# Updated National Training Qualifications for Vertebrate Pest Managers in Australia

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**ABSTRACT:** Vertebrate pest management in Australia continues to evolve in response to land use changes, shifting community attitudes, and advancing technologies. The increasing demands and complexity of this profession requires employees with expertise in a broad range of disciplines. The Australian Pest Animal Strategy (APAS) recommends that best practice management of vertebrate pests should focus on reducing damage due to pests rather than the number of individual animals, using a strategic and integrated approach that incorporates the best available knowledge, tools, and skills. To help achieve this, Australia's vertebrate pest management training qualifications under the national Vocational and Education Training system are being updated to align with the APAS. Industry engagement and consultation during the scoping phase of this project has highlighted a number of reasons why people who work in pest management are not undertaking training to obtain nationally recognised qualifications. Barriers to formal education include employers who are unwilling to release staff for periods of training; a lack of available training courses and skilled trainers in the industry, especially in rural and regional areas; workers with university qualifications who lack practical field skills; workers who are employed on short-term contracts with no secure career path; and a preference for competency-based short courses for professional development. This paper explains the motivation behind Australia's qualifications and training review and how the industry proposes to overcome some of the problems with current training programs. These issues are not unique to Australia, and we also explore how the United States is facing similar challenges in addressing the continuing education needs of vertebrate pest management professionals.

**KEY WORDS:** best practice, community engagement, continuing education, multidisciplinary, planning, training, vertebrate pest management

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## INTRODUCTION

Vertebrate pest management is an evolving discipline that must continually adapt in response to land use changes, variable community attitudes, and the advent of new knowledge, digital tools, and technologies. The complexity of this profession requires employees who are equipped to deal with "unique, ill-defined 'wicked problems' involving many stakeholders with diverse values" (Stummann and Gamborg 2014). Effective management of pest animals requires a strategic approach that focuses on the desired outcome from management – not just killing pests (Braysher 1993, Braysher and Saunders 2003a,b, Braysher et al. 2012). Indeed, rarely is damage to the environment or production due to one pest animal or weed. More often, a range of factors are at play. To achieve the desired results, management needs to address multiple pests and weed species, as well as other factors such as farming practices and climate. Workers who are responsible for planning and undertaking pest management activities therefore need appropriate training to understand and be able to apply the strategic approach (Buckmaster and Braysher 2012). The human dimension of pest management also requires workers with skills in the social sciences, facilitation, planning, decision-making, negotiation, and community engagement.

In many countries including Australia and the United States, increasing demands and responsibilities are being placed on pest and resource managers to have a broader set of skills and knowledge across several disciplines, as governments move to decentralise governance of natural resources at the regional and local levels (Raik et al. 2008, Tegt et al. 2010, Stummann and Gamborg 2014). In Australia for instance, many states and territories have recently developed 'biosecurity' strategies that collectively address pest plants and animals, and animal health and disease management. As a result, several agencies have been amalgamated into single 'one-stop-shops' for services relating to agriculture, invasive species, and natural resource management. While this move is apparently essential for improving bureaucratic efficiency, increasing service provision and reducing administrative red tape (Raik et al. 2008), the effectiveness of these agencies primarily depends on the capacity of their employees (Lauber et al. 2010). However, studies have shown that employees tasked with cross-disciplinary duties in the pest and natural resource management sector do not have the appropriate skills to deal with increased public involvement and the politics and negotiation aspects of planning and implementing resource management (see Raik and Wilson 2006, Stummann and Gamborg 2014). Even those professionals who are specifically trained in areas such as forestry and wildlife management falter at integrating human dimensions information into decision-making (Miller and McGee 2001, Miller 2009, Stummann and

Gamborg 2014). As Stummann and Gamborg (2014) highlighted, despite widespread acknowledgement that natural resource management (NRM) professionals need more problem-solving skills and social science-related knowledge to be able to cope with their expanding job roles, there are too few opportunities for people to develop these capabilities. Furthermore, the training that is available, whether it is through vocational or higher education, struggles to meet the changing needs of employers and employees (Schön 1987 cited in Raik and Wilson 2006, Stummann and Gamborg 2014). Consequently, efforts are being directed towards improving training and education opportunities, and building capacity across the pest management sector. In this paper, we present the key issues and barriers to training for vertebrate pest managers and discuss how these problems might be overcome.

