

ATTACHMENT A

Grey list species review method October 2008

This document outlines the grey list review method as developed following OFMIG's meeting in April 2008.

Review Process

The review matrix and how it would be applied was discussed and accepted in principle at the 3 Td OFMIG meeting as a standard screening method to apply to the grey list and as an alternative to more costly risk assessment of individual species.

Representatives of DEWHA and BRS have worked together to develop the approach and matrix for collating information to allow a transparent review of species on the grey list. The approach could be used for species that may require review in the future. The review matrix has been refined to include an appropriate threshold score to determine potentially high and low risk species and to address further comments provided by OFMIG members (WA and PIAA) and as a result of suggestions from an expert workshop to review grey listed species held 16 October 2008.

The threshold score of 12 (as the threshold for potentially high risk species) has been determined by calibrating the matrix with a number of fish species known to have established in Australia and have been shown to have clear impacts on other species or habitats. These species include European carp and *Gambusia*. A similar system has been used widely in New Zealand and Great Britain. The ranking criteria have been applied to differentiate between those species that are high risk (to be considered for addition to the noxious list) and those that are lower risk.

As a result of difficulties in securing sufficient resources to undertake individual risk assessment OFMIG agreed to the involvement of a small group of experts to consider borderline species, or species evaluated as having insufficient information. Borderline species are those species that have scores greater than or equal to 8 and those with scores less than or equal to 12 (inclusive). Species evaluated as not having sufficient information have a lack of information on 3 or more criteria.

The review matrix uses climate matching (as used in the Bomford risk assessment models), the assessment criteria considered in the original noxious list assessment, and other criteria. A criterion for *hardiness* was added as suggested at the expert workshop in October 2008. The criteria are grouped according to the key policy areas relevant to government consideration of the potential pest and invasiveness of a species: biodiversity; impacts; and trade. The definitions section below provides explanations of the terms for categories used in the matrix. BRS has populated the matrix with information for grey list species with the exception of several genera, which were considered by an expert group based on 'example' species. The expert workshop involved nominated experts and members of the aquarium industry.

The final outputs will be reported to OFMIG for consideration and review at its meeting on 7 November 2008. OFMIG will then report to the Marine and Coastal Committee. Nominations for additions to the noxious list will be recommended to the Natural Resource Management Standing Committee. The Natural Resource Management Ministerial Council will consider and endorse any additions to the national noxious list.

Species classified as low risk through this process could be considered for further assessment as species suitable for live import into Australia under Federal legislation and processes e.g. if the Industry chose to make an application to amend the live import list for individual species. A requirement of this legislated process is for a comprehensive environmental assessment of the proposed amendment on the Australian environment. The Bomford risk assessment model for freshwater fish would be applied in this process to contribute to the environmental assessment and information for the decision. The work done in reviewing the grey list under the OFMIG process could be used as an initial source of information if a live import list amendment application be made.

The review matrix and method as outlined provide a repeatable process for reviewing further species that may be added to the grey list for the purpose of recommending whether they be considered potentially noxious in Australia. To ensure consistent and repeatable results, future users outside this process will need to be mindful to apply the review matrix in an appropriate context using relevant and reliable information sources.

Review matrix definitions

Application of the Threshold Score

The review matrix has been used to identify grey listed species that are high risk (score >11), and species that are low risk (score <11). For the initial review process, any species considered borderline (score 8 and 12) were deemed to warrant expert technical input at the review workshop, as were species where information is limited (more than 3 criteria do not have sufficient supporting literature).

Precautionary Principle

Many animal species (including fish) when assessed in terms of their potential impact on the environment or invasiveness may have limited scientific or other information to support views on their potential impacts or noxious status. It is accepted practice in Australia to apply a precautionary approach (e.g. the precautionary principle is taken into account in statutory decision making in some jurisdictions) when there is little or no scientifically based evidence or information, and where other information available is not science based.

BIODIVERSITY

The following criteria relate to the distribution and abundance of a species. A species is more likely to establish itself in Australia if introduced if it is: widely distributed; can tolerate a wide range of climatic conditions; lives in a region with closely matching climatic conditions to Australia; or previously has established itself outside its natural range, either in Australia or elsewhere.

Climate Match

The climate score is derived from the risk assessment climate match model CLIMATE (Bomford, 2006).

Risk assessment models have been developed by the Bureau of Rural Sciences to assess the risk of exotic vertebrates establishing in Australia. An integral part of these models is climate matching between each species' natural geographic distribution and similar environments in Australia.

