10–YEAR NATIONAL INVESTMENT **PLAN FOR WEEDS RESEARCH, DEVELOPMENT & ENGAGEMENT 2020–2030**

FOR THE CENTRE FOR INVASIVE SPECIES SOLUTIONS

CATALYSE CREATE CONNECT

EXPOSURE DRAFT

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Why an exposure draft?

This 10-year National Investment Plan for Weeds R,D&E exposure draft has been prepared by the Centre for Invasive Species Solutions following an Australian Government request.

This is the Centre's national plan; national in scope and national in collaboration.

The exposure draft is based upon an initial analysis of the state of weeds R,D&E funding in Australia, and initial Australia-wide consultation.

The Plan is a decadal plan covering 2020-2030, and it is important that the consultation continues to ensure the Plan has impact.

> This Plan seeks to guide collaborative investments, not to redefine, duplicate or make redundant existing weed strategies and plans. Where there are relevant strategies that cover environmental benefits and landscape scale industry activity—such as the Australian Weeds Strategy 2017-2027, the Environment and Community Biosecurity RD&E Strategy, and the Meat Industry Strategic Plan— the Plan intends to augment, enhance or otherwise add value to these.

Who can provide feedback on this paper?

Anybody interested or involved in weeds research, management, policy or practice can provide feedback. Feedback can take any format, but should be provided by no later than 28 February 2019 to: weeds@invasives.com.au

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VISION

WE ENVISAGE SUSTAINED, POSITIVE HIGH IMPACT WEED RD&E ENABLING THE RIGHT ACTIONS IN THE RIGHT PLACE AT THE RIGHT TIME

MISSION

WE WILL PROVIDE ONGOING PIPELINES OF KNOWLEDGE THROUGH CREATING AND ENABLING THE SHARING OF WEED MANAGEMENT INNOVATION

Objective 1: Catalyse

Catalyse innovation and action that might not otherwise occur through shepherding sustained RD&E co-investment and collaboration

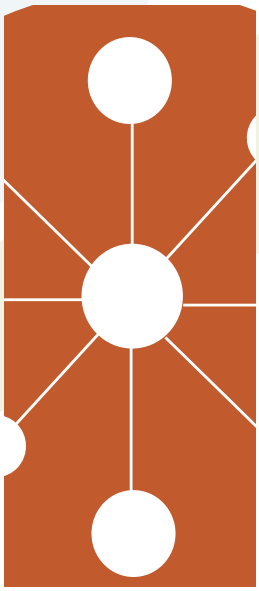
Objective 2: Create

Create rigorously tested, evidence-based tools and methods to enhance the effectiveness of weed management efforts and expedite their time to impact

Objective 3: Connect

Connect people and institutions through collaborations and networks to share knowledge and experience

Domain 1: Weed Incursions	Domain 2: Integrated Landscape Management	Domain 3: Control Technologies	Domain 4a: Human and Institutional Dimensions	Domain 4b: Adoption Pathways
This domain focuses on prevention, detection and response systems	This domain focuses on integrated landscape management and weed control methods	This domain focuses on increasing control options and embedding these into ongoing management regimes	This domain focuses on improving the human and institutional aspects of the management of weeds, informing policy and industry adoption	This domain focuses on effective information tools, communication and adoption pathways for cost–effective weed management



A 10–year plan for impact

The need:

The weed problem is not going away:

- The weeds of the future are already here among the 26,000 exotic plant species now in the country
- Between 10 and 20 exotic plants naturalise every year
- Weeds cost industry around $4.3 billion per annum (*McCleod 2018*)
- Australia's parks, reserves, world heritage sites, rivers, wetlands, coastlines and other environments are being invaded by weeds; eroding their uniqueness and values
- The impact of weed R,D&E has been dampened by boom bust funding cycles

Why now

The next weeds R,D&E bust could be as early as 2020!

There has always been a significant baseline level of investment made across some aspects of weeds RD&E, particularly within State government agencies. However, this baseline doesn't extend to all areas of R&D. In recent decades, for example, weed biocontrol R&D has relied on opportunistic program funding (booms). Unfortunately there is often a lack of investment continuity from one program to the next, and in the case of biocontrol this has meant specialist scientific staff cut backs and loss of capacity after program funding ends (busts) – see table. Each subsequent boom is serviced by a smaller pool of capacity, and while it can grow, it rarely reaches previous levels and over time diminishes.

In other words, if R,D&E capacity is to be built up to and maintained at levels sufficient to provide the pipeline of tools to address a continuously growing weeds problem, alternative investment flow models that smooth out boom-bust cycles need to be in place (see figure on page 6).

SPECIALIST (SCIENTIFIC) FTEs* INVOLVED IN BIOCONTROL R&D (EXCLUDES TECHNICAL AND EXTENSION FTEs)			
ENTITY	Late 1980s - early 1990s	2014	2018
CSIRO	17	2	5
QUEENSLAND	9	1.5	3
VICTORIA	8	2	3
TASMANIA	1	0	0
NEW SOUTH WALES	2	0.5	1#
NORTHERN TERRITORY	2	2	1
TOTAL	39	8	13

Source: Palmer et al (2014) updated Dr Louise Morin CSIRO pers com 2018
**The current FTEs associated with NSW biocontrol R&D is 7 (NSW DPI Weeds RD&E Strategy 2016-2021), however for consistency with previous published work, the figure here excludes technical, post-doc and extension FTEs.*

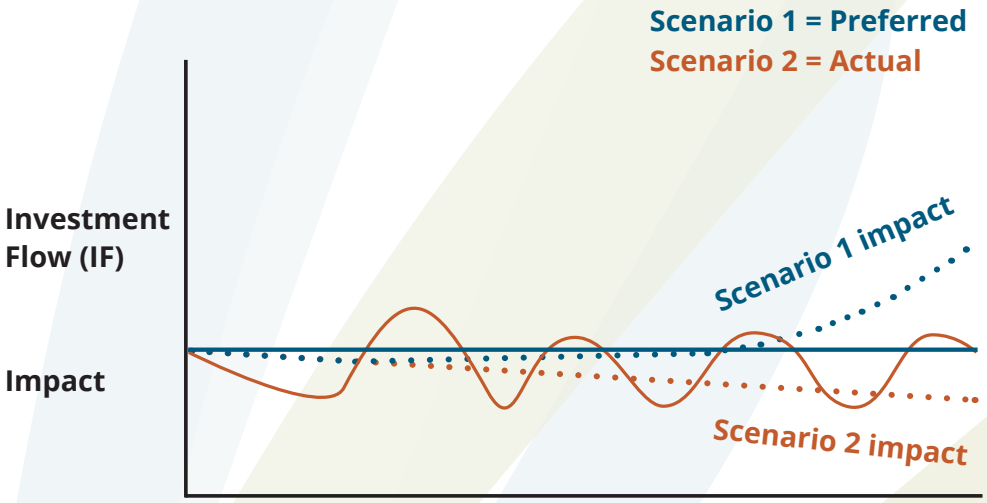
The opportunity

To reduce the huge negative impacts of weeds, governments and industry have committed to major 2030 targets. For example, the Meat Industry Strategic Plan commits to invest in research and innovation to reduce weed and pest impacts by $150M a year, while the National Biodiversity Strategy 2010-2030 commits governments to reducing impacts on biodiversity from invasive plants and animals by 10 per cent.

