LEGISLATIVE ASSEMBLY OF THE NORTHERN TERRITORY

SESSIONAL COMMITTEE ON THE ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

REPORT ON INVASIVE SPECIES AND MANAGEMENT PROGRAMS IN THE NORTHERN TERRITORY

May 2008

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Forward

For the layperson, it is probably difficult to grasp just how important invasive species are in the scheme of things. Urban dwellers, for example, may tend to think of weeds as merely an irritation. In fact, invasive species rate with present concerns over water and climate change. Together, these factors can make or break our environment.

We have a choice between the healthy, diverse environmental systems we have enjoyed, or a series of flat monocultures dominated by just a few aggressive invasive species. Between these is a world of difference — a world of difference for the Territory as we now know it. Invasive species threaten not just the lifestyle we enjoy, and the tourism that is such an important economic activity in the Territory. Their effects, if unchecked, will flow through to our agricultural sector too. In fact, there won't be much that is left untouched. Invasive species have the capacity to change all the natural systems in the environment, right down to the water cycle.

Inevitably, these are things that touch us all. There are people in the Territory who understand this very well, who have spoken and written to the Committee to show us, in detail, the state of things on invasive species in the Territory. They shared their particular experiences, based on their different roles within the management of invasive species. Together they revealed a complex, challenging situation to which nobody who cares about the Territory could remain indifferent. The Committee thanks them, sincerely, for their contribution, both to the Inquiry, and to the Territory environment we enjoy and appreciate.

This Report takes a honest look at the situation on invasive species in the Territory, and asks what can be done to improve upon it. There are a number of practical, pragmatic things that can be taken up from the Report. Many of these are based on suggestions made by witnesses and in submissions, or respond to problems identified by them. It is clear that we need both to accept the gravity of the present situation, and take on

board the passion and commitment that came through in contributions to the Inquiry. In that way we can indeed make progress and ensure that for future generations the Territory remains as good a place to be as it is now — or better.

I thank my fellow Committee members for their interest and energy in pursuing the Inquiry. We have seen a few changes of membership, but nevertheless the quality of their participation, and their willingness to work together as a committee, have been outstanding.

Special note should be made of the assistance provided by officers of the relevant Northern Territory Government agencies. They provided initial briefings, additional material, and information, which has proved invaluable. On behalf of all members of the Committee I wish to place on record our appreciation of the support provided by the Committees Secretariat, in particular by Terry Hanley, Brian Lloyd and Maria Viegas.

Ted Warren MLA
Chair

Membership of the Committee

Mr Ted Warren MLA (Chair)

Mrs Fay Miller MLA

Mr Matthew Conlan MLA (from 21 August 2007)

Ms Malarndirri McCarthy MLA (from 12 February 2008)

Mr Karl Hampton MLA (from 12 February 2008)

Mr Matthew Bonson MLA (to 28 November 2007)

Mr Rob Knight (10 October 2006 to 26 November 2007)

Mr Gerry Wood MLA (to 11 October 2007)

Dr Richard Lim MLA (to 9 July 2007)

Committee Secretariat

Mr Terry Hanley, Secretary

Dr Brian Lloyd, Research Officer (from 7 February 2008)

Ms Maria Viegas, Research Officer (to 6 February 2008)

Ms Lauren Copley, Administrative/Research Assistant (from 8 April 2008)

Ms Jo Burgess, Administrative/Research Assistant (5 January 2007 to 7 April 2008)

Ms Kim Cowcher, Administrative Assistant

Terms of reference

Inquiry, Invasive Species and Management Programs

The following matter be referred to the Environment and Sustainable Development Committee for inquiry and report -

1. The Northern Territory's capacity to prevent new incursions of invasive species, and to implement effective eradication and management programs for such species already present; and
2. That the committee in its inquiry will:
   (a) begin its investigations by engaging the scientific community to conduct a scientific summit on invasive species;
   (b) use case studies to inform the analysis, and will draw its case studies from a range of invasive species;
   (c) while investigating the value of control programs, focus on community based management programs for weeds and feral animal control; and
   (d) as a result of its investigations and analysis will recommend relevant strategies and protocols for government in dealing with future incursions and current problem species.

List of abbreviations

AQIS Australian Quarantine Inspection Service

AusBIOSEC Australian Biosecurity System for Primary Production and the Environment

CLC Central Land Council

DPI Department of Planning and Infrastructure

EFT Equivalent Full Time

ILC Indigenous Land Corporation

LGANT Local Government Association of the Northern Territory

DPIFM NT Department of Primary Industry, Fishing and Mines

GLLG Giraween Lagoon Landcare Group

NLC Northern Land Council

NRETA NT Department of Natural Resources, Environment and the Arts

NRM Natural Resource Management

OECD Organization for Economic Cooperation and Development

STAR Space and Temporal Animal Reduction model (Charles Darwin University)

VRDCA Victoria River District Conservation Association

WONS Weeds of National Significance

WRMS Weeds Risk Management System (NT)

WWF World Wildlife Fund

Summary of findings

The Territory has a number of serious challenges with invasive species. Weeds attract highest levels of concern, followed by feral animals, aquatic species, invertebrates and diseases. But different aspects of environmental integrity, and different vectors and pathways for invasive species, are closely interconnected. Each category of invasive species is part of a wider picture. There are particular challenges in the Territory due to its large area and small population. There are also great variations in environmental conditions: between the dry climates of Central Australia and the wet tropical climates of the Top End.

Invasive species management is in a process of change. Recognition of the complexity and seriousness of the problem has led to the development of risk-management and decision-support systems for invasive species management in the Territory. These also appear in other jurisdictions, including the federal jurisdiction. Such systems were in development through the period of the Inquiry. It is intended that they will provide an objective basis for decision-making and prioritising: between different risks and threats, and between actions to prevent and control invasive species. Systems are also intended to provide divisions of responsibilities between government agencies and between jurisdictions, particularly in the event of new incursions of invasive species. These systems are important in the sense that no one agency, or jurisdiction, is responsible for all parts of invasive species management, and coordination is essential. It is also important that sufficient funding and infrastructure are available for front-line work on invasive species so that these systems succeed in being more than a formal exercise.

Administrative arrangements for the management of invasive species in the Territory have moved away from a model of government as sole provider to a model of partnership between government and non-govern-

ment players, and this is expressed in legislation. In line with this, there is also a new funding environment, in which community-based programs compete within a competitive grants process. In jurisdictions where these initiatives have been adequately supported with measures to assist, encourage, and enforce compliance, there has been success in leveraging public effort and interest, to help with invasive species prevention and control. In the Territory, however, many of these enabling factors have not been sufficiently addressed, and while community-based bodies and programs exist, the Territory has yet to attain full benefit from them.

Invasive species by category

There are challenges on invasive species in the Territory in relation to weeds, vertebrate species, aquatic invasives, invertebrates, and diseases. Together, they represent a significant threat to biodiversity in the Territory, and threaten not only to degrade the environment but to rule out a diversity of uses and benefits from the natural environment, including tourism and some kinds of primary industry.

Weeds For weeds, substantial problems exist for a range of grassy and other invasive species that have become endemic to the Territory. Some grassy species introduced for pastoral purposes present special problems due to their strongly invasive characteristics, and their effects in increasing the severity of bushfires. While the Weeds Risk Management System (WRMS) is an important ”top-down” development, people engaged in weed control in regional areas perceive a range of problems, including difficulties attracting grants funding, a shortage of front-line and support staff from NT government agencies; and a lack of key infrastructure such as wash-down facilities for vehicles. Overall,there is a low level of compliance with weed regulations due to the low number of prosecutions obtained under the Weeds Act, and this in turn results in there being few

incentives for landholders to manage weeds.

Insufficient management of weeds where government is the landholder — on Crown Land for example — plays an important part in undermining a culture of compliance, and affects other landholders directly by providing a point-source for weed invasions. Government also has discretion to exempt landholders from obligations under the Weeds Act, and this is perceived as an unhealthy situation in view of its own obligations as a landholder.

Key environmental areas, such as Kakadu National Park, are under direct threat from a range of intractable weeds species, and shows what the Territory will lose if weeds go un-managed. Further problems emerge in the relationship between local government and the NT government: local government have responsibility for and have opportunity to address weeds problems, but receive little in the way of funding for this purpose.

Declarations under the Weeds Act are a problematic area for weeds management. A number of species that have value for primary industry have negative impacts on other sectors. This contributes to a slow pace for declarations of weeds under the Act. Weeds management across the Territory is also affected by the continued sale of species identified as problematic under such national programs as Weeds Of National Significance (WONS), and a lack of coordination between lists of declared species between the Territory and other jurisdictions. All of these areas need to be addressed if weeds regulation in the Territory is to work as intended.

Vertebrates From evidence tendered to the Inquiry, it is clear that vertebrate invasive species are present across the Territory, in high numbers, and control is difficult. For some species, high fertility rates make it difficult to keep numbers steady, and even this represents a major investment in money and manpower. Reductions are another matter. Highly mobile, vertebrate invasives spread quickly, and readily cross jurisdic-

tional borders. Efforts at biological control are often fraught because they may affect primary production and domestic animals.

The Inquiry heard that relevant NT legislation provides incentives and penalties in relation to declared species, however in practice resource constraints often prevent them from being applied. As for weeds, vertebrate invasives can be gazetted as declared species. This process faces similar challenges to that for weeds: some species represent value to one sector of the community and loss to another. As a result, declarations can be contentious and difficult to achieve.

Evidence before the Inquiry suggests that efforts to control vertebrate invasives in the Territory have been compromised by under-investment in prevention and control, and insufficient coordination between them. One aspect of this is the lack of follow-through that has held back vertebrate invasive species management in the Territory. Large-scale, effective programs which have reduced numbers have been followed by periods of neglect, with resulting recoveries in population. Over a longer time-frame this represents poor value for money for the Territory. Equally, opportunities have been missed, to eradicate species where they have initially been discovered in small numbers.

Vertebrate invasives are a vector for a range of other invasive species, including weeds and diseases transmissible to humans. This gives them a special importance, and underscores connections between the impacts of one species and others that is a feature of the area as a whole.

To deal with problems of this scale and complexity, NT government agencies are developing risk-management systems for vertebrate invasive species, as a basis on which to prioritise and coordinate response. This is consistent with best practice, and echoes approaches taken for other types of invasive species in the Territory.

Aquatic invasives The Territory also faces challenges from aquatic invasive species. Due to its proximity to Asia and similarities in climactic conditions, the Territory is susceptible to incursions, as well as threats from other Australian jurisdictions. A relatively recent incursion brought this to the attention of relevant agencies in the Territory. In that instance, efforts at prevention were effective. As for other categories of invasive species, government agencies are more likely to respond decisively where industry interests are involved than when effects are regarded as "environmental".

Despite this episode, awareness of aquatic species threats is lower than for weeds or feral animals. The sale of aquatic species as domestic pets represents a special point of vulnerability. As for weeds, vendors continue to sell species with a high potential to become invasive. Significant further risk comes about in relation to the disposal of these species from home aquaria: an absence of facilities to manage this means that some species are likely to be released into the environment. Other releases occur from ponds in domestic gardens, in times of heavy rainfall and flood. As for other kinds of invasive species, the effectiveness of management regimes is lessened, and risks increased, by regulatory differences between Australian jurisdictions. This leads to a broad scope of action for people wishing to acquire aquatic species for aquaria, and low levels of awareness, and thus compliance, with regulation. This represents a continuing source of hazard for the Territory for aquatic invasives, especially in light of severe reductions in biodiversity seen in some other Australian jurisdictions with similar environmental characteristics.

Invertebrates and diseases Invertebrates are subject to a lower level of awareness than other categories of invasive species in the Territory. But this is not an indication of their significance. Invasive ant and bee species threaten environmental integrity by disturbing and replacing the role and actions of native species, leading to negative effects on such key environmental services as pollination. They also have negative impacts on the

health of humans. As for other categories of invasive species, the dispersal of invasive invertebrates may be the result of interactions with other species, such as ants being carried in soil and plant material associated with commercial nurseries, or domestic relocations. Despite this, such risks remain un-managed under Territory regulation and control measures.

Disease risks in the Territory may be closely associated with other categories of invasive species, as noted. Instances are established links between feral pigs and Japanese Encephalitis. Buffalo and tuberculosis share a similar assocation. Diseases attract a higher level interest from national-level programs, particularly under Biosecurity and the Australian Quarantine Inspection Service (AQUIS). The Territory has, however, only very limited capacity in the event of an invertebrate or disease incursion, which for the latter measured only in weeks, and this represents a key point of vulnerability for the Territory.

Community-based programs

Community-based programs have been fostered under such legislation as the Weeds Act, but participants face a turbulent environment. Substantial investments of time and effort are needed in order to pursue grant money — in addition to, or at times instead of, direct efforts at invasive species control. Participants also experience confusion and frustration at the various caveats that come with grants, such as restrictions to work on particular species, and with intricate and apparently inconsistent parts of present administrative arrangements. The obligation, under many grants, to re-apply for funding when weather interrupted control work was seen as unreasonable and difficult to work with. In general, interruptions to the continuity of funding attracted strong criticism, as this compromised the effectiveness of control efforts, allowing time for invasive species populations to recover. Funding interruptions resulted in a loss of staff from control programs due when money for wages was not available.

These participants perceive difficulties communicating with and accessing government agencies, and express disappointment at a lack of agency staff to support extension, education and control work. Opportunities were perceived for better data gathering on the distribution of invasive species, that could be achieved through better public awareness and coordination. There was a sense of frustration in relation to mapping and information: a number of participants were not aware of a way to contribute information on distributions of invasive species, or to themselves access accurate information on this, and this was viewed as an important gap in arrangements.

In addition to conventional community groups, pastoralists and Indigenous programs also figured as key players in this non-government sector. In a practical sense, pastoralists overlap with other participants through their membership of Landcare and similar groups. In some instances, pastoralists displayed high levels of coordinated activity, and were able to bring more resources to bear on invasives. They also echoed the frustrations of other players on inconsistent arrangements made by government agencies for the practical control of invasives, and flagged as a problem lower numbers of field officers from government agencies. This is despite the fact that pastoralists had at times been able to exert greater political influence than other players.

Indigenous groups and programs have a high level of involvement with invasive species control, undertaking control work on Indigenous land, but also under contract for other landholders. Notable programs were being undertaken by Indigenous programs to protect Kakadu National Park from invasive species. These involvements represent avenues for employment for Indigenous people while leveraging their knowledge of country. However, skills requirements such as for handling chemicals for weed and invertebrate control, have proved a limiting factor, and this underscores the need for employment in this area to be complimented with training. There are other problems in that Indigenous people have trouble

managing invasive species on their traditional land due to low revenue returns from that land, and this requires consideration. Like other players in this area, Indigenous programs to control invasive species experience an uncertain funding environment, marked by a range of policy objectives from different granting bodies, in- and outside of the Territory.

Taking all of these community players into account, they have in common: breakdowns in relationships with government agencies; a perception that government is not investing enough in terms of practical capacity; and an acute awareness of where current policy settings are not working on the ground. They are also aware that their capacity is reduced due to limits in the capacity of government agencies to provide a partnership stake with in external grant applications. These features have implications for questions of capacity.

Capacity

Current policy settings, including those expressed through legislation, are based on a concept of partnership between government and community-based groups. The underlying idea is that the scale of problems with invasive species are too great for government alone to resolve. This is a valid perception. However the balance between the partners in this relationship has not achieved the best, or the intended setting. Community groups are not in a position to give their best, or to recruit further support from the broader community, due to shortfalls in the level of support from government. In allowing this situation to persist, government sacrifices opportunities to marshal the public support that could make a difference to invasive species management. There continues to be insufficient capacity in terms of emergency response, and this is indicative of shortfalls in practical capacity to manage invasive species in the Territory.

Government's stance on funding capacity for invasive species management appears to be based on the premise that the Territory could never

fund such a project. However, current underspending represents poor value for money. Effort across sectors in the Territory is not as effective as it could be because it operates on a funding drip-feed. This reduces the inflow of funding from external sources, and risks alienating the community players that such legislation as the Weeds Act are designed to engage.

Nor is there an alternative to an increase in government investment. The prospect of generating funding by using invasive species to achieve commercial objective cannot succeed. Expert advice is that management for commercial gain and management for environmental purposes are so fundamentally different as to make this impossible. While federal grants represent an important further resource, expert advice, again, is that there is no alternative but for state and territory jurisdictions genuinely to engage in partnership funding — that is make financial or in-kind contributions — if they want that money to come into their jurisdiction. Perceptions of cost-shifting, where state and territory jurisdictions use such grants to fund basic work, are picked up in the grant selection process and result in failed bids. So a requisite level of funding is necessary, for a number of reasons.

Various aspects of information creation and management are integral to questions of capacity to manage invasive species. Research is a critical input to risk-management systems and evidence-based decision-making in general. Despite research undertaken by government agencies, and through partnerships with Charles Darwin University, there are significant gaps in research data, particularly for the categories of invasive species where levels of awareness and concern are lowest. Research on interactions between species and the environment is highly specific to the sites in question, and much of this work must be done in Australia, and indeed in the Territory, if it is to be done at all. It is to be noted that bottle-necks have arisen in the Weeds Risk Management System process due to a shortage of research data.

Mapping is a further dimension to information capacity. Community players expressed a desire to both contribute and access mapping data on the distribution of invasive species, and a number of witnesses underscored the importance of this data as a basis for a successful control process.

Public awareness, engagement and education — a further part of a spectrum of information matters for invasive species — are critical in order to elicit the contributions of the community toward invasive species management, and to increase the levels of compliance with regulation necessary to achieve better outcomes. In the Territory, there is evidence that support for this aspect of arrangements on invasive species has been reduced, and this represents a lost opportunity to recruit the community to the effort to control invasive species. Other state jurisdictions provide models of how this can work, in particular Queensland, and the Weed Spotting Networks active there and in Victoria and Tasmania.

Summary of recommendations

Evidence heard by the Inquiry suggests that orders of scale for present problems with invasive species in the Territory are huge. There are species for which the number and extent of infestations are growing rapidly. In view of these challenges, the Committee proposes a set of appropriate objectives, which are:

- To halt the spread of invasive species, incrementally reduce levels of infestation, prevent sleeper species from becoming endemic, and prevent the introduction of new invasive species;
- To raise staff and financial resources to a point where NT can take full advantage of community interest in the control of invasive species, and of funding mechanisms, external to the NT, for invasive species management;
- To continue to develop and strengthen invasive species risk-management systems and evidence-based practice; and,
- To ensure there is a sufficient level of research activity to meet the demand for research data created by invasive species risk-management systems and evidence-based practice.

These objectives are expressed in the following recommendations.

All Terms of Reference

Recommendation 1

The Committee Recommends that the Northern Territory Government divides its pursuit of objectives for invasive species management into stages:

a). An initial five-year phase in which the prime objective would be to *stop* further increases in the number and extent of invasive species in

the Territory, drawing on and consolidating risk-management systems, calculating and putting sufficient resources in place, to do so.

b). A subsequent five-year phase in which the prime objective would be to *reduce* the number and extent of invasive species in the Territory, using risk-management systems to identify those of highest significance for environmental integrity.

c). A further subsequent phase, building on and continuing the first two phases, of a character and length to be determined by review.

Recommendation 2

The Committee recommends that the Northern Territory Government continues to support and develop risk-management systems for the management of invasive species, and:

a). Ensures that the risk management process includes triple-bottom-line assessments of the impacts of invasive species

b). Continues to support and develop evidence-based practice in invasive species management, in and beyond risk-management systems.

Recommendation 3

The Committee recommends that the Northern Territory Government establish consistent obligations on all landholders for invasive species management, by:

a). Establishing invasive species management as an integral part of business by placing consistent obligations on all landholders.

b). Undertaking invasive species control on Crown Land, to improve culture of compliance and prevent Crown Land from being a point-source for invasive species.

c). Removing or reducing the scope of exemptions from legal obligations on landholders to control invasive species.

d). Instituting property-based and region-based pest management plans as a means to manage and control invasive species across all categories of invasive species.

Recommendation 4

The Committee recommends that the Northern Territory Government strengthen the current legislation to control invasive species by:

a). Pursuing prosecutions under relevant Acts with sufficient vigour to give them due legal weight and, as a result, power to influence behaviour in the community.

b). Ensuring that government agencies have a budget to pursue prosecutions under invasive species legislation, so that prosecutions will not affect other agency functions.

c). Ensuring that a graduated series of responses is available as a means to achieve compliance with legislation and objectives, including the introduction of warning and infringement notices with and without penalty.

Recommendation 5

The Committee recommends that the Northern Territory Government increase public awareness and contribute to culture of compliance by:

a). Engaging in an active campaign to increase awareness, education, and compliance.

b). Ensuring that agencies have sufficient staff and funding to contribute to the campaign.

Recommendation 6

The Committee recommends that the Northern Territory Government continue and extend liaison and coordination with agencies and bodies outside of the Territory, and that it:

a). Advocates that the Territory be made into two regions — Central Australian and Top End — under the national Natural Resource Management system, so that grant applications and the programs they fund are able to address local conditions more effectively.

b). Increases the level of consistency between Territory lists of proscribed or permitted species and those of other jurisdictions, across all categories, except where this would reduce the Territory's capacity to respond to local threats and conditions.

Recommendation 7

The Committee recommends that the Northern Territory Government Regulation and Legislation develops a capacity to anticipate, and appropriately respond to, the consequences of species introduction or importation by:

a). Reversing the burden of proof such that approvals for new introductions or importation of species into NT will be subject to a them appearing on a list of admissible species.

b). Arranging that species for introduction to the Territory are subject to management plans before their release.

Categories of invasive species

Weeds

Recommendation 8

The Committee recommends that the Northern Territory Government strengthen the application of the the Weeds Act by:

a). Considering the creation of a controlled "Schedule Class D" under the Weeds Act, for species economically useful to some landholders, but risky to others, with appropriate conditions on use.

b). Ensuring that the declared weeds list is as consistent as possible with those of other jurisdictions, while respecting local conditions.

c). Ensuring that Northern Territory Government agencies not remove species from declared species lists due to the species being considered endemic.

Recommendation 9

The Committee recommends that the Northern Territory Government provides for legislative control of Gamba Grass, and other "improved pasture" species with weedy characteristics, either by:

a). Declaring such species a prohibited plant (Schedule Class A) under the Weeds Act, or

b). Declaring such species a controlled plant (Schedule Class B) under the Weeds Act.

Recommendation 10

The Committee recommends that the Northern Territory Government integrate weeds management into business processes by:

a). Requiring that weed planning be included in all planning and development proposals.

b). Considering ways to link weed management and property values, such as linking local government rates to the weeds management on properties.

Recommendation 11

The Committee recommends that the Northern Territory Government control weeds and feral animals on Crown Land by:

a). Using Indigenous programs, among others, to control weeds and feral animals on Crown Land

b). Facilitating training for program participants

Recommendation 12

The Committee recommends that the Northern Territory Government increase measures to inhibit the prevalence and spread of weeds by:

a). Establishing a sufficient number of wash-down facilities, at strategic points in the Territory, and requiring their use, to reduce the spread of weeds by road transport.

b). Establishing practical requirements and protocols for effective management of weeds on transport corridors and disturbed ground.

c). Establishing a Northern Territory Weed Spotting Network under the auspices of the Weeds Division, Department of Natural Resources, Environment and the Arts

Recommendation 13

The Committee recommends that the Northern Territory Government reduce the risk of invasive plant species being distributed by commercial nurseries

by:

a). Ensuring that retail nurseries are aware of their obligations under relevant legislation,

b). Increasing education, inspection, and penalties to provide proper linkage between the Weeds Act and daily practice in the industry.

c). Prohibiting the commercial sale of plant species listed as Weeds of National Significance (WONS) or, alternatively, declaring all WONS species under Schedule A of the Weeds Act,

d). Encouraging retail nurseries to adopt, and market their services as, environmentally-responsible practice.

Feral animals

Recommendation 14

The Committee recommends that the Northern Territory Government increase incentives for the management and control of feral animals, and enforce penalties where infringements of legislation occur.

Recommendation 15

The Committee recommends that the Northern Territory Government provide additional resources for control of large herbivores such as camels to prevent further steep rises in populations, and that it:

a). Ensures continuity and follow-up for numbers-reduction in feral animals so as to maximise benefit from such programs.

b). Addresses the need for, and funds, restoration ecology as an integral process in ecosystem recovery and protection after the removal of invasive species.

Recommendation 16

The Committee recommends that the Northern Territory Government continue and expand cross-jurisdictional arrangements to:

a). Manage and control feral animals across borders with Queensland, South Australia and Western Australia.

b). Continue inter-jurisdictional cooperation on control, management and research on Cane Toads.

Recommendation 17

The Committee recommends the continuation and expansion of research in the Territory on key problematic species, such as the Cane Toad.

Aquatic invasives

Recommendation 18

The Committee recommends that the Northern Territory Government continues and extends monitoring and control of aquatic invasives, by:

a). Continuing the Environmental Surveillance program.

b). Continuing and expanding the monitoring and control of invasive species in freshwater environments.

c). Continuing to support and implement protocols for the management of hold-fouling, ballast water, and other similar vectors for the introduction of aquatic invasives.