Species which have a high climate match score show attributes which are likely to make them successful colonisers in Australia. Conversely species with a low climate score will have a lower probability of establishment. The climate match score ranges from 1-8 with the following scoring system:

- 1=0
- 2= 1-40
- 3= 41-150
- 4= 151-400
- 5= 401-1000
- 6= 1001-1500
- 7= 1501-2500
- 8= >2500
- Data deficient is scored as a 4.1 (precautionary principle).

The Climate Match score is the single highest score in the review matrix, reflecting its importance as the key criteria in determining if a species is likely to establish itself in Australia if introduced.

Established in Australia

Indicates if the species has previously established populations or currently has populations in Australia. This criterion is given a ranking score from 0-2, with the following scoring system:

- 0= Not established in Australia
- 1= Recorded occurrence in Australia
- 2= Reproducing population or widespread in Australia

Eradication effort

Indicates if there is, has been, or will be an eradication effort of any scale in Australia for the species. Accurate data for this category is difficult to obtain. For this reason this category is used for information purposes only and does not contribute to the overall score. This category has the following rating system:

- Ongoing- An eradication program is currently in place and eradication efforts are ongoing
- Eradicated- An eradication program has been implemented previously and the species has been successfully eradicated from Australia.
- Not at this time- An eradication program within Australia has yet to be implemented for this species.
- Not established- The species has not established in Australia and so an eradication effort is not currently contemplated or required for this species.

Established internationally

Indicates if the species has established populations outside their natural range in any other country. This criteria is given a ranking score from 0-2, with the following scoring system:

- 0= No established populations outside their natural range
- 1= Limited distribution outside its natural range, typically in the same continental region
- 2= Widespread distribution outside its natural range
- 2.1= No information available (2.1 precautionary principle)

CITES listing

Indicates if the species is listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). This criteria is of limited value in determining whether a species is likely to establish itself if

introduced to Australia and so is used here for information purposes only and does not contribute to the overall score. It follows a simple yes/no scoring system.

Hardiness

Hardiness is used as an indicator of the species' ability to tolerate, or survive, or adapt to a wide range of temperatures, pH, salt or freshwater aquatic environments, or the ability to survive out of water for periods of time.

- 0= low
- 1= medium
- 2= high

Resilience

Indicates rate of population doubling as an indicator of the rate of population growth. This is likely to be a good indicator of rate of population expansion once established. This attribute is also likely to provide an indication of the difficulty of eradication once established. This criterion is given a ranking score from 0-2, with the following scoring system:

- 0= Slow population growth
- 1= Moderate population growth
- 2= Fast population growth
- 2.1= Unknown rate of population growth (precautionary principle)

IMPACTS

The following criteria relate to the environmental impact a species is likely to have if it successfully establishes in Australia. Possible impacts include habitat modification or disturbance, negative interaction with native species, particularly predation or aggression, the genetic risk to the gene pool of native species through hybridisation, the genetic risk of hybridisation with established noxious species and adopting some or all of the pest characteristics of that species, or the potential introduction of high risk diseases.

Current noxious status in Australia

Indicates if the species has noxious status in any Australian states or territories. Currently no distinction is made between being listed as noxious in a single state or territory and being listed as noxious in multiple states or territories.

- 0=Not listed in any jurisdiction
- 1=Yes listed in at least one jurisdiction

Potential Impact on habitat

Indicates if the species has potential to significantly modify or disturb habitats in which it establishes. This criterion is given a ranking score from 0-2, with the following scoring system:

0= No impact on habitat

1= Low impact on habitat

2= Medium or high impact on habitat

2.1= Unknown impact on habitat (precautionary principle)

Potential Impact on other species

Indicates if the species has characteristics or behaviour which could significantly impact other species in environments if it establishes. Strong negative impacts include predation and aggression which are likely to affect the distribution and abundance of other species in these areas. This criterion is given a ranking score from 0-2, with the following scoring system:

- 0= No impact on other species
- 1= Low impact on other species
- 2= Medium or high impact on other species
- 2.1= Unknown impact on other species (precautionary principle)

Genetic risk to native species

Indicates if the species poses a significant genetic risk to native fish species through hybridization and introgression. Hybridization with native species will alter and dilute the gene pool of native species and in extreme cases may lead to the genetic extinction of the native species, particularly in cases where the introduced species is abundant and the native species is rare. Introgression is the introduction, through hybridisation, of non-native genetic information into the native gene pool, which may alter the fitness of native species. This criteria is given a ranking score from 0-2, with the following scoring system:

