







The purpose of this Research, Development and Extension (RD&E) Plan is to identify key priorities that need to be addressed to assist with empowering and supporting community-led groups of land managers to more effectively and cost-efficiently undertake adaptive feral pig management on a sustained, landscape-scale, cross tenure basis.

All land owners have a legal responsibility to take all reasonable steps to prevent the spread of, and if possible eradicate, established pest animals on their land.

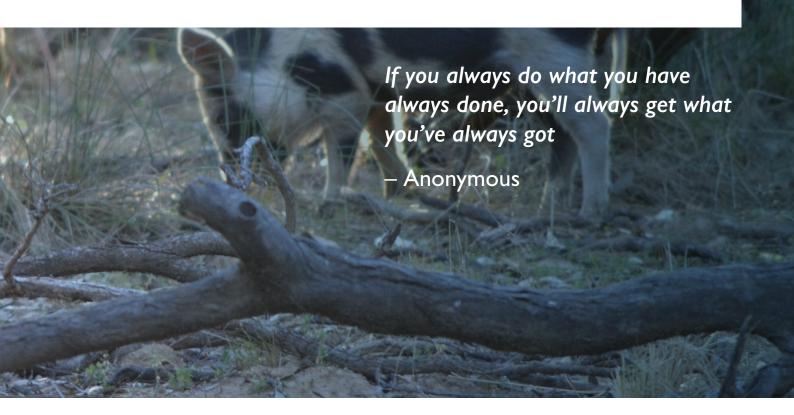
This Plan has been prepared with support and input from the National Feral Pig Action Plan's Implementation Committee, and its sub-committees.

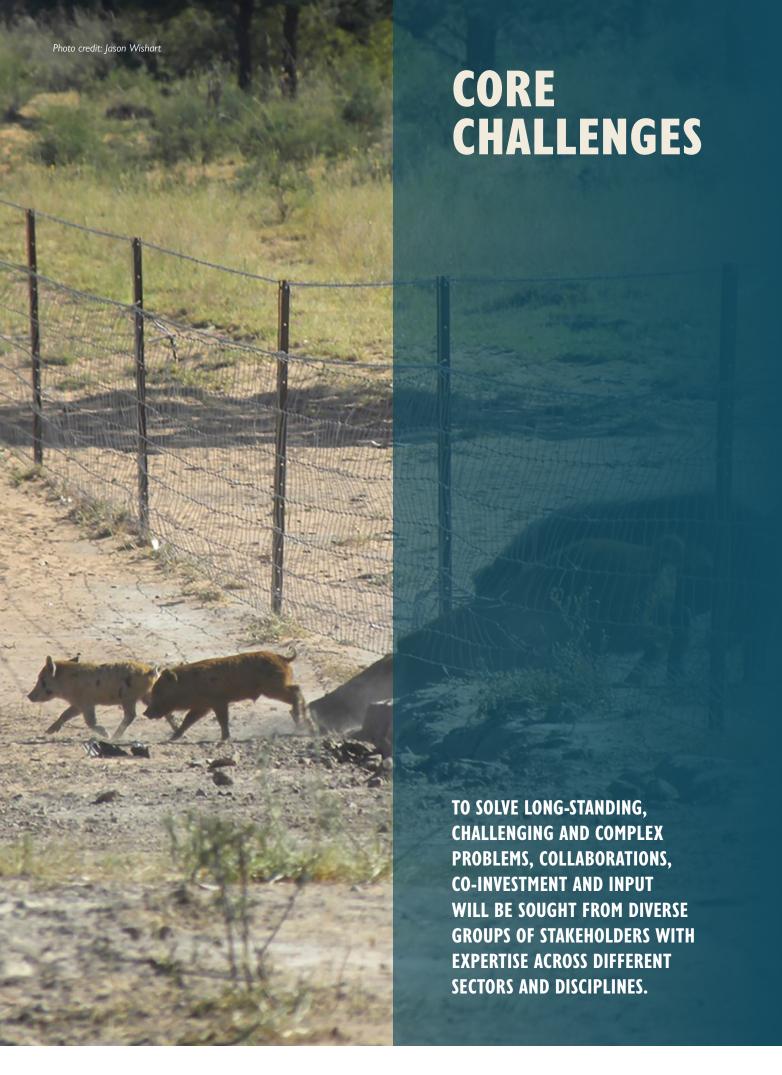
The timeframe of this RD&E Plan aligns with that of the National Feral Pig Action Plan 2021-2031. It may be reviewed and revised as RD&E outputs and outcomes are delivered.

