



Risk Management Proposal

Zoo Crocodilia and Zoo Crocodilia Hatching Eggs

ZOOCROCS.SPE

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1 Purpose

The purpose of this document is to:

- Show how options for the management of risk organisms have been assessed.
- Provide recommendations for the import requirements.

2 Background

Crocodylians and their hatching eggs are considered risk commodities, with the potential to harbour exotic viral, bacterial and parasitic disease which could become established in New Zealand.

In November 2007, the [Import Risk Analysis: Crocodilia and eggs of Crocodilia from Australia](#) was completed by the Ministry for Primary Industries (MPI).

Subsequently the *Import Health Standards (IHSs) for Zoo Crocodilia from Australia and Zoo Crocodilia Hatching Eggs from Australia* were issued in 2008.

The zoo industry has since requested expansion of eligibility to all freshwater and saltwater animals in the order crocodilia from the European Union, Malaysia, Singapore, Indonesia, Thailand, Papua New Guinea and Australia as part of the zoo's planned Southeast Asian development due to open in 2020.

In response to the request, MPI developed the [Import Risk Analysis: Crocodilia from Malaysia, Singapore, Indonesia, Thailand, Papua New Guinea, northern Australia and the European Union](#) dated March 2019.

This risk analysis considers the biosecurity risks associated with the importation of captive hatched and reared, saltwater and freshwater Crocodilia from the European Union (for the purposes of this document referred to as the European Zone), and Malaysia, Singapore, Indonesia, Thailand, Papua New Guinea and northern Australia (collectively referred to as the 'Malaysian Zone').

This Risk Management Proposal (RMP) has been written to accompany the updated *Import Health Standard for Zoo Crocodiles and Zoo Crocodile Hatching Eggs*.

3 Objective

The objective is to manage, to an acceptable level, the biosecurity risks posed by the import of zoo crocodilians and their hatching eggs into New Zealand.

4 Options assessment

Under Article 3.3 of the World Organisation for Animal Health (OIE) Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement), risk management measures which provide a level of protection greater than provided by international standards may be imposed only when they can be scientifically justified on the basis of a risk assessment.

For a detailed analysis of hazards and their risks please refer to the following supporting documents:

[IRA: Crocodilia from Malaysia, Singapore, Indonesia, Thailand, Papua New Guinea, northern Australia and the European Union](#) dated March 2019.

[IRA: Crocodilia and eggs of Crocodilia from Australia](#) dated November 2007.

From the *IRA (2019)*, the following organisms were classified as hazards in the commodity and identified for risk management.

- *Edwardsiella tarda*
- *Amblyomma* spp.
- *Placobdelloides stellapapillosa*

5 Recommendations for identified risk organisms

The organisms that were considered as hazards are those that could be transmitted by crocodilia and that may infect domestic or feral /wild animals, or humans in New Zealand or establish in the environment.

The following organisms were considered hazards in the commodity and will be considered in this RMP.

5.1 *Edwardsiella tarda*

Edwardsiella tarda is not included on the OIE-listed diseases, infections and infestations in force in 2018.

Edwardsiella tarda is not on the unwanted organism list.

5.1.1 Risk management presented in the 2008 IHS for Zoo Crocodilia from Australia

- (1) The Crocodilia to be imported are:
 - a) born and reared in an environment with good quality water from a supply not inhabited by fish (either potable water or water from a bore) and have never been fed on fish or been exposed to live fish; or during the pre-export isolation period samples from both gular and paracloacal glands were collected from each animal and these samples have been cultured for *Edwardsiella tarda* with negative results; and
 - b) during the pre-export isolation period faecal samples were collected from each animal on two separate occasions, at least 14 days apart, and these samples have been cultured for *Edwardsiella tarda* with negative results.

5.1.2 Risk management options presented in the 2019 IRA

- (1) There is a moderate risk from *Edwardsiella tarda* in the commodity and potential risk mitigation measures are described for crocodilians imported from the Malaysian Zone.
- (2) The risk could be reduced by:
 - a) Maintaining crocodilia within the temperature range of 24-28 degrees Celsius; and/or
 - b) Crocodilia should have been reared in an environment with good quality water from a supply not inhabited by fish (either potable water or water from a bore) and have not been fed on fish or been exposed to live fish; and/or
 - c) Samples from both gular and paracloacal glands should be cultured for *Edwardsiella tarda* with negative results; and
 - d) Faecal samples collected on two separate occasions and cultured for *Edwardsiella tarda* with negative result.

5.1.3 Discussion 2019

- (1) *Edwardsiella tarda* is a ubiquitous bacteria which has been reported to be present in the normal intestinal flora of wild and captive aquatic animals including crocodiles. *Edwardsiella tarda* is distributed globally, but is not recognised as present in New Zealand.

