



RD&E Gap Analysis

The purpose of this gap analysis is to prioritise RD&E activities required to achieve the goals and mission of the National Feral Pig Action Plan (NFPAP) and inform the development of the RD&E strategy for feral pigs.

This gap analysis is organised into four key themes:

- 1) Feral pig impacts and threats
- 2) Social, cultural and economic barriers
- 3) Informed strategic management activities
- 4) Monitoring and evaluation in different landscapes.

Concept	Current situation	Factors responsible	Desired state	Suggested projects to address NFPAP actions	Priority	Linkages with other strategies*	Responsible parties	Anticipated budget
Theme 1 - Feral pig impacts and threats								
1.1 Defined problem which is understood by stakeholders	<p>Understanding the size and cost of the problem Current population dynamics and economic, environmental, and social impact information to inform the size of the problem, costs and impacts is not available</p>	<ul style="list-style-type: none"> Inconsistent methods used by states and territories to estimate population densities and distributions Methodology has not been developed to quantify impacts from feral pigs 	<ul style="list-style-type: none"> Impacts of feral pigs on key environmental, agricultural, cultural, and social assets are quantified 	<ol style="list-style-type: none"> i. Build spatial models of regional / national population abundance, distribution and structure (e.g. data integration, landscape genetics and connectivity models) ii. Quantify costs and benefits of achieving defined management objectives (e.g., % population reduction, target density) in different landscapes 	High (i) Being actioned by ABARES and CSIRO	NFPAP 3.1.3 SEC 6.5, 6.6, Recommendation 1	<p>(i) ABARES (DAWE) and CSIRO with input from state and local governments, NRM agencies, Indigenous organisations, and land managers</p> <p>(ii) State and local governments, NRM agencies, Indigenous organisations, contractors and land managers</p>	<ol style="list-style-type: none"> i. National, contract in place (\$\$\$) ii. Local/ Regional/ State (\$\$)
	<p>Understanding the density:impact relationship The relationship between feral pig density and impact is poorly understood limiting the application of density</p>	<ul style="list-style-type: none"> Complex interactions of many different factors Difficulties in accurately, rapidly, and inexpensively determining density and damage 	<ul style="list-style-type: none"> Accurate relationships between feral pig density and impacts for key production and natural environments 	<ul style="list-style-type: none"> Quantify relationships between population density and the level of impact (within prioritised areas and ecosystems). Evaluate/demonstrate cost-effective technologies i.e., camera/drone surveys for automated, remote, and real time (where possible) surveillance and 	High	NFPAP 3.1.2	State and local governments, CSIRO, Universities, NRM agencies, Indigenous organisations, contractors, AI	Scope extends nationally, with work required locally and regionally (\$\$\$)

