

CHAPTER SEVEN

THE DRAFT IMPORT RISK ANALYSIS METHODOLOGY

Introduction

7.1 This chapter discusses the draft IRA methodology. Fundamentally, the draft IRA methodology involved two stages: risk assessment and risk management.

7.2 Risk assessment involves an assessment of the probability of the entry, establishment and spread of individual pests, and the economic consequences of that happening. The product of these two measures provides a measure of the overall unrestricted risk posed by an individual pest. This is then measured against Australia's ALOP.

7.3 Following from risk assessment, risk management is designed where necessary to identify quarantine protocols to achieve Australia's ALOP. Following the implementation of appropriate quarantine protocols, the restricted risk posed by an individual pest should be within Australia's ALOP.

The Risk Assessment Methodology

7.4 The draft IRA risk assessment follows three steps, in accordance with ISPM No 2:

- a) pest categorisation;
- b) an assessment of the probability of entry, establishment and spread of a pest; and
- c) an assessment of the economic consequences (including environmental impact) arising from the entry, establishment and spread of that pest.¹

Pest Categorisation

7.5 Pest categorisation is designed to screen a complete list of potential quarantine pests so as to identify those that require in-depth examination in the ensuing risk assessment. During development of the draft IRA, BA adopted two stages in its pest categorisation.²

1 Biosecurity Australia, *Draft Import Risk Analysis on the Importation of Apples from New Zealand*, October 2000, pp 33-34

2 *Ibid*, p 34

7.6 First, a list of pests was compiled based on information obtained from MAFNZ, state plant health authorities in Australia, scientific publications, databases on apple pests and consultation with Australian experts. The list was limited to pests present in New Zealand, but either absent from Australia, or present but not widely distributed and under official control.³

7.7 Secondly, in accordance with ISPM No 2, BA assessed whether it was 'feasible' or 'not feasible' that an individual pest would become established in Australia, and whether the economic consequences of establishment were 'significant' or 'not significant'.⁴

The Probability of Entry, Establishment and Spread of a Pest

The Probability of Entry

7.8 The probability of entry describes the probability that a quarantine pest will enter Australia as a result of trade in a commodity, in this case apples, and be distributed in a viable state. In the draft IRA, BA analysed the probability of entry of an individual pest associated with apples into Australia according to two components:

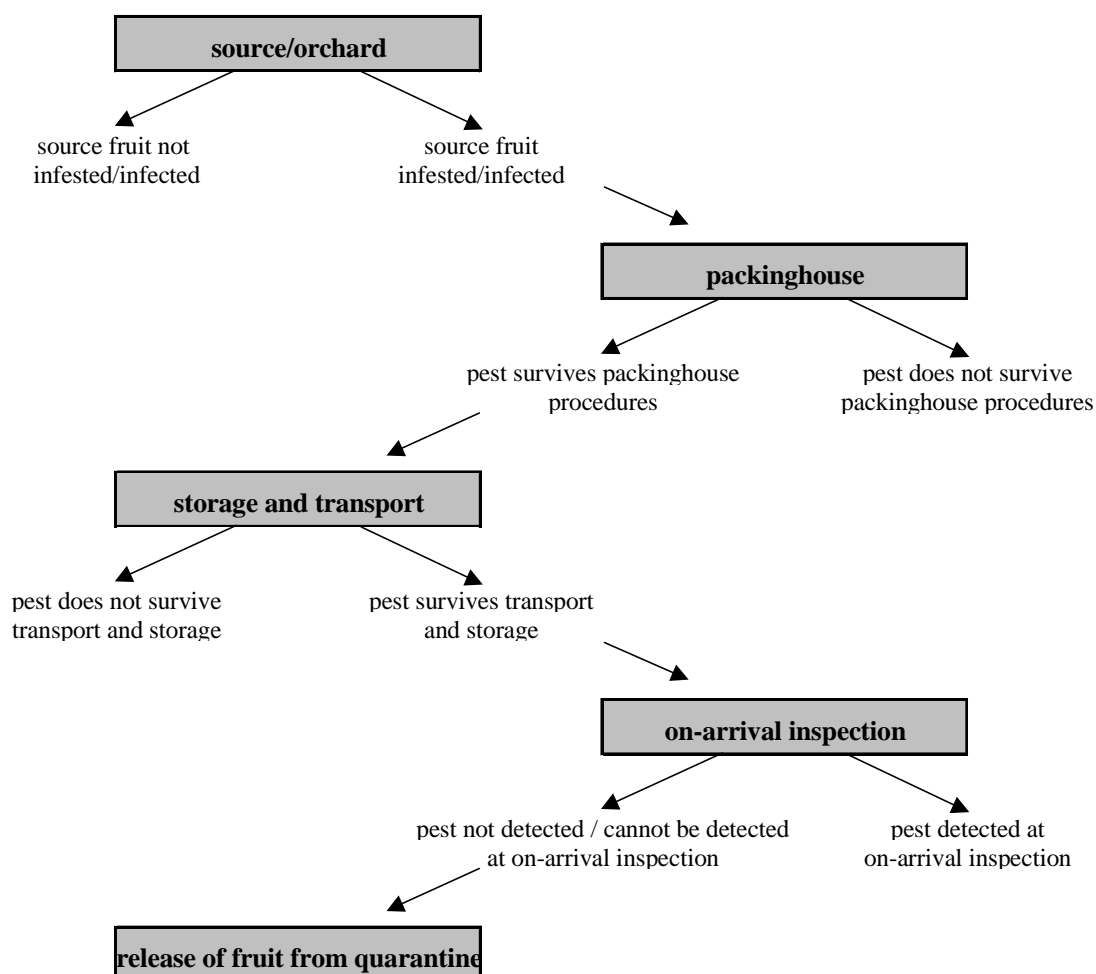
- a) The likelihood of importation; and
- b) The likelihood of distribution.