Recommendation 19

The Committee recommends that the Northern Territory Government reduces risks of aquarium species to the Territory environment by:

a). Increasing levels of public awareness, regulation, and compliance.

b). Discouraging the importation of invasive aquatic species into the Territory by private persons, including black- or grey-market importation.

c). Establishing a permitted species register, excluding aquarium species known to have invasive characteristics.

d). Increasing levels of consistency between Northern Territory registers of proscribed aquatic species and other jurisdictions.

e). Promoting the use of native species for domestic aquaria.

f). Considering options to establish a facility to accept and manage unwanted aquarium fish.

g). Creating different regulations, allowing different species, for aquaria, and for ponds and dams, due to the high potential for species escape from the latter during heavy rain and flooding.

Invertebrates and diseases

Recommendation 20

The Committee recommends that the Northern Territory Government expands the capacity of the Territory to respond to disease incursions.

Recommendation 21

The Committee recommends that the Northern Territory Government Government promotes public awareness of impacts of invertebrate invasives.

Recommendation 22

The Committee recommends that the Northern Territory Government legislate to control the movements of plant material, soil, and other materials

with respect to their capacity to act as a vector for invertebrate invasives.

Recommendation 23

The Committee recommends that the Northern Territory Government increase management and control for vertebrate pests which are known vectors for infectious diseases, in particular feral pigs and buffalo.

Recommendation 24

The Committee recommends that the Northern Territory Government expand and develop research on invertebrate invasives in the Territory.

Community-based programs

Recommendation 25

The Committee recommends that the Northern Territory Government achieve a better balance between government programs and community programs to manage invasive species, by:

a). Setting appropriate levels of front-line staff to support community-based programs in a region, and in view of local threats from invasive species.

b). Improving the level and quality of engagement with community-based programs and reference groups.

c). Increasing support to community-based programs to assist with grants applications (see Recommendation 28.c.).

d). Instituting a stronger regional focus by placing more government agency staff in regions, to clear obstacles to community-based programs and provide expertise at point of need.

e). Fostering processes that provide greater continuity of funding to community-based groups.

Recommendation 26

The Committee recommends that the Northern Territory Government improve information-gathering processes on invasive species by:

a). Considering ways to enable staff from other agencies, and government contractors, to report sightings of invasive species.

b). Increasing opportunities for community-based programs, and members of public, to contribute to and access mapping facilities for invasive species.

Capacity

Recommendation 27

The Committee recommends that the Northern Territory Government maintain and extend the Territory's rapid-response capability for invasive species incursions.

Recommendation 28

The Committee recommends that for applications by non-government applicants to federal granting bodies, government provides sufficient levels of financial and in-kind contribution to effectively support the application, and facilitates this by:

a). Requesting Treasury, in consultation with agencies directly involved with invasive species management, to calculate levels of funding that would provide this outcome.

b). Expressing this as a proportion of the turnover of industries affected — specifically, as a percentage of benefits to the Territory from primary industry and tourism — and setting this as an ongoing rate for future appropriations, subject to adjustment as the economic significance of the environment becomes more clear.

c). Dedicating one and one half positions Equivalent Full Time (EFT), in government, to support grant applications by Territory applicants — one EFT for community-based programs, and one-half EFT for applications by government agencies.

Recommendation 29

The Committee recommends that the Northern Territory Government continue and expand current levels of research to support the management of invasive species by:

a). Ensuring that there is sufficient research activity and capacity, to meet higher levels of demand for data due to the wider use of risk-management systems.

b). Undertaking further research to assess the economic value of environmental assets and services.

c). Continuing and expanding on research partnerships with Charles Darwin University and other Territory institutions and organisations, to meet demand for research data generated by emergent risk-management systems.

Chapter 1

Introduction

This Report describes the risks from invasive species in the Northern Territory, and responses to them, at the time of Inquiry hearings in 2006-2007. The structure of the Report corresponds to the Inquiry Terms of Reference as follows.

This Introduction describes the progress of the Inquiry, and gives an initial description of the scale and complexity of the problem, and the systems and methods designed to respond to it. This goes toward answering the fundamental question of the Territory's capacity, overall, to respond to threats from invasive species (Term of reference 1).

Initially, this involves considering decision-support systems. In an area where the amount of work that needs to be done, and competing imperatives of control, eradication and prevention create a particularly complex field of operation, these systems, it is hoped, will allow better responses to invasive species.

As for all chapters, findings and recommendations are grouped at the end of the Introduction. For Chapter 1, these are findings and recommendations that apply across all of the areas considered in subsequent chapters.

The following four chapters of the Report describe the problems and responses, identified in the Introduction, in greater detail. It covers each of the four categories of invasive species — weeds (Chapter 2), vertebrates (Chapter 3), aquatic invasives (Chapter 4) and invertebrates & diseases (Chapter 5). In each chapter there are *case studies* required by the Terms of Reference (Term of reference 2.b).

The sixth chapter considers the experience of *community-based* programs working with invasive species (Term of reference 2.c). The decision-support systems described in chapters 1 and 2, in particular, are often "top-down" initiatives. This chapter considers the views and experience of people engaged in practical control work on invasive species, including local, industry and Indigenous groups.

The seventh and final chapter returns to, and brings a particular focus to, the keyword *capacity* (Term of reference 1). It discusses the implications of the information brought to light in previous chapters and presents a synopsis of current challenges on invasive species and responses to them, assessing the Territory's capacity to respond.

These are the basis for the Inquiry's Findings and Recommendations, which are placed at the close of each chapter (Term of reference 2.d). In each case, recommendations correspond as nearly as possible to the subject matter of the chapter. In some cases recommendations may also refer to other areas, to make it unnecessary to make another separate recommendation.

For Term 2(a), the Committee resolved to hold a Scientific *Round-Table* rather than a *Summit*, scheduled near the end of public hearings rather than the start. This allowed the Inquiry to make the best possible use of expert opinion assembled for the Round-Table, coming as it did toward the end of the cycle of information gathering. Material from the Round-Table is cited throughout the Report.

1.1 Progress of the Inquiry

On August 23 2005, the Legislative Assembly of the Northern Territory's Standing Committee on Environment and Sustainable Development was given a reference to inquire into the management, prevention and eradication of invasive species in the Northern Territory.

In the course of the Inquiry, 8 Hearings were held, starting December 2, 2005 and finishing November 16, 2006. The Inquiry heard from 55 witnesses at 7 locations in the Territory, and received 43 Submissions.

1.2 Risk and complexity

A minimal definition of an "invasive species" is of a species "out of place", whether it is a weed, a feral animal, an aquatic species, an invertebrate species or a disease.[1] Invasive species are most commonly exotic and, at their most active, have in common the ability to "...quickly become intractable, ...be extremely resource hungry in terms of control measures".[2] For these, "the cost of impacts can ...be huge."[3] Invasive species degrade ecosystems, land and water quality, and are injurious to humans in a variety of ways: either through environmental effects such as increased fire intensity, or due to the negative effects of direct contact, as in the case of some exotic ant species, or due to the allergenic qualities of many exotic weeds.[4]

The management, prevention and eradication of invasive species in the Northern Territory is a highly complex area of activity. The Territory faces

[1] Mr Peter Bekkers, *Transcript of Evidence*, 20 October 2008, p.177.

[2] Dr Greg Leach, NRETA, *Transcript of Evidence*, 2 December 2005, p.3.

[3] Dr G.Leach, NRETA, *Transcript of Evidence*, 2 December 2005, p.3.

[4] See Agtrans Research, "Review of progress on invasive species for the Department of the Environment and Heritage", Commonwealth of Australia, 2005. http://www.environment.gov.au/biodiversity/invasive/publications/review/pubs/review-full.pdf, accessed 08/02/08, pp.29, 31.

a variety of challenges, including a large number of established invasives and threatened introductions. There are also marked differences in conditions between Central Australia and the Top End. At the same time, there are profound changes in methods to deal with invasive species. These things are closely-related. The number and complexity of challenges faced by the Territory, across different landscapes, has been a spur to develop new systems to prioritise across a wide range of threats, and thus, it is hoped, improve responses to problems that can appear "intractable".[5]

The Inquiry heard that within invasive species management, threats often compete for attention and resources. This makes it critical to develop ways to balance between them, including the need to coordinate control of already-established species and prevention work against new species threats. There are "strong similarities" between invasive species, in that they are "extremely resource hungry" and that "the cost of impacts can ...be huge".[6] But there are also tensions between competing imperatives. These must be resolved if the Territory is to check incursions of invasive species, and to make progress on species already established.

This was underscored by contributions to the Inquiry suggesting that the main risk to the Territory "is not necessarily a single species or pathway" — rather "it is the complexity of a number of potential pathways for invasive species to come into that is the greatest threat to us".[7] The sense of complexity was heightened when the Inquiry heard that climate change was likely to increase the pace of change in natural environments, adding further unknowns.[8]

At stake, if the Territory is not able to respond to these risks, is biodi-

[5]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.3.

[6]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.3.

[7]Mr Brent Williams, NRETA, *Transcript of Evidence*, 15 November 2006, p.250.

[8]Mr John Etty, *Transcript of Evidence*, 5 October 2006, p.157; Dr T.Bowland, *Transcript of Evidence*, 15 November 2006, p.215; Mr W.Goedegebuure, *Transcript of Evidence*, 16 November 2006, p.293.

versity. "Biodiversity" refers to the broad variety of naturally-occurring organisms in a natural environment, together with the sum of interactions between them. Where biodiversity is maintained, natural environments are robust and sustainable. They are also able to provide the "environmental services" essential to maintaining the biological world — of which insects' pollination of crop and other plants is one example.[9] The Inquiry was told that invasive species are seen as the greatest threat to Australia's biodiversity, and this reinforces a sense of the gravity of invasive species control.[10]

As the Inquiry was told in relation to weeds, where biodiversity collapses environments are dominated by a handful of aggressive species. Biosystems with smaller numbers of species are vulnerable to disease, raising the prospect of population collapse and subsequent desertification.[11] With this in mind, contributions to the Inquiry stressed the importance of maintaining biodiversity so as to allow for "a multiplicity of land uses as well as valuing the environmental services provided by healthy ecosystems".[12] Where natural environments undergo radical reductions in biodiversity, there are sacrifices of environmental integrity, but also reductions in the range of possible human use as well.

This is an important consideration for a jurisdiction such as the Territory where land is indeed put to diverse uses, within a context of strong cultural and environmental contrasts. Even for non-Indigenous land-use there are strong differences of view on how land should be used and, in particular, how certain species should be treated in view of their invasive characteristics. This is treated at length in the first case study in the Report, which deal with so-called "improved pasture" grassy invasives,

[9]Greening Australia, *Submission no.10, p.10*; Dr.Anne Walters, NRETA, *Transcript of Evidence*, 15 November 2006, p.282.
[10]Mr John Thorp, *Transcript of Evidence*, 15 November 2006, p.273.
[11]Greening Australia, *Submission no.10*, p.11.
[12]Greening Australia, *Submission no.10*, p.10.

which are viewed by some primary producers as important resources, that improve the carrying capacity of land, while other landholders see them as substantial risks to property and human safety — through their effects in creating hotter bush fires — as well as the state of the natural environment.[13] Again, this raises levels of complexity on decision-making on invasive species, and makes the effort to create a more sophisticated means to respond more compelling.

Many of the areas of risk considered thus far rely on argument, and the willingness to perceive complex natural processes. More tangible appreciations of the present predicament are also valuable: evidence is critical in efforts to contain risks on invasive species. Formal economic evaluation of naturally-generated environmental services is an emergent discipline that will develop over time into a mature instrument.[14] However, even traditional indicators show tangible connections between biodiversity and the well-being of the Territory. While the link with agricultural industries is clear, a number of witnesses to the Inquiry asserted a strong connection between biodiversity and the continued health of the Territory's tourism sector.[15] The Inquiry was told that the Territory's natural environment is a key draw-card for tourism business which, contributed "directly and indirectly . . . $2bn and 15 000 jobs to the Northern Territory economy", accounting for "5% of the Northern Territory's gross product" for the year 2001-02.[16] The Territory's tourism is "essentially nature based", and "if . . . high profile tourist or cultural [values] are degraded by invasives it's a direct economic loss, not only to the Northern Territory but to the individual tour operators as well".[17]

[13]See Gamba Action Group *Submission 11*, p.1 ff.
[14]Dr Adam Drucker, Charles Darwin University, Submission no.43.
[15]Mr Sunil Dhanji, Greening Australia, *Transcript of Evidence*, 7 September 2006, p.89; Mr Bill Goedegebuure, Parks and Wildlife Advisory Council, *Transcript of Evidence*, 16 November 2006, p.289.
[16]Mr W.Goedegebuure, *Transcript of Evidence*, p.289.
[17]Mr W.Goedegebuure, *Transcript of Evidence*, p.289.

That this is at risk is confirmed in accounts of invasive species in Kakadu National Park. The Inquiry was told that, in terms of weedy invasives alone, Kakadu was subject to infestations of Olive Hymenachne; Mission Grass; *Mimosa Pigra*; Salvinia, and Para Grass.[18] While a number of these are controlled, their presence, still threatens to bring about fundamental change in environmental systems in Kakadu, and to remove established features of the park such as the presence of Magpie Geese during migration, for which the Park is renowned.[19]

A further confounding factor are arrangements in government on invasive species. There is a perception that the government of the Northern Territory does not have sufficient resources to control invasive species on land it controls, let alone other parts of the Territory. The Inquiry was told that this is evident in the Territory government's breach of its obligations to control weeds on crown land after the Weeds Management Act (2001) came into law.[20]

There is also evidence of tension between the government's sense of obligation to the Territory's primary producers, and to environmental and other constituencies. In practical terms, this is expressed in divisions of responsibility between the Northern Territory Department of Primary Industry, Fisheries and Mining and the Department of Natural Resources, Environment and the Arts. Under this arrangement the former takes responsibility for invasive species that affect "production", while the latter takes on invasive species issues where they affect "amenity".[21] In fact, this distinction can easily breakdown in practice — if, for example there were

[18]Dr Greg Calvert, Department of Environment and Heritage, *Transcript of Evidence*, 5 October 2006, p.108; Ms Anne Ferguson, Kakadu National Park, *Transcript of Evidence*, 5 October 2006, p.128; Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.112, 106.
[19]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.105, 107.
[20]See for example Mr Michael Crothers, *Transcript of Evidence*, 5 October 2006, p.143; Mr Paul Barnes, Local Government Association of the Northern Territory (LGANT), *Submission no.18*, p.8.
[21]Mr. Rod Gobbey, DPIFM, *Transcript of Evidence*, 15 November 2006, p.242

"fire ants on a strawberry farm" — and this may provoke questions as to "when an environmental issue [is] not an economic issue".[22] However, an enduring concern must be, as one witness suggested, that due to the present state of knowledge on calculating environmental costs, the distinction between production and amenity simply results in the environment being "put to one side".[23]

This Report will return to questions of relative emphasis and resourcing by government. But these factors taken together make it imperative that there be better methods to negotiate the complexities of the current situation on invasive species. Finding a balance between different species, between prevention and control, between different interests and different land-use priorities, is clearly essential. At time of hearings, it appeared that some risks were not being addressed, and that there were opportunities to act quickly, in such a way as to reduce requirements for future expenditure, that were being missed. Perceived resource constraints also made it imperative that the Territory achieved the most beneficial effect for its expenditure to control invasive species — and also that it set an appropriate level of expenditure that would allow this work to proceed.

1.3 Responses to complexity

Management of the complex problems entailed in invasive species can be improved though the use of decision-support frameworks. A significant part of testimony to the Inquiry described projects to develop this kind of framework.

This discussion arose in hearings as a result of interest, during the Inquiry, in setting goals and priorities for invasive species.[24] This interest

[22]Mr R.Gobbey, *Transcript of Evidence*, 15 November 2006, p.242; Dr R.Lim MLA, *Transcript of Evidence*, 15 November 2006, p.247.
[23]Mr Brent Williams, *Transcript of Evidence*, 15 November 2006, p.247
[24]*Transcript of Evidence*, pp.82-87, p.124.

was sharpened due to a perception of a scarcity of funds with which to manage invasive species.[25] In response, witnesses suggested that linear rankings of priorities were inadequate in the face of levels of complexity associated with invasive species. Where Committee members asked witnesses to identify priorities in this way, witnesses suggested that attempts to prioritise objectives in a linear fashion had been attempted in the past and found wanting.[26] Rather, they suggested, a more constructive approach was to employ systems-based approaches, involving concepts of risk-management, "triage", and evidence-based practice.[27] Subsequent testimony showed that this work was being done in a variety of settings, in and out-side of government, in and beyond the Territory, and that these are important changes in approach on invasive species management.

The Inquiry heard that a number of aspects of the present situation had led to these new approaches. The scale of the problem makes it necessary to make funding "go further", and it can be done "by actually understanding where you can do the right thing, in the right place, at the right time".[28] The way to achieve this is by adopting a "structured approach", based on evidence and research, so that the best use can be made of "scarce resources".[29]

The main emphasis in these approaches is to judge levels of risk for particular species, and factor-in information about the implications of these risks.[30] Systems compute and combine information from different information streams by using such mechanisms as "weediness scores" that allow risk factors to be assessed and aggregated.[31] Correct "interpreta-

[25]See for example Mr M. Bonson MLA, *Transcript of Evidence*, 7 September 2006, p.83.
[26]Mr Rod Cramer, Temple Bar Station, *Transcript of Evidence*, 7 September 2006, p.86.
[27]Mr Craig James, Desert Knowledge CRC, *Transcript of Evidence*, 7 September 2006, pp.82-83.
[28]Mr C.James, *Transcript of Evidence*, 7 September 2006, p.96.
[29]Mr C.James, *Transcript of Evidence*, 7 September 2006, p.83.
[30]Mr C.James, *Transcript of Evidence*, 7 September 2006, p.88.
[31]Dr Greg Calvert, Department of Environment and Heritage, *Transcript of Evidence*, 5

tion" of the resulting ranking "is vital" so that the best possible decisions can be made.[32] For under present conditions there is always a wide range of species that *could* attract the attention of people working in this area.[33]

Local land managers are adopting elements of this kind of approach, combining mapping with ongoing control and reduction, but continue to struggle with the ongoing requirement for follow-up.[34] Witnesses suggested that it was important that this kind of approach be adopted more widely across the Northern Territory.[35] Encouraging signs lie in the implementation of such frameworks as the *NT Pest Animal Strategy*.[36] There are other similar exercises being pursued locally and Territory-wide, as will be seen below for systems designed to monitor risks from weeds (the *Weeds Risk Management System*) and from other types of invasive species.

This style of approach has significant political effects on the process of managing invasives. On one hand, according to witnesses, they can become the focus of the differences in points of view that often make decisions on invasive species difficult.[37] This could, for example, hinge on differences of opinion over whether a particular plant is a "weed" or a resource for the pastoral industry — a number of grassy invasives are subject to this kind of debate.[38] Others take the view that that such approaches, based on evidence, can simplify decisions on competing inter-

October 2006, p.125.

[32]Mr Glen Edwards, NT Parks and Wildlife Service/ Desert Knowledge CRC, *Transcript of Evidence*, 7 September 2006, p.84.

[33]Mr Glen Edwards, NT Parks and Wildlife Service/ Desert Knowledge CRC, *Transcript of Evidence*, 7 September 2006, p.84.

[34]Mr Peter McDowall, Centralian Land Management Association, *Transcript of Evidence*, 7 September 2006, p.84.

[35]Mr C.James, *Transcript of Evidence*, 7 September 2006, p.84.

[36]Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.84

[37]Mr S.Dhanji, *Transcript of Evidence*, 7 September 2006, p.84.

[38]See for example the views of Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.306, compared with those of Dr M.Douglas, *Transcript of Evidence*, 15 November 2006, p.212.

ests and imperatives by bringing objective evidence to bear, and making decisions more defensible, making them ultimately less contentious:

> the thing about these systems is they are clear, transparent, you know why you have done it. You can argue why you have made that decision. And it takes away some of the politics and fighting that goes on when you can actually say; "these are the facts, this is how we did it".[39]

As further discussion will show, the conflicts of interest that arise around invasive species make this "defensibility" a thing of no small merit.

1.3.1 The STAR model

The STAR (the "Space and Temporal Animal Reduction") model, a decision-support framework for the management of feral animals developed at Charles Darwin University, embodies many of these principles.[40] Dr. Bradshaw told the Inquiry that STAR was predicated on an acceptance that "eradication is pretty much impossible for most species":

> [Only for very] few species will you ever get into a situation where you can guarantee eradication [so the goal must be] density reduction ...damage reduction. We have to accept that they are going to be there for the foreseeable future and we have to live with them, but we can live with them on our terms not theirs. We need consistent broad spatial scale and lengthy monitoring data are absolutely essential. Without these you cannot make informed decisions.[41]

[39] Mr John Thorp, National Weeds Management Facilitator, *Transcript of Evidence*, 15 November 2006, p. 257.
[40] Dr Corey Bradshaw, Charles Darwin University, *Transcript of Evidence*, 16 November 2006, p.339 ff.
[41] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.347.

As noted, this kind of evidence-base is also needed to make judgements on the expenditure of resources of invasive species control or prevention. Prevention is, it is generally agreed, where the most cost-effective effort can be applied, in which case "for every dollar spent ... you save approximately $38".[42] Given that many species are already established in the Territory, challenges lie in determining how much of present capacity should go to control, and how much to prevention.

This kind of competing imperative — where both kinds of response are necessary, but where resources may not cover prevention and control for all species — is inherent to the management of invasive species. A systems approach, such as that embodied in STAR, is considered necessary to deal with these dilemmas. There is a perception that other, more linear, approaches have failed. A further facet of STAR, which reflects an intention to grapple with this complexity, is its character as an "adaptive management framework", which is itself designed to change as it is used, "meaning that [as] we implement control, we collect more data, we re-prioritise the models, make new predictions and then go forward with that".[43]

This and similar systems are intended to allow more to be done with less: to show "what we can achieve for the smallest amount of money invested ... using these ecological economic models to inform about the best practical way forward".[44]

The STAR system is designed to support efficient expenditure by giving researchers the means to generate "the things we need to know ... to run a risk management model on invasives".[45] In order to do so, "we need to collect from pretty much all these species across the board, survival rates; how those vary through time and space, fertility, movement param-

[42]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.344.
[43]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.343.
[44]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.347.
[45]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.340.

eters".[46] A particular focus in this case is to establish "density damage relationships": "if we knock off 90% of all buffalo", does that result in "90% of the damage on the ground [being] controlled or reduced". Further questions are:

> How many animals do you need to eradicate or remove before the damage on the ground eventually goes away or it is not undetectable ... We also do not know very much about density dependence. How do these parameters change vital fertility movement and various densities of the population ...?[47]

Consideration of this, one of several decision-support systems presented to the Inquiry, shows important elements of such systems. First, it shows that the spur to creating them is a recognition of high levels of complexity attached to invasive species, in combination with a strong awareness that this has been a problem for management in the past. Second, a consideration of STAR suggests that such models have the capacity not only to integrate information arising from research. They also create demand for research, without which such models cannot do their work. Certain levels of funding for research will be necessary if these systems are to prove useful. Clearly, practical effort and resources must also be applied if the systems are to bear fruit. These are important points of reference for considerations of other, similar systems.

1.3.2 Biosecurity

While the STAR system itself belongs to the research effort on invasive species, there are other models, such as those associated with the *Biosecurity* process, which are intended to be functioning systems, active in the federal and Territory spheres. At a federal level, this is a more general framework than those outlined by Territory agencies, more about "national

[46] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.340.
[47] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.340.

policy [than], on-ground delivery", which "highlight things about world trade, the movement of people . . . and the demands of consumers."[48] "Key drivers" for Biosecurity are recognition of the significance of invasive species as the "greatest threat to Australia's biodiversity", and of the need for "greater collaboration" in this area between different Australian jurisdiction, and government departments.[49] The developing strategy will, it is reported:

> AusBIOSEC brings together all activities in this area being undertaken by the Australian Government, states and territories, as well as industry, landholders and other key stakeholders. It establishes a policy framework for greater national collaboration on biosecurity issues both within and across jurisdictions and with key stakeholders in the primary production and environment sectors.[50]

Over the long-term, there are also plans to include public health within the framework, building relationships with health agencies across jurisdictions, although these have been put on-hold to allow the Biosecurity process to "crawl before we walk".[51]

At this federal level, an important and immediate feature of the system is that it reverses the onus of proof for species introductions:

> In the past they have had a prohibited list and if you wanted to bring a plant in to Australia they would check it on that prohibited list and if it wasn't on the prohibited list it, then you could bring it in. Now they have gone completely around from

[48]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.273.
[49]Mr J.Thorp, *Transcript of Evidence*, 16 November 2006, p.273.
[50]Senator the Honourable Ian Campbell, Federal Minister for the Environment and Heritage, *Submission no.31*, p.[2]. See also Dr Andria Marshall, Department of Primary Industry, Fisheries and Mines, *Transcript of Evidence*, 2 December 2005, p.30, for a similar description.
[51]Mr R.Gobbey, DPIFM, *Transcript of Evidence*, 15 November 2006, p.241.