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	reductions as measures of success	<ul style="list-style-type: none"> Diversity of feral pig impacts in different production and natural systems Temporally and spatially sporadic distribution of pig impacts in many systems 		monitoring of outcomes from control programs			specialists, and land managers	
1.2 Feral pig threats to biosecurity and biodiversity addressed	<p>Role of feral pigs in incursions of exotic and endemic disease</p> <p>Feral pigs pose biosecurity and disease risks (livestock, wildlife, plants, and public health) to Australia</p>	<ul style="list-style-type: none"> Risks (and costs) of endemic and zoonotic disease transmitted by feral pigs understudied 	<ul style="list-style-type: none"> Improved capability across jurisdictions to prepare and respond to an exotic disease incursion following recent simulation activities Foundational knowledge of disease prevalence in feral pig populations, contact rates and risk of transmission to livestock and wildlife Prioritised regions for population control actions established Clear understanding of management requirements for responding to exotic disease incursions Reduced endemic and zoonotic risks from feral pigs 	<ul style="list-style-type: none"> Feral pig movements, contact rates and behavioural responses to control studied Feral pig population genetics examined for sub-population structure and population estimates Identify spatially-explicit priority regions for feral pig population control, using a risk-based approach, to include considerations of threats to Australia's biosecurity status, agricultural businesses, ecological communities, ecosystems and landscapes, and cultural assets. Inform spatial epidemiological models of disease spread in, and by, feral pig populations (including interactions by humans) by providing data on key parameters to improve model integrity. Develop improved, updated and reliable density and distribution layers for modelling Investigate feasibility of regional coordinated zoning plans to eradicate feral pigs at a landscape-scale 	High	NFPAP 3.2.3, 1.1.3 SEC 6.8	DAWE, State and local governments, Universities, CSIRO, NRM agencies, Indigenous organisations, industry, private land conservation organisations, and land managers	Scope extends nationally, with work required locally and regionally. (\$\$)
	<p>Role of feral pigs in threatening biodiversity</p> <p>Nationally, feral pigs adversely affect 148</p>	<ul style="list-style-type: none"> Competition for feed, predation, destruction of water sources, 	<ul style="list-style-type: none"> Minimal threats from feral pigs on native flora and fauna 		High	TAP 1.2, 3.1, 4.1 NFPAP 1.1.3, 3.2.1	DAWE, State governments, Universities, CSIRO, NRM	Scope extends nationally, with work

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	species of threatened flora and fauna and 8 threatened communities	impact on water quality, habitat loss	<ul style="list-style-type: none"> Increased understanding of feral pig impacts on nationally threatened, and near-threatened species and ecological communities 			SEC 6.6, Recommendation 5 (Review of TAP)	agencies, Indigenous organisations, private land conservation organisations, and land managers	required locally and regionally. (\$\$\$)
1.3 Climate change impacts on feral pig population dynamics and impacts understood	<p>Impacts of climate change on feral pig population dynamics, biosecurity threats, and impacts caused by feral pigs.</p> <p>These have not been comprehensively studied and/or communicated</p>	Changes in seasonal conditions in response to climate change	<ul style="list-style-type: none"> Increased knowledge incorporated into habitat suitability and population distribution modelling, with outputs used locally to adapt management strategies and optimise use of available resources to control threats and populations. 	<ul style="list-style-type: none"> Investigate potential impacts of climate change on: <ul style="list-style-type: none"> habitat suitability and geographical type impacts caused by feral pigs in economic and non-market terms understand impacts on feral pig population dynamics and threats 	Medium-High	NFPAP 3.2.3	DAWE, State governments, Universities, CSIRO, NRM agencies, Indigenous organisations, private land conservation organisations, industry and land managers	Scope extends nationally, with work required locally and regionally. (\$\$\$)
Theme 2 - Social, cultural and economic barriers								
2.1 Land managers are engaged, committed, and well-resourced for sustained management actions	<p>Assure program longevity</p> <ul style="list-style-type: none"> Intermittent, short term and/or minimal funds available to support feral pig control by land managers 	<ul style="list-style-type: none"> Short term policy directions/priorities of jurisdictions Restrictive criteria for funding programs Minimal quantified data on costs of damage caused by feral pigs (ie. benefits from feral pig control unknown) 	<ul style="list-style-type: none"> Long term self-perpetuating investment model in place to encourage sustained actions and deliver suppressed reductions in feral pig populations and their impacts 	<ul style="list-style-type: none"> Develop non-prescriptive methodologies to underpin a biodiversity stewardship fund to incentivise sustained action and investment for vertebrate pests, recognising the value of co-benefits delivered to ecosystems and biodiversity and supported and informed by performance metrics Identify/develop market-based incentives for feral pig management for different classes of assets <ul style="list-style-type: none"> Determine feasibility of, and implement, a tripartite, long term investment program between private sector/industry, local, state and territory governments and Commonwealth government for vertebrate pest management Widespread extension activities, using a phased approach, with stakeholders to 	High	NFPAP 3.1.4, 3.2.3 SEC Recommendation 1, 2, 5	DAWE, State governments, Universities, CSIRO, NRM agencies, Indigenous organisations, private investors, private land conservation organisations, industry, and land managers	Scope extends nationally, with work required locally and regionally. (\$\$\$)