Successful implementation of the National Feral Pig Action Plan 2021-2031 will mean that by 2031:

- Impacts of feral pigs to environment, agricultural, cultural and social assets are actively suppressed through maintenance of low feral pig populations.
- Functional investment models are in place that incentivise land managers to routinely undertake effective, coordinated and collaborative feral pig control programs.
- Expansive and connected networks of coordinated community-led management groups are in place.
- Social licence is maintained for feral pig management actions by land managers.
- Sustained employment opportunities to actively suppress feral pig impacts.

For these ambitious, longer-term outcomes to be realised, many gaps need to be filled.







Land managers not knowing how, where and when to apply the appropriate best practice management techniques to optimise effort and cost-efficiency in their region. Knowledge of density, home range, core home range, movement and distribution of feral pig populations in the landscape at different times of the year is required to inform effective management plans.



Inadequate mechanisms in place that actively encourage and support land managers to work together, undertake ongoing adaptive best practice management approaches, and adopt monitoring to inform their programs.



Limited data is being collected to measure effort, management outcomes on populations and/or impacts that can then be used to stimulate continuous improvement in adaptive best practice management by land managers.



Land managers are unable to determine whether their collaborative feral pig management actions lead to lasting regional changes in feral pig populations and/or impacts.



Limited longevity and resourcing of management programs, coupled with capacity, capability, priority and time constraints of land managers



Determining returns on investment from community-led management programs at a landscape level and to individual land managers is difficult.



# THE FOUR GOALS ARE:



# **Engagement**

Land managers value sustained partnerships with others in using integrated best practice management methods to control feral pigs.

Feral pig management is all about people. Influencing behaviour change of land managers, motivating them to work closely together, and use the full range of feral pig best practice management methods in integrated ways remain key impediments to effective feral pig management.



# Capacity and capability building

Increased capacity and capability of land managers to apply integrated best practice management

Knowledge and skill development is required to support land managers with applying the different best practice management methods for feral pigs, selecting the most suitable management and monitoring tools for their situation, and how to best use them to maximise outcomes and capture quality data. Consistency in training methods should also be applied across states and territories to ensure appropriate use and application of aforementioned tools.



# Impact monitoring

Changes in feral pig impacts and/or populations as a result of coordinated and collaborative best practice management are measured, analysed and reported by land managers.

For area wide adoption, meaningful and practical performance measures are needed to enable land managers to collect appropriate data so that changes to targeted assets and/or population abundance can be monitored over time. Ideally, data should be collected using reliable, cost-effective and robust recording systems that are easy to use and allow data to be collated, aggregated, analysed and shared.



# Informed and strategic control

Management actions are coordinated, strategic and informed by science-based data

Technology is increasingly being used, supported by artificial intelligence and machine learning, to improve resource use and efficiency, optimise effort, and outcomes achieved from feral pig management. Real-time knowledge of feral pig abundance, locations and spatial and temporal movements in locations landscapes is needed. This information will enable feral pig management actions by community-led groups to be done using the most suitable methods at the right places at the right times, maximise the use of limited resources, and enhance local collaborations between private and public land managers.

# HOW TO USE THIS RD&E PLAN

This RD&E Plan aims to present the key RD&E gaps that need to be filled to progress the implementation of the National Feral Pig Action Plan 2021-2031 by stakeholders. Ideally, applications submitted to funding agencies that encompass feral pig management, monitoring and/or stakeholder engagement should outline how they align with the goals of this RD&E Plan and how they will deliver against its priorities. Funding proposals can therefore be tailored to meet the specific grant criteria set by these funding agencies whilst addressing the prioritised feral pig RD&E gaps.

It is important to note that activities to address the RD&E actions listed in the Table overleaf could be done at different scales (i.e. small pilot studies, local, regional, state or national level) to deliver required RD&E outputs and outcomes. The scale and location of activities applied to address an RD&E action and attain the expected outcomes will affect the cost, complexity and timeframes of a project.