There is a need for coordination of R,D&E and enabling communities to access the results of R&D. There is also a need to combine formal R&D with local expertise and experience, and to share this experience. These needs have been strongly conveyed to the Centre for Invasive Species Solutions in the preparation of this Plan.

At the same time, the national biosecurity system continues its reach across industries and communities and provides potential to strengthen linkages, co-investment and shared responsibility for a shared problem. The review of the Intergovernmental Agreement on Biosecurity has highlighted the need to balance Australia's biosecurity focus across economic and environmental challenges. The inclusion of a national Environment and Invasives Committee Weeds Working Group within the overall national biosecurity framework bodes well for enhanced national attention on weeds.

Conceptual model of alternative weed investment flows



This conceptual model suggests that for an equal investment over time impact will be higher where the investment is consistent rather than boom-bust, given loss of capacity after each bust.

The objectives

This plan aims to put in place an enduring model (at least ten-years) of co-investment to enhance the impact of current and future weed management efforts, particularly where these address the RD&E priorities of the Environment & Invasive Committee and of the Australian Weed Strategy 2017-27.
The three key objectives of the Plan, and hence giving the Plan its title, aim to:

1. **Catalyse** innovation and action to occur that might not otherwise through shepherding sustained RD&E co-investment and collaboration
2. **Create** rigorously tested, evidence-based tools and systems to enhance the effectiveness of weed management efforts and expedite their time to impact
3. **Connect** people and institutions through collaborations and networks to share knowledge and experience

The outcomes

The main outcomes or deliverables from this Plan include:

- adoption of best practice in national incursion management, including prevention, early detection, and adoption of risk-based surveillance systems
- R&D support for integrated landscape management approaches that target multiple species with multiple control techniques at the regional scale
- reduction in the impacts of established weeds through a strategic pipeline of control tools, including biocontrol, integrated with industry and community delivery
- improvement in the human and institutional aspects of weed management including through enhancing communities, industries, and organisational capacities
- enabling adoption of cost-effective weed management through better information and communication systems

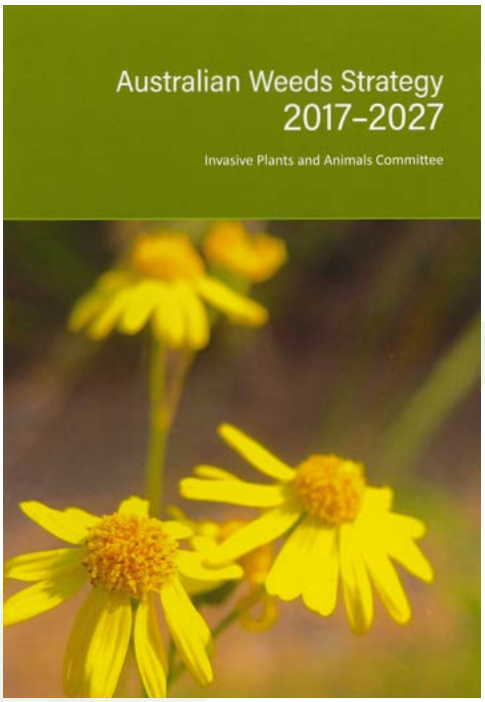
Focus and scope of the Plan

This Plan seeks to guide collaborative weed RD&E investments, not to redefine, duplicate or make redundant existing weed strategies and plans. Where there are relevant strategies that cover environmental benefits and landscape scale industry activity—such as the Australian Weeds Strategy 2017-2027, the Environment and Community Biosecurity RD&E Strategy, and the Meat Industry Strategic Plan— the Plan intends to augment, enhance or otherwise add value to these.

The operating and funding environment for weeds RD&E is complex with many actors involved. This Plan is positioned so that it does not add to this complexity but rather seeks to:

- improve coordination across the spectrum of actors and factors involved in weeds RD&E through the provision of collaboration, information and networking platforms
- address those priorities of the national biosecurity system which are not sufficiently covered by existing efforts through working closely with the Weeds Working Group of the Environment and Invasive committee under the national biosecurity framework
- invest in public good priorities that deliver shared environmental and production benefits at the landscape scale, particularly where there is market and institutional failure, through forming collaborations at the investment and RD&E activity levels applying appropriate investment principles outlined in this Plan

Strategic alignment to other strategies and plans



The Australian Weeds Strategy (AWS) 2017-2027 provides a strategic framework for weed policy, management and RD&E for the next decade. As such, the AWS is the key national strategy that guides the priorities of this Plan. To a significant degree the Plan seeks to implement the R&D aspirations of the AWS.

The AWS is not the only framework that will guide this Plan. Others include specific strategies and plans under the national biosecurity system, as well as key industry priorities where these industries, such as Meat & Livestock Australia, have previously given an in-principle commitment to co-invest. Plant Health Australia and Animal Health Australia each have Biosecurity RD&E Strategies but these tend to defer RD&E roles to the relevant industry R&D organisation. In the case of the Plant Biosecurity RD&E Strategy, it is made clear that environmental weeds are not included in the scope of the strategy.