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				obtain support, build awareness and gain adoption				
2.2 Social and cultural barriers to effective long-term management removed	<p>Community perceptions.</p> <ul style="list-style-type: none"> • Divergent community perceptions on control methods, impacts and value of feral pigs • Barriers to involvement hence optimal engagement approaches are poorly understood • Limited data to support land manager engagement 	<ul style="list-style-type: none"> • Multiple values associated with feral pigs, including recreation, food source • National, state, and regional policies assume communities support broad scale control of feral pigs • Assumed positions of individuals are in line with mitigating impacts and reducing feral pig populations. 	<ul style="list-style-type: none"> • Cooperation across scales through acknowledgement of multiple values associated with feral pig control. • All land managers (public and private) have feral pig management integrated into their land management activities and planning • More consistent and effective feral pig management occurs across Australia at all levels of government, regional and local groups. 	<ul style="list-style-type: none"> • Understand and address social impediments to feral pig control, including adoption of integrated best practice management methods by land managers through social science and planning studies • Improve land manager understanding of what integrated best practice management is and how to apply it 	High	TAP 2.1, 5,2 NFPAP 1.2.1, 1.2.2, 3.2.1	State and local governments, Universities, NRM agencies, Indigenous organisations, private land conservation organisations, NFPAP demonstration sites, industry, and land managers	Scope extends nationally, with work required locally and regionally to reach land managers across Australia. (\$\$\$, with \$\$ in-kind time of land managers)
Theme 3 – Informed strategic management activities								
3.1 Reliable regional knowledge of movement ecology	<p>Low local/regional knowledge of feral pig population density and spatial and temporal movement ecology in different habitats and geographical areas</p> <ul style="list-style-type: none"> • Reliance on numbers of pigs killed as a proxy of success of control programs, without good understanding of actual populations present • Annual population reductions of >70% are not being achieved 	<ul style="list-style-type: none"> • Feral pigs are intelligent, prolific breeders, mobile in their environment, can occur in varying densities, adaptive and evasive • No performance metrics in place reflecting difficulty in capturing meaningful, consistent data to use to measure changes in population and/or impacts 	<ul style="list-style-type: none"> • Informed knowledge of local population distribution and density will lead to more informed and effective pig management • Information can be easily accessed and cost-effectively obtained in close to real time • Monitoring becomes part of standard practice 	<ul style="list-style-type: none"> • Develop standardised methods for land managers to estimate local population abundance and density in different landscapes to improve effectiveness of control programs. • Develop methods to estimate local population spatial and temporal movement in different landscapes, and connectivity between local populations to inform management strategies • Demonstrate application of methods to management groups to gain adoption 	High	TAP 3.2, 3.3 NFPAP 3.1.3, 3.2.2	DAWE, TERN Australia, State and local governments, NRM agencies, Indigenous organisations, industry, NFPAP demonstration sites and land managers	Scope extends nationally, with work required locally and regionally to support adoption (any smaller projects needed). (\$\$\$)