This RD&E Plan does not provide a list of feral pig RD&E projects required to address prioritised actions. It is aimed at informing those stakeholders wanting to direct investment and/ or conduct feral pig related RD&E programs. Key stakeholders include, but are not limited to, national, state and local jurisdictions, natural resource management agencies, Indigenous organisations, non-government organisations, industry and community-led groups.

For each activity, subjective ratings have been provided as a guide for cost, complexity, timing and feasibility.



t: Bren Fuller, Whitsunday Regional Council



#### **GOAL 1: ENGAGEMENT**

Objective 1.1: To increase land manager engagement in coordinated, community-led feral pig management groups (NFPAP 1.2.1, 2.1.1, 3.1.2, 3.2.1)

Insights and learnings applied into extension programs to improve participation rates in collaborative programs.

Metrics developed to assess practice change of land managers, over time, in relation to working collaboratively and applying integrated best practice management of feral pigs.



Relative cost\*

Feasibility#







B. Encourage and support land managers to adopt integrated feral pig best practice management.

Practical toolkits developed to provide guidance on how to positively influence land managers to adopt integrated feral pig best practice management.



Relative cost\*





Complexity<sup>†</sup>

Feasibility#





C. Demonstrate benefits to individual land managers from being part of a locally coordinated feral pig management group, using a series of case studies. (Incorporate learnings from 1.1A and B.)

Increased involvement of land managers in locally coordinated feral pig management groups to maximise area wide participation.



Relative cost\*

Complexity<sup>†</sup> Feasibility#





D. Encourage practice change by land managers by incorporating local/regional key influencers into extension and adoption programs.

To embed on-ground best practice management of feral pigs into wholeof-property management calendars to optimise outcomes of control programs.

Improved recognition by land managers that feral pig control is a routine management task, akin to weed control and other farm management activities.







Relative cost\*

Complexity<sup>†</sup>

Feasibility#











E. Develop resources to guide the establishment of community-led feral pig management groups.

Community-led groups are successfully established, with support from the NFPAP.





Relative cost\*

Complexity<sup>†</sup>

Feasibility#















- Short term (1-3 years)
- Medium term (3-5 years) Long term / ongoing (>5 years)



#### \* Relative cost

- Low (Low levels of capacity, time, resources and/or expertise required to complete activity)
- Medium (Moderate levels of capacity, time, resources and/or expertise required to complete activity)
- High (High levels of capacity, time, resources and/or expertise required to complete activity)



#### † Complexity of activity

- Low (activities that are relatively easy to complete)
- Medium (activities that are moderate in their difficulty)
- High (activities with a high level of difficulty, may include a large number of elements to comblete)



#### # Feasibility of achieving expected outcomes

- Low (little degree of control in delivery of expected outcomes).
- Medium (moderate degree of control in delivery of expected outcomes);
- High (able to fully influence delivery of expected outcomes);

# **GOAL 1 Continued: ENGAGEMENT**

Objective 1.2: To build opportunities for peer to peer learning in best practice management by actively engaging and building networks of community-led groups, including NFPAP demonstration sites. (NFPAP 1.2.1)

Test innovative management, monitoring and community engagement approaches to enhance coordinated best practice feral pig management on a landscape-scale, cross tenure basis.

Enable continuous improvement by land managers in integrated best practice management of feral pigs.

Increased partnerships between land managers and stakeholders.

Increased land areas under coordinated and collaborative management.

Improved understanding by land managers of what integrated best practice management means in different regions, and how to consistently and effectively apply different methods in their landscapes.

Demonstrated efficacy and efficiency of best practice management being used in different landscapes on feral pig population and/or impact reduction.

Maintained social licence to use all available best practice management methods, in accordance with state and territory legislation and APVMA permits.







Relative cost\*





Complexity<sup>†</sup>





Feasibility#





# Objective 1.3: To increase linkages and partnerships between coordinated groups of land managers (NFPAP 1.2.2)

A. Establish communities of practice to support collective learning and connect people across different organisations and regions.

Linkages between community-led groups and other stakeholders established to enable collaboration at a catchment/regional scale.

Increased knowledge sharing, social connections and support between different groups of land managers.

Strengthened partnerships with peak industry bodies, State Farming Organisations, Rural Research and Development Corporations, mining companies, non-government organisations and other affected land managers.