## VOCATIONAL EDUCATION IN AUSTRALIA

Australia's education system is organised into three sectors: schools, vocational education and training (VET), and higher education. The Australian Qualifications Framework (AQF) covers all nationally recognised qualifications in Australia, with the three sectors forming a continuum (Figure 1). AQF awards are recognised both nationally and internationally, which in principle facilitates the portability of qualifications and the units of competency (or subjects) that make up each course. The AQF allows a student to progress through increasingly higher qualifications as need and interest allow. VET typically provides a wide range of post-secondary skills training at the lower AQF levels (1 to 6), while level 7 to 10 qualifications are delivered through the university sector. VET courses must be delivered through a registered training organisation (RTO), and regulatory powers for RTOs in most states are managed by the Australian Government through the Australian Skills Quality Authority (ASQA). VET courses are based on industry Training Packages, which define the assessment standards for different vocational qualifications. The content of each of the qualifications that make up a training package (e.g., Certificate II to Advanced Diploma in Conservation and Land Management) is defined by the relevant industry, and a training package is 'owned' by one of 11 Industry Skills Councils (ISCs). The ISC responsible for the development, implementation, and improvement of nationally-recognised qualifications and training products for the agriculture, horticulture, and conservation industries (including vertebrate pest management) is AgriFood Skills Australia ('AgriFood'). ISCs have a Continuous Improvement process where industry stakeholders can provide feedback on relevant training and qualifications, to ensure qualifications are updated to reflect current industry needs and best practice. Where there is a defined occupational need or regulatory requirement, combinations of selected units of competency can also be delivered through VET as industry-endorsed skill sets. These are often preferred because they can be completed in less time than a full qualification and can be targeted to the particular needs of a user group or agency.

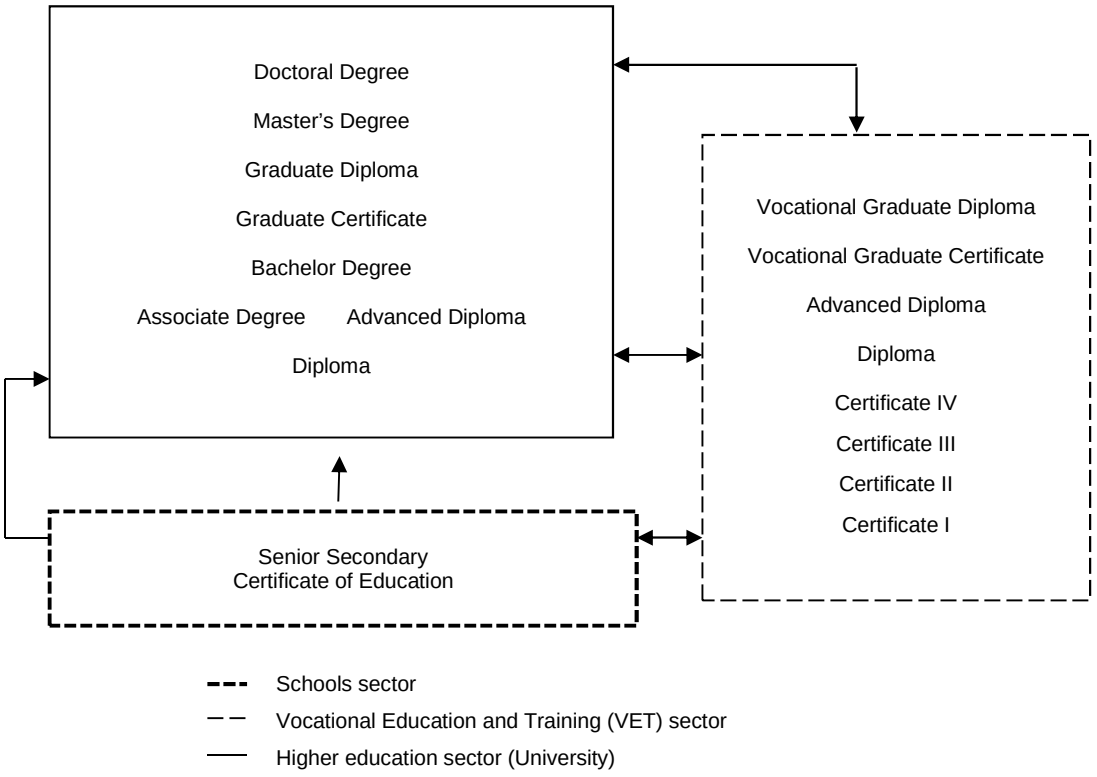


**Figure 1. The Australian Qualifications Framework (AQF) comprises 13 national qualifications in 3 sectors, with several cross-sectoral linkages.**