7.9 BA examined the likelihood of importation of an individual pest according to the four step pathway shown schematically in Figure 7.1 below.

3 *Ibid*, pp 34-35

4 *Ibid*

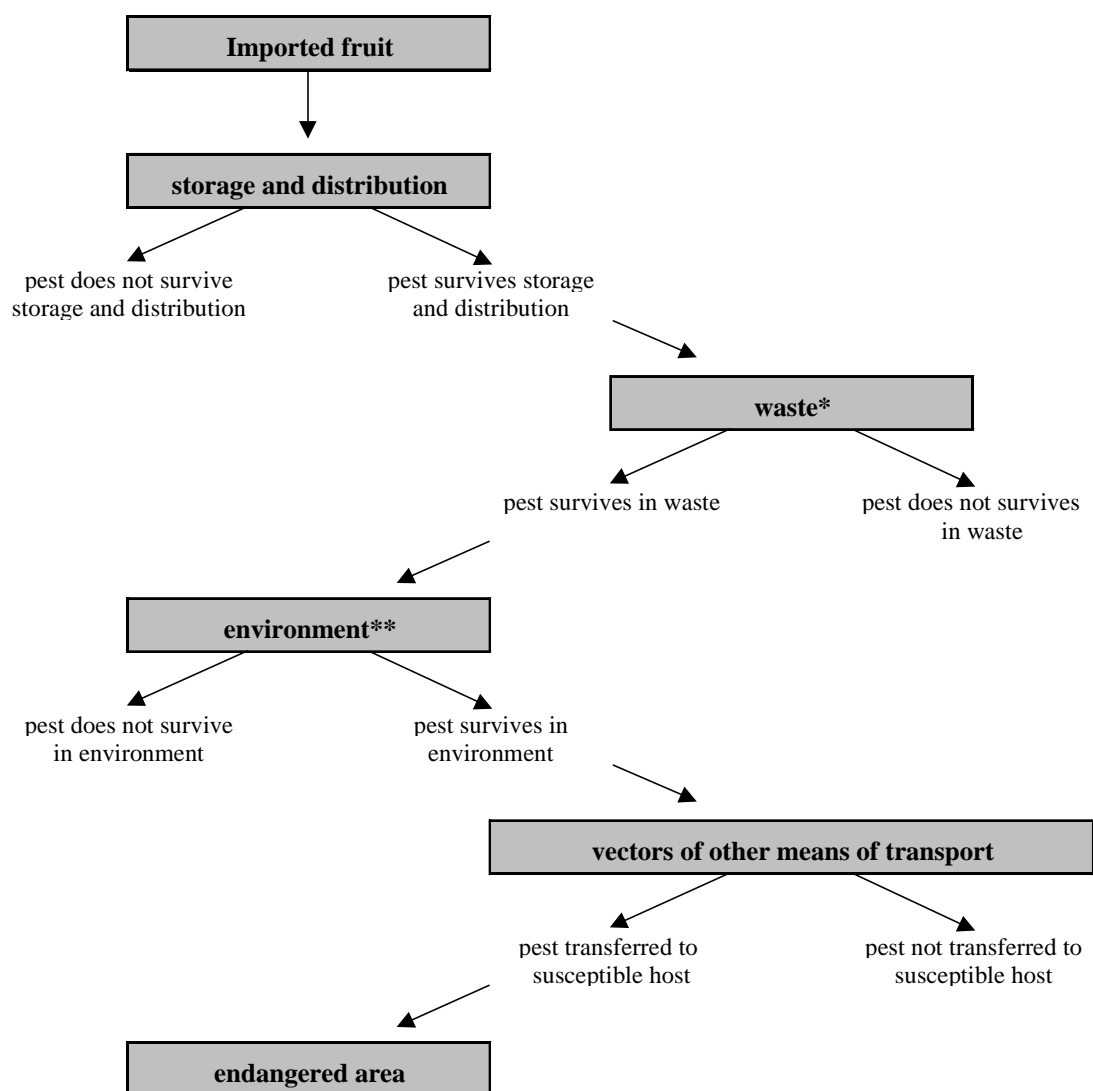
Figure 7.1: Scenario Pathway for the Importation of a Pest Associated with Imported Fresh Apple Fruit from New Zealand