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			for control operations <ul style="list-style-type: none"> Adoption of technological approaches to enumerate and locate feral pigs cost-effectively, rapidly, and reliably 					
	Inadequate intensity and scale of control programs in time and space	<ul style="list-style-type: none"> Knowledge deficiencies of feral pig ecology or behavioural responses to control programs Control effectiveness may be limited by immigration from unmanaged areas, or evasive behaviours 	<ul style="list-style-type: none"> Feral pig movements and behavioural responses to control studied, strategies modified to account for findings Feral pig population genetics examined to map sub-population structure to determine feasibility of 'management unit' approach. 	<ul style="list-style-type: none"> Nationwide feral pig genetic study to map sub-population structure and use genomic information to estimate local population size Improve local understanding of how control effectiveness may be being limited e.g., via immigration, population recovery, translocation, and/or evasive learned behaviours 	High	NFPAP 3.1.2	DAWE, State and local governments, Universities, CSIRO, NRM agencies, Indigenous organisations, private land conservation, NFPAP demonstration sites industry and land managers	Scope extends nationally (\$-\$-\$-\$)
3.2 Optimised management	Strategic best practice management planning is not being used or applied <ul style="list-style-type: none"> Targets are not in place to monitor outcomes achieved on assets, populations and/or values 	<ul style="list-style-type: none"> Challenges of managing complex systems to obtain definitive outcomes 	<ul style="list-style-type: none"> Optimised feral pig management strategies (regions, timings, methods, intensity of control regimes) for economic, biosecurity, environmental and/or cultural outcomes Improved knowledge to target appropriate timing for feral pig management and use of control methods 	<ul style="list-style-type: none"> Review existing best practice management strategies and undertake gap and priority analysis Develop standardised templates and guidance material for local management plans Develop and implement integrated systems capable of generating local management plans, providing guidance to land managers on control methods to be used, when to conduct activities and data required to be collected (including use of supportive technologies), analysis of data captured and reported by land managers and providing timely, relevant feedback Determine the appropriate scale and combinations of control techniques required to achieve effective control in different environments across Australia 	High	TAP 3.3 NFPAP 1.2.1, 1.2.2, 3.1.2, 3.2.1, 3.2.2, 3.3.1	State and local governments, RSPCA, Universities, CSIRO, NRM agencies, Indigenous organisations, private land conservation, contractors, industry, NFPAP demonstration sites and land managers	\$\$\$

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			<ul style="list-style-type: none"> Monitoring becomes part of standard practice for control operations 					
	<p>Reliance on jurisdiction (or other organisations) Little incentive for producers in many regions to be involved in feral pig control when impacts are not recognised or quantifiable</p>	<ul style="list-style-type: none"> Many land managers waiting/relying on external programs to manage feral pig populations and impacts Lack of recognition by land managers of biosecurity obligations Environmental damage not providing direct incentive to land managers to manage feral pigs, when other factors may also be at play. 	<ul style="list-style-type: none"> Compliance with legislative requirements to control feral pigs by land managers in place, driven by strong regulatory presence. Increased cohesion to reinvest own profits back into community-led coordinated control programs. Increased involvement in local groups and regulatory compliance to manage feral pigs by other producers (e.g., beef, cane, horticulture, banana industries) 	<ul style="list-style-type: none"> Communication and engagement program, underpinned by science-based data, to build awareness of impacts being caused by feral pigs, and increase understanding of legislative responsibilities 	High	NFPAP 2.1.1	State and local governments, NRM agencies, Indigenous organisations, contractors, industry, NFPAP demonstration sites and land managers	\$\$
	<p>Improving the efficacy of control methods • Range of control methods available but are being inconsistently applied and/or poorly integrated to decrease feral pig impacts • Actions by land managers are largely reactive, ad hoc, fragmented, and short-term</p>	<ul style="list-style-type: none"> Resourcing of feral pig programs lack longevity Land managers disengage with feral pig control programs Economic and social barriers to adoption No specialised training for feral pig management at Certificate level 	<ul style="list-style-type: none"> Maintained social license through best practice management techniques to meet SOPs Maintain and improve current, and develop additional, management tools for efficacy/non-target safety e.g., for 1080 	<ul style="list-style-type: none"> Improve land manager' understanding of what integrated best practice management is and how to apply it Address social impediments to feral pig control, including adoption of integrated best practice management methods by land managers Demonstrate the efficacy of best practice management strategies being used in different landscapes to land managers (supported by demonstration sites) on population and/or impact reduction, including timing of control activities and integration of feral pig management plans into land management 	High	TAP 3.4, 5.1, 6.1 NFPAP 1.1.2, 1.2.4, 2.1.1, 2.1.2, 2.2.2, 3.1.2, 3.2.1, 3.2.2 SEC 6.1, Recommendation 13	State and local governments, Universities, CSIRO, RSPCA, NRM agencies, Indigenous organisations, private land conservation, contractors, industry, NFPAP demonstration sites and land managers	\$\$\$