## ISSUES WITH CURRENT TRAINING

In 2010, a report commissioned by the Invasive Animals Cooperative Research Centre (IA CRC) identified that the training and qualifications on offer for vertebrate pest managers in Australia did not reflect current best practice and were not consistent with the goals of the APAS, nor did they meet the needs of employees and employers working in the industry (Brown and Munckton 2010). The APAS states that best practice management of vertebrate pests should focus on reducing the damage caused by pests using a strategic and integrated approach that incorporates the best available knowledge, tools, and skills (Natural Resource Management Ministerial Council 2007). In order to implement best practice, workers in all areas of pest and resource management need to understand three things:

- That action should be taken to minimize the risk of new pests entering Australia and establishing; and to eradicate any new pests before they become established – while understanding that once established, eradication of pest animal populations is incredibly difficult to achieve.
- The principles and objectives of the Australian Pest Animal Strategy and related strategies (e.g., Australian Weed Strategy, state biosecurity strategies), and that coordinated broadscale management is required to reduce the damage due to pests to an acceptable level;
- The importance of the work they do as part of a team and their role in the overall pest planning, implementation, and management process.

A major decline in the availability, quality, and appropriateness of vocational pest management training over the past decade suggests that many employees, from field staff up to regional managers and policy makers, are unlikely to have a proper understanding of principles of current best practice vertebrate pest management, or the skills and capacity to apply the strategic approach to their pest management programs (Brown and Munckton 2010). Brown and Munckton's (2010) findings led the Australian Vertebrate Pests Committee (VPC), in collaboration with the IA CRC, to approach AgriFood and initiate a review of the existing pest animal vocational training and qualifications framework. The review also included weed management, because of its close overlap in job skills and the need for a similar strategic approach.

Targeted consultation during the scoping phase of the AgriFood review confirmed the gap in current training, with regards to the underpinning knowledge and skills required to interpret and apply pest management principles and strategies. The scoping report also identified a number of key reasons why people who work in pest management jobs are not undertaking training to obtain nationally recognised qualifications. Barriers to formal education include:

- employers who are unwilling to release staff for periods of training;
- lack of available training courses and skilled trainers in the industry, especially in rural and regional areas;
- workers with university qualifications who have a good understanding of the theory but lack the practical field skills to plan and appropriately implement effective management;
- workers who are employed on short-term contracts with no secure career path; and
- a general preference for competency-based short courses for professional development.

It is essential to understand what is driving these impediments, so that appropriate training solutions can be explored. The IA CRC is working to overcome two of the key obstacles, the content and availability of training, and these issues will now be discussed further.

### Issue 1: Availability of Training

#### *Thin Markets and Access to Training*

The provision of specialised training in vertebrate pest and weeds management, like other niche industries (e.g., poultry production), is affected by a limited and dispersed clientele or a 'thin market', which makes offering training financially unviable (Pratley 2013). Many pest and land managers are based in rural and regional areas, and they cannot afford to travel long distances or commit to long periods away from work to study. This has forced several RTOs to cease offering qualifications or training services that do not attract enough students to cover costs.

To further complicate this market, the broader conservation and land management industry in Australia is driven by short-term funding cycles, and government employees are generally hired on temporary contracts with no job security or long-term career path. They often have minimal support from their employers to undertake professional development in the form of extended diploma or degree programs, or indeed to partake in any training that is not a regulatory requirement (AgriFood Skills Australia 2013, Marsh and Brown 2013). As a result, many agencies tasked with pest management duties have limited staff, time, and funds. Consequently, on-ground activities are often contracted out to private businesses. This combination of factors provides little motivation for workers to increase their knowledge or update their pest management skills through vocational training. It also reduces the number of opportunities they have to learn relevant situational 'cues' (e.g., signs of wild dog damage, or an outspoken, uncooperative landholder) that help develop the skilled intuition required to deal with wicked problems (Stummann and Gamborg 2014). Regular exposure to unique challenges in the workplace, particularly where the work involves dealing with the public, gives practitioners the opportunity to build a 'professional artistry' and practice applying the skills that, in turn, develop their confidence and professional competence. But for employees who are not exposed to suitable work situations and adequate on-the-job learning, formal training that combines theory and practice is vital for skills development and capacity building (Stummann and Gamborg 2014).