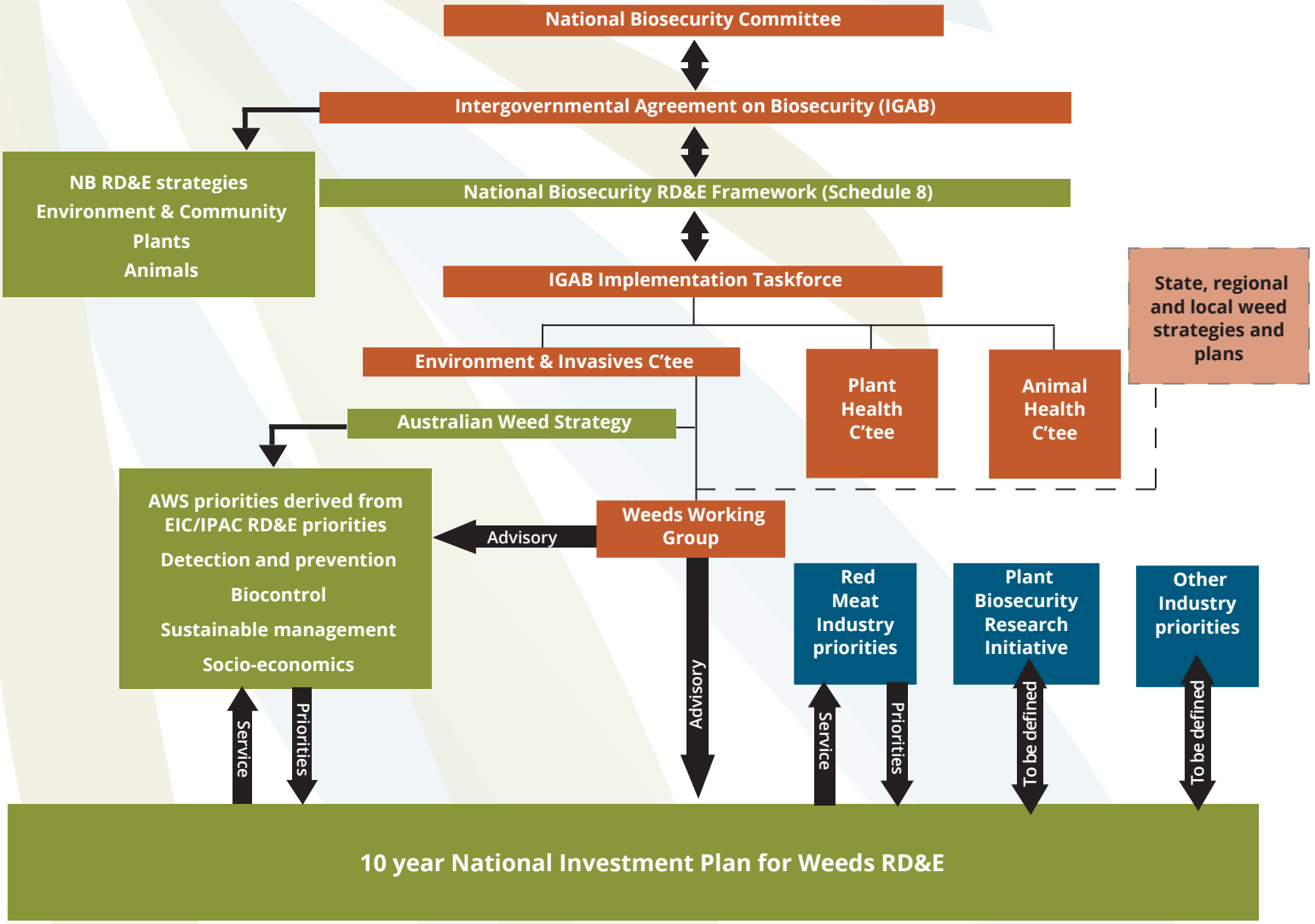
As important as aligning to the priorities of other institutions is the need to avoid duplication creating community confusion. For this reason, the collaborative governance arrangements outlined in the Plan (page 25) include mechanisms for regular communication and coordination with those involved in the Plan's activities as well as those not directly involved in the plan but whose interests and activities intersect with it.

DOMAIN	Australian Weed Strategy	National Biosecurity RD&E Framework	Environment and Invasive Committee R&D priorities	National Environment & Community RD&E Strategy	Plant Biosecurity RD&E Strategy	Animal Biosecurity RD&E strategy	Red Meat Industry priorities
1. Weed incursions	High	High	High	High	Medium	Low	Medium
2. Integrated landscape management	High	High	High	High	Medium	Low	High
3. Control technologies	High	High	High	High	Low	Low	High
4a. Human and institutional dimensions	High	High	High	High	Low	Low	High
4b. Adoption Pathways	High	High	High	High	Low	Low	High

High = direct and strong alignment with agreed and published strategies

Medium = inferred alignment with published strategies

Low = no clear alignment with published strategies


National Biosecurity Committee
Intergovernmental Agreement on Biosecurity (IGAB)
NB RD&E strategies
Environment & Community
Plants
Animals
National Biosecurity RD&E Framework (Schedule 8)
IGAB Implementation Taskforce
State, regional and local weed strategies and plans
Environment & Invasives C'tee
Plant Health C'tee
Animal Health C'tee
Australian Weed Strategy
AWS priorities derived from EIC/IPAC RD&E priorities
Detection and prevention
Biocontrol
Sustainable management
Socio-economics
Advisory
Weeds Working Group
Red Meat Industry priorities
Plant Biosecurity Research Initiative
Other Industry priorities
Service
Priorities
Advisory
Service
Priorities
To be defined
To be defined
10 year National Investment Plan for Weeds RD&E

A call for collaborative action

For the Commonwealth:

The Australian Government plays a role in R&D by providing investment where there is a public benefit, such as where high value public assets are at risk. In the case of weed R&D investment, public benefit aligns to Australia's commitment to the United Nation's Convention on Biological Diversity. In 2016, the National Biosecurity Committee stated the Australian Government will support R&D for more effective pest and disease management where there are demonstrable clear pathways for the adoption of innovation, community and/or industry commitment and ownership of the research and its outcomes, and in accordance with government investment principles requiring that beneficiaries contribute in proportion to benefits received. [1] The review of the Intergovernmental Agreement on Biosecurity made recommendations on the need for national investment in biosecurity RD&E, particularly cross-sectoral issues.

For industries:

Most primary production industries already invest in weeds RD&E through commodity based Rural Industry Investment Funds (managed through the R&D Corporations and related industry companies) and through various forms of cross industry collaborations. There is no convincing argument to divert this funding from existing programs, which are largely directed towards on-farm production cost reductions resulting in private benefit. However some industries, such as livestock industries, operate at landscape scales and choose to collaborate in areas where impact and management responsibilities are blurred. Here, collaborative and co-investment models between industry and government can achieve a critical mass of effort to be effective and provide the desired mix of public and private benefits.

For State Governments:

Under Australia's Constitution, State and Territory Governments have responsibility for land and water resource management, including weed management. As such, they are closer to the coalface of weed management, and in aggregate are the biggest investors in both on-ground weed management and weed RD&E. Often this investment duplicates or could be better informed by the experience of other States, or could be coordinated across States to achieve the critical mass needed to enhance impact. National approaches that efficiently allocate resources and share costs, lessons and benefits are critical to reducing the burden on individual State budgets.

For communities:

Weed-focused community action groups, Landcare groups, NRM Boards and the like facilitate cooperative interventions at scales needed to make a difference beyond individual backyards and farms. For the people associated with these, timely information and confidence in its efficacy are the critical ingredients of success. Moreover, while access to Best Management Practice is important, the challenge of adapting them to local circumstances can be hard; hence networking and accessing the experience of others is important. Communities can benefit from national information platforms, but they can also play a vital role in strengthening these platforms so that they meet a diverse range of expectations and provide programmatic, tried and tested solutions.