- (2) It is likely that conditions of stress, which lead to immunosuppression, lead to clinical disease.
- (3) The IRA suggests that *Edwardsiella tarda* may be present in the environment and may lead to high bacterial numbers and subsequent disease if conditions such as water temperature, water flow rate, and water pollution provide optimal conditions for the bacteria. Outbreaks of disease can be controlled by improving hygiene, water quality and reducing stocking densities.
- (4) There is no evidence that *Edwardsiella tarda* is able to be transmitted through crocodile eggs.
- (5) The IRA determined there is no risk to human health from *Edwardsiella tarda* carried by crocodilians due to the remote risk of human exposure and the simple measures that can be implemented to mitigate risks for carers and handlers.
- (6) The below recommendations acknowledge that the risk posed by the importation of a small number of crocodiles into containment is very low. MPI's *Import Risk Analysis: Ornamental Fish* concluded that it would be time consuming, expensive and unjustified to put in place measures for *Edwardsiella tarda* in animals showing no clinical signs of disease during a quarantine period, and recommended testing be conducted only for those fish that show signs of disease during the quarantine period.
- (7) Given the above, the below recommendations are considered appropriate risk mitigation measures for *Edwardsiella tarda*.

5.1.4 Recommendations 2019

- (1) The recommendation is that the animals are healthy, and originate from premises that are under regular veterinary supervision; and follow a health monitoring programme including necropsies, and microbiological and parasitology testing.
- (2) Each crocodilian to be imported must be certified as originating from a captive population in which no isolation of *Edwardsiella tarda* has occurred.
- (3) Each crocodilian to be imported must be certified free from clinical evidence of infectious disease, external parasites, plant and seed contamination, and appear to be fit for travel.
- (4) On arrival, crocodilians must remain in post arrival quarantine for a period of at least 30 days. During this time the crocodilians must be inspected weekly and subjected to MPI approved testing for *Edwardsiella tarda* if displaying clinical signs.

5.2 Amblyomma.spp

Amblyomma spp. are blood sucking ixodid ticks with some species acting as vectors of diseases such as Rocky Mountain spotted fever and ehrlichiosis.

Amblyomma spp. are not included in the OIE-listed diseases, infections and infestations in 2018.

Amblyomma spp. are listed on the unwanted organisms register.

The only tick of this species found in New Zealand is the endemic *Amblyomma sphenodonti* on tuatara.

5.2.1 Risk management from the 2008 Import Health Standard for Zoo Crocodilia from Australia

- (1) None apart from the requirement that during transport to the port of departure and during transit to New Zealand, all feed provided is free from evidence of contamination with ticks and weeds/weed seeds.

5.2.2 Risk management options presented in the 2019 IRA

- (1) Risk mitigation measures could include a combination of pre-export quarantine in a tick-free environment and the application of topical permethrin-based ectoparasiticide treatment.
- (2) The above risk mitigation measures relate only to crocodilia imported from the Malaysian Zone.

5.2.3 Discussion 2019

- (1) *Amblyomma spp* ticks vary in their host specificity, and tick parasitism on crocodiles is extremely rare. There is only one published record of *Amblyomma* on a crocodylian and the author of the study suggests that the local monitor lizard population served as the preferred host and transfer was accidental.
- (2) Hard ticks do not occur on wholly aquatic vertebrates and thus any infestation must occur during terrestrial emergence of the crocodile.
- (3) The importation of a few crocodilia into a containment facility is not considered to be relevant from a biosecurity point of view.
- (4) However, in line with other zoo standards, each crocodylian should be inspected for ectoparasites including ticks prior to export.

5.2.4 Recommendation

- (1) The recommendation is that all crocodilia must undergo an inspection for ectoparasites prior to export.
- (2) Additionally and in line with other zoo standards, during transport to the port of departure and during transit to New Zealand, all feed and bedding provided must be certified free from evidence of contamination with ectoparasites.

5.3 *Placobdelloides stellapapillosa*

Placobdelloides stellapapillosa is a predacious and facultative sanguivorous leech that parasitises on a variety of vertebrates and invertebrate hosts.

Leeches have been identified as vectors of some haemoparasites in crocodylians including haemogregarines and trypanosomes, however in reptiles these haemoparasites have been found to be non-pathogenic and therefore the risk analysis concluded that the vector potential of *Placobdelloides stellapapillosa* is considered negligible.

Placobdelloides stellapapillosa has been reported attached to crocodylians in the Malaysian Zone.

The host range of the leech is unknown and the risk assessment concluded that there is a moderate consequence assessment for its potential to establish and parasitise other organisms living in and around New Zealand waters.

These organisms are not included in the OIE-listed diseases, infections and infestations in force in 2018.

5.3.1 Risk management from the 2008 Import Health Standard for Zoo Crocodilia from Australia

- (1) None

5.3.2 Risk management options presented in the 2019 IRA

- (1) Risk mitigation measures could include a combination of pre-export quarantine in a leech-free environment and the topical application of vinegar and alcohol.
- (2) The above risk mitigation measures relate only to crocodilia imported from the Malaysian Zone

5.3.3 Discussion 2019

- (1) The importation of a few crocodilia into a containment facility is not considered a relevant pathway from a biosecurity point of view.
- (2) However, in line with other zoo standards, each crocodylian should be inspected for ectoparasites including leeches prior to export.

5.3.4 Recommendation

- (1) The recommendation is that all crocodilia must undergo a thorough inspection for ectoparasites, including leeches prior to export.
- (2) Additionally and in line with other zoo standards, during transport to the port of departure and during transit to New Zealand, all feed and bedding provided must be certified free from evidence of contamination with ectoparasites.