Relative cost\* Complexity<sup>†</sup>











# **GOAL 2: CAPACITY AND CAPABILITY BUILDING**

Objective 2.1: To increase the capacity and capability of land managers, including First Nations people, to conduct integrated feral pig best practice management (NFPAP 2.2.1, 2.2.2 and 3.2.2)

A. Conduct practical feral pig management training programs to build skills, knowledge and networks of land managers, including Indigenous Rangers.

Demonstrable increase in knowledge, skills and capability of land managers in how to humanely, competently and confidently use available feral pig best practice management methods in integrated ways.

Increased number of formally qualified people in vertebrate pest management.

Minimised need for Indigenous Ranger groups to outsource feral pig management expertise and skills to manage Country.

Increased capacity and capability to apply feral pig methodologies to participate in future carbon abatement and/or biodiversity markets.



Relative cost\*

Complexity<sup>†</sup>

Feasibility#













B. Develop and implement an extension program for land managers to demonstrate the effectiveness of using combinations of different methods in different areas to reduce feral pig populations.

Increased confidence of land managers in effectively, efficiently and humanely conducting adaptive feral pig management.

Increased ability to actively participate in emerging market opportunities with respect to feral pig management e.g. carbon abatement, biodiversity.





Relative cost\* Complexity<sup>†</sup>

Feasibility#





Objective 2.2: To ensure feral pig best practice management and monitoring training for land managers is available and consistent across providers, and incorporates the most current legislative requirements specific for each state and territory. (NFPAP 2.2.1, 2.2.2)

A. Increase availability of, and access to, formal qualifications for vertebrate pest management (e.g. Certificate III in Rural and Environmental Pest Management) for training providers and land managers.

Extension staff and pest management specialists delivering content to land managers are accredited according to formal qualifications.

All written resources provided to land managers are in accordance with relevant legislation for each jurisdiction and PestSmart.

Land managers and pest management specialists comply with state-level Code of Practice (COP) and Standard Operating Procedures (SOPs) for the effective and humane management of feral pigs, or national COP and SOPs where these documents have not been developed.

















#### **Expected outcomes**

Indicative timing

# **GOAL 2 Continued: CAPACITY AND CAPABILITY BUILDING**

Objective 2.2 continued: To ensure feral pig best practice management and monitoring training for land managers is available and consistent across providers, and incorporates the most current legislative requirements specific for each state and territory. (NFPAP 2.2.1, 2.2.2)

B. Develop and implement training programs to support adoption of endorsed monitoring and surveillance methods (linked with Objective 3.3).

Consistent population monitoring and surveillance methodology routinely and robustly undertaken by coordinated groups of land managers.

Inclusion of monitoring and surveillance methods into recognised training



Relative cost\* Complexity<sup>†</sup>









Feasibility#





#### **GOAL 3: IMPACT MONITORING**

Objective 3.1: To quantify returns on investment flowing to individual land managers from their involvement and participation in local coordinated groups. (NFPAP 1.2.1, 1.2.2, 3.1.3)

Estimate costs of feral pig damage and benefits arising from feral pig management over time, for different agricultural industries and land tenure types, and use this information to inform benefit cost analysis for different land managers.

Increased stakeholder understanding of costs of damage caused, and risks posed, by feral pigs to different agricultural industries.

Benefit cost analysis template available for land managers to quantify returns on investment from coordinated and collaborative feral pig management.

Land managers recognise feral pig impacts and drive the need for more RD&E investment into feral pigs across different agricultural sectors.

Land manager participation in industryled extension and adoption programs to improve their capacity and capability in undertaking adaptive feral pig management.

Increased participation of land managers in local coordinated groups.



Relative cost\* Complexity<sup>†</sup>

Feasibility#





**Objective 3.2:** To drive continuous improvement in feral pig management and monitoring actions over time (NFPAP 3.1.2, 3.2.1, 3.2.2)

Establish performance metrics to measure how land managers are continuously improving the efficacy and efficiency of their best practice management actions.

Performance metrics agreed and incorporated into management programs.

Inclusion of human-focussed metrics into methodologies for carbon abatement and/or biodiversity markets to demonstrate continuous improvement in feral pig management.