1 National Biosecurity Committee 2016, National framework for the management of established pests and diseases of national significance, Department of Agriculture and Water Resources, Canberra

The Investment framework

Investment principles and how they will be actioned

The over all investment proposed by this Plan is founded on a logical framework and a set of guiding principles to inform decisions. The principles and application of these will be overseen through a collaborative governance structure (outlined further on page 25) where co-investors ensure alignment to key government, industry and community priorities. The guiding principles include:

Principle 1: Focus on causes, not symptoms

How: By defining root causes of problems with stakeholders and using this to tailor the RD&E activities and co-investment share accordingly

Principle 2: Align investments with agreed national priorities, such as the priorities identified in the Australian Weed Strategy (AWS), and invest to meet these priorities

How: By adopting the AWS as a key guide for investment and working with the EIC Weeds Working Group (WWG) to guide, monitor and assess progress. This will also ensure that national activities can be connected to State and regional plans through the cascading links with the relevant representatives on the WWG

Principle 3: Invest in high impact, public benefit outcomes and in activities that pass the national interest test; and by rallying co-investors around collaborative activities to facilitate a critical mass of effort

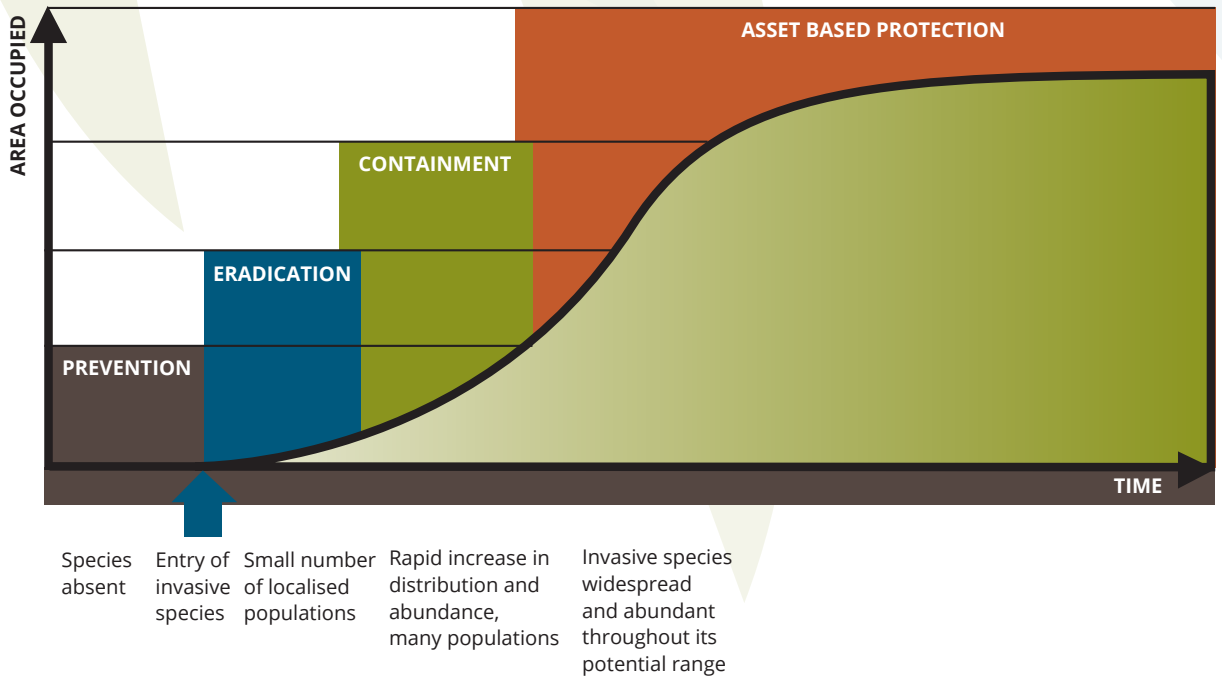
How: By underpinning investments with scoping and feasibility assessments and benefit cost analyses of economic, social and environmental returns. These will provide the basis for identifying the appropriate collaboration and co-investment arrangements

Principle 4: Balance investments across the invasion curve (see figure below) from prevention at the border to reducing the effects of established weeds

How: By applying existing and emerging incursion assessment tools within pre-project scoping studies to determine project efficacy and fit with national priorities. Also by consulting with the EIC WWG to ensure activities address critical points along the invasion curve

Principle 5: Clearly define the risks to be addressed, with subsequent investment proportional to the risks

How: By incorporating risk assessment into the investment decision frameworks and under collaborative governance oversight



Investment priorities

As previously indicated, the Plan will take its direction from a number of national strategies, key of which is the Australian Weeds Strategy (AWS) 2017-2027 and national invasive species RD&E priorities adopted by the Enivronment and Invasives Committee.

The AWS outlines three goals—each with multiple priorities that help guide this Plan:

Goal 1 focuses on prevention, detection and early intervention with priorities on:

- effective risk-based approaches to pre-border and border activities
- a consistent risk assessment and prioritisation approaches within Australia
- early detection, diagnostics and monitoring systems

Goal 2 focuses on minimising the impact of established weeds with priorities on:

- national coordination, investment and management of weed impacts
- coordinated management approaches across all land tenures
- commitment to weed containment
- enhancing weed control techniques and integrated management options

Goal 3 focuses on enhancing capacity and commitment to weed management with priorities on:

- developing the knowledge, capacity and commitment of key stakeholders
- long-term research, development and extension capacity and capability
- national data, information and knowledge infrastructure to support effective management
- institutional arrangements and decision support resources to increase the effectiveness of weed management

Investment distribution

This Plan addresses each of the AWS priorities through a combination of ensuring that RD&E activities align appropriately to the invasion curve and across Domains of RD&E activity.

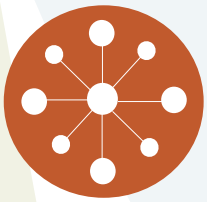
In a national planning workshop, government, industry and community stakeholders envisaged the Plan would distribute its investments relatively equally across the four segments of the invasion curve (see adjacent Figure).

INVASION CURVE SEGMENT	PROPOSED ALLOCATION
1. Eradication and prevention—deliberate or accidental release into the natural environment	Range of views: 15-26% Average for segment: 22%
2. Containment, eradication—naturalising, but with limited spread	Range of views: 10-35% Average for segment: 22%
3. Asset based protection, containment—increasing abundance and dispersal	Range of views: 25-35% Average for segment: 32%
4. Asset based protection, containment—increasing abundance and dispersal	Range of views: 15-35% Average for segment: 25%

To achieve these outcomes, the Plan is structured into four Domains of RD&E:

1. **Weed Incursions.** This domain focuses on prevention, detection and response systems

2. **Integrated landscape Management.** This domain focuses on integrated landscape management and weed control methods



3. **Control Technologies.** This domain focuses on increasing control options and embedding these into ongoing weed management regimes

4a. **Human and institutional dimensions.** This domain focuses on improving the human and institutional aspects of the management of weeds, informing policy and industry adoption

4b. **Adoption pathways.** This domain focuses on effective information tools, communication and adoption pathways for cost–effective weed management

Domain 1:

Weed incursions

Rationale

A focus on incursions enables both better prevention tools and systems and early interventions to improve outcomes. Committing to this overcomes the historic tendency for skewing investment to established weed problems.