> that way and they are saying; "now what we are going to have is have is a permitted list, if it is not on the permitted list, you cannot bring it in".[52]

This reversal represents progress after a period of liberal introductions of exotic species, many of which have proved, in the long term, to be invasive. On the other hand, there are also features in this system that arouse concern:

> The only problem is, is that heaps and heaps of species are already here. In a lot of cases they are only here in very small amounts, but as long as they are actually already recorded in Australia then we are under international obligations to continue to allow those species to come in.[53]

There are other changes, too, that come into play when species become established: at this point, responsibilities for an invasive species moves from the federal to the state or territory jurisdiction where it has become endemic ("can not be eradicated"):

> then ...it is up to the individual state and territories to take their own action what they see fit, to minimise the spread or to stop the spread into their jurisdictions.[54]

A consideration of these arrangements shows something about the nature of Biosecurity overall. We have already heard that it is not "about on-ground delivery".[55] Rather, it is a system of protocols that controls relationships and parcels-out responsibilities between governments on threats to biosecurity. Under Australia's federal system, these are complex, and need management — especially because invasives species pay no spe-

[52]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.113.
[53]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.113.
[54]Mr Ian Kilduff, DPIFM, *Transcript of Evidence*, 15 November 2006, p.249. See also Ms Alice Beilby, NRETA, *Transcript of Evidence*, 2 December 2005, p.14.
[55]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.273.

cial respect to jurisdictional boundaries. So Biosecurity not only articulates changes in responsibility where species become endemic, but also becomes a platform for cost-sharing agreements associated with invasive species threats and incursions.[56] It supports a convergence of efforts so that, for example, threats associated with primary production and those associated with the environment will be "progressed under a single process", and provides a mechanism for coordinating national-level initiatives such as the revision of the National Weeds Strategy, occurring at time of the Inquiry.[57] Biosecurity also provides a mechanism through which similar positions — such as chief veterinary and plant officers — and agencies in different jurisdictions are involved in regular communication.[58]

The Australian Quarantine Inspection Service (AQUIS) is a key player in Biosecurity, and this too shows something about the nature of the system.[59] The previous two decision-support systems discussed in this Report seek to balance effort to control endemic invasive species with that devoted to preventing new incursions. The main focus of the national Biosecurity apparatus appears to rest on the prevention of new introductions. While the National Weed Strategy is evidence of some thought being given to endemic invasives, and this has resulted in "dramatic changes" to weed management in Australia, much of the Biosecurity mechanism is intended to provide a means for jurisdictions to work with each other where an acute "event" makes concentrated short-term attention necessary.[60] The protocols it provides, indicating which jurisdiction's legislation will have priority in particular Biosecurity events, is consistent with this focus.[61]

[56]Mr R.Gobbey, *Transcript of Evidence*, 15 November 2006, p.242.
[57]Hon. I.Campbell, *Submission no.31*, pp.[1, 2].
[58]Mr R. Gobbey, *Transcript of Evidence*, 15 November 2006, p.248.
[59]Mr R. Gobbey, *Transcript of Evidence*, 15 November 2006, p.249.
[60]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.255; Mr. I.Kilduff, *Transcript of Evidence*, 15 November 2006, pp.246-247.
[61]Mr I. Kilduff, *Transcript of Evidence*, 15 November 2006, pp.246-247.

Within the Territory, too, the Biosecurity framework has a similar quality. It allows, for example, for the resources of a variety of government agencies to be called upon where there is the prospect of a significant Biosecurity event.[62] This orientation is confirmed in descriptions of the "incursion management responsibilities" that fall to DPIFM and NRETA in the event of a crisis.[63] If "interoperability" is a focus of Biosecurity at a national level, it provides similar linkages and cross-cutting mechanisms within the Territory, providing the basis for cross-training and liaison between government departments that own different parts of the Biosecurity puzzle, and working against the continuation of "silos" that may have arisen in these areas.[64]

1.4 Discussion

Invasive species generate so complex a set of challenges that new systems are needed to manage information on invasive species, and to coordinate response. Other such systems will be considered in the following pages, but the three considered here provide important points of reference. The two Territory-level systems considered attempt to balance prevention and control, amongst other imperatives. Biosecurity is a much broader system, operating in and beyond the Territory, which exhibits significant tensions: for on one hand it appears to aim at a comprehensive solution or framework, "a continuum from prevention to eradication",[65] while on the other it displays a marked preference or priority on prevention over eradication.

There are positives and negative aspects to this approach. Biosecurity provides a series of negotiated arrangements for particular scenarios, and

[62]Mr I.Kilduff, *Transcript of Evidence*, 15 November 2006, p.247.
[63]Mr J.Carroll, DPIFM, *Submission no.13*, pp.8-9.
[64]Mr R.Gobbey, *Transcript of Evidence*, 15 November 2006, p.242; Mr W.Goedegebuure, *Transcript of Evidence*, 16 November 2006, p.298; Mr I.Kilduff, *Transcript of Evidence*, 15 November 2006, p.247.
[65]Mr J.Carroll, DPIFM, *Submission no.13*, p.8.

this is one of its key strengths. Transfers of responsibility from one jurisdiction to another are part of those articulations. All parties then know where their responsibilities lie, and this provides an antidote to notoriously problematic relationships between jurisdictions under the Australian federation. On the other hand, to the states and territories these protocols can look as though they are left to their own resources where their need is greatest.[66] In fact, dealing with endemic species is likely to account for a significantly higher proportion of overall costs of managing invasive species than sporadic emergencies and regulating borders. Given that under the Australian Constitution responsibilities for land are overwhelmingly left with the states and territories, generating alternatives to these arrangements would require considerable creativity and, probably, generosity.

However, there are other fundamental questions to be considered. These new "systems" — particularly for Biosecurity and similar — have a "top-down" quality. At other points this Report considers the view from the "bottom-up". It is reasonable to suggest that a truly effective integrated response, that draws effectively on all players in invasive species, will harness both, resulting in a situation where resources, information and coordination flow right through — top, bottom and middle — and where community-level action, and those of local and Territory government dovetail because all parties are engaged and have a sense of common purpose. Upper-level frameworks are important, but there would need to be considerable investment in other, supporting areas before they could achieve this.

These two facets of the issue, though, converge on one important question: are these top-level frameworks capable of achieving genuine progress in a situation often characterised as "intractable", or will they simply satisfy bureaucratic imperatives while real-world problems on invasive species

[66]Ms. A.Beilby, *Transcript of Evidence*, 2 December 2005, p.14; check interpretation and-or select other source.

continue to mount up? While both sides of the spectrum are important, it is vital that a balance be achieved so that the tough problems, requiring follow-through and consistency, manage to attract ongoing support. The practical work of engaging the community and getting control work done is possibly less attractive, and certainly more expensive than high-level designs, but one without the other will produce little change in a situation that is attracting strong concern from both professionals and community people — as the Inquiry hearings and submissions show.

1.5 Findings and recommendations

Findings

The Territory faces serious challenges in managing invasive species. Weeds attract highest levels of concern, followed by feral animals, aquatic species, invertebrates and diseases. But different aspects of environmental integrity, and different vectors and pathways for invasive species, are closely interconnected. Together, they represent a significant threat to biodiversity in the Territory. These species threaten not only to degrade the environment, but to rule out a diversity of uses and benefits arising from the natural environment, including tourism and primary industry.

There are particular challenges in the Territory due to its large area and small population. In addition, there are great variations in conditions, seen in contrasts between the dry climates of Central Australia and the wet tropical climates of the Top End. These add to the complexity of managing invasive species in the Territory.

An acknowledgement of the complexity and seriousness of the problem has led to the development of risk-management and decision-support systems for invasive species management in the Territory. These also appear in other jurisdictions, including the federal jurisdiction. Such systems

were in development through the period of the Inquiry. They are intended to provide an objective basis for decision-making and prioritising between different risks and threats, and between actions to prevent and control invasive species. Systems are also intended to provide divisions of responsibilities between government agencies and between jurisdictions, particularly in the event of new incursions of invasive species. These systems are important because no one agency, or one jurisdiction, owns all parts of invasive species, and coordination is essential. It is also important that sufficient funding and infrastructure are available for front-line work on invasive species so that these systems succeed in being more than a formal exercise.

Administrative arrangements for the management of invasive species in the Territory have moved away from a model of government as sole provider to a model of partnership between government and non-government players, and this is expressed in legislation. In line with this, there is also a new funding environment, in which community-based programs compete within a competitive grants process. In jurisdictions where these initiatives have been adequately supported with measures to assist, encourage, and enforce compliance, they have been successful in leveraging public effort and interest to help with invasive species prevention and control. In the Territory, however, many of these enabling factors have not been sufficiently addressed, and while community-based bodies and programs exist, the Territory has yet to attain full benefit from them.

Recommendations

Evidence heard by the Inquiry suggests that orders of scale for present problems with invasive species in the Territory are huge. There are species for which the number and extent of infestations are growing rapidly. In view of these challenges, the Committee proposes a set of appropriate objectives, which are:

- To halt the spread of invasive species, incrementally reduce levels of infestation, prevent sleeper species from becoming endemic, and prevent the introduction of new invasive species;
- To raise staff and financial resources to a point where NT can take full advantage of community interest in the control of invasive species, and of funding mechanisms, external to the NT, for invasive species management;
- To continue to develop and strengthen invasive species risk-management systems and evidence-based practice; and,
- To ensure there is a sufficient level of research activity to meet the demand for research data created by invasive species risk-management systems and evidence-based practice.

These objectives are expressed in the following recommendations.

Recommendation 1

The Committee Recommends that the Northern Territory Government divides its pursuit of objectives for invasive species management into stages:

a). An initial five-year phase in which the prime objective would be to *stop* further increases in the number and extent of invasive species in the Territory, drawing on and consolidating risk-management systems, calculating and putting sufficient resources in place, to do so.

b). A subsequent five-year phase in which the prime objective would be to *reduce* the number and extent of invasive species in the Territory, using risk-management systems to identify those of highest significance for environmental integrity.

c). A further subsequent phase, building on and continuing the first two phases, of a character and length to be determined by review.

Recommendation 2

The Committee recommends that the Northern Territory Government continues to support and develop risk-management systems for the management of invasive species, and:

a). Ensures that the risk management process includes triple-bottom-line assessments of the impacts of invasive species

b). Continues to support and develop evidence-based practice in invasive species management, in and beyond risk-management systems.

Recommendation 3

The Committee recommends that the Northern Territory Government establish consistent obligations on all landholders for invasive species management, by:

a). Establishing invasive species management as an integral part of business by placing consistent obligations on all landholders.

b). Undertaking invasive species control on Crown Land, to improve culture of compliance and prevent Crown Land from being a point-source for invasive species.

c). Removing or reducing the scope of exemptions from legal obligations on landholders to control invasive species.

d). Instituting property-based and region-based pest management plans as a means to manage and control invasive species across all categories of invasive species.

Recommendation 4

The Committee recommends that the Northern Territory Government strengthen the current legislation to control invasive species by:

a). Pursuing prosecutions under relevant Acts with sufficient vigour to give them due legal weight and, as a result, power to influence behaviour in the community.

b). Ensuring that government agencies have a budget to pursue prosecutions under invasive species legislation, so that prosecutions will not affect other agency functions.

c). Ensuring that a graduated series of responses is available as a means to achieve compliance with legislation and objectives, including the introduction of warning and infringement notices with and without penalty.

Recommendation 5

The Committee recommends that the Northern Territory Government increase public awareness and contribute to culture of compliance by:

a). Engaging in an active campaign to increase awareness, education, and compliance.

b). Ensuring that agencies have sufficient staff and funding to contribute to the campaign.

Recommendation 6

The Committee recommends that the Northern Territory Government continue and extend liaison and coordination with agencies and bodies outside of the Territory, and that it:

a). Advocates that the Territory be made into two regions — Central Australian and Top End — under the national Natural Resource Management system, so that grant applications and the programs they fund are able to address local conditions more effectively.

b). Increases the level of consistency between Territory lists of proscribed or permitted species and those of other jurisdictions, across all categories, except where this would reduce the Territory's capacity to respond to local threats and conditions.

Recommendation 7

The Committee recommends that the Northern Territory Government regulation and legislation develops a capacity to anticipate, and appropriately respond to, the consequences of species introduction or importation by:

a). Reversing the burden of proof such that approvals for new introductions or importation of species into NT will be subject to a them appearing on a list of admissible species.

b). Arranging that species for introduction to the Territory are subject to management plans before their release.

Chapter 2

Weeds

2.1 High levels of concern

In the course of the Inquiry, more was heard about weeds, in far greater depth, than any kind of invasive species, and these levels of concern have led to a high level of attention on weeds in this Report. Adding to this, the Inquiry took place 5-6 years after the enactment of the NT Weeds Management Act (2001), an important piece of legislation in the area with a high profile in the public eye, so that the Inquiry was in a position to review the effectiveness of the Act, and this too brought further focus on weeds.

Within this focus on weeds, however, there is much that is relevant for other kinds of invasive species. Weeds demonstrate the kinds of effects, interactions and challenges that arise from invasives of all types. These parallels are likely to become more clear once levels of research for other invasives increase to match that of weeds. Weeds are also relevant in other ways: they interact with other invasives, hastening the dissemination, and exacerbating damage, caused by other species.[1] Moreover, like other invasives, weeds act in concert with other negative consequences

[1] Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.13.

for the environment — notably climate change — to generate other multiplier effects.[2] This underlines the fact that although it is at times necessary to consider invasives in their "categories" (weeds, feral animals, etc.), in the real-world their effects are produced together, again underscoring the high levels of complexity faced by initiatives to manage and control them.

This chapter describes the costs and impacts of weeds, gives examples of weeds successes — and failures — in the Territory, and details the particular challenges that arise in efforts to manage weeds. It details structural arrangements for weed management in the Territory, including current legislation, relationships and responsibilities in government, manpower resources and funding for weed control, and presents a substantial case study on "improved pasture" species. This is all based on information from Inquiry hearings, and submissions made to the Inquiry. A final section reviews the gaps identified in weed management over the course of the chapter, and proposes solutions.

2.2 Current state

2.2.1 Impacts and effects

There were a number of strong statements to the Inquiry on the scale and seriousness of weeds impacts, and speakers demonstrated a high degree of unanimity on this. Australia-wide, they are estimated to cost $4 billion annually, and this figure is made more dramatic in that it includes only losses to primary production. The cost of weed management adds "up to 15%" of the cost of fruit and vegetables to the consumer.[3] Estimations of other economic values, such as those associated with environmental assets

[2] Mr. J.Etty, *Transcript of Evidence*, 5 October 2006, p.157.
[3] Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.253.

and services, are the subject of emergent research.[4] In addition to their wide-reaching effects on biodiversity, which will be discussed in further detail, weeds are regarded as having profoundly negative effects on:

> the environment on human health, on water resources, [they create] fire hazards, [provide] shelter for vermin and [act] as alternate hosts for diseases and pests. They have a number of impacts, they compete with pastures and crops, raise the cost of production, contaminate products, choke and pollute water ways and cause injurious and toxic effects and impact on tourism and that also takes in impacts on cultural values as well with Indigenous lands.[5]

Witnesses told the Inquiry that weeds attract a consistently high priority in ratings of environmental threats. One witness suggested that weeds and fire management were at the top of environmental concerns in the Territory.[6] A second rated weeds, nationally, as "the second most important threat to our environment after land clearing".[7] A third stated that "the weed issue here in the Top End or across the Territory is ... equal to that which pertains to water in the southern states".[8] A fourth suggested, of just one weed — Gamba Grass — that it is "a bigger threat to our total environment than cane toads" because of its capacity to make dramatic reductions in biodiversity.[9] Other speakers agree that weeds have immense environmental implications for the Territory, where they are "a

[4] Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.13; Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.253. Also see Dr Adam Drucker, Charles Darwin University, *Submission no.43*

[5] Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.13.

[6] Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.13.

[7] Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.253.

[8] Mr Dan Halloran, Northern Territory Agricultural Association, *Transcript of Evidence*, 5 October 2006, p.144.

[9] Mr John Earthrowl, Gamba Action Group, *Transcript of Evidence*, 16 November 2006, p.357.

clear and present danger to the environment" due to their role in causing "profound eco-level change".[10] This includes such key environmental areas as Kakadu.[11] In such places — significant for their environmental values, in a cultural sense, and for tourism — weeds are, at a fundamental level, "entirely changing everything about hydrology and the turnover, the actual function of those eco-systems".[12]

In view of the damage done by weeds, it is notable that many have been deliberately introduced. A large number owe their presence in the Territory to trials as pasture and fodder plants for the cattle industry. A submission from Greening Australia states that of "460 pasture and legume species" trialled in the Territory between 1947 and 1985, "80 became weeds", of which "13 of those are now serious crop weeds".[13] Moreover, "only 4 proved useful without becoming weeds", and "one plant became a major weed within 10 years of introduction.[14]

With this in mind, people with an interest in the area might hope to hear of greater levels of control over plant introductions in the Territory. But one witness described even the present situation as "open slather" on new introductions, with a "mind boggling" absence of "checks and balances" on new species coming into the Territory.[15] The witness stated that recent (at the time of the hearing) assessments by Territory government departments had shown high levels of risk for new weed introductions, and a lack of capacity[16] to deal with this compared with other states:

> So at the moment we are just sort of plugging holes and trying to stop things and manage our existing problems and it is down to the point, with us, if we do have an emergency response,

[10]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.
[11]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.
[12]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.
[13]Greening Australia, *Submission no.10*, pp.6-7.
[14]Greening Australia, *Submission no.10*, pp.6-7.
[15]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.17.
[16]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.18

> which we have with Cabomba, we have got to pick what we are going to drop. It's a choice we have got to make, we just don't have the capacity to respond.[17]

Another witness made similar observations, saying that "the cat was out of the bag" on weeds which, under present levels of control, were spreading "like a sort of cancer" across Territory rangelands.[18] From this perspective, the Territory faces a forbidding challenge in view of the multiple ways weeds are disseminated — "water borne or air borne or carried by feral animals".[19] Resource constraints are thrown into relief not only by the high costs involved in removing weeds, but a further need to "reinstate natural integrity" once the weeds are removed, so that positive effects can be sustained.[20]

Negative assessments of the present situation facing the Territory on weeds are common, and could be seen as discouraging. However, there are positive features as well. There is a growing awareness, across a range of stakeholders, of the scale and urgency of the problem: smallholders, the horticulture industry, tourism operators, Indigenous interests and mining companies.[21] It is significant that, due to its legislative obligations, one mining company, "currently spends more on trying to control Gamba Grass on their one mining lease than the entire pastoral industry is gaining benefit from the use of Gamba Grass in Cape York".[22] Where such obligations exist, and entail significant ongoing expenditure, there will be flow-on effects across the community that increase the level of interest in weeds prevention and control.

[17] Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.40.
[18] Mr J.Etty, *Transcript of Evidence*, 5 October 2006, p.146.
[19] Mr J.Etty, *Transcript of Evidence*, 5 October 2006, p.146.
[20] Mr J.Etty, *Transcript of Evidence*, 5 October 2006, p.146.
[21] Dr Michael Douglas, Charles Darwin University, *Transcript of Evidence*, 15 November 2006, p.214.
[22] Dr M.Douglas, *Transcript of Evidence*, 15 November 2006, p.214.

2.2.2 Successes and threats

Despite the high level of concern voiced over weeds in the Territory, and the huge scale of the problem, weeds management includes positive as well as negative stories. There are cases of significant weeds being effectively controlled, and in some cases virtually eradicated. The Territory's actions to control Athel Pine — a designated Weed of National Significance (WONS) — in Central Australia, for example, has attracted positive comment, as have Territory programs to control Mimosa.[23] Mimosa continues to be a problem in the Territory, but there are other weeds on which the Territory has made progress: outbreaks of Alligator Weed and Parthenium have so far been eradicated, and the Territory has the capacity to do the same for Baleria.[24] The Territory's actions to control Cabomba are regarded as good, although this continues to be a challenge, particularly as it has serious impacts on drinking water, and in view of the plant beginning to seed — a first in Australia.[25].

There are a number of prospective risks, in terms of new weed introductions, including Parthenium, Rubber Vine and Pond Apple, all of which are established in various parts of Queensland, raising the risk of introduction across the common border in to the Territory.[26] Other weeds species in the Territory represent varying levels of threat, ranging from those which threaten to become established to species already endemic in the Territory. Considering some of these species gives further background on the state of play on weeds before the Territory's arrangements are explored at greater length, and conditions surrounding pasture-related weeds in the case study below.

[23]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.18; Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, pp.279-280.
[24]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.13.
[25]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.13; and see Power and Water Corporation, *Submission no.23*
[26]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.14

Lantana at time of the Inquiry was a "sleeper weed" in the context of the Territory — it had a "feral population" around Darwin, but it had not yet become pervasive.[27] But there are reasons to think it has the capacity to do so: according to witnesses it covers four million hectares of the eastern seaboard of Australia and has a high prevalence in Queensland, where the cost of control is soon likely to go "well over $100 million", although even this is likely to be an " underestimate".[28] Given similarities in climate between Queensland and the Territory, a witness to the Inquiry saw "absolutely no reason why it will not grow extensively and invade the Top End of the Territory", with the potential to produce similar levels of environmental degradation as that from Gamba Grass.[29] At the time of the Inquiry, Lantana had only just been declared as a prohibited weed in Queensland, and there was uncertainty as to its status in the Territory in this regard.[30] The Inquiry heard that there are lessons to be learned from Queensland with regard to the management of Lantana and weeds more generally. Even after concerted effort to control Lantana in Queensland, varieties were being sold in commercial nurseries until local regulation, set in train by local government's obligations under weeds legislation, closed this regulatory loophole.[31] Judging from testimony, closing similar gaps in weed management may need to be considered in the Territory.[32]

Mexican Poppy represents a failure, according to witnesses, of the Territory's will and capacity to control weeds. A witness involved in the pastoral industry in the area of Alice Springs suggested that Territory government agencies were reluctant to respond to Mexican Poppy despite it being

[27] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.112.
[28] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.111; Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.253.
[29] Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.216.
[30] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.111-112.
[31] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.112.
[32] Dr G. Calvert, *Transcript of Evidence*, 5 October 2006, pp.114, 122.

brought to their attention as a weed threat, and despite the fact that control of Mexican Poppy is less difficult than for other more aggressive species.[33] The ongoing process of dealing with Mexican Poppy and NT government agencies led to high levels of frustration, as was clear from an account of its history:

> About 1997, we received a letter from DPIF, advising us of Mexican Poppy, and informing us of our duty to eradicate it ...Since that time we have spent probably $500,000 working on MP on our 1410Ha property, and on adjacent VCL, and on adjacent NTG property. (All the infestations on our place originated from upstream Government properties.) We have attended public meetings, at which all sorts of promises were made by NTG officers, and never kept...I have put in a lot of time on a committee to draft up a MP Management Plan, which has been "bottom drawered". I've observed NTG Weeds Officers deal with "crops" of MP quite inappropriately. We've had to put up with different NTG Departments, passing the buck, to where ever the Legislation is weakest. We've been re-infected from upstream neighbours, the worst being NTG and Commonwealth Govt. land, with no recourse. Despite all this, we have demonstrated that it is possible to deal with MP, only to now find that NTG Weeds Officers want it de-listed![34]

While this is just one view, other sources appear to confirm its main points. Although its view is less-openly critical of government, Greening Australia's critique the history of Mexican Poppy management is in essence consistent with Cramer's account. It suggests that Mexican Poppy "was detected and reported early and yet still managed to get away" because:

[33]Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, pp.85-86.
[34]Mr R.Cramer, Temple Bar Station, *Submission 14, , p.1.*

- Many stakeholders wanted copious amounts of research done before entering any control programs
- Control and follow-up were sometimes haphazard
- Concerted will amongst stakeholders was never really gained or if gained lapsed
- Quarantine and hygiene procedures were never put in place (it is a major issue in quarry products)
- Despite its declaration enforcement has not been used as a tool.[35]

A third witness also suggested that Mexican Poppy represented a significant lost opportunity and, in an echo of the first source, predicted that Mexican Poppy "will get delisted because it has gone into that point where control is not feasible".[36]

These accounts raise a number of issues about how NT government agencies deal with stakeholders in the community. There appear to be community-led processes, and modes of engagement, that terminate in a dead-end. They also resonate with other accounts that appear in this Report, as do concerns on failures to effectively manage weeds where government is the landholder. There are clearly further concerns about the listing process — where weeds are formally nominated under regulation as prohibited species — and this too is echoed in other testimony.[37] Overall, it appears that the challenges the community faces on weeds, and invasive species in general, are so great that effective action can only come where there is partnership between stakeholders — including between government and community players. The story of Mexican Poppy management in the Territory is not encouraging in this respect.

[35]Greening Australia, *Submission no.10*, pp.11-12.
[36]Mr S.Dhanji, *Transcript of Evidence*, 7 September 2006, p.86.
[37]See Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.109, 113.

