Stewart 1991, Durand et al. 2000). Introduced diseases in wild fisheries usually cannot be eradicated, and can have significant ongoing economic and ecological implications. A pathogen risk analysis was considered necessary to identify not only the types and quantities of bait being used in Australia, but also whether their translocation and use represents a significant threat to aquatic animal health at regional and national levels. This project was undertaken to fulfill the need to identify potential disease risks associated with translocation of endemic aquatic animals and their products used as bait and berley, and to rank the disease risks in order to provide information essential for policy development at a future date.

Objectives

Objective 1: Assessment of disease hazards in translocation of bait in Australia, and to expand the NAAH-TWG paper (OOS 24-06) on identification of hazards of bait and berley use into a full risk analysis (RA).

Objective 2: Conduct qualitative risk assessments to determine disease risks associated with identified hazards.

Methods

Objective 1, Milestone 1. Develop a detailed commodity description and Hazard Identification list

A literature review found limited nationally focused information on the quantities of bait used in commercial fisheries in Australia, though some was found, mainly for rock lobster fisheries. Some more information on bait use for commercial fishing was also obtained from informal phone interviews and emails with commercial fishers, however the information supplied was limited to lists of taxa used for specific fisheries and was of limited use at a national level. The subject was perceived by the wholesale bait industry as sensitive, and co- operation by phone and also in returning questionnaires that were sent to bait wholesalers was very limited (one partially filled response from 10 sent out). Representatives of all State and Territory fisheries departments were contacted for additional data, but data on quantities of bait used by recreational and commercial fishing industries were simply not documented by any fisheries agencies, hence estimations of the quantities of various types of bait used in various pathways (live bait, fresh dead bait, frozen bait, and preserved bait) had to be made qualitatively, or were based on previous surveys of bait use by recreational fishers (Kewagama Research 2002, 2007).

The preliminary hazard list was presented to the Commonwealth's project officers and AAHC's Bait translocation working group to determine if risk assessment was required. The decision was made that there was sufficient evidence of risk posed by bait or berley translocation to proceed to the detailed risk assessment process.

Objective 2, Milestone 2. Conduct a qualitative risk assessment on the identified hazards and determine and document the risks to Australia's aquatic animal resources associated with bait translocation.

The risk assessment methodology used standard methods of release assessment, exposure assessment, consequence assessment and risk determination as outlined in the OIE Aquatic Animal Health Code (OIE 2010, Chapter 2) and by Biosecurity Australia (2009). Specific methodology is described in more detail in the completed RA which is included as an attachment (Appendix 3).

Results/Discussion

The final list of species most widely used as bait or berley included representatives from 17 families of saltwater fishes, 16 families of freshwater fishes, 16 species of prawns, 13 species of crabs or nippers, 13 species of freshwater and saltwater crayfish/lobsters, at least 32 species of molluscs (gastropods, bivalves, and cephalopods), 23 families or species of annelids, 4 species of echinoderms and 1 ascidean.

A detailed review of the known diseases of these commodities was then undertaken to identify potential hazards (infectious diseases and parasites) to aquatic animal health presented by the use of those commodities as bait. The outcome of this process resulted in compilation of a preliminary hazard list comprised of at least 80 diseases of potential concern, including 30 viruses, 8 bacterial diseases, 20 protozoan diseases and 21 metazoan diseases from finfish, crustaceans and molluscs, as well as one fungal disease from finfish. Data gaps were also identified with respect to disease agents of pipis, cockles, callianassids, bait crabs, cephalopod molluscs, annelids, echinoderms, and ascideans, all of which are commonly used as bait.

The list of disease agents recorded from the commodities used as bait or berley were then refined and those disease agents that were likely to be ubiquitous and/or unlikely to cause significant disease were eliminated. From the preliminary list of 80 potential hazards, 44 disease agents were classified as diseases of concern that required detailed risk assessment. The 44 diseases of concern were placed into 35 different categories and detailed qualitative risk assessments were undertaken.