The proportional under-investment in prevention, where the greatest returns can be achieved, was highlighted as a matter of concern by the independent review of Australia's biosecurity system (Craik, Palmer and Sheldrake 2017).

Scope

This domain involves the development and deployment of best practice tools and systems for early detection and prevention through use of risk-based surveillance systems. This domain ensures investment targeted to understanding and applying techniques focused on prevention of new weed introductions, movements within Australia or establishment.

Outcomes

This domain will reduce the impacts of weeds through adoption of best practice incursion management systems, risk-based surveillance systems and deployment of rapid and cost-effective responses.

Activities

Subject to further stakeholder consultation, potential activities include:

- reviews and synthesis of best practice in incursion prevention and management systems (overseas, other biosecurity sectors, health, emergency)
- development of new tools and techniques to prevent and manage incursions
- technical, policy and legal dimensions of detection and prevention systems
- technical and policy guidance for early responses, aligned to and building on the National Environmental Biosecurity Response Agreement and emergency response procedures already in place
- professional capacity building and guidance across species, regions and jurisdictions in risk based surveillance, prevention methods and interventions
- strategic pathway assessment to prevent incursions and inform responses at national, state and regional scales

Eradication is possible with early detection and ongoing response

Mouse-ear hawkweed (Hieracium pilosella) native to Europe, is highly invasive in New Zealand, North America and Japan. Four incursions are documented from Australia, all subject to eradication. If it were to spread, hawkweed would have severe conservation and agricultural consequences throughout south-east Australia.

In December 2014, a bushwalker discovered a small infestation of hawkweed in Kosciusko National Park and reported it to the NSW National Parks and Wildlife Service (NPWS). A subsequent investigation confirmed an infestation which covered 150m2.

The incursion response was led by NPWS, and within six days of identification the site was quarantined, mapped and the weed controlled. The surrounding area was surveyed, and monitoring plots were established to determine the response of hawkweed to the herbicides used and ensure no re-establishment. Surveillance continued with the assistance of the NSW Weed Eradication Detector Dog team, which discovered three new plants within 100m of the core infestation area that are now controlled.

Since then, further surveillance has continued, with drones being trialled as a high-tech method of surveying inaccessible areas of places like Kosciusko. Only when every individual plant has been located and controlled, and the seedbank is exhausted, can hawkweed be considered eradicated.

Source: Invasive Plants and Animals Committee (2016), Australian Weeds Strategy 2017 to 2027, Australian Government Department of Agriculture and Water Resources, Canberra.

Domain 2:

Integrated landscape management

Rationale

Established weeds cause considerable costs to agriculture, threaten natural systems and can affect community wellbeing. Moving from a focus on species or specific control techniques to approaches
based on integrated management, and focused on outcomes rather than problems, helps to deal with many weeds (and even other issues) by combining different techniques simultaneously or in sequence. Such approaches try to have managers across different land uses within a catchment or region coordinate actions to reduce the impacts of weeds. As such, management at this scale depends upon community, industry and NRM organisation led solutions.

Scope

Planned investment in this domain focuses on systemic approaches applied at the bioregional or landscape scale. These often rely on sustained interventions that make conditions less suitable to targeted weed species, including shading, grazing and fire regimes and competition, coupled with other control techniques, particularly herbicides. Ecosystem managers faced with multi-species invasions need cost-effective management techniques. In grazing systems, decision tools can help inform profitable and integrated approaches. RD&E on understanding the landscape ecology of weeds, developing practical solutions and getting them adopted will underpin integration of landscape management approaches suitable for pastoralism and agriculture, environmental managers and communities.

Outcomes

This domain will contribute to reducing economic, environmental and social costs of established weeds through industry and community driven RD&E at catchment and regional scales.

Activities

Subject to further stakeholder consultation, potential activities include:

- developing communities of practice within NRM regions to deliver integrated approaches, including through the adoption of new technologies developed in Domain 3
- support for regional trials and case studies of bioregional and NRM approaches
- large scale industry and community mobilisation on multi-technique strategies

Climate and weather shifts as drivers of weed spread and management

Shifts in climate are likely to influence weed species' distributions in Australia. Extensive modelling of species' distributions for southern Australia is indicating a southern shift*.

A major adaptation response to a range of NRM challenges, including climate, is increased landscape connectivity, but this presents a major opportunity for increased weed invasion.

Moreover, temporary shifts associated with climate variability can also spread weeds. This can occur during drought, for example, as stockfeed is moved from one part of Australia to another. This feed may be contaminated by weeds if strong biosecurity protocols are not implemented.

** Scott JK, Murphy H, Kriticos DJ, Webber BL, Ota N and Loechel B (2014). Weeds and Climate Change: supporting weed management adaptation. CSIRO, Australia.*

Domain 3:

Control technologies

Rationale

Irrespective of the need to move towards integrated landscape management of weeds (Domain 2) or to implement targetted responses, mitigation of weeds is costly and not always effective. There will continue to be a demand for a range of weed control options that can be used alone or in combination.

Chemical (herbicide) options have been pursued commercially by industry for agricultural related application, while classical biological control options have received support from government and industry for agricultural and environmental outcomes. Technological advances in cognate areas of science and engineering are also becoming available as options for weed management. Refining and adapting technologies such as robotics / drones so they are fit for purpose in weed detection and control will require ongoing R&D.

Scope

This domain proposes nesting a range of control technologies, including biocontrol, within a wider network of land managers and practitioners involved in applying, monitoring and managing these technologies. These investments will be enhanced by industry and community engagement and delivery and deploying control options within integrated programs of landscape management.

Outcomes

This domain contributes to the reduction of the impacts of established weeds through control technology R&D integrated with innovative landscape scale and community engagement.

Activities

Subject to further stakeholder consultation, potential activities include:

- establishment of cost-effective pipeline of biocontrol agent screenings and introductions, including use of latest technologies to streamline agent selection & screening (modelling, molecular, genetic)
- prioritisation of weed targets, considering impact of weed & feasibility and likelihood of success of a range of control options
- development and / or adaptation of high tech detection and control technologies where there are public benefits