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	<ul style="list-style-type: none"> Many land managers work individually to control feral pigs 		<ul style="list-style-type: none"> Adoption of effective feral pig management is not unduly constrained by social and regulatory limitations of land managers wishing to control feral pigs Improved skills and knowledge leading to managers effectively applying control methods in a more strategic and efficient manner Increase engagement and involvement of land managers in community-led feral pig management groups on a long-term basis Key messages of reductions in feral pig impacts being achieved are understood by stakeholders and general public Formal vocational training courses available in all states and territories for feral pig management 	activities (property scale) and groups (local/regional scale) <ul style="list-style-type: none"> Investigate feasibility of alternate approaches to humane feral pig control methods Develop network of regional coordinators to coordinate community-led management groups and support adoption of best practice feral pig management by land managers Update/develop resources, including national SOPs and COPs for humane destruction of feral pigs 				
Theme 4 - Monitoring and evaluation in different landscapes								
4.1 Continuous improvement in program effectiveness through effective monitoring and evaluation.	Develop performance measures for impact monitoring <ul style="list-style-type: none"> Lack of standardised measures and methodologies to consistently measure 	<ul style="list-style-type: none"> Poor stakeholder knowledge of outcomes from feral pig control programs being achieved by land managers 	<ul style="list-style-type: none"> Monitoring recognised as a key component of control programs, and funded appropriately 	<ul style="list-style-type: none"> Develop a suite of standardised performance metrics to measure outcomes of control programs on different asset types Demonstrate the use of agreed performance measures by land managers to inform management strategies 	High	TAP 4.1, 4.2, 4.3 NFPAP 3.1.2, 3.2.2, 3.3.1, 1.2.3 SEC 6.9, Recommendation 15	DAWE, TERN Australia, State and local governments, NRM agencies, Indigenous organisations,	\$\$\$

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	<p>outcomes or demonstrate management effectiveness</p> <ul style="list-style-type: none"> • Surveillance and monitoring techniques being developed to provide tools/solutions to land managers to better manage feral pig populations, cost-effectively and efficiently • Where techniques are available, monitoring is underutilised or poorly resourced 	<ul style="list-style-type: none"> • No performance measures in place reflecting difficulty in capturing meaningful, consistent data to use to measure changes in population and/or impacts • Low investment in monitoring of control programs 	<ul style="list-style-type: none"> • Performance metrics agreed and adopted into management programs • Consistent reporting of feral pig management programs in place, using agreed and standardised templates • Benchmarks established and used for KPI reporting by land managers, stakeholders and NFPAP • Increased adoption of FeralScan to improve its information base and usefulness • Effective monitoring techniques that can be used by non-specialist land managers 	<ul style="list-style-type: none"> • Devise field monitoring protocols for different landscapes to improve consistent collection of comparable data (to collect field baseline, assess change, support spatial modelling, etc.) • Develop new technologies/tools and/or enhance uptake of existing technologies to increase land manager engagement and involvement and/or obtain data to inform performance metrics • As part of a consortia, contribute to the development of a centralised recording platform supported by agreed business rules to support sharing of aggregated data and information between different stakeholders 			private land conservation, contractors, industry, NFPAP demonstration sites and land managers	

*Key:

TAP = Threat Abatement Plan for feral pigs (2017)

NFPAP = [National Feral Pig Action Plan \(2021-2031\)](#).

SEC = [Senate Environment and Communications References Committee](#) (2021). Impact of feral deer, pigs and goats in Australia.