Source: Biosecurity Australia, *Draft Import Risk Analysis on the Importation of Apples from New Zealand*, October 2000, p 38

7.10 Similarly, BA also examined the likelihood of distribution of an individual pest according to the four step pathway shown schematically in Figure 7.2 below.

Figure 7.2: Scenario Pathway for the Distribution of a Pests Associated with Imported Fresh Apple Fruit from New Zealand



* In the draft IRA, 'waste' was defined as the unconsumable part of the apple (for example, core, skin or whole fruit) discarded by the consumer, by a wholesale or retail distributor, or by a manufacturer.

** In the draft IRA, 'environment' includes compost, tips, animal feed and other perceived niches in the natural environment.

Source: Biosecurity Australia, *Draft Import Risk Analysis on the Importation of Apples from New Zealand*, October 2000, p 41

7.11 In assessing the likelihood of an individual pest passing each of the four steps of the importation and distribution pathways shown above in Figures 7.1 and 7.2, BA adopted the qualitative nomenclature shown in Table 7.1 below.⁵

Table 7.1: Nomenclature for Qualitatively Describing Likelihoods

Likelihood	Description
Extreme	The event would be virtually certain to occur
High	The event would be likely to occur
Moderate	The event would occur with an even probability
Low	The event would be unlikely to occur
Very low	The event would be very unlikely to occur
Negligible	The event would almost certainly not occur

Source: Biosecurity Australia, *Draft Import Risk Analysis on the Importation of Apples from New Zealand*, October 2000, p 39

7.12 Finally, having assessed the likelihood of an individual pest passing each of the four steps of the importation and distribution pathways, BA combined these likelihoods using a matrix of ‘decision rules’, shown in Figure 7.3 below.⁶

Figure 7.3: Matrix of Rules for Combining Descriptive Likelihoods

Likelihood 1	<i>Extreme</i>	extreme					
	<i>High</i>	high	high				
	<i>Moderate</i>	moderate	moderate	low			
	<i>Low</i>	low	low	low	low		
	<i>Very Low</i>	very low	very low	very low	very low	very low	
	<i>Negligible</i>	negligible	negligible	negligible	negligible	negligible	negligible
			<i>Extreme</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
		Likelihood 2					

Source: Biosecurity Australia, *Draft Import Risk Analysis on the Importation of Apples from New Zealand*, October 2000, p 42

7.13 To take an example from the above matrix of rules for combining descriptive likelihoods, if the likelihood of importation of an individual pest was assessed as “moderate”, and the likelihood of distribution as “moderate”, then these are combined to achieve a “low” probability of entry of that pest.⁷

7.14 BA noted in the draft IRA that where a “high” or “extreme” likelihood is multiplied by a lower likelihood, the result will generally fall into the same range as the lower of the two. This is because a “high” or “extreme” likelihood is close to 1, and therefore should not significantly alter the value with which it is combined.