The detailed risk assessments found 21 diseases for which the unmitigated risk exceeded the ALOP (Appendix 3). The diseases were ranked (high, moderate, or low risk), based on those most likely to pose a risk to the environment and industry when translocated into new areas and catchments. Two diseases were classified as high risk, namely EHNV of finfish and AVG of abalone. Three diseases were classified as moderate risk, including EUS of finfish, and infection of molluscs with *Bonamia* and *Perkinsus*. Sixteen diseases were classified as low risk, including VER of finfish, goldfish ulcer disease, microsporidian infections of finfish and crustaceans, infections of live finfish, molluscs and crustaceans with digeneans, nematodes and cestodes, infections of live finfish with copepods, infection of finfish and annelids with myxosporeans, viral infections of freshwater crayfish, GAV, SMV and WTD of prawns, infections of crustaceans with *Hematodinium* spp. and *Sacculina* spp., and infections of molluscs with Haplosporidians and *Marteilia sydneyi*. The ranking results were also stratified by pathway (live bait, fresh dead bait, frozen bait, or preserved bait commodities) to clarify which bait and berley commodities posed a risk of disease introduction that exceeded what was considered to be the appropriate level of protection (ALOP) (see the RA summary table above, and Appendix 3). Options for mitigation of these risks to within the ALOP were also presented.

The RA determined that active disease surveillance should be implemented in a structured manner to fill in the data gaps that were identified during the hazard identification step. The importance of active surveillance was highlighted when a detailed risk analysis was undertaken for a hypothetical unknown virus from finfish. There remains a significant risk of transfer of unknown disease agents, even in the absence of their identification (Gaughan 2002), and the risk assessment for the hypothetical unknown virus from finfish demonstrated that disease surveillance is the only way to minimize these risks whenever significant quantities of bait are being translocated to new geographical regions.

Benefits

The strategic benefits of this project are that potential disease risks associated with translocation of endemic aquatic animals and their products used as bait and berley have now been identified and ranked, which provides information essential for the next stages of the RA (option evaluation, risk management and risk communication) which are required to inform policy development at a future date.

Further development

Several options for mitigation of these risks to within the ALOP were presented. These and other options for risk mitigation should be examined in more detail and prioritised, preferably by a national working group including representatives from all states and territories (with stakeholder involvement wherever necessary), in order to develop the most appropriate and effective options for risk mitigation during the risk management and risk communication phases of this risk analysis process.

The emergence of a virus similar to Ostreid Herpesvirus-1 (OHSV-1) was recorded in Pacific oysters in NSW during the latter stages of development of this RA. While OHSV-1 like viruses of oysters are certainly significant and worthy of inclusion in the RA, virtually nothing about this disease in Australia has been published at this time. Hence it is very difficult to assess the risk posed by this disease at this stage, and because of this the OHSV-1 like virus remains omitted from the RA at this time. It will nevertheless be included in the RA during the next phase of the project, at which time it is expected that more information will be available, allowing a proper assessment of risk to be undertaken.

Planned outcomes

The planned outcomes achieved during this study include production of a RA that provides a better understanding of the range of aquatic animal species used as bait and berley in Australia, together with the patterns of their use and translocation, likely routes of introduction into the environment via various pathways, and a list of ranked (high, moderate, low, and within ALOP) commodities that highlights those most likely to pose disease risks when translocated into new areas and catchments.

Conclusion

The RA was completed and identified several commodities that pose a risk of transfer of diseases to wild fish, crustaceans or molluscs that exceeded the ALOP. Several options for mitigation of these risks to within the ALOP were presented, but these need to be refined and prioritised, preferably by a national working group including representatives from all states and territories (with stakeholder involvement wherever necessary), in order to develop the most appropriate and effective options for risk mitigation during the risk management and risk communication phases of this risk analysis process.

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Appendix 1. Intellectual property arising from this research

None

Appendix 2. Staff engaged in the project

Dr Benjamin Diggles

Appendix 3. Risk assessment. See companion document.