Mimosa has proved to be a weed that is difficult to manage, capable of spreading rapidly in the environment. According to one witness it is one of two "big ornamental weeds that have gone berserk in Kakadu" — the other is Salvinia, an ornamental water plant used in aquaria.[38] Mimosa spread has major implications for biodiversity, in Kakadu and in other infestations in the Territory's Top End:

> When mimosa covers a big area like it does down here, you are talking about more than 83% loss of native biodiversity. Mimosa infestations are incompatible with most native species. You would not do any more damage to that area in just bulldozing it and covering it with concrete. It is a total loss of biodiversity.[39]

Biological control agents are available, but their main effect is to control the weed's spread, rather than killing plants. That must be done through spraying and direct, physical control methods.[40] Obviously, this entails significant manpower. In a detailed account of Mimosa control in Kakadu, the Inquiry was told that control programs engage Indigenous people — particularly young people — as a key part of this hands-on aspect of the work.[41]

Although it seems that these programs do achieve a measure of effective control, there is an important "moral" to be drawn from the story of Mimosa in Kakadu. A witness told the Inquiry that although Mimosa in Kakadu "did not really get away here until the 1980's", it now "covers 100 000 hectares":

> Kakadu Parks alone are spending half a million [dollars] a year in just trying to keep it under control. It does not have a very

[38]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.112.
[39]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.113.
[40]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.130
[41]Ms Anne Ferguson, Kakadu National Park, *Transcript of Evidence*, 5 October 2006, pp.125-127.

> strong hold on Kakadu yet, but it is on the verge . . . ".[42]

Commenting on this, the witness suggested that:

> The big take home message with mimosa and for all weeds, is that you never save money by not controlling the weed, and if you can get on top of it when it is still a very small population you will save yourself so much time and bother . . . later on.[43]

Mimosa in the Territory is a classic example of the fundamentals of weed control. It shows what happens when principles are followed — and when they are not followed. The described scenario of low activity and spread, transitioning to a high prevalence leading to crisis, echoes the development of other weed hazards. Relatively lower expenditures required for early intervention are simply the correlative of this pattern. The ongoing need for manpower and follow-up, portrayed in detailed descriptions of Mimosa control in Kakadu, sends realistic signals about the levels of effort and expenditure that are involved in effective weed management.[44] By extension, this also provides some idea of resource needs for the control of other invasives.[45]

Olive Hymenachne was introduced, like those of the weeds case study (below), as a potential pasture plant. Like Para Grass, Hymenachne grows in environments too wet for many other plant species, and was originally trialled with a concept of "ponded pasture" in mind, as a means, effectively, to expand conditions under which pasture plants would grow and thus increase pasture for cattle.[46] In the event, however, this did not go to plan. The Inquiry was told that Hymenachne "was only promoted for

[42] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.112-113.
[43] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.113.
[44] Ms A.Ferguson, *Transcript of Evidence*, 5 October 2006, pp.125 ff.
[45] See also Greening Australia / Darwin Regional Weed Advisory Committee, *Submission no.10, part 2*, for further comment on *Mimosa Pigra*
[46] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.118.

a short period of time before people realised how bad it was", and that it was "promoted as a pasture species until just recently".[47] Unfortunately, things developed quickly from there, and Hymenachne is "now listed as a weed of national significance, and there has been quite a fair amount of research gone in to its control".[48] Nevertheless, in a story common to weeds management, "people have still been spreading it".[49] In weeds, many opportunities are lost by inconsistencies in approach.

Hymenachne, like Mimosa, represents a significant threat to Kakadu.[50] Because they inhabit a similar niche in the terrain, Hymenachne and Para Grass "tend to form an unholy alliance ...[there] is no room in there for anything else".[51] This is because:

> Hymenachne can grow in almost twice the depth of water that Para Grass can, so all those areas of open water that have been left over from Para Grass invasion will then be filled up by the Hymenachne. The Hymenachne will actually grow in over the top of the Para Grass. I was always terrified by Para Grass until I saw what Hymenachne can do, and it makes Para Grass pale in comparison.[52]

Due to these characteristics, levels of risk for wider outbreaks of Hymenachne in Kakadu are high. The Inquiry heard that there are currently "a lot of infestations, but they are very small and scattered", and are subject to control by Parks North.[53]. Citing earlier experiences with Para Grass, where a window of opportunity to stamp out early infestations at a much lower cost (in 1983), the witness made parallels with Hymenachne and its destructive potential in Kakadu, saying that if "Hymenachne gets

[47]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.107
[48]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.107
[49]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.107.
[50]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.108.
[51]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.108
[52]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.108
[53]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.108

away now", Kakadu will no longer be able to enjoy its present a reputation "of being one of the most weed free parks in Australia ... we are on the verge of losing that reputation".[54]

These brief studies give a foretaste of the challenges of managing individual weeds species. A number of the features identified come up for discussion in other parts of the Report. Taken together, they demonstrate the levels of complexity involved in managing weeds across the Territory. That complexity is a special feature of invasive species has already been flagged earlier in the Report. More detailed discussion of individual types and species of invasives shows the impact of this complexity in practical terms, and draws a broader picture of the problem as a whole. Further elements of complexity, as they pertain to weeds, are covered in the following section.

2.3 Aspects of complexity

In its early sections, this Report draw a distinction between "linear" and "systems" approaches to invasive species, particularly in terms of ways to prioritise, distribute and marshal resources in the face of complex and competing imperatives. Detailed information about the characteristics of invasive species — of weeds in this case — lends further credence to the idea that sophisticated systems are needed to confront the challenges they represent. The ways in which weeds proliferate and spread through the environment is just one aspect of this overall complexity.

2.3.1 Means of spread

The Inquiry heard that key non-human vectors for weeds spread included wild horses and other feral animals, and wind- and water-borne move-

[54] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.108.

ments of plant materials.[55] Human-assisted pathways are numerous. The railway line between Alice Springs and Darwin was frequently cited as a vector — seeds and other plant materials are picked up by the passage of trains and deposited further along the line.[56] Weed infestations often occur where there is ground disturbance, and the railway corridor is a clear instance of this.[57] Indeed, in general, "road corridors, cyclonic events, anything that will disturb the landscape, opens it up for invasion" by weeds.[58] Another human-assisted pathway occurs where weeds are included in hay and transported to other areas.[59]

Retail nurseries and domestic gardening are other important factors in the spread of weeds. The Inquiry heard that of the "3000 introduced weeds in Australia . . . nearly three-quarters of those are ornamental plants gone wild".[60] In spite of these being known factors, "Darwin nurseries are absolutely full with garden thugs", (this being a term for garden plants with established invasive characteristics)[61]. Despite high levels of risk, and a significant history of weeds stemming from ornamental introductions,

> people are [continuing to plant] highly invasive species in their gardens, which are then escaping over the fence and getting in to surrounding bushland, in to waterways and then spreading all over the place, jumping the fence.[62]

[55]Ms A.Ferguson, *Transcript of Evidence*, 5 October 2006, p.128.
[56]Ms Marj King, Top End Native Plant Society, *Transcript of Evidence*, 6 October 2006, p.192.
[57]Shepherd, Katherine, p.150.
[58]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.216, and see also Mr J.Etty, *Transcript of Evidence*, 5 October 2006, p.148.
[59]Ms Anne Shepherd, Mayor of Katherine, *Transcript of Evidence*, 5 October 2006, p.150; Mr Peter Foster, Taminmin High School, *Transcript of Evidence*, 6 October 2006, pp.179, 174.
[60]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.111.
[61]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.120.
[62]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.111.

Vectors for weeds spread clearly represent a number of un-managed risks. There appeared, at the time of hearings, to be an insufficient sense of linkage between policy on weeds and practices in retail nurseries and domestic gardens. These were multiplied in some instances by poor practice on the disposal of garden waste where, for example, cuttings had as a matter of routine been placed in a river corridor, and then carried to other places.[63] Similarly, in spite of it being a known factor in the spread of weeds, witnesses suggested that parties responsible for the rail corridor were not performing maintenance in this regard,[64] and some witnesses were unclear as to who had responsibility at all.[65]

2.3.2 Need for follow-through

Another challenging aspect of weeds control is the necessity for ongoing work to follow-up on areas where control has been successful. The nature of weeds is such that 100% removal is rare, even if there have been concerted efforts to remove them. Consequently, as for other invasive species, there "has got to be a long term commitment" to weeds control.[66] Witnesses told the Inquiry that it was necessary for this commitment to take shape in concrete financial terms if weeds control was to be effective:

> There can not be a bit of money to control the problem without having follow up funding to follow up that control work because I have seen it time and time again. You put money into getting rid of the weed infestation, and there is no money for anyone to come back and follow it up, so that is a waste of money. But that is what the feds or whoever will fund, is this reactionary stuff and to me it needs to be if you are go-

[63] Ms A.Shepherd, *Transcript of Evidence*, 5 October 2006, p.142.
[64] Ms A.Shepherd, *Transcript of Evidence*, 5 October 2006, p.150.
[65] Mr E.Schoppe, *Transcript of Evidence*, 5 October 2006, p.57.
[66] Ms A.Ferguson, *Transcript of Evidence*, 5 October 2006, p.131.

> ing to tackle the weed, here is money for one year and here is five years or ten years funding for follow up to make sure that investment has some outcome.[67]

It is clear from much testimony that this requirement most frequently goes unfulfilled. Witnesses spoke of extensive experience where necessary continuities were not achieved, resulting not only in ineffective weeds management, but a collapse in morale in community-driven inputs to weed management programs:

> We attended a weed strategy workshop a while back and they got everybody to put up on the wall, weeds strategies and programs that they have been involved with and over the period of time there was 28 weed strategies and plans and things, and they were all discontinued or fell flat.[68]

This represents a significant lost opportunities for weeds management. This is after-the-fact: there are also lost opportunities with regard to anticipating problems with weeds — the prospective aspect of "follow-through". Witnesses to the Inquiry were critical of current practice in this regard, arguing that in the Territory weeds management is "always trying to control plants once they become uncontrollable", rather than the more effective, cheaper option of "getting in there and knocking off plants within their early stages of infestation".[69]

While these omissions of necessary continuity appear to be in the majority, there are also important instances where it has been applied, and the positive outcomes that have resulted serve to strengthen arguments on follow-through, examples in the Territory where:

> that approach of just going back and consistently controlling an area has resulted in the only known Parthenium eradication

[67] Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.145.
[68] Mr Rick Elliot, *Transcript of Evidence*, 5 October 2006, p.143.
[69] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.116.

in the world at Elsie Station.[70]

These positive and negative examples, together, amount to a persuasive body of information, underscoring a need for greater continuity in weeds management. It is encouraging that this could represent a more cost-effective approach where early infestations are appropriately targeted, and where larger control efforts are consolidated by follow-up operations.

2.3.3 Conflicts of interest

A key element adding to the complexity of weeds management are the conflicts of interest that arise between those who may benefit from the use of particular species, and others who are concerned and effected by their environmental consequences. For weeds, this particularly affects a range of so-called "improved pasture" species, introduced to support the Territory's cattle industry, which are the subject of the case study further below. People responsible for weeds management in regional areas of the Territory are strongly aware of conflicts of interest surrounding these species, and are also aware that a proportion of problematic weeds have in fact been introduced to the Territory with the object of adding to pasture.[71] The Inquiry heard that similar conflicts of interest occur, in relation to introduced pasture species, around Australia. Although these species represent "big benefits" to pastoral industry that have been obvious for some time, the full dimension of their environmental cost is only now becoming evident.[72] Symptomatic of the very different values and costs these plants represent for different stakeholders, the Inquiry heard that while they were "highly prized" by pastoralists, they were "greatly feared" by people with other interests in the land.[73]

[70] Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.145.
[71] Mr J.Etty, *Transcript of Evidence*, 5 October 2006, p.146.
[72] Dr M.Douglas, *Transcript of Evidence*, 15 November 2006, pp.213-214.
[73] Dr M.Douglas, *Transcript of Evidence*, 15 November 2006, p.214.

Under these conditions, even the basic step of classing a species as a weed is highly contentious,[74] and research into biological control of certain species does not take place because it is seen as "threatening the usefulness of those plants as pasture forage".[75] Certainly, people working in government weeds control programs can feel "caught in the middle" due to these pressures.[76]

Conflicts over benefits and costs are dramatised in the case of such species as Buffel Grass, said to contribute $1.5b to the Australian economy, "but at the same time too, it is regarded as probably being a greater threat to biodiversity in arid and semi-arid areas, than ... tree grazing".[77] It is, the Inquiry heard, "the number one management issue down in places like Uluru", where it is "changing the whole inland spinifex country of Australia".[78] Buffel Grass is just one of a set of plant species that are of "enormous value to the cattle grazing industry", but which have negative effects for other interests, creating a fundamental tension between the "desires and aspirations of the cattle grazing industry, and those who are interested in the long-term sustainability of the native eco-systems".[79]

Due to these conflicting interests, a degree of paralysis has beset the management of these species:

> There is absolutely no restrictions on any land management practices that encourage the spreadable growth of those grasses. There is no encouragement or incentives to undertake control. There is no biological control research. At the moment if you talked about introducing biological control for Para Grass people would take you out and shoot you. Because there is none of this

[74] Mr S.Dhanji, *Transcript of Evidence*, 7 September 2006, p.84.
[75] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.122.
[76] Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.19.
[77] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.108.
[78] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.108.
[79] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.108.

> [declaration], there is also very little research and development into understanding how to get on top of these problems. It is like nobody even wants to know about it. Because of the controversy that surrounds these things, because it is of value to one part of society and negative to another, people much prefer to just put it in the too hard basket and not look at it. At the same time too, we are now getting to the point where we really cannot it ignore this.[80]

These are the kinds of complexity that make systems-based approaches both necessary and, inevitably, political — because they involve compromises between competing interests and imperatives. The observations quoted up to this point are from professionals and researchers in weed control. A very different picture emerges from the other side of the stakeholder fence. Statements by pastoralists to the Inquiry tend to down-play the severity of the effects of these species.[81] This is despite the fact that, according to one researcher, very few pastoralists rely on Gamba Grass or Olive Hymenachne, for example, as mainstays of their requirement for fodder.[82] It may be that conflicts of interest have led to polarised views: even where economic value is less than dramatic, landholders with certain interests may underestimate the environmental impact of such species. Again decision-support systems could have a role in modifying this situation by providing an evidence-based picture of the benefits and deficits produced through their use. They are also likely lead to different perceptions of the balance of costs and benefits by the wider community, who will be more alert to the "hard stuff" that goes into choosing between interests:

> That on the one hand there are nurseries, there are primary producers that are making money out of this, that if anything

[80] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.109.
[81] Mr D.Halloran, *Transcript of Evidence*, 5 October 2006, p.149; Mr Tony Searle, NT Cattlemens Association, *Transcript of Evidence*, 16 November 2006, p.304.
[82] Dr M.Douglas, *Transcript of Evidence*, 15 November 2006, p.212.

> goes wrong, it is not government that pays, it is the taxpayers that pay. The costs are socialised. The costs and the losses are socialised to the community. And that is the very difficult one to weigh up.[83]

This could lead to a very different public view on the best policies to pursue.

2.4 Structural arrangements on weeds

2.4.1 NT Government arrangements

The Inquiry was told of the key structural components of the Territory government approach to weeds. The then acting-head of NRETA's Weeds Division outlined a series of protocols and relationships that constitute the bureaucratic dimension of the response on weeds. At time of hearings, this included links from the Weeds Management Strategy down to regional weeds management strategies for the five regions identified; lateral links to the Territory Natural Resource Management Plan; and links up from the Territory to the North Australian Quarantine Strategy and to the Weeds Of National Significance (WONS) process.[84] The Territory "takes the lead" on two WONS species — Athel Pine and Mimosa — and through the process as a whole maintains links with, and contributes to, national-level bodies such as the Australian Weeds Committee, and ministerial councils on natural resource management and primary industry.[85] These arrangements show a determination that arrangements on weeds in the Territory will be "linked right from the ground grass roots at the Landcare level and right through the Territory strategies, regional strate-

[83]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.253.
[84]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.17.
[85]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.17.

gies right up through to those national frameworks".[86]

Consistent with this, a proportion of Territory government effort on weeds goes to establish and maintain communications between different components of the weeds management sector — between Landcare groups and researchers for example — and "[making] sure that we are not duplicating effort".[87] In a similar vein government, through the Weeds Branch, is "supporting and developing" the Regional Weeds Plans and Weed Species Plans, which are both processes that were set in train by the Weeds Management Act (2001).[88] One of the initiatives being undertaken at the time to support these processes was the development of a database, accessible online, that would allow people to contribute and view information, using GPS coordinates, on the position and extent of weed infestations.[89] Statements by other witnesses to the Inquiry showed that there was both demand for such a system, and little awareness that one was being developed.[90]

At time of hearings, the Territory government had entered into a process of review, leading to the Weeds Risk Assessment System (WRMS) that is discussed later in this Report. This process involved getting different government stakeholders, such as Primary Industries and Biosecurity, together at forums.[91] The intention was to make the process into something more than just a "review [of] the declared weed list" — an approach that could have left important issues un-discussed.[92]

Two things can be observed about the information that came from this testimony. One is that the outlook from a government perspective is sig-

[86]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.17.
[87]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.19.
[88]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.19.
[89]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.19, and see also Ms A.Beilby, *Transcript of Evidence*, 15 November 2006, p.234.
[90]Mr P.Bekkers, *Transcript of Evidence*, 6 October 2006, p.178.
[91]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.23.
[92]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.23.

nificantly more positive than those expressed by witnesses from various parts of the community. Their views are presented in Chapter 3 of this Report. A second point of concern is that while bureaucratic processes within the Territory government appear to offer positive directions on weeds, there is much that needs to be done in terms of resourcing in order to allow these arrangements to have a productive effect. An optimal balance of bureaucratic structure, resources, and community engagement would seem to be a necessary condition for progress, especially in the light of the high quantum of work necessary to control weeds; the large geographical areas affected; low population densities; and widespread perceptions that it will be difficult to put together sufficient financial resources to make genuine control possible. These factors — especially this last — as much as the conflicts of interest and other generators of complexity, appear to be responsible for a certain sense of paralysis on weeds control. Achieving this combination of necessary conditions must attract ongoing attention and concern.

2.5 Legislation

2.5.1 Features

The Inquiry heard that the purpose of the Weeds Management Act (2001) was:

> to prevent the spread of weeds into and out of the Territory and ensure that the management of weeds is an integral component of land management, ensure that there is community consultation in creation of weed management plans and to ensure that there is community responsibility in implementing weed management plans.[93]

[93]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.16.

The Inquiry heard that the Act requires "owner and occupiers" to manage and control weeds, and to "dispose of weeds only on their own land or at designated weed disposal areas".[94] This includes government itself, with respect to its management of Crown Land — a contentious subject for many landholders in the community.[95] Under the Act, all landholders are under a formal obligation, if a declared weed appears on the land they occupy, to "show that they are actually doing some work on that land, either containment or there is a program in place".[96]

This change in legislative arrangements ushered in by the 2001 Act was described as:

> a strong shift from the previous management of weeds in the Territory, where it was very much an operational focus and the staff were involved in "hands on" programs and went out and worked side by side with landholders.[97]

At the same time as the Act came into force, however, resourcing constraints were applied to the Territory government's weed program, and this had a strong influence on arrangements after that point. The Inquiry heard that, from this point, NRETA's Weeds Branch became, essentially, an "advisory service". Although Branch staff "still go and assist landholders on the ground and drive those programs", in general "responsibility has come onto managers themselves and ... a lot of those community groups, Landcare groups, there has just been that change since 2001".[98] These developments have led to perceptions, by some, that a significant effect of the legislation has been simply to shift responsibility from government to

[94]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.16.
[95]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.16. See also Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.143; Dr R.Lim MLA and Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.307; and Mr R.Elliot, *Transcript of Evidence*, 5 October 2006, p.144.
[96]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.17.
[97]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.16.
[98]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.16.

landholders,[99] while others have called for a review of the legislation and its supporting arrangements.[100]

It appears from testimony given to the Inquiry that similar legislation in Queensland has had strongly positive results. One difference is that there has been more forceful action on declaring species, and Lantana as a case in point.[101] More broadly, government action made local government see weeds management as an integral part of their business:

> They have made every local government in the entire state have their own Pest Management Plans, every local government has a Pest Management Working Group, and the amount of interest and control of weeds in Queensland is unprecedented. It has gone from no interest whatsoever, to enormous enthusiasm because it has said to local government; "this is now a core business", in the past it never was core business. Now weed control is core business of everyone.[102]

This is one way in which the Queensland implementation of this approach does more than just transfer responsibility to landholders. Further dimensions are that there has been a shift from species-oriented management to a more integrated style of management plan that focuses across species on a particular parcel of land: "Property Pest Management Plans", "put together" by local government.[103] The results were "amazing" — "I have never seen such a change in attitude so quickly.[104] The key element in this being effective lies in it being comprehensive: all parties are under obligation, and because of this rates of compliance are higher, saying that "a Property Pest Management plan would be desirable for anyone

[99] Mr Gerry Wood MLA, *Transcript of Evidence*, 7 September 2006, p.94.
[100] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.110.
[101] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.112.
[102] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.114-115.
[103] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.115.
[104] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.115.

with properties over 10 hectares" and then supported and enforced that through local government and legislation.[105]

In view of this point of reference, the Territory's approach appears to have a much narrower base of support, to be less comprehensive, and to therefore achieve significantly lower levels of compliance. The example of Queensland shows that when there are sufficient levels of these, public and institutional awareness multiplies as a result of wider motivations to comply — generated by strong signals from government — and rising densities of information in the community as a result. For this reason, Queensland is an example from which the Territory could benefit in its efforts to improve weeds management.[106]

2.5.2 Declaration

One function of the NT Weeds Management Act is that it provides a mechanism for declaring weeds. Declaration is a process of putting species into categories that allow them to be controlled and various actions prohibited that would result in their broader dissemination.

There are three categories of declaration under the Act — "Class A ...to be eradicated ...; Class B is to control the spread and species not be introduced into the Territory; and Class C", ("Not to be introduced to the Territory").[107] As already indicated, weed declarations are sometimes contentious, and a number of witnesses made comment on the declarations process. Positive views indicated that some species that were on the Territory list of declared plants were not on those of other jurisdictions, even those with similar climates and conditions, and that this was a good

[105] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.115.
[106] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.115.
[107] Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.16. See http://www.nt.gov.au/nreta/natres/weeds/ntweeds/declared.html for definitions of weed declarations.

sign.[108] On the other hand, there were species listed in other jurisdictions that were not in the Territory, signalling a lack of coordination between jurisdictions that could well be addressed to good effect.[109]

In any event, a number of witnesses tended the view that there were difficulties with declaration. In part this stems from declaration being the sole means by which plants can be controlled. One witness called declaration "a real stumbling block", saying that until "these things are declared it makes it very hard to mount a case that they are a species of concern".[110] Conversely, where a species is not declared, "there is absolutely no restriction on the sale or spread of the weed".[111] This point was illustrated in connection with Gamba Grass which, if it were left un-declared in the Territory, "is just going to ... spread to properties all over the countryside and it will be away before we know what is going on".[112] But until plants achieve that status:

> There is absolutely no restrictions on any land management practices that encourage the spreadable growth of those grasses. There is no encouragement or incentives to undertake control. There is no biological control research.[113]

From this it is clear that it is not simply that additional regulation and restriction comes into play when a weed is declared. The resulting increase in financial resources, and levels of interest, is critical in making progress on effective control. The Inquiry heard that declaration of Hymenachne in Queensland and the Territory had been of "enormous value".[114] Until that point:

[108]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.114; Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.16.
[109]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.114.
[110]Dr M.Douglas, *Transcript of Evidence*, 15 November 2006, p.215.
[111]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.109.
[112]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.109.
[113]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.109.
[114]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.109.

> people were spreading it everywhere until it was declared, then they said; "right no more, let's contain and control the existing infestations, please do not spread it any more".[115]

While species introduced as pasture plants receive a lot of attention during discussions on declared weeds, it is just as applicable to ornamental plants from gardens and commercial nurseries. The Inquiry heard that current settings are allowing a "flood" of ornamental plants into the environment that is "just completely out of control".[116] Out of these, of most concern are the "garden thugs" to which this Report has already referred, "highly invasive garden plants", of which most:

> ...are still available in nurseries and are still being widely sold against all current advice by researchers, it is still happening ...the legislation does not look at this issue at all really. There are a couple of species that are declared ...but largely the whole issue is ...ignored.[117]

There are problems, then, with the combination of these two things — that declaration is virtually the sole regulatory means to control weeds, and that the declaration process itself appears to be slower and less responsive than it needs to be. A further criticism of declaration, however, is that it lacks "predictive" ability — the capacity to take into account a species potential to become a problematic weed and set responses in train to prevent or reduce future problems. The Inquiry heard that "one of the big problems with declaration [is that] people do not bother declaring something until there is direct evidence of it getting out of control".[118] However, by "that stage it is usually already too late".[119] Rather, the regulatory environment, particularly as it applies to declaration "needs to have

[115]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.109.
[116]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.122.
[117]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.114.
[118]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.113.
[119]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.113.