- 0= Low or no risk of hybridisation. Introduced species shares no or only distant phylogenetic relationship with native species
- 1= Medium risk of hybridisation. Introduced species belongs to the same phylogenetic Family as native species

- 2= High risk of hybridisation. Introduced species belongs to the same phylogenetic Genus as native species
- 2.1= Unknown risk of hybridisation. Introduced species has an unresolved phylogeny but may have close ancestral relationship with native species (precautionary principle)

Genetic risk from hybridisation with established noxious species

Indicates if the species poses a significant genetic risk through hybridization with established noxious species and adopting some or all of the characteristics of the noxious species. Established noxious species are defined as those listed on the national noxious fish list. This criteria is given a ranking score from 0-2, with the following scoring system:

- 0= Low or no risk of hybridisation. Introduced species shares no or only distant phylogenetic relationship with established noxious species
- 1= Medium risk of hybridisation. Introduced species belongs to the same phylogenetic Family as established noxious species
- 2= High risk of hybridisation. Introduced species belongs to the same phylogenetic Genus as established noxious species
- 2.1= Unknown risk of hybridisation. Introduced species has an unresolved phylogeny but may have close ancestral relationship with established noxious species (precautionary principle)

Known carrier of high risk disease

Indicates if the species is a known carrier of high risk disease that could pose a significant risk to native fish species. High risk disease is defined here as those listed on Australia's National List of Reportable Diseases of Aquatic Animals (2007) and included in the Import Risk Analysis on live Ornamental Finfish (1999). This criterion is given a ranking score with the following scoring system:

- 0= Not know to carry high risk disease
- 1= May carry high risk disease
- 2= Is known to carry high risk disease
- 2.1= Unknown disease risk (precautionary principle)

TRADE

The following criteria relate to how international trade in a species might influence escape and establishment of that species, or its potential impact if it escapes. If trade in a species has been restricted elsewhere, it suggests that this species has been recognised by that country as a potential threat, for one reason or another, and so may pose a similar threat if introduced to Australia. If a species has multiple uses across sectors this relates to how widely spread the species is likely to become if it is introduced to Australia and thus how many different pathways exist to escape into the wild. The more widespread a species is spread across activities or industries, the greater and more varied the risk of the species escaping captivity and establishing in the wild. However some pathways to escape pose a greater risk than others. For example those species commonly kept in ponds and dams are far more likely to escape than those restricted to strict research facilities. Thus the extent and type of industry use will also be a determining factor of the likelihood of escape. Together these two factors can be considered as the breadth and depth of risk of escape into the wild due to industry trade.

Restricted trade elsewhere

Indicates if the importation or movement of the species has been limited to or within other countries. If trade in a species has been restricted elsewhere, it suggests that this species has been recognised by that country as a potential threat, for one reason or another, and so may pose a similar threat if introduced to Australia. This information is difficult to ascertain and is likely available only for a handful of countries. For this reason this category is currently used for information purposes only and does not contribute to the overall score.

However, this category could help inform the decision process where the review ranking is borderline. This category has a simple rating system of *yes* trade in this species is restricted elsewhere, *no* trade in this species is not restricted elsewhere, or trade in this species is *unknown*.

Multiple use species

Indicates the use and benefits of the species across various sectors, including recreational fishing, aquaculture, the aquarium industry, or religious/ethnic activities. If a species has multiple uses across sectors this relates to how widely spread the species is likely to become if it is introduced to Australia and thus how many different pathways exist to escape into the wild. The more widespread a species is spread across industries, the greater and more varied the risk of the species escaping captivity and establishing in the wild. This criteria can be considered as the breadth of risk due to industry use. This criterion is given a ranking score of 1 or 2, with the following scoring system:

- 1= Used in < one industry
- 2= Used in > one industry
- 2.1= Breadth of use of this species is unknown (precautionary principle)

The score cannot equal zero because that would imply no use for this species and therefore no reason to bring it into the country.

Captive status in industry

Indicates how widely the species is kept within an industry and under what conditions. Some pathways to escape pose a greater risk than others. For example those species commonly kept in ponds and dams are far more likely to escape than those restricted to strict research facilities. Thus the extent and type of industry use will also be a determining factor of the likelihood of escape. This criterion can be considered as the depth of risk due to industry use. This criterion is given a ranking score from 0-2, with the following scoring system:

- 0= Use is restricted to a limited purpose or highly contained
 - 1= Use is not restricted or contained but the species is not widely kept
 - 2= Use is not restricted or contained and the species is widely kept
- 0 2.1= Depth of use of this species is unknown (precautionary principle)