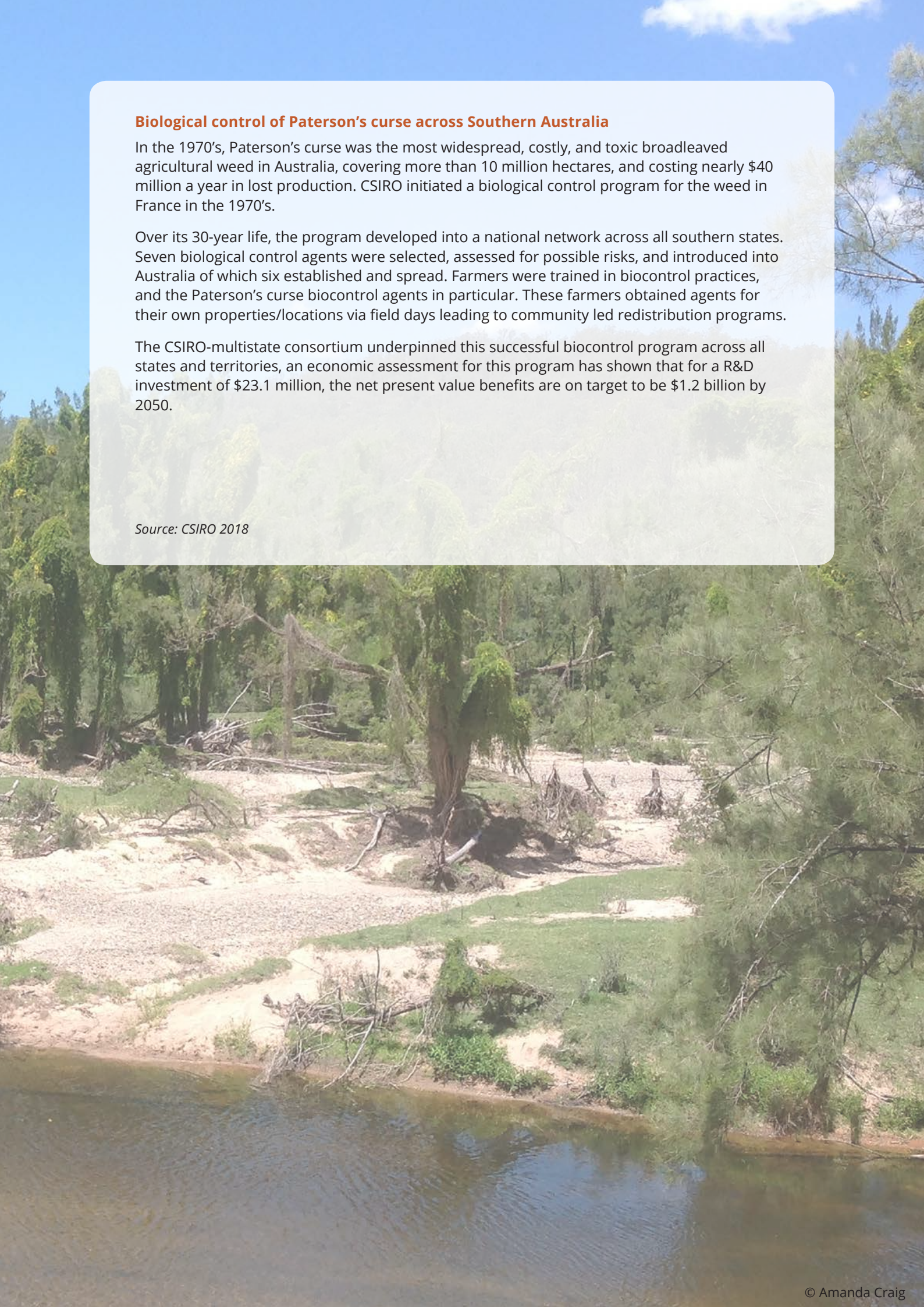
Biological control of Paterson's curse across Southern Australia

In the 1970's, Paterson's curse was the most widespread, costly, and toxic broadleaved agricultural weed in Australia, covering more than 10 million hectares, and costing nearly $40 million a year in lost production. CSIRO initiated a biological control program for the weed in France in the 1970's.

Over its 30-year life, the program developed into a national network across all southern states. Seven biological control agents were selected, assessed for possible risks, and introduced into Australia of which six established and spread. Farmers were trained in biocontrol practices, and the Paterson's curse biocontrol agents in particular. These farmers obtained agents for their own properties/locations via field days leading to community led redistribution programs.

The CSIRO-multistate consortium underpinned this successful biocontrol program across all states and territories, an economic assessment for this program has shown that for a R&D investment of $23.1 million, the net present value benefits are on target to be $1.2 billion by 2050.

Source: CSIRO 2018



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Domain 4a:

Human and institutional dimensions

Rationale

Factors that enable development and deployment of best management practices for weeds span
from reform of government policies, through communities of practice, to individual enterprise or community adoption. This domain seeks to value-add to the other domains by enabling adoption, continuous learning and adaptation.

Scope

Engaging governments, industries, landholders and others to achieve maximum long-term reductions in impact of weeds. The domain focuses on the many complex socio-economic, institutional and policy dimensions of weeds, including through enhancing agency and industry performance and professional capacity.

Outcomes

This domain contributes to improvement in the human and institutional aspects of the management of weeds by better understating the drivers for action and the approaches and incentives needed to modify behaviours.

Activities

Subject to further stakeholder consultation, potential activities include:

- improvement in the human and institutional aspects of the management of weeds by better understating the drivers for action and the approaches and incentives needed to modify behaviours
- investigation of triggers for effective behaviour across scales and region
- building networks at scale to move towards a national and regional coordinated effort
- development of frameworks for making networks and connections - linking and enhancing capabilities across activity spectrum from farmer / local government / researcher / policy developer / agency manager
- support communications, education and mobilising interest and investment

A wealth of experience to work with

Australians are renowned for resourcefulness, pitching in and responding collectively in the face of adversity. The challenge of weeds has been no exception, with community-based groups such as Landcare, the Australian Association of Bush Regenerators and the Council of Australian Weed Societies (CAWS) through to weekend 4-wheel drive and other bush appreciation clubs coordinating the bulk of human capacity thrown at on-ground weed management.

Some of the more institutionalised groups, such as CAWS and its State-based affiliates, play an important role in networking on-ground weed managers, scientists and representatives of the various regulatory and policy agencies. This networking of the various actors is fundamental to the success of any national weed initiative.

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Domain 4b:

Enabling adoption networks and communications

Rationale

R&D only goes so far. There is a need to facilitate the effective communication and resourcing of ways to ensure adoption of R&D outputs that will result in meaningful outcomes for specific user groups.

For example, R&D targeting pre-border risk assessments may be packaged into management systems for biosecurity services, while a program focused on community and industry engagement in biocontrol dispersion may be packaged in entirely different ways, targeting different managers and citizen science and farmer groups.

Scope

This domain will ensure that research generated innovations will lead to effective changes in management practice.

The communication, packaging, refinement and testing of techniques sits within this domain—it is therefore synergistic with all other domains. This domain specifically focuses on how to meet the needs of users of the R&D, and how to package and communicate outputs to enable extension.

PestSmart, Feralscan and the Atlas of Living Australia biocontrol portal are three digital platforms that provide an avenue for data, information and knowledge sharing and delivery. Systematic convergence of existing weed management and information sources into a single harmonised platform is a high priority of the Australian Government.

Outcomes

This domain will contribute to cost-effective weed management through the skilful communication of new and improved techniques and management systems, including through enabling adoption networks.