...powers of prediction".[120] For this witness, a lack of predictive capacity was very evident in the current situation for garden plants:

> There are species getting out of gardens everywhere, and as quickly as you can get in there and start mopping up a few, there are more sneaking in behind you. There is a constant plague of them ...[121]

However, the witness also put this into perspective by saying that this was a problem not just for the Territory. Rather, it affects "every single town in Australia", and is a problem for "all of Australia and in fact ... the world".[122] Nevertheless, it is necessary for weeds management in the Territory to eradicate "weeds before they become a problem and not wait until they cover 100 hectares and then say; "yep sure is a weed, time that we declared it".[123]

This is another argument in support of better decision-support and information systems. This account implies that the "coarse" evidence of seeing weeds widely established is an insufficient input to the weeds control process. Earlier, detailed evidence needs to be generated, and this entails a better means to create and marshal that information. It appears from testimony that this is something that was not sufficiently specified in connection with the Weeds Act, under which "the Minister has the power to declare those plants" — but "it doesn't specify in the Act what process [the Weeds Branch] would go through" to support that decision.[124]

Acknowledgement of this gap had, at time of hearings, been a spur to a review of arrangements. The two-year public consultation had involved a review of the Declared Weed Species List, but had gone beyond this narrower brief to develop, amongst other things, an "economic cost-benefit

[120]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.113.
[121]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.113.
[122]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.113.
[123]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.122.
[124]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, pp.18.

analysis model" to support decision making on weeds declaration.[125]

There was also a perceived need to respond to other deficits on declarations and the Weeds Act. Criticisms were that the Act and its supporting mechanisms, at time of hearings, did not help responsible Territory agencies "when it comes to conflict resolution"; made it "hard to show the evidence for why one species [was] on the list versus the other"; and did not "allow for us to deal with the prioritisation for fund management".[126]

2.5.3 The Weeds Risk Management System (WRMS)

The Weeds Risk Management System (WRMS) is a product of this broader process of review, and is intended to address identified gaps in regulatory and administrative arrangements for weeds in the Territory.[127] As for similar systems described in this Report's Introduction, the WRMS is designed to deal with complexity in weeds management.

An encouraging sign is that a range of people working directly on weeds control have expressed support for such a system: to prevent future introductions of problematic plant species; and to stop the "spread and further establishment" of species already in the Territory, for the "sleeper weeds" that have proved such a challenge for management and the allocation of resources.[128] Interest and support for such a system has also come from the research community, and in fact the WRMS is itself the product of collaborative arrangements between the Territory government and its agencies (NRETA, DBERD, DPIFM) and Charles Darwin University.[129]

[125]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, pp.18

[126]Mr Keith Ferdinands, Department of Natural Resources, Environment and the Arts, *Transcript of Evidence*, 15 November 2006, p.218.

[127]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, pp.18.

[128]Gamba Action Group, *Submission 11*, p.2; Mr R.Elliot, *Transcript of Evidence*, 5 October 2006, p.143; Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.149. See also Mr Bill Low, Low Ecological Services, *Transcript of Evidence*, 7 September 2006, pp.93-94.

[129]Dr Michael Douglas and Dr Samantha Setterfield, Charles Darwin University, *Submis-*

The Australian Quarantine Inspection Service (AQUIS) is also represented in the process.[130]

Witnesses from Territory government weeds programs emphasised the role of the WRMS as a tool to manage complexity:

> to take that complex issue, break it down into a series of smaller questions in a logical way and then allow that system to help us make decisions in terms of how we prioritise which species we respond to and how we respond ...[131]

This is necessary because "we are always going to have limited resources to use to respond to weeds" and because there are significant differences in "impact", "feasibility" and "control" for each weed species.[132] As for similar systems described above, the WRMS is based on an acceptance that negative events — such as illegal introductions across Territory borders — will occur, and provides a basis on which to respond to them.[133]

A key element in the WRMS is its ability to be used in such a way that it supports communication and engagement with the weeds constituency. In the light of debates over whether particular species should be declared or not, for example, the WRMS can, by providing evidence and a record of decision-making, support ongoing dialogue and furnish "defensible" decisions: "there [are] going to be people asking why and why not [and the WRMS is] one process we can go back to, to clearly show how we made our decisions".[134] This is important because this system is not designed to act directly on weeds, but should provide a tool to put in place the "standard best practice" government agencies "are trying to ... foster ... in

sion no.27, p.3; Mr K.Ferdinands, *Transcript of Evidence*, 15 November 2006, p.216.

[130]Mr K.Ferdinands, *Transcript of Evidence*, 15 November 2006, pp.219-220.

[131]Mr K.Ferdinands, *Transcript of Evidence*, 15 November 2006, p.218.

[132]Mr K.Ferdinands, *Transcript of Evidence*, 15 November 2006, p.218.

[133]Mr K.Ferdinands, *Transcript of Evidence*, 15 November 2006, p.217.

[134]Mr K.Ferdinands, *Transcript of Evidence*, 15 November 2006, p.218.

the NT".[135]

But, as for the Weeds Act, there are supports to the WRMS that need to be provided if it is to fulfill its promise. The Inquiry heard, for example, that acquiring the full range of information for each species entered on the WRMS was "very time consuming" and "proving to be a real bottleneck" — the capacity to provide information and research data to feed the WRMS may need to be increased.[136] Another witness suggested that, to be effective, the WRMS should be be able to deliver usable outputs for property-based management programs.[137] This echoed comment on Queensland's successful experience with weeds policy.[138]

It also suggests that such systems, in order to fulfill their promise, need to articulate down from the high orders of generality with which they begin, and provide more specific outputs that can be grasped and put into practice by a variety of landholders. This raises some challenges for these systems. On one hand, they are creatures of bureaucratic process, but they must come down to practical details. On the other, they must encompass technical data within systems of great complexity, but their outputs should, if they are to be useful, be able to be comprehended by users with lower levels of technical training. These imperatives represent ongoing challenges for the management of such systems. More clear, however, is that the balance between theoretical generality and practical detail should be respected in one fundamental way, and that is in providing sufficient human resources to support the real-life implementation of the system. The example of the original roll-out of the Weeds Act in the Territory, where on-the-ground support receded as other elements were put into practice, clearly shows that such an approach would be unlikely

[135]Mr. K.Ferdinands, *Transcript of Evidence*, 15 November 2006, p.218.
[136]Mr K.Ferdinands, *Transcript of Evidence*, 15 November 2006, pp.220-221.
[137]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.256.
[138]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.115.

to work well.[139]

2.5.4 Enforcement

The Inquiry heard, from a number of witnesses, that the efficacy of the Weeds Act had been brought into question by deficiencies in enforcement. Prosecutions under the Act have been rare.[140] As one witness suggested this must, in effect, throw the status of the Act into question: " if you have got the laws, if they are not going to be enforced, well it is a waste of time drafting them".[141] Not only have there been few prosecutions, but there is a perception that some offences defined by the Act have not been prosecuted at all, such as penalties for "transferring" plant material from declared weeds.[142] This has led to a lack of awareness in the community on what is permissible under the Act, and hence "half the people who are doing it probably do not even know that they are liable".[143]

Other witnesses stated that responsible NT government agencies had "severe limitations" in their capacity to implement the provisions of the Act.[144] At time of hearings, NRETA's Weeds Branch had not "had the ability to actually finish writing up our regulations" under the Act and, in any event, simply did not " have the resources there to actually enforce it".[145]

Where prosecutions have been pursued, the results have not been as positive as they might be. The consequences for prosecuting agency representatives were poor enough to deter further use of the legislation:

[139]See Mr B.Williams, *Transcript of Evidence*, 15 November 2006, p.230.
[140]Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.91.
[141]Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.91.
[142]Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.91.
[143]Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.91.
[144]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.20.
[145]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.20.

> . . . to my knowledge the Noxious Weed Act has only been used once in the Northern Territory. And it was not a very fun thing for the weed section because they put the act on this guy, they then had to go out and do the control, and that used all of their budget for that year.[146]

This resulted in a "chilling effect" on future prosecutions:

> . . . that sent a big message to weeds officers do not put the act on anyone. Because (a) you are going to lose all your budget, you are going to have to go and do all the work and you are not going to get any money in return. So the Weeds Act is there, it is a big stick that gets waved around and rarely is anyone hit with it and if they are, there are consequences for the people that wield the stick.[147]

There was a general sense amongst witnesses that present weeds legislation had not been fully implemented and supported, and that this had vitiated the force of the Act. Again, the comparison with Queensland throws the situation into relief. Territory legislation is regarded as similar in purpose and structure to that of Queensland, but the implementation and supporting measures around the Act contrast markedly. But it is still possible to put these measure in place. As one witness suggested to the Inquiry, it would be problematic if the Territory were to look "for a new solution when we haven't activated the one we have got".[148] There appears to be scope for improvement in these areas.

2.5.5 Crown land

A closely related matter hinges on weed management on land where government is the landholder. The perceived lack of weeds management on this land

[146] Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.148.
[147] Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.148.
[148] Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.100.

is significant because, as one witness told the Inquiry, "the biggest landholder with the most weeds is the Territory government".[149] This is regarded as a major disincentive for compliance with the Weeds Act by other landholders.[150] There are two facets to the problem. One is that, as for any law, landholders will not be motivated to comply where there is a widespread lack of compliance on the part of a particular constituency. As one witness suggested, it is unrealistic to " expect the general public to respect what you are doing and really want to comply with what you are doing if the government cannot manage its own land".[151] The other problem is a practical one: where it is not effectively managed for weeds, Crown land becomes a source of "further infestation", leaving other landholders "forever working against the tide".[152]

There are significant resource issues attached to this problem. It was suggested to the Inquiry that from the early days of the Weeds Act's operation this was a stumbling block to implementation as government in the Territory suddenly became aware of its obligations under the Act, and found itself unable to budget for resulting resource requirements.[153]

This amounts to one of the biggest challenges across invasive species management — weeds management on largely vacant land in a jurisdiction with a large land mass and, in most areas, very low population densities. It is, indeed, as one witness suggested, a "vexed" problem where it is widely believed that there are simply "not the resources to combat weeds on vacant Crown land" and "no money there to follow up control". The scale of the problem is highlighted "when you take into consideration that all the beds and banks of rivers are vacant Crown land": "you are talking about a really big issue there that is probably beyond the economics

[149]Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.86.
[150]Mr R.Elliot, *Transcript of Evidence*, 5 October 2006, p.144.
[151]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.277.
[152]Dr Lim MLA, *Transcript of Evidence*, 16 November 2006, p.307.
[153]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.153.

scope of any government".[154] It is possible that creative approaches may offer some avenues in more heavily populated areas of the Territory, where community groups might be engaged to do some of this work.[155]

However, other more "radical" approaches may offer options for a more constructive approach. Queensland is again used as a positive example, with regard to its use of Strategic Weed Eradication Education Program (SWEEP) teams, which:

> ... they actually put money into over a five year period ... to go out and actually reduce the weeds on vacant Crown land using teams of youth and whoever they could get to train up to do it. But they put a lot of money into that to reduce the weeds to enable them to then use the Weeds Act.[156]

It seems that real investment in this kind of measure is necessary if legislative and other instruments are to have their intended effect. Un- or insufficiently funded approaches have not, judging from evidence tendered to the Inquiry, had a very positive effect, either directly on the problem, or in terms of raising community awareness and ensuring compliance with such tools as currently exist.

2.6 Resourcing

2.6.1 Current resource commitments

The Inquiry heard that the Territory government was spending, at time of hearings, $391,500 on weeds work through NRETA for the 2006/2007 financial year, and the "current estimated investment" on weeds through both DPIFM and NRETA totalled $1,270,800 for the same year.[157]

[154] Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.143.
[155] Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.143.
[156] Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.143.
[157] Mr R.Gobbey, *Transcript of Evidence*, 15 November 2006, presentation slide 23.

At time of hearings, dedicated NTG staff for weed management amounted to 29 positions in total, of which 22 were permanent and the remaining 7 contract positions.[158] The Inquiry heard that the Weeds Branch of NRETA had a single extension officer for weeds, providing education and advice, although weeds officers also provided advice as part of their portfolio of functions and duties.[159] The extension budget was $20,000 "for the whole of the Territory".[160]

These are modest resource investments in proportion to the scale of the weeds problem, on one hand and, on the other, to the size and value of the sectors affected by weeds, such as primary industry and tourism. Two interrelated trends have brought change, and not a little turbulence, to those engaged in weeds management. First, funding arrangements have moved toward a less centralised grants-based system, with organisations bidding for money from both federal and Territory granting bodies. Second, a more devolved model has developed for human resource inputs into weed management, where the overall effort relies more than it used to on various kinds of community-based committees and programs, and less on dedicated staff in government agencies. These community-based programs are the focus of Chapter 3, but they provide a number of the comments about resource adequacy that appear here because under present circumstances they form an integral link in the chain of weeds management, and consequently are in a position to comment.

2.6.2 Staffing

The Inquiry heard that in regional areas of the Territory numbers of weeds management staff had declined, since the 1990's. At the same time, the advent of the Weeds Management Act increased the amount of work that

[158]Ms A.Beilby, *Transcript of Evidence*, 16 November 2006, p.296.
[159]Ms A.Beilby, *Transcript of Evidence*, 16 November 2006, p.293.
[160]Ms A.Beilby, *Transcript of Evidence*, 16 November 2006, p.298.

would fall to those positions. This was evident at Katherine,[161] but also at Alice Springs, which was perceived to have suffered a reduction from 7 to 2 dedicated weeds staff in the local branch: a pattern consistent with those views from within government agencies quoted earlier in this chapter.[162] Witnesses to the Inquiry suggested that lower numbers of botanists in regional areas also played a part in reducing capability, so that it was less possible to flag weed infestations.[163] There is a clear sense, overall, across a range of stakeholders, that the number of NTG weeds staff is too low in rural and regional areas of the Territory.[164] But there is also a sense that even moderate increases would make a meaningful difference to current local, community-based efforts, just to "harness what the community is doing and encourage that".[165]

2.6.3 Funding

A number of witnesses to the Inquiry identified problems with the funding of weed control. On one hand, concerns were raised about the quantum of funding. One witness told the Inquiry that in his experience local government did not receive funding for weeds control work, and had to "just skim a bit off the budgets here and there" to get this work done.[166] There was also a perception of insufficient funding support from the perspective of regional weeds committees: one representative told the Inquiry of problems obtaining funding from NT government for a weeds risk matrix that was deemed necessary for a coordinated local response.[167] Another witness spoke of difficulties in mounting education and engagement

[161] Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.150.
[162] Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.81.
[163] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.115; and see Mr Erich Schoppe, Tennant Creek Town Council, *Transcript of Evidence*, 6 September 2006, p.55.
[164] See for example Mr D.Halloran, *Transcript of Evidence*, 5 October 2006, p.164.
[165] Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.162.
[166] Mr Les Edmistone, *Transcript of Evidence*, 5 October 2006, p.133.
[167] Unknown Person, *Transcript of Evidence*, 5 October 2006, p.144.

programs in Territory regions due to perceived problems in obtaining NT government funding for such purposes.[168]

There were also concerns raised about methods of funding. These were considered disruptive. The Inquiry heard that people working on front-line weeds control programs experience frustration over uncertainties in funding, asking "how can you run weed programs if you do not know whether from one year to the next year you are going to get funding".[169] This uncertainty extends beyond immediate control work, and beyond Territory patterns of funding. The Inquiry was told that uncertainties in federal funding have a negative impact on the weeds research effort: opportunities had been sacrificed on biological control, after initial gains, because follow-up work had failed to attract funding.[170]

Further problems arise from the way funding for practical weeds control work is targeted and held accountable. The Inquiry was told that under present funding arrangements, grant recipients were not given scope to address sleeper weeds: funding structures obliged them to focus on eradication and control, not prevention.[171] This runs counter to the advice tended to the Inquiry, by a number of witnesses, that prevention is significantly more cost effective than control.[172] Another similar scenario was described, where weeds control workers were under grant funding identified for control of a particular weed. If these workers discovered infestations of other weeds in the course of their funded activity, they are unable to do control work on these, under the conditions of their grant.[173] On this evidence, it appears, exclusive reliance on species-specific management fosters a piecemeal approach to control. This contrasts with advice

[168]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.148.
[169]Mr G.Wood MLA, *Transcript of Evidence*, 15 November 2006, p.259.
[170]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.152.
[171]Mr P.McDowall, *Transcript of Evidence*, 7 September 2006, p.94.
[172]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.344; Katherine Region Weeds Advisory Committee, *Submission 37*, p.[3].
[173]Mr Rob Knight MLA, *Transcript of Evidence*, 15 November 2006, p.259.

to the Inquiry that better effects are achieved through the adoption of an integrated approach, such as property-based weeds management plans in Queensland.[174]

Up to this point, this section has considered issues around staffing and financial support from the Territory government. There are also important things to consider about the predicament of Territory applicants for "external" grant money: that is, from outside the Territory, most often from the federal government.

One aspect of this hinges on the structures used to target, package and prioritise weed risks. The Inquiry heard that a present focus, from a federal perspective, on Weeds of National Significance (WONS) left Territory stakeholder in weeds management less able to respond to more local challenges.[175] This resulted in mismatches between the parameters of federal grants funding and actual need within the Territory. It was reported that a further important mismatch was created by the Territory's status as a single Natural Resource Management region from a federal perspective which also reduced the Territory's ability to respond to local and immediate challenges.[176] This means that environmental differences between Central Australia and the Top End — arid and tropical — are less visible to national grants schemes, and some grant applications are as a result less likely to succeed.

It seems that these are part of a wider picture, faced by various weeds groups, of a funding environment that requires considerable investment of time — to prepare applications — with outcomes uncertain. There are tensions in that this often requires substantial investments of private, unpaid, time in community settings, and reduces time and effort able to be expended directly on weed control.[177]

[174] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.115.
[175] Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.155.
[176] Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.278.
[177] See for example Unknown Person, *Transcript of Evidence*, 5 October 2006, p.144.

A witness suggested that in one round of federal grant applications where regional weeds groups had lodged applications, the only successful applicant had been the Territory government.[178] This left people in community-based weed groups wondering whether that was "because they have got more influence and more clout to be able to push the their projects at the expense of the community".[179] This raises questions on the capacity of groups, operating at this level, to compete for federal funding: and whether further support from the NT government could make a difference.

However, this is a difficult area. As shown, there are already questions about the adequacy of Territory government staffing and financial resourcing. Both of these areas would be involved if the Territory government were to increase support to groups applying for external grants. A critical factor is that federal government grant schemes now often require a degree of investment from the government of the jurisdiction concerned.[180] Applications must show that jurisdictions are either contributing money or making so-called "in-kind" contributions: that is, where government staff put time into the project.[181] However, due to tight constraints on agencies responsible for weeds, the Territory is embarrassed on both of these options, with the result that although there is further funding available from federal sources, there is no further capacity for the Territory to be a "partner" in grant applications either on their own behalf or for groups outside of government.[182] A witness from the Weeds Branch observed:

> They are in the same boat as us, they certainly go out and actively seek money but they are restricted and what happens with a lot of those applications is they then need to tie us in as

[178]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.155.
[179]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.155.
[180]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.19.
[181]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.19.
[182]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.20.

> a department for our in-kind contribution and we don't have that capacity anymore. We actually can identify where we are but that is what the Commonwealth is saying and we have to be careful that we are not double-dipping and we are just saying "Yeah, we will do 10% of our time for a weeds officer to help with that project". There is only so many times ...you could do that if you have got a number of community groups around. So you find that what happens is the staff are 200% committed to work programs and that's impossible to maintain.[183]

This demand for what is, in effect, partnership funding is clearly aimed at reducing cost-shifting between jurisdictions, and witnesses told the Inquiry that the Commonwealth does take this issue seriously.[184] But it is also part of a new, more devolved model — evident in state and territory weeds acts among other things — that, witnesses acknowledged, makes life more difficult for those same community-level groups it hopes to encourage.[185] It seems that the balance between government and non-government groups, accountability and freedom-of-action, could be improved if the devolutionary model is to live up to its potential. In the meantime, the Territory is missing out on opportunities to maximise external contributions to its weed effort. This is due to immediate shortfalls in its own levels of investment and, possibly, to an insufficient grasp of the implications of contemporary grant models.

[183]Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.20.
[184]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.277.
[185]Ms A.Beilby, *Transcript of Evidence*, 16 November 2006, pp.281-282.

2.7 Case study: "Improved pasture" species

2.7.1 Differences of opinion

This Report has already touched upon the different perspectives and conflicts of interest that arise on so-called "improved pasture" grassy species. These are species that have been deliberately introduced into the Territory to increase the carrying-capacity of pastoral land for the cattle industry. This process has introduced some controversial species, with claims for their value to the cattle industry competing with warnings coming from people with an environmental focus on the consequences of the wider dissemination of these species. Together, these species — Gamba, Para and Mission grasses in the Top End, Buffel Grass in Central Australia, among others — form the single most controversial environmental issue in the Territory. Differences of opinion manifest in many ways, but there are divergent views, even, on the degree to which cattle producers are reliant on these species: a pastoralist told the Inquiry that "100%" of cattle producers relied on such species to remain viable, while another witness suggested "very few" pastoralists, 2-3 properties in any one region, relied on them to this extent.[186]

Proponents say that these grasses allow pastoralists to run more cattle for a given acreage of land. Witnesses critical of the widespread dissemination of these species identify them as the "biggest" weed threats, particularly introduced African species such as Gamba Grass.[187] These witnesses note the high numbers of plant species introduced into the Territory that have become problematic in practice, and identify as a matter of concern that a high number of them have been introduced specifically for pastoral purposes.[188] Somewhat dramatically, out of 460 introductions

[186]Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.306; Dr M.Douglas, *Transcript of Evidence*, 15 November 2006, p.212.
[187]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.
[188]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.

associated with the pastoral industry only "four ... were actually useful without becoming weeds as well".[189] While in general discussion often emphasises the benefits of these introductions to the pastoral industry, "they are actually impacting on other industries; while they are improving the cattle grazing industry they are actually negatively impacting on other industries".[190] Conflicts of interest over these species mean that balanced assessments are rare: few researchers have been in a position to ask "what is the benefit for the Northern Territory economy of this species and what is the cost of it?" so that a more effective basis for policy could be created.[191]

Some witnesses suspect that such evaluations, if they were performed, may find that the more aggressive of the "improved pasture" species are "almost certainly of a greater detriment to the environment than they are a benefit".[192] Critical viewpoints on these species from the environmental sector are reflected in new terminology that refers to them as "fire weeds", due to the effects they have in increasing temperatures of bush fires, and making major contributions to fuel loads.[193] These effects figure in current risks to Kakadu, where such weeds are instrumental in "changing everything about hydrology and the turnover, the actual function of those eco-systems."[194]

2.7.2 Gamba Grass

A number of witnesses and submissions to the Inquiry concurred in their statements on the risk to the Territory's environment from Gamba Grass. One submission referred to it as a "significant threat to the Territory's bio-

[189] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.
[190] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.
[191] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.122.
[192] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.122.
[193] Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.13.
[194] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.

diversity and economy", and "one of the top threats to ... woodland communities in the Northern Territory".[195] Another submission called Gamba Grass "a serious threat to the ecological integrity of all National Parks in the Darwin region".[196]

However, other statements on Gamba Grass portray a much stronger, and more complete picture of the risks involved. Higher fire intensities are an initial effect: Gamba Grass, it is suggested, "produces fuel loads six times higher than what we would normally have with native grasses, and it produces fuel loads eight times higher than what we would normally expect".[197] This has a significant impact on tree cover, with "some literature ... talking about tree cover halving every 12 and a half years" while other recent research "has suggested that tree cover can drop by 50% in as little as five years".[198] Repeated iterations of this cycle generates particular concern, because this represents the prospect of wide-scale changes in the composition of natural landscapes in the Territory:

> Over a period of time you will have complete tree loss from the hot fires; they burn and kill the adult trees. There will be no more recruitments because the huge fuel vapour suppresses any native tree growth, and you basically just end up converting wood lands in to vast areas of open grasslands, dominated by Gamba Grass. This is only a fairly limited spread at the moment in the Northern Territory, but it can spread over pretty much the entire Top End which is something like 380 000 km2. It is a very scary weed ...[199]

Moreover, Gamba Grass is an aggressive weed well suited in its characteristics to be transmitted across the Territory and become more and more

[195]Gamba Action Group, *Submission 11, p.1.*
[196]Darwin Regional Weeds Advisory Committee, *Submission no.17*, p.[5].
[197]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.
[198]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.
[199]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.

widely established:

> Gamba grass establishes in a wide range of habitats, invades long distances from road sides and you do not necessarily need disturbance for it to establish. It is a very vigorous grower and it not only dominates eco-systems but it alters water and nutrients cycling.[200]

These witnesses present a picture in which successive fires are made more intense by the presence of Gamba Grass in the environment, and the interaction between this fire intensity and the growing dominance of Gamba Grass — which in turn produces hotter fires. In spite of these characteristics, and high levels of awareness about them, Gamba Grass was not declared under the Weeds Act,[201] and this attracted critical comment from some witnesses to the Inquiry.[202]