### Issue 2: Quality of Training

#### *Lack of Experienced Trainers*

Availability of pest management training is limited by the number of qualified and experienced trainers and assessors available to deliver training. Professional obsolescence, the aging workforce in general, and a

significant decline in the demand for and availability of vertebrate pest training across Australia has put the sector at risk of losing its expertise (Brown and Munckton 2010, Clayton et al. 2013, Pratley 2013). Brown and Munckton (2010) identified that the VET industry suffers from a lack of suitably qualified trainers with the necessary skills, understanding, and experience of the strategic approach to pest management. This is concerning, considering that all VET trainers are required to maintain 'industry currency' and RTOs are responsible for employing trainers and assessors with industry-relevant skills (Standards for NVR Registered Training Organisations 2012, Clayton et al. 2013). However, it is not surprising, given that the capabilities required to perform one's job do not remain static (Clayton et al. 2013), and vertebrate pest management has undergone many changes in the past two decades, with substantial amendments to policy and legislation and the introduction of new tools, technologies, and products, as well as a new approach (Braysher et al. 2012). Keeping up-to-date is an onerous task for both trainers and workers in the field.

The recent popularity of distance or online learning delivered by advanced communication technologies might suggest the need for traditional classroom-based trainers has somewhat lessened. But despite its appeal for thin markets, online courses demand a much broader teacher skill base than face-to-face teaching, and the quality of training can be affected by the experience level of the online trainer (Wiesenberg and Stacey 2005). Virtual classrooms require teachers with not only subject matter expertise, but also with advanced technological and curriculum design skills and ongoing professional support (Wiesenberg and Stacey 2005). Although online learning environments can help to overcome some barriers to training by allowing greater access and flexibility, the medium presents its own challenges that ultimately depend on the presence of appropriately skilled trainers.

***Unsuitable Content***

The overlapping of boundaries between Australia's educational sectors makes it difficult to ensure that course curricula cover the appropriate content and produce graduates with industry-ready knowledge and skills. The vocational training sector is designed to provide entry-level, practical, competency-based training, which in the past has led to a status problem for VET not only in Australia, but also in many developed nations where the level of education is closely linked to income (ODEC 2009). Traditionally, universities have been viewed as the exclusive providers of a theoretical higher education, which is often a prerequisite for certain job roles (Priest 2009, Moodie et al. 2013). According to the AQF, higher-level VET qualifications train students in "theoretical and applied knowledge and skills for specialised and/or skilled work" while a university degree provides graduates with "broad and coherent knowledge and skills for professional work" (Australian Qualifications Framework Council 2013). The distinction between these qualifications is not well-defined and presents a challenge for VET curriculum developers, as well as for students who seek to move between sectors using the recognition of prior learning and articulation frameworks (Elford 2011). Nevertheless, the majority of relevant post-secondary qualifications in Australia do not provide graduates with an understanding of the strategic approach to pest management and how to implement landscape-scale programs to reduce the damage caused by pests (Brown and Munckton 2010). University degrees in science, natural resource management, and related fields tend to emphasise the broader disciplinary theory and 'technical rationality': the view that "professional activity consists in instrumental problem solving made rigorous by the application of scientific theory and technique" (Schön 1983 in Raik and Wilson 2006). Studies from Canada and the U.S. have also found a shortage of university degree or diploma programs that focus specifically on invasive species issues, and that natural resource management courses have major curriculum deficiencies with regards to the social sciences and human dimensions-related topics (Smith et al. 2009, Vonhof 2010, Blickley et al. 2013). Non-disciplinary skills such as project management, networking, program leadership, and written communication have long been recognised as being crucial for all job sectors (Stummann and Gamborg 2014), yet without sufficient training in how to understand and manage the human dimensions of environmental problems, many graduates leave university and struggle to work effectively within an ever-changing, complex social context (Vonhof 2010, Blickley et al. 2013). Although the application of standardized, theoretical scientific knowledge is necessary in science-based professions, Raik and Wilson (2006) emphasise that theory alone does not adequately address the uncertainty, complexity, context, uniqueness, and values that routinely characterise actual practical professional situations involving people and resources, such as those problems encountered within the vertebrate pest sector. In these occupations, practice depends not only on technical principles, but also on intuition and experience (Raik and Wilson 2006). The strategic approach to pest management draws on theory and practice and teaches practitioners to tackle problems in a tactical way, using a planned, adaptive approach that allows for complexities and variance (Braysher and Saunders 2003a,b). Including the strategic approach in all vertebrate pest management and related VET and university-level courses would help to ensure that all graduates have the skills to apply theoretical knowledge to real-world problems.