Activities

Subject to further stakeholder consultation, potential activities include:

- development of a national weeds portal to access data and information about best management practice, and to share on-ground management experience
- support for communities of practice to deliver integrated approaches
- support to enable citizen science networks

How PestSmart facilitates adoption of invasive species management

Over 2015 to 2017, the former Invasive Animals CRC led and set up a national communications network to coordinate messaging and communication outputs regarding the national release of the rabbit biocontrol RHDV1 K5.

The PestSmart digital platform played a central role in enabling the tailored communication tools of state and territory governments to be accessible to the farmers, community groups and agencies involved in the K5 release at 600 sites across the country in March 2017.

As one of the more significant and high-profile biocontrol releases in recent years, the PestSmart platform provided the constant update of information required for a successful coordinated release as well as for full public transparency of the process.

Analysis of preliminary data across the public release sites suggests feral rabbit populations were reduced by 38 per cent at those sites.

The experience and lessons learnt from the release are being evaluated by those involved in other areas of biocontrol, such as for weeds.

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Draft performance indicators

DOMAIN	SHORT TERM KPI (TO 2022)*	LONG TERM KPI (TO 2030)*
1. WEED INCURSIONS	Best practice management pathway intervention tools are available to prevent new weed introductions Surveillance systems are available to detect new weed incursions Weed eradication tools and/or decision support systems are available to apply	y end users have adopted tools x end-users have adopted the systems and processes and/or y of weeds detected Decline in weed incursion rate
2. INTEGRATED LANDSCAPE MANAGEMENT	Baselines methods for measuring the condition of landscapes are established Protocols for collation, harmonisation and analysis of spatial distribution (maps) are in place and utilised nationally Landscape management tools are available, and integrated weed management practices are being adopted	There is a measurable and comparative improvement to the baseline weed burden and landscape condition Cost efficiency /return on investment targets have been met The national costs of weeds demonstrate a significant declining trend
3. CONTROL TECHNOLOGIES	Weed targets for control are prioritised and desired management endpoints set Pipeline of control projects on x targets and risk assessments complete for y agents and other controls have commenced Community is primed for engagement in biocontrol delivery	Beneficial impacts of control have been demonstrated for x targets New biocontrol agents and other control technologies are integrated into management practices for target weeds Streamline biocontrol development processes using latest technology are entrenched from the start of management pipeline projects
4A & 4B HUMAN AND INSTITUTIONAL DIMENSIONS, AND ADOPTION NETWORKS AND PATHWAYS	Key stakeholders are involved in the Plan's R&D activities Processes are in place to provide evidence-based decisions Changes in behaviour or attitudes are indicating change is likely in future	There is an established weed investment process for weed management There is a resilient investment RD&E model in place There are congruent national, state and industry policies based on R&D findings
	Effective communications and networks in place	Communication systems and networks are enduring and effective

** Short and long-term KPIs, together with x and y targets, will be refined through public consultation and with potential co-investors*

Collaborative governance

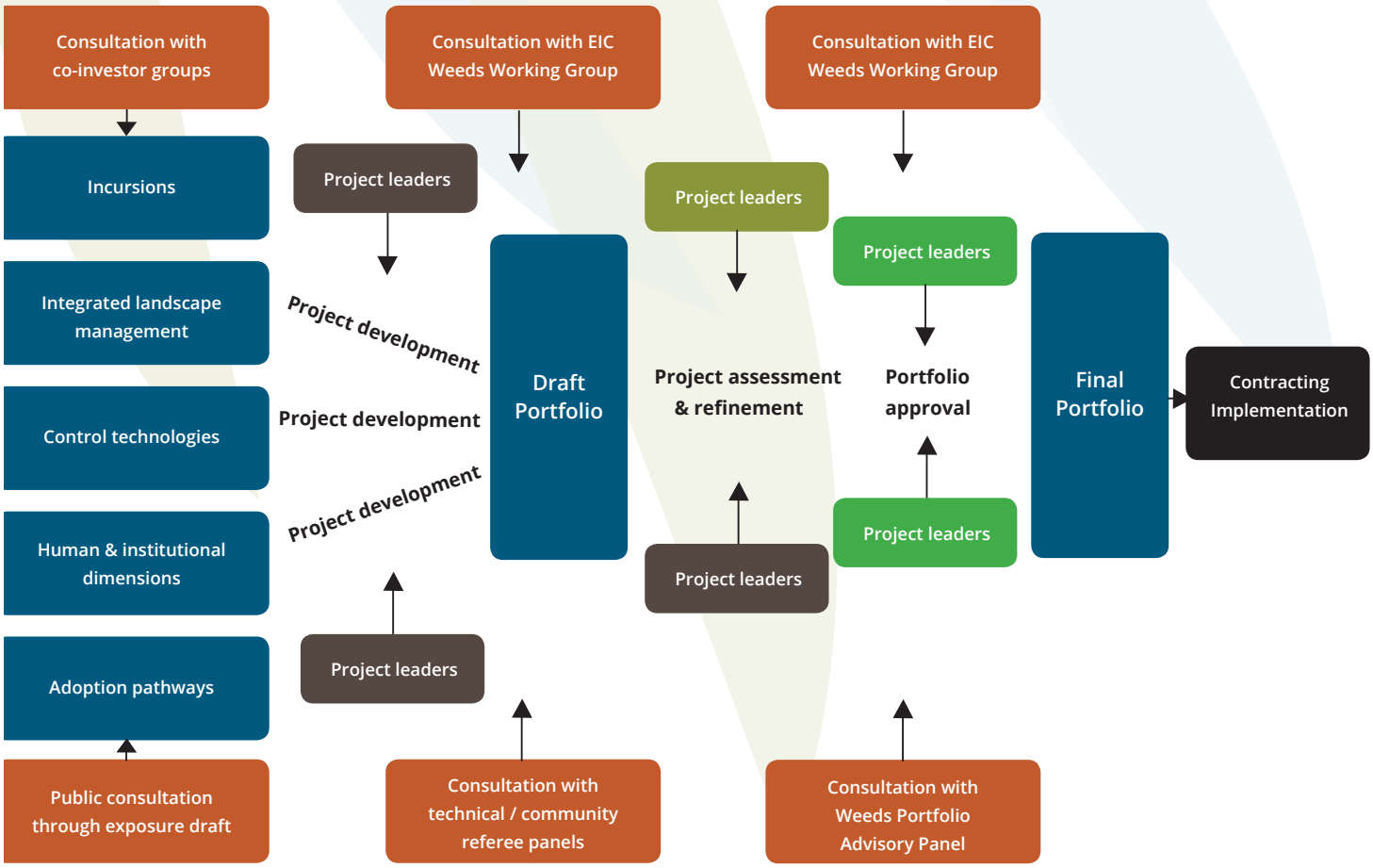
This national plan recognises the existence of the many State and local weed strategies and plans and their industry equivalents, many of which are harmonised through the National Biosecurity RD&E Framework.