Witnesses told the Inquiry about the kinds of land in the Territory susceptible to infestation by Gamba Grass. While risks presenting to National Parks have already been noted, concerns were raised in one submission that Gamba Grass was prevalent on Department of Planning and Infrastructure (DPI) vacant Crown Land in the Darwin region "over an area extending north from the Adelaide River township" which, increasingly, "significant resources are being expended annually in an effort to manage".[203] The submission also indicates significant infestations on DPI Transport and Infrastructure land, where it "is widely distributed on the road network in the Darwin region" and notes that "Gamba represents a serious hazard to road users through fire and reduction of visibility".[204] The submission reports progress on a "strategic management plan" to contain

[200]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, pp.343-344.
[201]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.
[202]Greening Australia, *Submission no.10*, pp.6-7; Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.109.
[203]Darwin Regional Weeds Advisory Committee, *Submission no.17*, p.[5].
[204]Darwin Regional Weeds Advisory Committee, *Submission no.17*, p.[5].

this, in positive terms.[205] Aboriginal lands are also noted as a point of vulnerability, although again the submission reports that responses appear adequate — others are not as positive on levels of preparedness to meet this aspect of risks from Gamba Grass.[206]

Further comments noted the presence of Gamba Grass in the north-south rail corridor. Weeds, it seems, are often picked-up and transferred with train movements.[207] The distribution of hay, absentee landlords, and land occupied by gas pipelines, Power and Water installations and other places where earth has been disturbed, were also noted as problematic in terms of the spread and establishment of Gamba Grass through the Territory.[208]

Illustrating something of the breadth of impact such species can achieve, the Territory government Power and Water Corporation detailed special concerns about the interaction of Gamba Grass and water quality. Power and Water's submission to the Inquiry stated that a close relationship existed between water quality and biodiversity in water catchments.[209] Advice received by Power and Water, consistent with that tendered to the Inquiry elsewhere, is that a rising prevalence of Gamba Grass brings with it the likelihood of an overall change in the characteristics of the natural environment in catchments, leading to "monospecific stands of Gamba Grass with no tree overstorey", and this "has significant implications for managing water quality and yield from the Darwin River Dam".[210] Other catchments, such as the Manton Dam catchment, face similar risks, raising the prospect of pervasive problems from the interaction of Gamba Grass with water supply.[211] Consistent with other testimony, Power and Water

[205]Darwin Regional Weeds Advisory Committee, *Submission no.17*, p.[5].
[206]Darwin Regional Weeds Advisory Committee, *Submission no.17*, p.[5].
[207]Mr R.Knight MLA, *Transcript of Evidence*, 5 October 2006, p.150.
[208]Mr J.Earthrowl, *Transcript of Evidence*, 16 November 2006, p.355.
[209]Power and Water Corporation, *Submission no.23*, pp.1-2.
[210]Power and Water Corporation, *Submission no.23*, p.1.
[211]Power and Water Corporation, *Submission no.23*, p.2.

notes difficulties that arise from having the rail corridor cross catchment land at Manton Dam, and with un-managed land adjacent to catchments acting as a source for Gamba Grass transmission into the catchment.[212]

2.7.3 Buffel Grass

Buffel Grass is the Central Australian counterpart of Gamba Grass introduced for pastoral purposes and now problematic in its interactions with the natural environment. They are clearly distinguished in their habitat, one suited to the drier climates of the Centre, the other suited to the wetter climates of the North.[213]

There are, however, strong parallels between them. As for "improved pasture" plant in the Top End, witnesses to the Inquiry paint a picture in which there are "two camps" on Buffel Grass, divided by their focus on pastoral industry or the environment, and as a result "nobody is talking to each other".[214] And, as with similar scenarios described by witnesses to the Inquiry in the Top End, these differences of opinion, and the interests affected, have brought a certain paralysis to the situation on Buffel Grass. Said one witness: "Nothing will happen with Buffel in Central Australia as long as the pastoral industry feels threatened about it that is the reality".[215]

The history of Buffel Grass in Central Australia is instructive, in that it gives a textbook example of sleeper weeds, the missed opportunities associated with them, and the sometimes perverse efforts that have gone into transforming them from a marginal status in that environment into a pervasive species. The Inquiry heard that Buffel Grass was originally introduced by cameleers, who brought it to Australia from Afghanistan in

[212] Power and Water Corporation, *Submission no.23*, p.2.
[213] Mr P.McDowall, *Transcript of Evidence*, 7 September 2006, p.80.
[214] Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.80.
[215] Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.80.

saddles in the nineteenth century.[216] After that it was present in Central Australia, but deliberate action by the NT government and CSIRO "helped it" to gain a foot-hold.[217] More recently, Buffel Grass had been deliberately planted during a period of drought in Central Australia — to reduce dust. In fact, these attempts were at one stage in the 1970s considered to have been "a failure".[218] Then "the Buffel eventually [went] through a series of particularly wet years and:

> all of a sudden, you know just there fiddling away with its genes until it got it right and away it went and then the same thing happened particularly around 2000, when we suddenly saw Buffel in lots of places.[219]

Human actions also increased genetic variation, which proved to be instrumental for the species' future hardiness in this environment. In order to counter a tendency for seed to stick in seeding equipment, a range of varieties of Buffel Grass seed was combined. The resulting planting patterns then led to higher levels of genetic variation through interbreeding. The people involved "were acting in good faith, but it did not help the situation in hindsight".[220]

Since then other pressures have come to bear, influencing the spread of Buffel Grass. One of the most notable is the variation across varieties in palatability to cattle: this results in these varieties not being at all controlled by grazing, and this gives them an inherent advantage.[221] This is "natural selection at its worst", where these varieties of Buffel Grass become both an environmental threat, and also a threat to the pastoral

[216]Mr C.James, *Transcript of Evidence*, 7 September 2006, p.91.
[217]Mr C.James, *Transcript of Evidence*, 7 September 2006, p.91; Mr G.Wood MLA and Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.90.
[218]Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.90.
[219]Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.90.
[220]Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.91.
[221]Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.80.

industry — which Buffel Grass was intended to assist.[222]

A submission to the Inquiry made a number of points about Buffel Grass, highlighting its negative effects on the environment and biodiversity, which in turn will affect tourism.[223] Buffel Grass increases the severity of bush-fires and, as a result, increases greenhouse gas emissions in the Territory — a problem with a number of the "improved pasture" species considered here.[224] Control work for this species also figures as a high cost for national parks, and Crown Land.[225] The submission describes a "worst case scenario" in which Buffel Grass collapses biodiversity, and becomes dominant. This raises the prospect of monocultures of Buffel Grass that are themselves vulnerable to future disease and, after that, there is for land to undergo desertification.[226] Under such circumstances, problems with the severity of fires, and the greenhouse gases they produce, would be exacerbated.

These concerns are made more urgent due to the apparent spontaneous development of new strains of Buffel Grass that "can tolerate sandy, nutrient-poor soils": if so, this would increase the prevalence of Buffel Grass further again.[227] The submission argues that there are few control measures that have proved effective in limiting Buffel Grass to pastoral land, and in view of this there should be a moratorium on the introduction of further new varieties of Buffel Grass.[228] It also argues that the use of Buffel Grass and similar species on pastoral land often masks poor land management practices.[229] A better alternative is for pastoralists to pursue better methods to monitor pasture condition and determine stocking

[222]Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.80.
[223]Greening Australia, *Submission no.10*, p.11.
[224]Greening Australia, *Submission no.10*, p.11.
[225]Greening Australia, *Submission no.10*, p.11.
[226]Greening Australia, *Submission no.10*, p.11.
[227]Greening Australia, *Submission no.10*, p.9.
[228]Greening Australia, *Submission no.10*, p.10.
[229]Greening Australia, *Submission no.10*, p.9.

rates.[230] The submission acknowledges difficulties in mediating between pastoral and environmental interests where Buffel Grass is concerned,[231] but:

> We need to ensure we are careful not to lose the relatively high biodiversity we still have in the Northern Territory all because we haven't had the inclination or resources to be able to quantify the negative impacts of this species. It is unfortunate that the measurable economic contribution of an industry (no matter how small) is often used as a justification for environmental degradation because such considerations are difficult to quantify.[232]

The best course of action, according to the submission, is that new strains of Buffel Grass not be approved for introduction to the Territory. A stronger argument that Buffel Grass should be declared under the Weeds Act is considered too ambitious given the contested status of this and other improved pasture species in the Territory.[233] However the perception of the value of Buffel Grass may change in the future, as its negative consequences, even for the pastoral industry, become more evident.[234] These include negative impacts on the health of horses, "reduced fertility in cattle", and the "depletion of soil nutrients" so that the application of fertilisers becomes necessary.[235]

2.7.4 Para Grass

Para Grass grows in wet and shallow-water areas, where it will "actually grow out over water" and, as for Olive Hymenachne, this has led to it

[230]Greening Australia, *Submission no.10*, p.10.
[231]Greening Australia, *Submission no.10*, p.10.
[232]Greening Australia, *Submission no.10*, p.10.
[233]Greening Australia, *Submission no.10*, p.10.
[234]Greening Australia, *Submission no.10*, p.9.
[235]Greening Australia, *Submission no.10*, p.9.

becoming a problem in Kakadu National Park.[236] As for Buffel Grass, it may be controlled by grazing where it appears on pastoral land, but in "natural reserves such as Kakadu where grazing has been alleviated, then the stuff just takes over".[237]

The Inquiry heard that Para Grass was a relatively recent introduction to Kakadu, in 1983, but since then had "taken off at an exponential growth rate".[238] The results are considered "quite terrifying": at time of hearings, there was more than 1000 hectares of Para Grass in Kakadu, and it covered more than "10% of the Magella floodplain", but modelling suggests that by 2025, at present rates of growth, "with a doubling time of five years", it will "cover half" of it.[239]

This presents a serious challenge for control efforts:

> Where it is out in the open areas and can be sprayed by helicopter, large areas of it can be taken out, but when it gets in under the melaleuca, underneath the paperbark forests, the cost goes up exponentially. You cannot just fly over and spray it, people have to get in there with air boats, or flood bikes and things like that and hand spray it and the cost per hectare of control goes through the roof.[240]

Effective control requires progressive reductions in biomass — by such methods as grazing and controlled burning — followed by spraying: well-developed stands of Para Grass are not controlled by spraying alone.[241] As a result of these challenges, high levels of investment are needed "just to even to be able to contain it yet alone eradicate it".[242]

[236] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.106.
[237] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.106.
[238] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.106-107.
[239] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.107.
[240] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.107.
[241] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.110
[242] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.107.

The Inquiry heard of two ways in which this problematic species disturbs underlying natural processes in Kakadu. First, it changes the density of vegetation, removing niches occupied by native species:

> When you look at a lot of natural billabongs in the Kakadu area they tend to be fairly devoid of heavy vegetative cover around the areas and that is good for a lot of native bird life. It allows a good diversity of native plants and animals to persist and when para grass comes in, it just completely spreads over all the land and over all the water. You no longer have large areas of open water; it just spreads out and takes over.[243]

Second, Para Grass interferes with natural processes, such as the germination of wild rice, and this has important consequences for other species:

> ...native rice is the species that fuels the huge great big numbers of Magpie Geese and things like that we have out here. As para grass cover increases we have a complete loss of all these other different species such as Iliocarpus and native rice, and all of those other species that all the water fowl depend on.[244]

As a result, in the period from the introduction of Para Grass to 2003 "there has been a considerable loss of Magpie Geese in the area" and, if it is left unchecked, "the historic views of great big crowds of Magpie Geese all over Kakadu will possibly become a thing of the past."[245]

2.7.5 Mission Grass

Mission Grass is another of the "improved pasture" species. Although it is considered here in brief, it exemplifies many of the problems that have emerged across the whole group. Mission Grass is, like Gamba Grass,

[243] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.106.
[244] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.107.
[245] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.107.

implicated in the increased severity of bush fires and consequent loss of biodiversity: successive cycles of growth and burn-off result in a self-reinforcing process in which Mission Grass comes to dominate the landscape.[246] As for others in this group of species, Mission Grass is established in Kakadu National Park, where these characteristics have led to it becoming a threat to natural ecosystems.[247] For the two main varieties of Mission Grass:

> Both species produce very high fuel loads and as a result of that, they produce very intense fires. They both prevent tree recruitment and they both regenerate rapidly after fire. The moment you burn them, they just regenerate really, really quickly and they can produce that high fuel load and a very short turnover as well.[248]

Despite the damage caused by Mission Grass, as for other "improved pasture" species, anomalies in the declared status of this species make control more difficult. Of the two main varieties — one an annual, the other a perennial grass — only the perennial is declared.[249] As for other invasives in this group, inconsistencies such as these allowed poor practice to continue, such as Mission Grass being bundled with hay, where hay is recognised vector for the spread of grassy invasives.[250]

2.8 Discussion

The improved pasture species considered in this chapter illustrate much of the present predicament on weeds, and of invasive species in general. They raise the prospect of significant, widespread damage to the environ-

[246] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.
[247] Ms A.Ferguson, *Transcript of Evidence*, 5 October 2006, p.128.
[248] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.105.
[249] Calvert, p.105.
[250] Mr W.Goedegebuure, *Transcript of Evidence*, 16 November 2006, p.292.

ment as a result of their proliferation in the Territory. This includes such areas of special significance as Kakadu National Park, which are important both for their environmental value and for the tourist business they bring to the Territory. As for the wider range of weedy invasives, control of these species is difficult in that there is a very large amount of work to be done even to control, let alone eradicate, them, and there are many remote, sparsely-populated places where this needs to be done, and this increases the set of practical obstacles to control. For improved pasture species, there are further complexities in that they are regarded by one sector of the community — the pastoral industry — as representing significant economic benefit, and differences of opinion about their relative merits and disadvantages, and contests between different interest groups around these species, have paralysed efforts to place further regulatory constraints on their use.

The degree of environmental damage of which weeds are capable must be a matter for surprise for people new to the area. It is apparent from evidence tendered to the Inquiry that it is in their power to effect radical change in ecosystems, and that this affects not only natural species other than plant species, but fundamental systems such as those governing the cycling of water through ecosystems. Although it is apparent that costs to primary production and environmental costs are most often regarded as being somehow separate, ultimately they cannot remain so: changes in fundamental environmental processes must impact with equally negative effect on both. In this sense, a convergence of the two streams of management — currently expressed as divisions between the responsibilities of DPIFM and NRETA — must be regarded as inevitable in the long, if not in the immediate term.

There are a series of gaps in the response to weed threats that emerged from the Inquiry. At the most general level, evidence tendered to the Inquiry suggested that the Weeds Act (2001) is a good, modern piece of legislation that is consistent in its design with other similar Acts that have

proved useful elsewhere: most particularly in Queensland. However, the basic shift represented in the Act — a shift in emphasis from government-provided services alone to a government-community partnership — had proved in many senses unsuccessful because of a lack of adequate levels of support from government. While the Act and associated arrangements have spawned community-reference groups and groups practically involved in weeds control, these groups struggle to survive, and suffer a series of practical and bureaucratic difficulties that lowers morale. With more support, these and similar groups make more of a contribution, and thus help solve the fundamental problem: that weeds control in the Territory is so great a task as to exceed the capacity of government alone.

This is a key reason why such systems as the Weeds Risk Management System are important: they hold out the prospect of optimal use of resources in the face of a problem for which resources are inherently scarce — due to the sheer scale of the problem. Again, such systems will only fulfill their promise if government responds to the clear signals, evident in the Inquiry, that these "bureaucratic successes" do not always flow through to the most practical layers of efforts at weed management, and resources must increase if they are to do so. It is notable, however, that participants at virtually every level of weeds management, from within and without of government, and including leading researchers in the field, were convinced of the value of such systems. In a number of cases, witnesses displayed an immediate need for the information support such systems would ideally provide.

These systems will include support for a range of responses to weeds risks. At time of hearings there was a heavy reliance on glysophate for control of a number of highly invasive weeds. The Inquiry heard that this brings with it the possibility of negative effects on soil chemistry and native vegetation[251] and, the possibility of the eventual failure of this approach

[251] Mr J.Earthrowl, *Transcript of Evidence*, 16 November 2006, p.356.

due to herbicide resistance.

In its sponsoring of these developments, the Weeds Act, then, is an important first step in coming to terms with weeds problems faced by the Territory. Further work must be done for it to fulfill its promise. The object of the Act is to engage the community so as to achieve a unanimity of action and purpose in the management and prevention of weeds. The Inquiry heard that there are a number of aspects of this engagement that have so far been neglected. First, inconsistencies in weeds management send the wrong signals to people in the community. This includes the failure to manage weeds where government is the landholder, and anomalous arrangements that see problematic species continuing to be introduced and transported in the Territory.[252] To that extent, people in the community are less likely to be recruited to a common cause on weeds. This is part of a situation in which there is "no reward or recognition" for good weeds management or, conversely, effective penalties for poor practice.[253] In addition to mechanisms set out in current Territory legislation, further options exist in other jurisdictions for this to be changed.[254] The result of implementing such measures should be that, as in Queensland, awareness, compliance and levels of voluntary contribution all increase in relation to weeds, the whole adding up to more than the sum of the parts.[255]

To respond to this situation, a number of proposals were put to the Inquiry. A broader conceptual proposition was that government, "rather than reacting to each threat as it emerges", develop "a strategic vision of the vegetative landscape we would like to have"[256] and then identify "necessary management to achieve it":

[252]LGANT, *Submission no.18*, p.3
[253]LGANT, *Submission no.18*, p.5.
[254]LGANT, *Submission no.18*, pp.4-5.
[255]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.114-115.
[256]Gamba Action Group, *Submission 11*, p.2.

> Such a common goal would enable a coordinated approach to be taken by all land managers to work toward a landscape that is more resistant to invasive weeds, reduces the risk of wildfire and supports biodiversity.[257]

Employing such an approach would make it more possible to achieve another key objective, which is to make weeds management part of "core business". This entails placing a consistent set of obligations on responsible parties. One part of this is to make weeds planning an integral part of "land use planning or development proposals", so that it becomes a routine part of the planning process.[258] This, in turn would lead to weeds management developing a higher status in the awareness of what one witness referred to as "the utilities": "the people with gas pipelines; the Telstra with cable; the local government or equivalent of it who manages the corridors" — all areas highlighted as problem areas and vectors for weeds.[259] In fact, until weeds come to the attention of these stakeholders, "they are generally ignored".[260]

Another important concept was that government agencies should be able to employ a graduated series of responses from educational awareness, "contact advice", through to legal action "at the very end of that spectrum", although "we are far better off working people cooperatively and encouraging them rather than resorting to legal action at the end of the day".[261] Successful prosecutions under the Weeds Act would make an important contribution toward such a state of affairs. At the other end of the spectrum, an increase in Weeds Officers would facilitate an increase of public awareness and levels of support for community-based weeds programs. A logical expression of the broad principle also emerged in

[257] Gamba Action Group, *Submission 11*, p.2.
[258] LGANT, *Submission no.18*, pp.5-6.
[259] Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.257.
[260] Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.257.
[261] Mr B. Williams, *Transcript of Evidence*, 15 November 2006, pp.229-230.

the suggestion that there be a "class D weed" which "you can grow ... for economic purposes, but you are responsible for containing it within your property".[262]

Regarding the introduction of further new species to the Territory, a number of witnesses agreed in the view that the onus of proof should be reversed: there should be a permitted plant species list.[263] The underlying presumption is that species are "guilty until proven innocent" by an assessment.[264] Consistent with this, management plans should be prepared for species that are to be introduced.[265] These processes, it was argued, would be significantly strengthened by greater levels of consistency between jurisdictions, so that uniform declared weeds lists and "weed control classes" existed in common between the states and territories, and at national level.[266]

The Inquiry heard of a number of instances in which current practice on weeds management was contradictory. One response that was suggested was there be a formal obligation placed upon commercial nurseries not to sell Weeds of National Significance (WONS) species, and that WONS species should all be declared under the Weeds Act.[267] It was also suggested that government did not fulfill its obligations as a landholder under the Weeds Act in relation to Crown Land, and that this was an obstacle to achieving wider compliance to the Act.[268] Under the circumstances, it was suggested that government's power to create exemptions under the Act was a conflict of interest, and should be removed.[269]

According to witnesses who appeared before the Inquiry, there are a

[262]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.150.
[263]WWF, *Submission no.24*, p.10.
[264]WWF, *Submission no.24*, p.10.
[265]LGANT, *Submission no.18*, p.7.
[266]WWF, *Submission no.24*, p.10.
[267]LGANT, *Submission no.18*, p.7.
[268]LGANT, *Submission no.18*, p.8.
[269]LGANT, *Submission no.18*, p.8.

number of other opportunities to rationalise weeds management in the Territory, which include:

> ...looking at weed risk management models of similar or analogous sorts of models I have just shown you, ratifying certain codes of conduct, developing rigorous guidelines for use of exotic species in our pastures, linking these formally to Pastoral Lands Act and assess all future introductions from the perspective of the potential damage that may occur if they go outside of the pastoral usage.[270]

This is part of a broader view that greater integration should be achieved between the different components of weed management. Key proposals were that property-based pest management plans be introduced in the Territory.[271] This would embrace the wider dimensions of invasive species, addressing the ways weeds interact with other invasive species to produce ill-effects. A suggestion that would compliment such an approach was that suitable mechanisms be found to link property values to the extent of weed management on properties — other jurisdictions had created such a connection through rates assessments.[272] A Weed Spotting Network would also be consistent with such approaches, as a focus for community action and awareness on weeds, and to harness community interest to further the wider project of weeds management — as such networks have in other jurisdictions.[273]

Other witnesses to the Inquiry identified a number of specific measures that would improve the Territory's capacity to manage weeds effectively. In some instances these echoed wider views on the importance of the rationalisation and integration of weeds management in the Territory: one submission made a series of proposals on Gamba Grass that in-

[270] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.344.
[271] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.122.
[272] Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, , pp.277-278.
[273] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.122, 116.

cluded increased funding for education; further encouragement of community participation in Gamba Grass management; greater efforts at mapping infestations; declaring Gamba Grass under the Weeds Act, and other measures.[274] In effect, this reflects the pervasive view that coordinated action is needed if the Territory is to face so complex a set of challenges to good effect. Important arguments were also made for a greater number of wash-down facilities to be made available, and this is supported by evidence that vehicles are indeed a major means by which weeds are spread.[275]

Taken as a whole, while weeds management does present a challenging combination of practical complexity and huge resource requirements, the evidence presented to the Inquiry suggests that the most productive way to respond is in large part identified, and attracts a wide consensus among people with direct contact with the area. It is true that there are important differences in the way that some weed species are seen by different parts of the community, but developing ways of analysing conditions, and supporting resource and management decisions, will help, if not entirely resolve these divisions. The key requirements are that these systems, as for legislation in the area, be sufficiently resourced and attract sufficient interest and will from government, to implement them fully and achieve their best possible effect.

[274]Gamba Action Group, *Submission 11*, p.1.

[275]Katherine Region Weeds Advisory Committee, *Submission 37*,p.[3]; Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.257.

2.9 Findings and recommendations

Findings

For weeds, substantial problems exist for a range of grassy and other invasive species that have become endemic to the Territory. Some grassy species introduced for pastoral purposes present special problems due to their strongly invasive characteristics, and their effects in increasing the severity of bushfires. While the Weeds Risk Management System (WRMS) is an important "top-down" development, people engaged in weed control in regional areas perceive a range of problems, including difficulties attracting grants funding, a shortage of front-line and support staff from NT government agencies; and a lack of key infrastructure such as wash-down facilities for vehicles. Overall,there is a low level of compliance with weed regulations due to the low number of prosecutions obtained under the Weeds Act, and this in turn results in there being few incentives for landholders to manage weeds.

Insufficient management of weeds where government is the landholder — on Crown Land for example — plays an important part in undermining a culture of compliance, and affects other landholders directly by providing a point-source for weed invasions. Government also has discretion to exempt landholders from obligations under the Weeds Act, and this is perceived as an unhealthy situation in view of own obligations as a landholder.

Key environmental areas, such as Kakadu National Park, are under direct threat from a range of intractable weeds species, and shows what the Territory will lose if weeds go un-managed. Further problems emerge in the relationship between local government and the NT government: local government have responsibility for and have opportunity to address weeds problems, but receive little in the way of funding for this purpose.

Declarations under the Weeds Act are a problematic area for weeds

management. A number of species that have value for primary industry have negative impacts on other sectors. This contributes to a slow pace for declarations of weeds under the Act. Weeds management across the Territory is also affected by the continued sale of species identified as problematic under such national programs as Weeds Of National Significance (WONS), and a lack of coordination between lists of declared species between the Territory and other jurisdictions. All of these areas need to be addressed if weeds regulation in the Territory is to work as intended.

Recommendations

Recommendation 8

The Committee recommends that the Northern Territory Government strengthen the application of the the Weeds Act by:

a). Considering the creation of a controlled "Schedule Class D" under the Weeds Act, for species economically useful to some landholders, but risky to others, with appropriate conditions on use.

b). Ensuring that the declared weeds list is as consistent as possible with those of other jurisdictions, while respecting local conditions.

c). Ensuring that Northern Territory Government agencies not remove species from declared species lists due to the species being considered endemic.