Relative cost\*

Complexity<sup>†</sup>







Goals, Objectives and Actions

**Expected outcomes** 

Indicative timing

# **GOAL 3 Continued: IMPACT MONITORING**

**Objective 3.3:** To refine and promote standard operating procedures for monitoring and surveillance by land managers to reliably and robustly estimate local population dynamics and impacts to targeted assets in different landscapes (incorporated into 2.2) (NFPAP 1.2.3, 3.1.1, 3.1.2)

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A. Review population and impact monitoring methodologies (including those developed by TERN Australia) to evaluate their feasibility, effectiveness, practicality, cost and availability for groups of land managers.	Practical methods and metrics developed and available for land managers to measure changes in feral pig populations and their impacts to targeted assets in different landscapes.  Methods and recommendations derived from this activity provided for endorsement to Terrestrial Vertebrate Working Group and Environment and Invasives Committee.  Endorsed methods are published on PestSmart website, supported by links from NFPAP website and resources.  Monitoring and surveillance incorporated into all project agreements to conduct pre- and post-control population monitoring using endorsed methods (commencing with programs funded by jurisdictions).	Relative cost*  Complexity†  Feasibility#	
B. Review digital monitoring tools and systems being used by agricultural industries that could be adapted/applied to assess feral pig impacts (e.g. vegetation change, soil disturbance, carbon sequestration).	Increased frequency of data collection and analysis of feral pig impacts and use of recording systems (including FeralScan) by land managers.	Relative cost*  Complexity†  Feasibility#	
C. Review the effectiveness and costs of different population surveillance methods (aerial and on-ground) and provide recommendations to standardise approaches.	Improved consistency of population monitoring and surveillance studies to enable uniformity in reporting and confidence in population density estimates.  Land managers are better informed of the suitability and costs of different population surveillance methods for their programs.	Relative cost*  Complexity†  Feasibility#	

# **GOAL 3 Continued: IMPACT MONITORING**

Objective 3.3: To refine and promote standard operating procedures for monitoring and surveillance by land managers to reliably and robustly estimate local population dynamics and impacts to targeted assets in different landscapes (NFPAP 1.2.3, 3.1.1, 3.1.2)

D. Capture aggregated feral pig data from locally coordinated management programs by modifying/adapting existing and secured centralised data recording frameworks, such as that developed for the National Koala Monitoring Program funded by the Department of Climate Change, Energy, the Environment and Water.

Business case prepared, including proposed governance rules) for consideration by Terrestrial Vertebrate Working Group and endorsement by the Environment and Invasives Committee.

Support obtained from states and territories to invest in the development of an independent, secure and trusted national centralised database for feral pigs.

Centralised data recording system developed and adopted by coordinated feral pig management groups, jurisdictions and other stakeholders.





Relative cost\* Complexity<sup>†</sup>















**Objective 3.4:** To ensure feral pigs are incorporated into a whole-of-system land management programs (NFPAP 1.2.2, 3.1.2, 3.2.1, 3.2.3)

A. Quantify impacts of feral pigs to prioritised threatened and endangered flora and fauna species.

Biodiversity threats from feral pigs are better recognised by jurisdictions, non-government agencies and philanthropists.

New management programs are initiated to protect biodiversity assets from feral pigs in priority areas.

Ongoing investment into local coordinated programs to protect prioritised native species.

Science-based data collected and reported using standardised performance metrics.

User-friendly tools available detailing threatened and endangered species across Australia being impacted by feral pigs.

Reductions in impacts to flora and fauna species can be calculated preand post- control to ascertain the efficacy of management activities and adapt program strategies, as required.





Relative cost\* Complexity<sup>†</sup>













# **GOAL 3 Continued: IMPACT MONITORING**

Objective 3.4 continued: To ensure feral pigs are incorporated into a whole-of-system land management programs (NFPAP 1.2.2, 3.1.2, 3.2.1, 3.2.3)

B. Quantify the magnitude of damage caused by feral pigs to cultural heritage, values and Indigenous communities.

Cultural values are better protected from feral pigs by sustained management programs through investments from jurisdictions, non-government agencies and philanthropists.









Complexity<sup>†</sup>



Feasibility#



C. Trial cost-effective and practical monitoring technologies and tools, digital applications and data analytics in several coordinated on-ground management programs in prioritised areas.

Incorporation of demonstration sites, wherever possible, due to their leadership in feral pig management, monitoring and community engagement.

Scalable framework that is targeted, tested, collaborative, and sciencebased to effectively reduce feral pig populations to targeted levels.