Consistent with the tone of the Framework, this Plan will be subject to collaborative governance arrangements.

Quintessentially the Plan resides within the Centre for Invasive Species Solutions (the Centre). The Centre is a national collaborative RD&E institution focused on biosecurity, and its members include the Australian Government, State governments and the ACT, Meat and Livestock Australia and the CSIRO.

Features of the proposed governance arrangements include:

- strategic oversight by the Centre's board
- investment recommendations made by a Weeds Portfolio Advisory Panel enabling co-investors to have a direct say over priorities and investments
- direct input into the national biosecurity system via the Centre and other partners' membership on the Environment and Invasives Committee's Weed Working Group
- collaborative Portfolio Agreement arrangements reflecting investors' priorities and relationship
- advisory panels—technical and community advisory panels to referee applications and support domains or projects subject to defined needs
- focused networks of outside interests who have 'shared responsibility' for weeds



Monitoring progress and measuring impact

Partners (co-investors) in the Plan will continuously measure the Plan's impact, tracking the process of innovation from inputs to impacts.

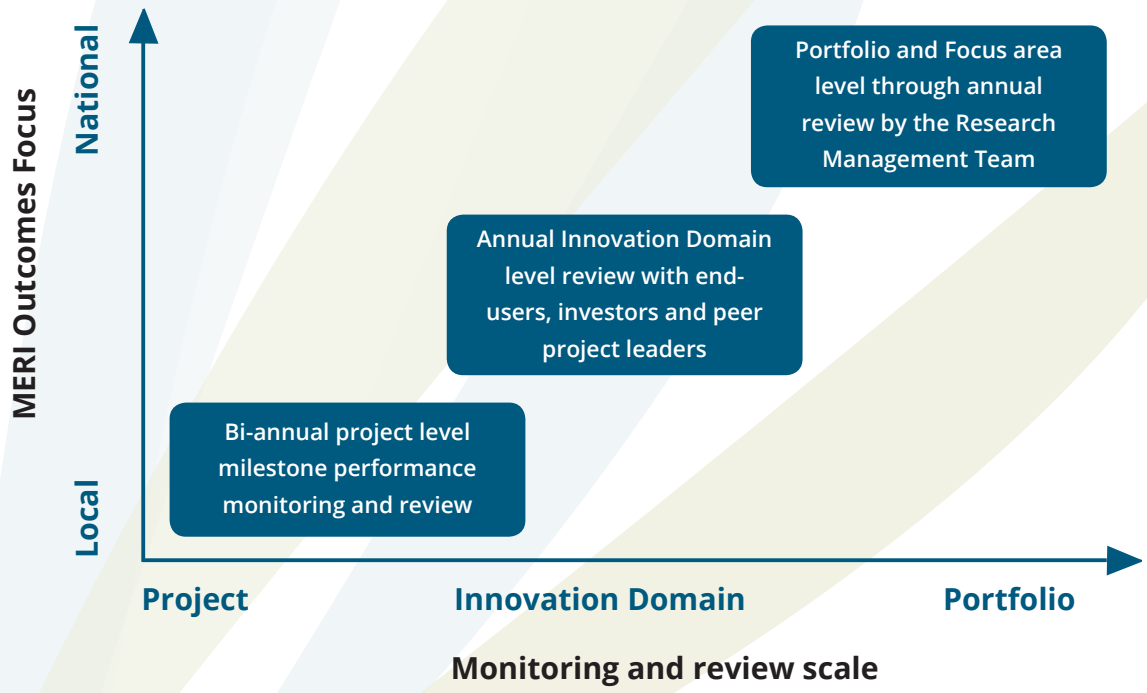
Monitoring progress and measuring impact will be undertaken as part of a process to ensure the Plan constantly adapts and improves to ensure its objectives are met.

Ongoing monitoring will be based on the Monitoring, Evaluation, Reporting and Improvement (MERI) framework, familiar to most people involved in publicly funded weed RD&E activities.

Using the MERI framework, the performance of weed activities will be monitored and evaluated at three levels (Figure below):

- Project level through bi-annual milestone performance monitoring
- Domain level through annual review with end-users, investors and peer project leaders aligned to the Domains
- Portfolio level through annual review and synthesis of project and domain level lessons

Ongoing monitoring and assessments will be coordinated through CISS in consultation with relevant co-investors, advisory panels and steering committees.



Next steps: heading towards 2020

Over the remainder of 2018 and 2019, there is considerable work to be done to get this Plan to the point where it is actionable and attracts the levels of investment required to achieve the critical mass needed to achieve impact. To get the Plan to that point, there are four critical actions required:

1. **Mobilise** CISS funds over the short term to build the partnerships and consensus around specific workplans that will give effect to the plan

   The Centre has been provided with Commonwealth funds to kick off elements of the Plan. Consistent with that, and following initial national consultation, the Centre proposes to invest in studies that give stronger justification for and direction of longer-term projects. To this end, the Centre proposes to invest in

   a) economic, social and environmental assessments associated with each Domain. These ex-ante assessments will not only provide guidance on priorities within Domains, but also provide guidance on the balance of investment across the Domains

   b) scoping studies providing a baseline understanding and gap-analysis of past and current weed investment

   c) an improved digital platform linked to outreach and citizen science, including the transfer, upgrade and maintain of weeds.gov.au

2. **Diversify and intensify** consultation around the Plan, including through feedback on this exposure draft

   This exposure draft will go through a further 6-month public feedback consultation and feedback process to test the assumptions it makes and to flesh out the detail that will be required to maintain public and co-investor confidence. Earlier drafts of the Plan were nationally disseminated, with feedback culminating in this draft. The next iteration of consultation commences with a launch of the exposure draft at the 21st Australasian Weeds Conference in Sydney, Sept 2018 and closes on 28 February 2019.

3. **Negotiate** with prospective co-investors and convene co-investor planning groups to specify the workplans for each Domain

   In parallel with the consultation process, the Centre will identify prospective investors in the Plan, connect them to the proposed kick-start activities outlined above and the public consultation feedback to prepare detailed investment blueprints and workplans for each of the proposed RD&E Domains.

4. **Hardwire** the plan into the national biosecurity monitoring, evaluation and continuous improvement systems

   The Centre and most of its partners are affiliated with one component or another of the formal, institutionalised national biosecurity system. These components include the Environment and Invasives Committee and its Weed Working Group. Some partners are represented in the higher echelons of the system including the National Biosecurity Council. Further aligning the Plan with the priorities, targets, activities and monitoring and assessment processes of the system will enhance its relevance, help build pathways to adoption, increase coordination and collaboration, decrease duplication, combine resources and amplify shared lessons and messages.

Who can provide feedback on this paper?

Anybody interested or involved in weeds research, management, policy or practice can provide feedback. Feedback can take any format, but should be provided by no later than 28 February 2019 to: weeds@invasives.com.au

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