Further development of the National Weed Risk Management Protocol

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Summary The discipline of formal pre-border Weed Risk Assessment (WRA), initiated in the late 1980s, is now well established. Significant developments in post-border Weed Risk Management (WRM) systems are more recent, with the publication of the Australian and New Zealand Standard for National Post-Border Weed Risk Management Protocol HB 294:2006 (the protocol) in 2006. During 2011–2012, the protocol was updated. The revised protocol reflects developments in: risk management practice and in indicating the reliability of predictions; the management of contentious plants; and the translation of WRM results into policy and management responses.

Keywords Weed risk assessment, post-border, weed risk management.

INTRODUCTION

Pre-border or quarantine Weed Risk Assessment (WRA) systems aim to prevent new weed incursions, whereas post-border Weed Risk Management (WRM) systems aim to prioritise the management of plant species which are present and occur on a range of scales from not-naturalised to invasive. Any jurisdiction that has noxious or declared plant laws has, inherently, some form of risk assessment and, often, some form of risk management, although they may not be well documented. The National Post-Border WRM Protocol HB 294:2006 (the protocol) was developed to provide a systematic approach to the prioritisation of weed species and to guide appropriate management for a given species.

APPLICATIONS OF THE PROTOCOL

There have been significant new applications of the National Post-Border WRM Protocol in Australia by the Northern Territory (Setterfield *et al.* 2010; NT NRETAS 2011) and New South Wales (NSW) (Johnson 2009a,b, Johnson and Charlton 2010) and internationally in a number of Latin and South American, south-east Asian and North African countries (FAO UN 2006).

The foundation for these developments has been the system developed by Virtue for South Australia (Virtue 2008, 2010). In that system, comparative weed risk is the product of scores for three factors: invasiveness; impacts; and potential distribution, in different land use types. The magnitude of these factors is established from scores for answers to a series of predetermined questions. Similarly, the feasibility of coordinated control is assessed as the product of scores for: control costs; current distribution; and persistence. Total scores for weed risk and feasibility of containment are then used to place a species within a weed management action matrix consisting of 25 cells.

Downey *et al*. (2010a) reviewed risk across the spectrum of weed management and highlighted a series of future challenges. As a result it was deemed timely that the WRM Protocol be revised to account for a range of issues that arose from implementation of the WRM protocol.

A workshop was held in Sydney in December 2011 in which participants examined the current WRM system and developed a series of revisions for the protocol.

NEW DEVELOPMENTS

The system of risk management used in the revised protocol is based on that adopted internationally as ISO 31000:2009 and in Australia and New Zealand as AS/NZS 31000:2009 (the Standard). The new handbook (Standards Australia, 2012) interprets the main concepts in the Standard to apply to weed risk management. It provides a generic guide to the development of key criteria to be considered in assessing: the weed risks posed by different species or genetic variants; and the feasibility of managing these species.

The following areas were also important in revising the protocol.

Risk treatment The protocol provides categorisation of plants into risk treatment classes such as ‘eradicate’, ‘contain’, or ‘protect sites’. With time and changes in circumstances or knowledge, species may be moved from one matrix cell (risk treatment action) to another. Panetta (2009) argues for a flexible approach to management, allowing for a change of

strategy when an initial plan, e.g. eradication, becomes untenable. Moreover, where there is a high level of uncertainty, more than one risk treatment option may be indicated (see below). In considering the feasibility of containment strategies, Panetta and Cacho (2012) state that this should be viewed in terms of the effort required to reduce spread and the effectiveness of risk treatment actions. They conclude that control of dispersal pathways and timely detection of new infestation foci appear to be most critical.

Widespread weeds Williams *et al*. (2009) noted that widespread weeds impacting on biodiversity have often been given lower priority in regional weed assessments in NSW. Just how widely the weed risk management net is cast will be important. Hence there is a need to clearly define the context of each evaluation. Downey *et al*. (2010a) suggested that the current Australian WRM system is not aimed at risk treatment of widespread weed species. While certainly species-led rather than site-led, the current WRM system can include widespread weeds as well as recent incursions of plants with uncertain potential to cause harm. Where risk treatment is site-based, protocols such as Asset-Protection Triage (Downey *et al*. 2010b) will be invaluable in prioritising actions.

Uncertainty Uncertainty is an inherent part of risk. The NSW WRM system introduced some accounting for uncertainty. In this instance, uncertainty was assessed as the proportion of 'do not know' answers to the total number of answers (Johnson 2009a, b). However, there are several types of uncertainty that may arise in weed risk assessment. These include:

- uncertainty about facts
  knowledge – data gaps, errors, small sample size, use of surrogate data
  variability – inherent fluctuations or differences over time, space or group, associated with diversity and heterogeneity
- uncertainty about ideas
  perception – processing and interpreting risk is shaped by our biology, psychology and social/cultural circumstances, which vary between individuals and over time
  description – expression of ideas with symbols, language or models can be subject to vagueness, ambiguity, context dependence, indeterminacy or under-specificity.

These types of uncertainty require different considerations. For example, uncertainty of knowledge can, in principle, be treated by obtaining more information. In contrast, variability (e.g. the number of seeds or distance of dispersal) can be better understood, but not reduced, by further information.

The revised protocol aims to guide users in explicit acknowledgement and analysis of uncertainty.

Contentious species These are plants that differ in weed risk scores in different land uses or jurisdictions, and have the potential to result in both significant benefits and costs. There has been significant new research into the risk assessment (Stone *et al*. 2008) and management of contentious plants, for example: Johnson (2007), Friedel *et al*. (2010), Grice *et al*. (2010) and Johnson (2010). This research extends into the area of potential biofuel source evaluation (Ferdinands *et al*. 2011). A dilemma in dealing with the contentious plants issue is just how far a *risk management* system should enter into any economic evaluation of potential new crops. The economic assessment of a putative new industry may be beyond the scope of a risk assessment system.

The revised protocol provides an improved framework for comparative weed risk assessment and management in Australia and may find wider application globally. We anticipate that the new protocol will be published by Standards Australia later in 2012 and that it will be available as hard copy or for downloading from Standards Australia.

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