Proactive land manager involvement in coordinated pilot groups in response to improved local intelligence.

Relative cost\*

Complexity<sup>†</sup>



Feasibility#





Objective 3.5: To increase the longevity of coordinated and collaborative feral pig management programs (NFPAP 3.1.4, 3.2.1, 3.2.2, 3.2.3)

Develop non-prescriptive methodologies for land managers to enable feral pig management to be incorporated into developing frameworks, including carbon abatement and/or biodiversity markets.

Formalised market-based incentives reward land managers for their effective management of feral pigs.

Land managers reinvest funds into community-led coordinated management programs.

Strengthened Indigenous-led / managed programs, supported by providing ongoing on-Country employment opportunities.

Outcomes from coordinated feral pig management programs align with environmental, social and governance (ESG) credentials of investment companies with respect to ESG reporting and offsets.

















# **GOAL 4: INFORMED AND STRATEGIC CONTROL**

**Objective 4.1:** To apply ecological, behavioural and biophysical information of feral pig populations at a local/ regional level into coordinated and collaborative feral pig management programs to reduce, and then maintain, suppressed feral pig populations. (NFPAP 1.2.1, 1.2.2, 3.1.2, 3.1.4, 3.2.1, 3.2.2, 3.2.3, 3.3.1)

A. Increase the use of feral
pig management plans by land
managers and community groups,
to guide strategic and adaptive
management actions.

Optimised feral pig management strategies (regions, timings, methods, intensity of control regimes) are implemented for economic, biosecurity, environmental and/or cultural outcomes.

Improved knowledge to target appropriate timing for feral pig management and use of control methods.





Relative cost\* Complexity<sup>†</sup>





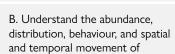












feral pigs by applying / adapting

technologies, tools and systems.

Utilised movement data captured from feral pigs fitted with GPS collars from different studies across Australia to better understand their ecology, behaviour and preferred habitats.

Enhanced local knowledge of the scale of population reduction required.

Influence of sex, site, season, time of day, intensity and frequency of site use, daily movement, home range, core home range and habitat features identified.

Data-based evidence of control effectiveness over time and how it may be influenced by population recovery, learned behaviours, translocation, and/ or immigration.

Insights communicated to land managers through community of practice networks and incorporated into feral pig management plans of community-led groups.

Data being routinely used by land managers to improve decision making, including the choice of the most appropriate on-ground control method(s) to use and their application at the right times.

Data obtained may be used to optimise integrity and robustness of spatial population, habitat suitability, impact and epidemiological models (subject to data sharing agreements).





Relative cost\*







Complexity<sup>†</sup>









# **GOAL 4 Continued: INFORMED AND STRATEGIC CONTROL**

**Objective 4.1 continued:** To apply ecological, behavioural and biophysical information of feral pig populations at a local/regional level into coordinated and collaborative feral pig management programs to reduce, and then maintain, suppressed feral pig populations. (NFPAP 1.2.1, 1.2.2, 3.1.2, 3.1.4, 3.2.1, 3.2.2, 3.2.3, 3.3.1)

C. Trial strategic management
approaches, cost-effective and
practical monitoring technologies
and tools, digital applications and
data analytics (using identified
monitoring technologies, tools
and data analytics from Action
3.4C) in several coordinated on-
ground management programs in
prioritised areas.

Land managers can strategically plan to target feral pigs at known locations using the most suitable combinations of control methods at the right time(s) to effectively and efficiently remove feral pigs.

Incorporation of demonstration sites, wherever possible, due to their leadership in feral pig management, monitoring and community engagement.

Scalable framework that is targeted, collaborative, and science-based delivered to effectively reduce feral pig populations to targeted levels.

Cost-effective use of best practice management methods to remove feral pigs.

Proactive land manager involvement in locally coordinated groups in response to improved and informed feral pig management.

Cost estimates to achieve defined management objectives determined at a regional scale and shared with project stakeholders.

Comprehensive business case developed for feral pig management to support planning and policy development for long term coinvestment into feral pig management.





Relative cost\*







Complexity<sup>†</sup>





Feasibility#





D. Investigate potential regional impacts of climate change on feral pig population dynamics and threats to targeted assets.

Increased knowledge incorporated into habitat suitability and population distribution modelling.

Use of outputs to adapt management strategies and optimise use of available resources to control threats and populations.





















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