## OVERCOMING THE BARRIERS

It is apparent that some of the barriers to formal education and training can only be overcome through appropriate institutional changes and a better understanding of the impediments to workplace learning. Although training per se cannot address motivational issues and economic challenges within the workforce, flexible training options and quality trainers and resources can help to ensure Australia continues to make progress towards its vision of a nation secure from the impacts of vertebrate pest animals.

### Flexible Training Options

Advances in information technology and the growing

e-learning market present numerous opportunities to improve the delivery and uptake of vertebrate pest training in Australia and overseas. Improved access to and availability of training using a "blended" approach (i.e., online learning combined with short, face-to-face courses; see Wiesenberg and Stacey 2005) provides employees with a way to overcome these barriers. The IA CRC has facilitated the development of two post-secondary, pest-specific courses based on the principles of best practice pest management. The VET Diploma-level course can be offered as a full one-year qualification through an RTO, or modified and delivered as a tailored, non-accredited short course designed specifically for staff from government agencies and other industry groups that are responsible for pest management. The full Diploma course can be delivered via distance education, with teaching material and correspondence available online. A Graduate Certificate course has also been created to cater for those seeking university-level training, although this higher-level qualification is now likely to be offered as a series of professional development short courses. Students in both courses are required to design and implement their own sophisticated, coordinated, and complex multi-disciplinary management plans (a process that teaches them to think critically and strategically about environmental issues), and to develop valuable planning and negotiation skills that are applicable across all natural resource-based systems. These courses are a significant step forward in addressing the training needs and demands of the pest management industry in Australia. However, ensuring their availability and uptake by training institutions, as well as attracting and retaining students, will be an ongoing challenge.

**Training Materials and Support Tools**

The review of current vertebrate pest and weeds vocational qualifications has identified a lack of consistency between the existing VET training package and what constitutes current best practice as outlined in the APAS and the Australian Weeds Strategy (AgriFood Skills Australia 2013). The IA CRC is working cooperatively with AgriFood to ensure the revised qualifications reflect the best available knowledge, tools, and skills in vertebrate pest management, which is embodied in the work of the CRC and its 24 partner organisations – and is developing new training materials and educational resources that will complement the revised training package and updated qualifications, once they are endorsed early next year.

The IA CRC has already established a range of knowledge pathways that serve to expand the knowledge and skill capacity of those working in vertebrate pest management. These pathways include three dedicated national facilitators (see http://www.invasiveanimals.com/about-us/people/) who are available to assist pest and resource managers to deal with species-specific and regional-based issues, as well as planning and implementation of management programs. We have also produced PestSmart Toolkits (see: http://www.feral.org.au/pestsmart/) – a suite of up-to-date best practice information about several key vertebrate pest species, all of which is freely available online. School curriculum-based teaching materials about pest animals are also available online at no cost, and they offer teachers a series of learning modules and student activities that introduce the complexities of pest animal management in Australia (see: http://www.feral.org.au/education-training/primary-secondary-school-resources/).

**Industry Partnerships**

The IA CRC, as an industry leader, is also managing a suite of projects designed to improve the community engagement skills and capacity of those working in the vertebrate pest profession. Led by the University of New England and in partnership with Pennsylvania State University, the 'Community Engagement' program is investigating the policies and social drivers in pest animal control, and ways to facilitate collective action while reducing legal and institutional impediments to the adoption of new pest management strategies and technologies. Through the establishment of communities of practice and 'train the trainer' courses, the program aims to build the capacity of pest practitioners, vocational trainers, and others working within conservation and NRM agencies to deal with vertebrate pest problems more effectively.