Recommendation 9

The Committee recommends that the Northern Territory Government provides for legislative control of Gamba Grass, and other "improved pasture" species with weedy characteristics, either by:

a). Declaring such species a prohibited plant (Schedule Class A) under the Weeds Act, or

b). Declaring such species a controlled plant (Schedule Class B) under the Weeds Act.

Recommendation 10

The Committee recommends that the Northern Territory Government integrate weeds management into business processes by:

a). Requiring that weed planning be included in all planning and development proposals.

b). Considering ways to link weed management and property values, such as linking local government rates to the weeds management on properties.

Recommendation 11

The Committee recommends that the Northern Territory Government control weeds and feral animals on Crown Land by:

a). Using Indigenous programs, among others, to control weeds and feral animals on Crown Land

b). Facilitating training for program participants

Recommendation 12

The Committee recommends that the Northern Territory Government increase measures to inhibit the prevalence and spread of weeds by:

a). Establishing a sufficient number of wash-down facilities, at strategic points in the Territory, and requiring their use, to reduce the spread of weeds by road transport.

b). Establishing practical requirements and protocols for effective management of weeds on transport corridors and disturbed ground.

c). Establishing a Northern Territory Weed Spotting Network under the auspices of the Weeds Division, Department of Natural Resources, Environment and the Arts

Recommendation 13

The Committee recommends that the Northern Territory Government reduce the risk of invasive plant species being distributed by commercial nurseries by:

a). Ensuring that retail nurseries are aware of their obligations under relevant legislation,

b). Increasing education, inspection, and penalties to provide proper linkage between the Weeds Act and daily practice in the industry.

c). Prohibiting the commercial sale of plant species listed as Weeds of National Significance (WONS) or, alternatively, declaring all WONS species under Schedule A of the Weeds Act,

d). Encouraging retail nurseries to adopt, and market their services as, environmentally-responsible practice.

Chapter 3

Vertebrates

3.1 Introduction

This chapter examines the status of vertebrate invasive species in the Territory. Considered are the challenges these species represent; the structure and effectiveness of response; and legislative arrangements. It presents a case study focusing on camels, which shows how these features are expressed in practice.

While weeds attract a high level of concern in the Territory, the Inquiry heard that vertebrates — feral animals — are also highly prevalent, are mobile, and reproduce at high rates. Again, it is a problem of an alarming scale:

> there are now very few areas of the Territory where you can go where you won't run into an exotic animal. You can go out into the most remote deserts, the Simpson Desert or the Western Desert and you are likely to run across a camel, if you go out to the remotest areas of Arnhem Land you will probably run into pigs, buffalo, cane toads and in certain areas things like crazy

ants.[1]

The Inquiry heard that there are 26 species of vertebrates that affect the Territory, "16 mammals, 4 birds, 2 reptiles, that dreaded amphibian [the Cane Toad] ...and 3 fresh water fish", and which 18 species have documented impacts on the environment.[2] For feral animals alone, the Territory faces problems with "camels, foxes, rabbits, [and] cats" in the south, and in the Top End "buffaloes, pigs, horses, [and] donkeys" although these can also "occur all over" the Territory.[3] For control purposes, these feral animals are divided into two classes:

> those that are a pest because they eat or kill native species or livestock, these are the predators the fox, the cat and the wild dog and the other group because they compete with native species and livestock for food, the herbivores and the main ones we have there are the rabbits, camels, horses, donkeys, pigs, buffalo and goats.[4]

A summary of successes and failures on the control vertebrate invasives in the Territory identified positive outcomes for: donkey control in the Victoria River Downs area; reductions in buffalo numbers due to BTEC (Brucellosis and Tuberculosis Eradication Campaign); and some successes for rabbits using introduced viruses.[5] Negative outcomes were identified for Cane Toads, feral cats and pigs.[6]

[1] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, pp.8-9, quoting from NRETA Parks and Conservation Master Plan

[2] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.3. Fish are considered in the chapter on aquatic invasive species below.

[3] Dr Tony Bowland, NRETA, *Transcript of Evidence*, 16 November 2006, p.301.

[4] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.4

[5] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.8.

[6] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.8.; The Committee released a report on Cane Toads in 2003, See:
http://www.nt.gov.au/lant/parliament/committees/Environ%20and%20Sustainable/Cane%20toad-Report-Vol%201.pdf

The Inquiry heard other evidence that provides background for this account. This showed something of the impact of various vertebrate invasives for different parts of the Territory community:

Wild dogs were identified as a matter of concern for the pastoral industry. One submission to the Inquiry, describes how "one bite from one dog to one beast could cost us over $10,000, and that does not consider the lost breeding time and ongoing genetic pool potential".[7] However, it is "never just one dog and one bite and one beast. Our last attack cost us seven beasts, and in one instance one dog led to deaths of 27 in one night".[8] Despite the potential for damage, control of feral animals was "way down the list" of priorities for pastoralists: time and labour are too scarce to make control a viable proposition in most cases.[9] Other testimony detailed a series of difficulties in targeting wild dogs for control, including problems with bureaucratic mechanisms, tighter restrictions on the 1080 poison traditionally used for wild dog baits, and threats to "off-species" animals — unintended contact of native animals with baits.[10]

Feral cats are known for the damage they do to native bird and small mammal species. The Inquiry was told that feral cats "are out there in every conceivable environment" in the Territory, "from dry desert country to the tropics".[11] Despite this, "we do not have an effective broad scale control technique for them at this stage".[12] These "really smart" animals represent a considerable challenge for efforts at control. Baiting and trapping of feral cats is difficult, although emergent research may bring about

[7] Mr R.Cramer, *Submission 14*, p.2.
[8] Mr R.Cramer, *Submission 14*, p.2.
[9] Mr P.McDowall, *Transcript of Evidence*, 2 December 2005, p.74.
[10] Mr P.McDowall, *Transcript of Evidence*, 2 December 2005, p.97; Mr R.Cramer and Mr. G.Edwards, *Transcript of Evidence*, 7 September 2006, p.98
[11] Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.69.
[12] Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.69.

change.[13] However, the amount of research available on feral cats is a limiting factor. A witness involved in front-line work in Kakadu National Park commented that there has:

> not been a lot of research yet on how to go about controlling cats, or even cat ecologies. There is not a direct recommendation about them, you know, a method that will work, ... cat control happens opportunistically, but it is only a very minor part of probably what is needed.[14]

A further difficulty lies with public attitudes to cat control. There are difficulties in such a process in distinguishing domestic from feral cats. This can result in tougher regulation being regarded as "political suicide" by local authorities.[15] This is just one instance of many where there is potential for invasive species control to conflict with other interests in the community.

Feral pigs represent a variety of risks to biodiversity, human health, and to the integrity of the landscape.[16] High populations intensify these problems: feral pigs are more numerous than buffalo.[17] Despite this, the problem has been under-regarded.[18] Feral pigs are a vector for diseases such as Japanese Encephalitis.[19] Thus they form part of a wider picture in which feral animal populations are regarded as an important risk factor for both human and animal health.[20]

[13]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.8, and see also Dr Tony Peacock, Invasive Animals CRC, *Transcript of Evidence*, 15 November 2006, p.269.
[14]Ms A.Ferguson, *Transcript of Evidence*, 5 October 2006, p.137.
[15]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.137-138.
[16]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.351.
[17]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.351.
[18]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.351.
[19]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.349.
[20]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.7.

Cane Toads are possibly the most high-profile invasive species in the Territory. They are the subject of another report released by the Committee in 2003. The present Inquiry heard that Cane Toads are rapidly spreading across the north of Australia, and will eventually cover an area extending from Queensland, across the Territory, and into northern Western Australia.[21] The Inquiry was briefed in detail on current research on the natural history of Cane Toads. This included information on the characteristics of the invasion front,[22] and the natural species upon which Cane Toads were having a negative effect.[23] More encouraging, there is also new data on native species that can consume Cane Toads as food, and learned behaviours that allow them to do so without succumbing to the Toad's natural toxins.[24] Population modelling is also a feature of current research on Cane Toads, attempting to place current increases in numbers into a wider perspective.[25] This research did not produce immediate solutions to a problem that is of great concern in the Territory. But it is an important instance of the kind of basic science that must be done if solutions to this — or other problems with invasive species — are to be developed.

3.2 Conflicts of interest

In it evidence tendered on weeds, the Inquiry heard that species could be seen as beneficial by one sector of the community and malign by another. As indicated above for feral cats, this is also a challenge for efforts at the control feature of vertebrate invasives.

Differences of opinion over camels are one instance of this. While some see camels as a resource that can be harvested for profit, pastoralists take

[21]Mr Matt Greenlees, University of Sydney, *Transcript of Evidence*, 16 November 2006, pp.327-328.
[22]Mr M.Greenlees, *Transcript of Evidence*, 16 November 2006, pp.328-330.
[23]Mr M.Greenlees, *Transcript of Evidence*, 16 November 2006, pp.331, 337-338.
[24]Mr M.Greenlees, *Transcript of Evidence*, 16 November 2006, pp.331, 336.
[25]Mr M.Greenlees, *Transcript of Evidence*, 16 November 2006, p.332.

a more critical view because camels destroy fences and consume water.[26]

A similar difference emerges on the eradication of different large herbivores. The view that they should be eradicated for environmental reasons contrasts with a view — held largely by Indigenous people in remote areas — that these are an important supplementary source of food.[27] However, "Aboriginal people are not blind to the damage that these animals are causing".[28] The witness suggested that

> they want to see a balance struck and I think that is a very viable position. If you can have the tradeoffs between meat supplementation and reduction of damage to country as they call it, then I think they are very, very much in favour of control.[29]

This underscores the importance of appreciating the "different versions of reality" that come to light in discussions of invasive species.[30] It also shows that where differences of opinion exist, half-way points can also emerge. Another witness concurred, suggesting a need for "imaginative programs" that "achieve what we want in terms of biodiversity and production outcomes while maintaining some level of the resource utilisation".[31] There are instances where this has been achieved, such as the management of Banteng on the Coburg Peninsula.[32]

However, matters can become more complex where the development of bio-control is contemplated. Many of the large vertebrate invasive species are sufficiently close to domestic animals — both in primary production and for domestic pets — that it is difficult to target one without affecting the other: an analogue of swine fever, for example, would likely affect

[26]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.7.
[27]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.7.
[28]Dr Bradshaw, *Transcript of Evidence*, 16 November 2006, p.350.
[29]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.350.
[30]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.350.
[31]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.7.
[32]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, pp.344-346 & ff.

farm pigs, and similarly diseases developed to suppress the feral cat population are likely to do the same for domestic cats.[33] This is a prospect that makes the community "very nervous", "perhaps quite rightly".[34]

3.3 Structural arrangements

3.3.1 Relationships and recent developments

At time of hearings, NRETA was engaged in drafting a 10-year plan for the management of vertebrate pests in the Northern Territory.[35] The process included the development of a "prioritisation scheme" analogous to the Weeds Risk Management System, and a system of "bioregions" to support control of vertebrate pests by geographical area rather than by species.[36] This last is a means to coordinate the control of invertebrate invasives so that a systems approach can be adopted.

Vertebrate invasives also figure highly in the Parks and Wildlife Conservation Masterplan, also produced by NRETA, which "looks at the Parks Estate and conservation across all land tenures across the Northern Territory".[37] This document gives a "high priority" to invertebrate invasives.[38]

Inter-jurisdictional efforts are seen as instrumental for vertebrate invasives control. The Territory maintains an involvement with other states and territories, and the federal jurisdiction, in cooperative processes.[39] A Ministerial Council on Natural Resource Management is prominent in this, and a national Vertebrate Pests Committee, which has authored an

[33] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.11.
[34] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.11.
[35] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.6.
[36] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.6.
[37] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.6.
[38] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.6.
[39] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.6.

Australian Pest Animal Strategy, a draft version of which was circulated at time of hearings.[40]

One trend of opinion emerging from this discussion was that national committees on vertebrate pests and weeds might be amalgamated "to really take a national perspective of invasive issues".[41] This is one further sign of a general interest in a concept of integration, borne of the awareness that a focus on single species has, in the past, allowed other species to go un-managed. There remain questions as to whether this kind of integration could lead to a loss of focus on particular categories of invasives.

It is clear that the management of vertebrate pests requires cross-jurisdictional support:

> There is absolutely no point in us going to a lot of trouble to controlling stuff if all we are going to do is get re-invaded from huge populations still living in other state jurisdictions. Most of our feral animals show that similar sort of very broad distributional pattern.[42]

While this is an important principle for all invasive species, vertebrate invasives are particularly mobile, and this strengthens the case in favour of cooperation. The Inquiry was provided with an example of these relationships in practice, where the Territory was working in cooperation with South Australia by providing samples from rabbits that displayed resistance to the viruses used to control them.[43]

3.3.2 Arrangements within the Territory

The Inquiry heard that the efforts of government agencies at vertebrate pest control are distinctive. They have been developed outside of agencies

[40]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.6.
[41]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.6.
[42]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.4.
[43]Mr P.McDowall, *Transcript of Evidence*, 7 September 2006, p.70.

responsible for primary industry, where control measures for weeds and marine invasives have had their genesis.[44] Rather, feral animal control "arose in a department that was ... concerned with conservation and so the primary driver ... for feral animal control has been a conservation outcome".[45]

This not only sheds light on "some of the different perspectives" associated with the management of vertebrate pests — it also points to a fundamental division in the way the Territory divides responsibilities for the management of invasive species.[46]

A key piece of legislation in this area is the Territory Parks and Wildlife Conservation Act, an Act "primarily directed towards protection of wildlife, habitats and ecosystems".[47] Powers under the Act are that the:

> Minister ... can by gazettal declare a species to be a feral animal and that gazettal can be either for the whole of the Territory or we can declare what is called a feral animal control area, we can just designate a particular bit of the Territory for which that action will occur in. That legislation also gives us the ability to declare prohibited entrants, so we can list species that we can say "we just don't want these in the Territory" and if they're elsewhere in Australia "don't bring them here we believe they are potentially a problem".[48]

However, the Parks and Wildlife Conservation Act is not the only legislation involved. The Pastoral Lands Act can also come into play.[49] This reflects the distinction between primary industry and conservation. Each have their separate acts and divisions within distinct government agen-

[44] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.5.
[45] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.5.
[46] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.5.
[47] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.5.
[48] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.5.
[49] Mr W.Goedegebuure, *Transcript of Evidence*, 16 November 2006, p.298.

cies, prompting some observers to call for their integration, to create "an effective sort of working control".[50] An alternative view would be that this separation has merit because it separates "conservation" functions from agencies with a history of close association with industry.

An important consideration is whether the provisions of relevant legislation can be implemented: when the Inquiry considered the Weeds Act, there were some doubts on this due to very low numbers of prosecutions. The Inquiry heard that similar conditions apply for legislation providing control over vertebrates:

> In our legislation the Territory Parks and Wildlife Act we have the capacity to offer to communities or land holders all these perks ...whether it be in kind support or is it a facility and I have to provide them with funds to undertake feral animal control. On the other hand if they are not doing that we have in our Act the ability to prosecute them to ensure they comply, but the real issue is that we do not have the resources to do either.[51]

From this it appears that as for weeds, legislation expresses good intent on vertebrate invasives control, but currently this is not possible for this to be reflected in daily practice. The need for this was underscored in other testimony to the Inquiry. This argued for a combination of regulation and education: "if you try and control exotic doves in town", for example, "there is no point in continuing to sell them through the pet stores".[52] The ability of government agencies to use soft and hard measures to signal acceptable practice to the community is central to achieving better results for all types of invasive species management.

[50]Mr W.Goedegebuure, *Transcript of Evidence*, 16 November 2006, p.298.
[51]Dr T.Bowland, *Transcript of Evidence*, 16 November 2006, p.298.
[52]Mr C.James, *Transcript of Evidence*, 7 September 2006, p.88.

3.3.3 A risk-management system for vertebrates

As outlined in the Introduction of this Report, the Inquiry heard that the complexity of requirements for invasive species management, and a history of mixed success, had prompted moves to develop risk-management systems. There are similar episodes in the Territory for vertebrate invasives, such as the resurgence in rabbit numbers after initial reductions using the *calyci* virus.[53] In another episode, a successful program to control pigeons in Alice Springs was, by report, cut short due to its apparent success.[54]

Such events should be able to be managed better with the benefit of a risk-management system. If properly instituted, such a system provides a basis on which to answer questions on how long to persist with a control campaign, and supplementary measures, and information gathering, to support follow-up controls in the event of a recovery in population numbers. It also supports decisions on the levels of resourcing necessary to make a project successful: witnesses stressed the importance of "identifying realistic resource requirements" at the outset, otherwise "you actually finish up under-resourcing the thing and it actually takes an awful lot longer and costs an awful lot more money".[55]

In the phase of project completion, there are similar things to account for: the need to attend to the so-called "restoration ecology" phase of the project.[56] This is work done after the removal of vertebrate invasives, to re-balance the ecology of the area in question. Without this, the removal of one species may have the unintended consequence of creating opportunities for others — potentially not just for other vertebrates alone, so it is important in allowing control efforts to reach their poten-

[53] Mr W.Low and Mr. G.Edwards, *Transcript of Evidence*, 7 September 2006, pp.66-69 & ff.
[54] Mr R.Cramer, *Submission 14*, p.1.
[55] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.7.
[56] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.11.

tial.[57] A risk-management system provides a framework through which to anticipate this as part of the larger management project, and to anticipate which invasive species could emerge after the first phase of control. Such a system could also support a triple-bottom-line analysis of costs and benefits of invasive vertebrates, identified to the Inquiry as important due to the different views vertebrate invasives can attract.[58] In these instances, the evidence-based mechanisms of risk-management systems provide a better basis on which to make decisions, for example taking into account both the price of camel meat and the cost of camels in terms of damage to fencing.[59]

The system under development at time of hearings entailed rating vertebrate invasives in terms of the "level", "extent" and "trend" of their impact, together with "social impact" and "stakeholder sensitivity".[60] A further factor is technical capacity: "what actually tools out there have we got that are effective in actually controlling it, or ... that we really don't have much in the way of a technical capacity to do anything".[61] From this, a clearer picture emerges on which species are in fact responsible for most environmental damage in the Territory, reckoned to be the "donkey and horse, followed by the cane toad, buffalo, pig, cat and fox".[62]

These measures address the fundamental need, "when you come to try and allocate the resources", for "an objective assessment scheme where we actually try to look at the factors that you can score and measure in terms of feral animals [that can] help ... direct us to which ones are the most significant [and] where we should be directing most of our resources".[63]

[57] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.11.
[58] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.7.
[59] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.7.
[60] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.4.
[61] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.4.
[62] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.4.
[63] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.4.

3.4 Case study: Camels

The Inquiry heard that the camel population in Central Australia, at time of hearings, amounted to one million animals, and this was "doubling every eight years".[64] There was a progressive pattern of northward spread being observed, a pattern aided by the animal's "independence" with respect to water.[65] As a result, camels are "extremely mobile", and this increases their impact on vegetation, considered serious in view of their numbers.[66] As noted for vertebrate invasives in general, this also makes cooperation with other jurisdictions entirely necessary: the NT "cannot act in isolation in managing camels".[67] In the face of so great a challenge, and in view of this need for cooperation, the Desert Knowledge CRC was at that stage "trying to pull together a national approach to managing camels ... over the next three years".[68]

Two approaches for control were discussed in hearings: shooting, and making use of camels within primary industry — for live export to other countries for meat, for example. However, witnesses cast doubts on the viability of "some sort of pastoral industry based on wild camels".[69] This would, it was suggested, "probably be only viable in certain areas".[70] Moreover, such an industry would have to remove huge numbers of animals to make an appreciable difference to their population: "400 000 camels a year to keep the population static".[71] In fact, the use of camels "would have to go up ten fold ... to stop the growth rate", and this was considered beyond the capability of such an enterprise.[72]

[64] Mr W.Low, *Transcript of Evidence*, 7 September 2006, p.73.
[65] Mr C.James, *Transcript of Evidence*, 7 September 2006, p.74.
[66] Mr C.James, *Transcript of Evidence*, 7 September 2006, p.74.
[67] Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.75.
[68] Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.75.
[69] Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.75.
[70] Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.75.
[71] Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.73.
[72] Mr C.James, *Transcript of Evidence*, 7 September 2006, p.73.

Shooting, "done by professional people", was considered "a very effective", but costly, form of control.[73] In remote areas like the Simpson desert "there is only one option really, and that is ... to go and shoot twice".[74] This emphasises both the importance of shooting as a means of control, and the very significant levels of expenditure it entails — recreational shooting was not considered a credible way to reduce the cost of such a program.[75]

However, even beyond expense, there are a range of other obstacles to shooting as a sole means of control for camels. Given the sheer scale of the exercise, according to one witness, camel shooting will not "in your wildest estimate ... stop 100,000 a year".[76] But a large-scale shooting program would also arouse strong "public reaction", and Indigenous people in particular would object because camels are "a very large, charismatic animal like a horse, so there will be some sort of opposition to doing it".[77] There are also other obstacles. Concerns were raised about regulatory constraints in the Northern Territory on helicopter platform shooting compared with other jurisdictions, and for a potentially problematic relationship between camel culling and NT animal welfare legislation.[78]

Under the circumstances, it could be that experimental research being carried out on fertility control for camels adds an important further strand to current means for control.[79] However, even then, given the long life-span of camels, "you would have to knock them down to reasonable numbers early" to achieve a successful outcome.[80]

[73]Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.76.
[74]Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.75.
[75]Mr C.James and Mr Scoot Andresen, Pet Industry Association of Australia, *Transcript of Evidence*, 7 September 2006, pp.74-75.
[76]Mr C.James, *Transcript of Evidence*, 7 September 2006, p.74.
[77]Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.75.
[78]Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.76.
[79]Dr T.Peacock, *Transcript of Evidence*, 15 November 2006, p.268.
[80]Dr T.Peacock, *Transcript of Evidence*, 15 November 2006, p.268.

This picture is corroborated by accounts of other large herbivore invasives. The Inquiry heard a description of a campaign to reduce horse and donkey populations in the Victoria River Downs district of the Territory, the VRD Donkey and Horse Management Program. Funded with $750,000 from the Indigenous Land Council, and $250,000 and in-kind support from NRETA.[81] By the time the program had run for six-years, over a period finishing at the end of 2004, it had "taken out 140,000 donkeys to achieve a population reduction of 40,000 donkeys".[82] Although this has been a large-scale effort, "at times, we have actually barely been keeping up with the reproduction of the beasts out there".[83] This echoes attempts at camel control. However, there are positive aspects to the program, including "very active on-going landholder support for this program".[84] The program has managed to recruit and form productive relationships with "organisations like the VRDCA and Indigenous landowners". It is also important that "if we just let it go, we would probably be looking at a population now of about 206,000 donkeys in that part of world", so a worse outcome has been avoided.[85]

This highlights two dimensions of the challenges faced for these large invasives: the sheer scale of the problem, and the importance of recruiting people, outside of government, to the project: common themes emerge throughout this Report. Accounts of buffalo, too, corroborate themes that emerge from the Inquiry. This includes the likelihood of steep new increases in numbers if the gains of the BTEC program are not maintained with follow-up programs. With those, it is possible that "we are going to be in a worse situation than we were pre-BTEC" if action is not taken.[86]. The effects of buffalo are also a reminder of the complexity of flow-on ef-

[81] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.8.
[82] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.8.
[83] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.8.
[84] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.8.
[85] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.8.
[86] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.349.

fects that result from rising populations: high numbers of buffalo have in the past been instrumental in saltwater intrusions into wetlands in Kakadu National Park and West Arnhem Land as a result of their physical passage through wet-land country.[87] This reinforces the sense that individual species have impacts across the spectrum of environmental impacts, and the loss of value if sufficient investment is not made at suitable moments.

3.5 Discussion

From evidence tendered to the Inquiry, it is clear that vertebrate invasive species are present across the Territory, in high numbers, and control is difficult. For some species, high fertility rates make it difficult to keep numbers steady, and even this represents a large investment in money and manpower. Reductions are another matter. Highly mobile, vertebrate invasives spread quickly, and readily cross jurisdictional borders. Efforts at biological control are often fraught because they may affect primary production and domestic animals.

The Inquiry heard that relevant NT legislation provides incentives and penalties in relation to declared species, however in practice resource constraints often prevent them from being applied. As for weeds, vertebrate invasives can be gazetted as declared species. This process faces similar challenges to that for weeds: some species represent value to one sector of the community and loss to another. As a result, declarations can be contentious and difficult to achieve.

Evidence before the Inquiry suggests that efforts to control vertebrate invasives in the Territory have been compromised by under-investment in prevention and control. One aspect of this is the lack of follow-through that has held back vertebrate invasive species management in the Territory. Large-scale, effective programs which have reduced numbers have

[87] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.351.

been followed by periods of neglect, with resulting recoveries in population. Over a longer time-frame this represents poor value for money for the Territory. Equally, opportunities have been missed, to eradicate species where they have initially been discovered in small numbers.

Vertebrate invasives are a vector for a range of other invasives, including diseases transmissible to humans. This gives them a special importance, and underscores the complex connections between species that are a feature of invasive species.