7.15 Conversely, where a “negligible” likelihood is multiplied by a higher likelihood, the result will generally remain in the “negligible” range. This is because a

6 *Ibid*

7 *Ibid*, p 43

negligible likelihood is close in value to 0, and any value multiplied by a value close to zero will remain close to 0.⁸

The Probability of Establishment

7.16 In the draft IRA, BA assessed the probability of establishment of an individual pest based on a comparative assessment of biological factors in the source and destination areas including:

- a) Whether hosts occur in sufficient numbers and geographical proximity to allow the pest to complete its life cycle, and whether known vectors are present or likely to be introduced;
- b) Whether the environment (for example, the climate and soil), is suitable for the pest and identified hosts and vectors;
- c) Whether the pest is able to adapt to conditions as presented in the risk area, including ability to withstand environmental fluctuations, develop pesticide resistance and overcome host resistance;
- d) The reproductive means of the pest, including characteristics which enable it to reproduce effectively in the new environment, together with the duration of the life cycle and the number of generations each year;
- e) Whether a minimum population is needed to survive; and
- f) Whether there are pest control programs and natural enemies of the pest in the source area.⁹

7.17 In assessing the probability of establishment of an individual pest in the draft IRA, it is notable that BA did not develop a pathway of events, as was the case in determining the probability of entry. Rather, the probability of establishment reflects opinion derived from a single comparative evaluation of the above factors.¹⁰

The Probability of Spread

7.18 In the draft IRA, BA assessed the probability of spread of an individual pest based on a comparison of biological information on the source area and destination area (see above), and on the individual pest's spread potential. Factors that were considered when evaluating a pest's spread potential included:

- a) The suitability of the natural and/or managed environment for natural spread;

8 *Ibid*

9 *Ibid*, pp 43-44

10 *Ibid*, p 44

- b) Movement of the pest with the commodity or with conveyances;
- c) The intended use of the commodity;
- d) Potential vectors for the pest in the destination area; and
- e) Potential natural enemies for the pest in the destination area.¹¹

7.19 As with determination of the probability of establishment of an individual pest, BA assessed the probability of spread of an individual pest according to a single comparative evaluation of the above factors, rather than a pathway of events as used to determine the probability of entry.¹²

The Overall Probability of Entry, Establishment and Spread

7.20 To achieve an overall probability of the entry, establishment and spread of an individual pest, BA multiplied the separate probabilities of entry, establishment and spread, again using the matrix of ‘decision rules’ shown in Figure 7.3.

7.21 For example, where an individual pest had a “high” probability of entry and “moderate” probability of establishment, it was assessed as having a “moderate” probability of entry and establishment. If in turn that pest was also assessed as having a “moderate” probability of spread, the pest was assessed as having a “low” overall probability of entry, establishment and spread.

Estimates of the Economic Consequences of a Pest

7.22 BA acknowledged in the draft IRA that there is limited information regarding the likely consequences of the incursion of quarantine pests associated with apple fruit. In addition, the impact of a pest on one country or environment is likely to be different to that on another country or environment.¹³

7.23 Given these limitations, BA indicated in the draft IRA that it attempted to estimate the economic consequences of the incursion of an individual pest into Australia based on what information was available, or information obtained for similar pests. This involved in some instances consideration of direct consequences such as crop loss, the implementation of control and surveillance measures, and environmental effects. It also involved in some instances consideration of indirect consequences such as:

- a) Effects on domestic and export markets;
- b) Changes to producer costs or input demands;

11 *Ibid*, pp 44-45

12 *Ibid*

13 *Ibid*, p 45

- c) Changes to domestic or foreign consumer demand;
- d) Environmental or other undesired effects of control;
- e) Feasibility and cost of eradication or containment;
- f) Capacity to act as a vector for other pests;
- g) Resources needed for additional research and advice; and
- h) Social and other effects.¹⁴

7.24 Once again, BA used qualitative descriptions of the economic consequences of entry, establishment and spread of an individual pest. These are shown in Table 7.3 below.