## WORLDWIDE CHALLENGES

Approaches to vertebrate pest management training and continuing education in other parts of the world provide a broader perspective of the challenges facing this profession. Training for science-based professional careers has traditionally been seen as the exclusive territory of universities (Kessler et al. 1998). However, in many countries, there is a growing demand for trained and committed field staff and middle managers to carry out the routine, day-to-day work (Kessler et al. 1998), particularly in the field of pest and resource management (Brown and Munckton 2010). Often these job roles require education and training beyond secondary school but less than a Bachelor's degree (Carnevale et al. 2012). In the United States alone, there are approximately 36 million people over the age of 25 with some college education but no degree. With no credentials to demonstrate their knowledge and skills to employers, these individuals are missing out on potential employment opportunities and higher earnings (Carnevale et al. 2012). The career and technical education (CTE) sector in the United States, despite its reputation as a "lesser" option to university, continues to evolve in response to changing labour-market conditions (Cataldi 2009, Carnevale et al. 2012). Like Australia's VET sector, CTE has the flexibility to deliver a range of relevant, portable, and standardised industry-based certifications and postsecondary qualifications, yet it is an underutilised, underappreciated and underemphasised system (Carnevale et al. 2012). Vocational training offers a range of pathways into the workforce and toward further education. Close partnerships and input from industry help to ensure the quality, reputation, and success of training programs, and employment outcomes for graduates are greatly improved as a result of training (Wheelahan and Moodie 2011, Moodie et al. 2013).

The continuing education needs of vertebrate pest

managers in the United States and Australia could be met through better linkages between vocational training and higher education, and government and non-government pest management agencies, industry and practitioners. Many U.S. government agencies have in-house training, certification and licencing programs, and professional development plans for staff working in the natural resource management, wildlife management, damage control, and vertebrate pest management sectors. Some examples include the California Department of Pesticide Regulation's continuing education program, the U.S. Department of Agriculture's (USDA) AgLearn program, the National Wildlife Control Training Program for wildlife control operators, and the U.S. Bureau of Land Management's National Training Center (see Draper and Cooley 2012). In partnership with the National Institute of Food and Agriculture (NIFA), the U.S. Cooperative Extension System provides an even broader set of educational opportunities through a national network connected to Land-Grant universities in each state and federal territory. This system was formalized in 1914 with the passage of the Smith-Lever Act as a means for addressing rural, agricultural issues through both research and informal education, and has since expanded to include other areas such as community and economic development, family and consumer sciences, and youth and leadership development (USDA 2011). Research in these fields is made available at the community level through Extension educators, who work closely with local leaders, farmers, entrepreneurs, families, consumers, and youth. Today, information is also available through the eXtension Web site, which provides specialized information and education on wide-ranging topics, including pest and invasive species management (The eXtension Foundation 2014). In Australia, there are very few comparable programs. Although the two countries have different geographical, ecological, cultural, economic, and political circumstances that affect the way vertebrate pest management is delineated and administered, we share many common issues and priorities for the future that present opportunities for collaboration. Our profession requires skilled managers and field workers who understand the social, economic, and political dimensions of vertebrate pest problems – those who are goal-oriented rather than discipline-driven – and who understand the need to build respect and trust between stakeholders and communities (Kessler et al. 1998). The framework is already in place for the integration of strategic pest management training into post-secondary curricula in both Australia and the United States, and the IA CRC is well-positioned to bring industry stakeholders, scientific experts, trainers, and practitioners together to bridge this capacity gap.

## CONCLUSION

While there is substantial variation in VET across countries, all educational institutions need to provide education and training for work. Graduates need generic skills and knowledge that employers expect and demand, but they also need to understand the underpinning theoretical principles as to why and how these skills should be applied when confronted with problematic, 'wicked' situations in the real world. Vocational training has evolved in response to the changing demands of the labour market and provides relevant training for entry-level occupations as well as higher-level qualifications for specialised job roles. Direct input from industry stakeholders into the development of qualifications and validation of assessment of competencies means that training is more likely to equip students with the range of skills and knowledge necessary to make them job-ready. But it is clear that stakeholders from the vertebrate pest industry and VET institutions need to work more closely together to foster a culture of professional development and interchange of both pedagogical and industry-specific knowledge, skills, and experience to ensure that training is high quality and reflects current best practice.

In comparison to many other countries, Australia is unique in the range and extent of pest and resource issues it deals with, which puts us in prime position to trial novel solutions to address the continuing education needs of vertebrate pest managers. Building the capacity of managers to implement strategic, efficient, and effective management over the long-term will ensure Australia's food and fibre industries remain globally competitive and sustainable; help to conserve our natural resources; and enable us to share our experiences and expertise with our Asia-Pacific neighbours and colleagues around the world.

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