14 *Ibid*, pp 45-46

Table 7.3: Nomenclature for Qualitatively Describing Consequences

Likelihood	Description
Extreme	The impact is likely to be highly significant at the national level. This classification implies that the impact would be of significant national concern. Economic stability, societal values or social wellbeing would be seriously affected in more than one geographic region.
High	The impact is likely to be significant at a national level, and highly significant within the affected geographic regions. This classification implies that the impact would be of national concern. However, the serious effect on economic stability, societal values or social wellbeing would be limited to a given geographic region.
Moderate	The impact is likely to be recognised at a national level, and significant within affected geographic regions. The impact is likely to be highly significant to directly affected parties.
Low	The impact is likely to be recognised within an affected geographic region, and significant to directly affected parties. It is not likely that the impact will be recognised at the national level.
Very low	The impact on a given criterion is likely to be minor to directly affected parties. The impact is unlikely to be discernible at any other level.
Negligible	The impact is unlikely to be recognised by directly affected parties.

Source: Biosecurity Australia, *Draft Import Risk Analysis on the Importation of Apples from New Zealand*, October 2000, p 46

The Measurement of Unrestricted Risk and Restricted Risk

7.25 Having obtained separate measures of the probability and the economic consequences of the entry, establishment and spread of an individual pest into Australia, BA combined these measurements to achieve an estimate of the unrestricted risk associated with that pest. This was done according to Figure 7.4 below.¹⁵

Figure 7.4: Risk Estimation Matrix

Probability of entry, establishment and spread	<i>Extreme</i>	negligible	very low	low	moderate	high	extreme
	<i>High</i>	negligible	very low	low	moderate	high	extreme
	<i>Moderate</i>	negligible	negligible	very low	low	moderate	high
	<i>Low</i>	negligible	negligible	negligible	very low	low	moderate
	<i>Very Low</i>	negligible	negligible	negligible	negligible	very low	low
	<i>Negligible</i>	negligible	negligible	negligible	negligible	negligible	very low
		<i>Negligible</i>	<i>Very Low</i>	<i>Low</i>	<i>Moderate</i>	<i>High</i>	<i>Extreme</i>

Consequence of entry, establishment and spread

Source: Biosecurity Australia, *Draft Import Risk Analysis on the Importation of Apples from New Zealand*, October 2000, p 48

7.26 To take an example, where the probability of entry, establishment and spread of an individual pest was assessed as “low”, but the economic consequences as “extreme”, that pest was allocated an overall unrestricted risk of “moderate”.

The Risk Management Methodology

7.27 In instances where BA estimates the unrestricted risk associated with an individual pest as greater than “very low”, BA develops risk management protocols designed to reduce the risk associated with that pest to a “very low” level, in line with what BA has determined is Australia’s ALOP.¹⁶ This process is as follows:

- a) For each quarantine pest, the level of risk, or expected loss, associated with the unrestricted or unmitigated importation of the pest is estimated;
- b) The unrestricted risk is then evaluated using the risk estimation matrix to determine where it falls in relation to Australia’s ALOP;
- c) If the unrestricted risk is “negligible” or “very low”, then it is considered to be acceptable and further risk management is not required;
- d) If the unrestricted risk is “moderate”, “high” or “extreme”, then alternative risk management strategies are identified, and the risk recalculated in each instance;
- e) Where the subsequent risk derived using a particular risk management strategy is “very low”, that strategy is considered to be acceptable;

- f) Where the subsequent risk derived using a particular risk management strategy is “negligible”, the strategy is considered unnecessarily restrictive;
- g) Overly restrictive risk management strategies were either rejected, or were modified so as to be less restrictive.¹⁷

The Measurement of Restricted Risk

7.28 Following the implementation of risk management protocols based on the process above, the measured risk associated with an individual pest is called the restricted risk. The restricted risk associated with an individual pest following the implementation of risk management protocols should either be “negligible” or “very low”.