To deal with problems of this scale and complexity, NT government agencies are developing risk-management systems for vertebrate invasive species, as a basis on which to prioritise and coordinate response. This is consistent with best practice, and echoes approaches taken for other types of invasive species in the Territory.

3.6 Findings and recommendations

Findings

From evidence tendered to the Inquiry, it is clear that vertebrate invasive species are present across the Territory, in high numbers, and control is difficult. For some species, high fertility rates make it difficult to keep numbers steady, and even this represents a big investment in money and manpower. Reductions are another matter. Highly mobile, vertebrate invasives spread quickly, and readily cross jurisdictional borders. Efforts at biological control are often fraught because they may affect primary production and domestic animals.

The Inquiry heard that relevant NT legislation provides incentives and penalties in relation to declared species, however in practice resource constraints often prevent them from being applied. As for weeds, vertebrate invasives can be gazetted as declared species. This process faces similar

challenges to that for weeds: some species represent value to one sector of the community and loss to another. As a result, declarations can be contentious and difficult to achieve.

Evidence before the Inquiry suggests that efforts to control vertebrate invasives in the Territory have been compromised by under-investment in prevention and control, and to coordinate these functions effectively. One aspect of this is the lack of follow-through that has held back vertebrate invasive species management in the Territory. Large-scale, effective programs which have reduced numbers have been followed by periods of neglect, with resulting recoveries in population. Over a longer time-frame this represents poor value for money for the Territory. Equally, opportunities have been missed, to eradicate species where they have initially been discovered in small numbers.

Vertebrate invasives are a vector for a range of other invasives, including diseases transmissible to humans. This gives them a special importance, and underscores connections between the impacts of one species and others that is a feature of the area as a whole.

To deal with problems of this scale and complexity, NT government agencies are developing risk-management systems for vertebrate invasive species, as a basis on which to prioritise and coordinate response. This is consistent with best practice, and echoes approaches taken for other types of invasive species in the Territory.

Recommendations

Recommendation 14

The Committee recommends that the Northern Territory Government increase incentives for the management and control of feral animals, and enforce penalties where infringements of legislation occur.

Recommendation 15

The Committee recommends that the Northern Territory Government provide additional resources for control of large herbivores such as camels to prevent further steep rises in populations, and that it:

a). Ensures continuity and follow-up for numbers-reduction in feral animals so as to maximise benefit from such programs.

b). Addresses the need for, and funds, restoration ecology as an integral process in ecosystem recovery and protection after the removal of invasive species.

Recommendation 16

The Committee recommends that the Northern Territory Government continue and expand cross-jurisdictional arrangements to:

a). Manage and control feral animals across borders with Queensland, South Australia and Western Australia.

b). Continue inter-jurisdictional cooperation on control, management and research on Cane Toads.

Recommendation 17

The Committee recommends the continuation and expansion of research in the Territory on key problematic species, such as the Cane Toad.

Chapter 4

Aquatic invasives

4.1 Introduction

The situation for aquatic invasives — marine and freshwater — is different than for the weeds and vertebrate invasives considered so far in this Report. In this area, the Territory retains a high level of environmental integrity:

> The lack of exotic fish in the NT's waterways is unique among tropical river systems around the globe and I firmly believe that the NT should be doing everything it can to maintain this pest-free status. This is particularly important given the commercial, cultural and conservation significance of the NT's tropical rivers and wetlands.[1]

There are, however, influences that could threaten this. The Territory's main exposure to risk is from vessels visiting Territory ports, particularly those coming from other tropical ports and from escaped species from aquaria and ponds. There is also a risk that imported seafood could carry

[1] Dr M.Douglas and Dr Samantha Setterfield, Charles Darwin University, *Submission no.27*, p.[2].

diseases that would have a negative effect on Territory aquatic species.

There are higher risks of marine invasives being introduced by shipping as shipping traffic increases in the Territory.[2] The Inquiry heard that one of the key areas of concern is ballast water, which is sea-water pumped in and out to help ships balance against changes of load. Best practice is that water should be taken on board, and expelled, away from coastal areas. In this way ships are less likely to pick up invasives, or to set them down in places where they might take hold.[3] However, there are times when it is difficult for ships to follow this course of action because it can put the "structural integrity" of vessels at risk.[4]

While various technologies are being considered, internationally, to treat ballast water so that risks are minimised, there have been "constraints" in the "pure volume of water" being dealt with, so "once again, it's a trade off between economics and the environment".[5] Despite these risks, there are also recent instances where a significant threat from a marine invasive species has brought swift and decisive action. This is covered in the case study on Black-Striped Mussel presented in this chapter.[6]

For aquarium species, the Inquiry heard of a number of instances of unauthorised release into the Territory environment.[7] There are also particular risks posed by keeping fish in ponds: there is potential for their release during heavy rain and flood during the Territory's monsoon season.[8] Releases from these sources have resulted in the presence of "mosquito fish, guppies and platys in our water ways".[9] The Inquiry heard that public education had been a weak point in the management of aquatic invas-

[2]Mr W.Goedegebuure, *Transcript of Evidence*, 16 November 2006, p.290.
[3]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.32.
[4]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.32.
[5]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.32.
[6]Mr W.Goedegebuure, *Transcript of Evidence*, 16 November 2006, p.290.
[7]Mr Dave Wilson, *Transcript of Evidence*, 16 November 2006, p.312.
[8]Mr D.Wilson, *Transcript of Evidence*, 16 November 2006, pp.312-313.
[9]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.24.

ives — people who keep fish as pets are less aware than they might be of the impact of releasing exotic fish into the environment.[10]

The importance of improving on this is signalled by the "predominance" of these species in Australian waterways to the east of the Territory, and this indicates the risks to which the Territory is exposed.[11] Tilapia, an aquarium species that has proved to be aggressively invasive in Queensland, is one species that represents "a significant threat to Barramundi fisheries in our Northern Territory waterways" due to common borders and similar climates.[12] Barramundi is also threatened by other exotic fish species.[13]

As for other kinds of invasive species, differences of perception and interest affect the management of aquatic invasives. This extends to tensions between the value seen in selling exotic fish for aquaria, as opposed to their environmental effects, and between environmental imperatives and cost already indicated for ballast water. It may, however, also extend to plans to control feral oysters — a situation that shares some similarities with improved pasture grasses in that more southerly oyster growers have responded by saying "you can't call one of our staples of our industry a marine pest".[14]

4.2 Structural arrangements

Of the two main areas of management for aquatic invasives — commercial-marine and the aquarium trade — there appears to have been more progress on the first. The Inquiry heard that an Intergovernmental Agreement had

[10] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.24.
[11] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.24.
[12] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.24.
[13] Dr M.Douglas and Dr S.Setterfield, *Submission no.27*, p.[2].
[14] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.30.

been achieved between Australian jurisdictions on marine invasives.[15] At time of hearings, the Inquiry was advised that the key aspects of this plan were due to come into force during 2006.[16] Arrangements under the Agreement were described as comprehensive:

> It addresses all know vector groups, right from your little fishing boat transiting the coastline, including the yachties and the recreational fishers through to your larger commercial ships that are under Commonwealth jurisdiction. It looks at biofouling. It looks at ballast water. It looks at the aquarium trade, although cursorily. It has the involvement of all jurisdictions and all representative bodies and the membership of NIMPCG is actually up to about 30 individuals. It is meant to be extremely thorough in its inclusion of all stakeholder groups.[17]

Risks of introducing marine invasives through ports and harbours had already caused CSIRO to develop a national Decision Support System.[18] This is the marine equivalent of the other risk-management systems considered in this Report, except that it is not owned by the Territory. The need for such a system had been recognised due to the introduction of two marine invasives from northern to southern waters by shipping.[19] At time of hearings, the system was being used by AQIS "as a means to assess the likelihood of the risk associated with ballast water".[20]

These arrangements agree with calls for greater inter-jurisdictional cooperation on marine invasives.[21] They also show a much higher level of federal government involvement compared with other areas of invasive species management.

[15]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.29.
[16]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.29.
[17]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.29.
[18]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.25.
[19]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.25.
[20]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.25.
[21]Mr W.Goedegebuure, *Transcript of Evidence*, 16 November 2006, p.291.

The Inquiry also heard an extensive description of management of marine invasives by Territory government agencies — the Aquatic Pest Management Unit of DPIFM in particular. As for efforts at management of other types of invasive species, a key part of this relies on engaging the public and other players outside of government to contribute information on sitings of marine invasives, "a process of community awareness and involvement", in which the "first line of defence is all the eyes and ears out there".[22] An instance of this has been relationships with "the people who undertake infrastructure, maintenance and boat repairs":

> They have been pulling boats out of the water and looking at things under boats and in the water for many years and know what's usual. They have a good rapport and the number of times the Aquatic Pest Management Unit is called out to have a look at the bottom of a boat with this strange mussel on board is quite good.[23]

As for management in other areas of invasive species, there is a high degree in variation of public awareness, and part of the task of agencies with management responsibility is to make players aware of responsible practice:

> To minimise the pest risk, we have actually targeted recreational vessels, especially those visiting Darwin marinas. They are high risk in terms of the fact that they have variable levels of hygiene. Their hulls aren't always 'shmico'. There are quite a number of vessels that were seen coming in that look like floating reefs. Some yachties have this belief that they are doing good by not applying antifoulant and supporting a whole ecosystem on their hull.[24]

[22] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.27.
[23] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.27.
[24] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.27.

Processes of information transfer are reported to work well: "quite often we get something weird and wonderful ...so we report that back to AQIS".[25] At time of hearings, a process of making risk assessments for marine invasives in the Territory was underway, but was being done, as yet, "on a fairly rudimentary basis", "but we have got to start somewhere".[26] The approach consists of:

> targeting high risk areas, vectors, such as large ships, foreign fishing boats, yachts, aquarium trade whatever the case may be and develop protocols to minimise the risk of marine pests being introduced or translocated by those vectors.[27]

From the point of view of government agencies, then, the outlook on aquatic invasives is positive. There were admissions that efforts to control freshwater invasives had lagged behind those in the marine environment but this, it was suggested, was "starting to pick up" in the efforts of national bodies.[28]

Some other witnesses, however, were more critical of arrangements. In relation to the management of marine invasives in the Territory, a witness from another government agency, NRETA, suggested that monitoring "has been focused largely on the Darwin region, and in some of the major ports as well", but had not extended far enough in a geographical sense.[29] There were other limitations, too, in the extent of checking and inspection where it was being done: "we are not looking at inspections of holds in terms of hold fouling, and we are certainly not looking at dinoflagellates ...".[30] The witness also identified a lack of research-based information in this area: "still we just simply do not know what the impact

[25]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.27.
[26]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.27.
[27]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.27.
[28]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.30.
[29]Ms Karen Weatherbane, NT Parks and Wildlife, *Transcript of Evidence*, 16 November 2006, p.302.
[30]Ms K.Weatherbane, *Transcript of Evidence*, 16 November 2006, p.302.

of introduced marine pests are".[31] These very different views of the state of marine invasives in the Territory are a further instance of the contrasts in perception, already identified, between agencies aligned with primary production or conservation objectives.[32]

Critical arguments were also made on the management of aquarium species. Some witnesses suggested that there was "no science behind the decisions".[33] To fill this gap, witnesses called for a "risk assessment protocol" for aquarium and pond fish, "consistent with national practice".[34] In essence this is a proposal to "establish a permitted fish list" along similar lines to those proposed for plants, and lists maintained under the national Biosecurity process.[35] In its submission to the Inquiry, the Parks and Wildlife Advisory Council said of the situation that: "legislation is in place to control and monitor the aquarium trade but a lack of funding and therefore resources to fully police the trade."[36] There are clear parallels between this and criticisms of arrangements on other kinds of invasive species detailed in this Report.

[31]Ms K.Weatherbane, *Transcript of Evidence*, 16 November 2006, pp.301-302.
[32]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.5.
[33]Mr S.Andresen, *Transcript of Evidence*, 7 September 2006, p.101.
[34]Mr S.Andresen, *Transcript of Evidence*, 7 September 2006, p.100; Mr D.Wilson, *Transcript of Evidence*, 16 November 2006, p.314.
[35]WWF, *Submission no.24*, p.17.
[36]Parks and Wildlife Advisory Council, *Submission 34*, p.2.

4.3 Case study: Black-Striped Mussel

Unlike other chapters in this Report, this case study describes a scenario in which a threatened introduction of an aquatic invasive species was prevented. The Inquiry heard that this marine invasive was discovered during marine survey work. Earlier phases of the survey had shown little in the way of invasives, but:

> when they jumped back in the water in Cullen Bay in March 1999, they were greeted with a scene of a monoculture of a little black mussels that none of the divers had previously seen but looked remarkably like a mussel from the States called the Zebra Mussel, which actually costs the U.S Government billions of dollars in the last few years in terms of remediation and control.[37]

It proved to be Black-Striped Mussel, a mussel which has the "capacity to populate at high rates".[38] This species:

> reproduces at an early age and in one month, one individual is capable of producing 50,000 little babies. And that 50,000, if they were to actually grow up would actually produced 100kg of weight of the black-stripped mussel, so it is a serious fouling organism.[39]

As a result:

> that was where the concern lay, in terms of its threat to aquaculture, its threat to the marine industries anything that involved pumping, pipes, water movement and not to mention the effect it would have on the food chains and marine ecosystem.[40]

[37] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.26.
[38] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.26.
[39] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.26.
[40] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.26.

When the discovery was made, "in recognition of the extreme threat represented by this little black mussel, a state of emergency was declared and all the marinas were quarantined".[41] It is notable that was initially quarantined "under the Commonwealth Quarantine Act because there was some doubt as to whether the NT Fisheries Act could actually cope".[42] However, to "get around that, they did actually make legislative changes to the Act within three days of the mussel being detected".[43]

Treatment occurred over "a period of 28 days", during which time "black-striped mussels were chlorinated and copper sulphated",[44] and

> you had a changing of legislation, you had determination of appropriate treatment methods, we conducted surveys not only in Darwin Harbour but also in Gove and treated 743 vessels for black-striped mussels.[45]

However, costs were high: "200 people were involved and the cost of the project was $2.2m or more. When you take into consideration the personnel costs it would blow that out quite significantly".[46]

This incursion had far-reaching effects on the management of marine invasives in the Territory. There have been lasting changes in legislation — the NT Fisheries Act and its Regulations — so that there are powers "to prohibit the removal and movement, sale or trade of marine or freshwater pests".[47]

Relevant government agencies in the Territory have a good impression of the Territory's performance over the course of this episode: "the North-

[41] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.26.
[42] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.26.
[43] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.26.
[44] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.26.
[45] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.26.
[46] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.26.
[47] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.26.

ern Territory Government still continues to lead the way".[48] However, it is worth noting that the early discovery of this incursion was a by-product of work already underway by a national agency — CSIRO — as part of their efforts to develop a decision-support network.[49] There was some luck involved, combined with foresight at national level, of which the Territory was the beneficiary. This lack of preparedness was underscored by deficits in Territory legislation at the time.

However, the most significant result of this episode are the systemic changes it brought about — changes to legislation and the creation of the Aquatic Pest Management Unit which, according to witness testimony, has been "instrumental in promoting the fact that the control of marine pests is a possibility and we shouldn't be throwing caution to the wind".[50] The Unit also provides an ongoing capacity to respond to emergencies.[51] The outbreak also led to "development of the generic list of criteria that would be applied to species that could be determined as a marine pest whether they had previously been seen in the country or not".[52] Nevertheless there are "are still some gaps that exist in the NT and nationally".[53]

4.4 Discussion

The 1999 outbreak of Black-Striped Mussel in the Territory stimulated a significant amount of change in the Territory. It has left a legacy of more modern, effective arrangements for aquatic invasive species. These appear to be in advance of what exists for weeds and vertebrate invasives — or, at least, to be more closely commensurate with the scale of current exposures to risk. At time of hearings, there appeared to be more that could be

[48]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.25.
[49]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.25.
[50]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.24.
[51]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.26.
[52]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.25.
[53]Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.24.

done, despite this progress — risk assessments of species and vectors were not, judging from descriptions, in an entirely mature state.[54] Nevertheless, the apparent sense of importance assigned to this area was greater than for others. Levels of public engagement claimed by government agencies were also promising, and represented an image of what could be achieved in these other areas.

This will be important in facing future threats. Due to its proximity to Asia and similarities in climactic conditions, the Territory is susceptible to incursions, as well as threats from other Australian jurisdictions. It seems likely, for example, that the Territory will face ongoing challenges in preventing the introduction of Tilapia, as noted in this chapter's introduction.[55]

Although the advent of Black-Striped Mussel in the Territory has raised awareness of marine invasives, there is a lower awareness of threats for other aquatic invasives. Sale of aquatic species as domestic pets represents a special point of vulnerability where, as for weeds, vendors continue to sell species with a high potential to become invasive. Significant further risk arises in relation to the disposal of these species from home aquaria. An absence of facilities means that some species are likely to be released into the environment. Other releases occur from ponds in domestic gardens, in times of heavy rainfall and flood.

As for other kinds of invasive species, the effectiveness of management regimes is lessened, and risks increased, by regulatory differences between Australian jurisdictions. This leads to a broad scope of action for people wishing to acquire aquatic species for aquaria, low levels of awareness, and thus low levels of compliance with regulation. This is a continuing source of potential hazard for the Territory from aquatic invasives. Severe reductions in biodiversity seen in other Australian jurisdictions with sim-

[54] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.27.
[55] Dr A.Marshall, *Transcript of Evidence*, 2 December 2005, p.24.

ilar environmental characteristics show what is at stake.

4.5 Findings and recommendations

Findings

The Territory faces a number of challenges in relation to aquatic invasive species. Due to its proximity to Asia and similarities in climactic conditions, the Territory is susceptible to incursions, as well as threats from other Australian jurisdictions. A relatively recent incursion brought this to the attention of relevant agencies in the Territory. In that instance, efforts at prevention were effective. As for other categories of invasive species, government agencies are more likely to respond decisively where industry interests are involved than when effects are regarded as "environmental".

Despite this episode, awareness of aquatic species threats is lower than for weeds or feral animals. Sale of aquatic species as domestic pets represents a special point of vulnerability where, as for weeds, vendors continue to sell species with a high potential to become invasive. Significant further risk comes about in relation to the disposal of these species from home aquaria: an absence of facilities to manage this means that some species are likely to be released into the environment. Other releases occur from ponds in domestic gardens, in times of heavy rainfall and flood. As for other kinds of invasive species, the effectiveness of management regimes is lessened, and risks increased, by regulatory differences between Australian jurisdictions. This leads to a broad scope of action for people wishing to acquire aquatic species for aquaria, and low levels of awareness, and thus compliance, with regulation. This represents a continuing source of hazard for the Territory for aquatic invasives, especially in light of severe reductions in biodiversity seen in some other Australian jurisdictions with similar environmental characteristics.

Recommendations

Recommendation 18

The Committee recommends that the Northern Territory Government continues and extends monitoring and control of aquatic invasives, by:

a). Continuing the Environmental Surveillance program.

b). Continuing and expanding the monitoring and control of invasive species in freshwater environments.

c). Continuing to support and implement protocols for the management of hold-fouling, ballast water, and other similar vectors for the introduction of aquatic invasives.

Recommendation 19

The Committee recommends that the Northern Territory Government reduces risks of aquarium species to the Territory environment by:

a). Increasing levels of public awareness, regulation, and compliance,

b). Discouraging the importation of invasive aquatic species into the Territory by private persons, including black- or grey-market importation.

c). Establishing a permitted species register, excluding aquarium species known to have invasive characteristics.

d). Increasing levels of consistency between Northern Territory registers of proscribed aquatic species and other jurisdictions.

e). Promoting the use of native species for domestic aquaria.

f). Considering options to establish a facility to accept and manage unwanted aquarium fish.

g). Creating different regulations, allowing different species, for aquaria, and for ponds and dams, due to the high potential for species escape from the latter during heavy rain and flooding.

Chapter 5

Invertebrates and diseases

5.1 Introduction

5.1.1 Diseases

Disease threats to the Territory include infectious diseases harboured in feral animals, such as Japanese Encephalitis in wild pigs; Brucellosis and Tuberculosis in buffalo;[1] Prospective threats for plant disease include Eucalyptus Rust,[2] and for marine life White-Spot Disease, which had entered the Territory recently in imported feedstock for aquaculture, but was successfully controlled.[3]

The Inquiry heard that disease incursions had enormous potential for harm. If Foot and Mouth Disease were to be discovered in Australia, the Inquiry was told, there would be approximately "$6m per day investment in the eradication of the disease ... is on the Commonwealth level" and

[1] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.349; Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.8.

[2] Mr R.Gobbey, *Transcript of Evidence*, 15 November 2006, p.245.

[3] Amateur Fishermens Association Northern Territory, *Submission no.40* and see Mr Chris Makepeace, *Transcript of Evidence*, 16 November 2006, p.361 ff.

"$6bn to $13bn would be lost overnight to the livestock industry in Australia".[4]

Another indication of potential costs from disease is the Brucellosis and Tuberculosis Eradication Campaign of the 1980's and 1990's. This amounted to, "if you include both the industry and government expenditure", a cost of "about $850m just over 10 years".[5] The program ensured a "Brucellosis and TB free status" for Australian livestock — a significant plus for primary industry.[6] However, the buffalo population is in a process of recovery. Although "in excess of 400 000 buffalo were killed", after approximately 20 years the Buffalo population is close to being "back ...where we started".[7] In fact, Brucellosis and Tuberculosis persist "in some more remote areas of the country", and buffalo, "the key host population, is expanding again westward".[8] In hindsight, the "eradication" part of the campaign title can be regarded as "a bit of a misnomer".[9]

This clearly presents a resurgent threat to the Territory. However, there is also "a host of diseases in Australia already, or at the verge of coming into Australia", that have "feral and exotic species hosts".[10] These diseases "affect livestock and even ...human beings".[11] The Inquiry heard that the "best chance" of reducing these negative effects was to modify the "dynamics of the hosts" — a powerful further argument for effective management of invasive species.[12]

There are two aspects to the Territory's capacity to respond to disease threats. It appears, from testimony heard by the Inquiry, that federal and

[4]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.340.
[5]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.340.
[6]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.340.
[7]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.340.
[8]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.340.
[9]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.340.
[10]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.341.
[11]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.341.
[12]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.341.

inter-jurisdictional arrangements to manage disease threats are comparatively well-developed.[13] On the other hand, capacity within the Territory, it seems, would be tested by any serious disease incursion: "if we had an animal disease tomorrow, we have enough people to manage that disease for a week, and that is it".[14] The solution is to "go whole of government": "our legislation is connected with the Disaster Act, that the relevant Ministers can call a disease a disaster, which then picks up your Police, Fire and Emergency Services".[15] Responses to larger-scale incursions presumably rely on contributions from outside the Territory.

5.1.2 Invertebrates

Invertebrate threats to the Territory include exotic species of ants and bees already established in the Territory;[16] and the potential introduction to the Territory of the Giant African Snail.[17]

Testimony to the Inquiry shows that invertebrates attract relatively little concern and awareness of any of the main categories of invasive species in the Territory. While evidence to the Inquiry suggests that "exotic invertebrates pose a serious threat to biodiversity of the Northern Territory",[18] there is a lack of capacity. One submission suggested that "there is at present minimal resource capability ... to effectively manage terrestrial invertebrate pest incursions which are principally environmental pests".[19] Moreover, while legislation provides "a legislative mechanism to deal with terrestrial invertebrates", it has "not yet been utilised for this group of

[13] Mr R.Gobbey, *Transcript of Evidence*, 15 November 2006, p.248.
[14] Mr I.Kilduff, *Transcript of Evidence*, 15 November 2006, p.247.
[15] Mr I.Kilduff, *Transcript of Evidence*, 15 November 2006, p.247.
[16] Dr Anne Walters, NRETA, *Submission no. 41*, pp.3-4.
[17] Mr I.Kilduff, *Transcript of Evidence*, 15 November 2006, p.244.
[18] Dr A.Walters, *Submission no. 41*, pp.3-4.
[19] Mr Brent Williams, NRETA, *Submission 42*, pp.1-2.

invasive species".[20] This reflects a pattern in invasive species management in the Territory, where legislative instruments often exist, but fail to live up to their potential due to an absence of successful prosecutions.

5.2 Case study: Tramp Ants

The Inquiry heard that there are "eight to ten" invertebrate species that are regarded as "current or potential threats" to the Territory.[21] The majority of these are so-called "tramp ants": exotic ant species with a "suite of characteristics that enable them to be particularly invasive".[22] Among these are the Yellow Crazy Ant, the African Big Headed Ant, and the Red Imported Fire Ant.[23] Their effects are "decreased abundances and diversities of native invertebrates and vertebrates as a result of competition and predation", leading to "decreased rates of ... seed dispersal".[24] One witness described the effect of Big-Headed Ant infestations in these terms:

> its impact is to turn an area which might have 20 native species of ants all doing particular aspects of the cleaning up of the environment the ecological "cleaner upper-ers" if you like, scavenging, burying seeds, so they have got places to germinate, all these ecosystem functions that they perform. The Big-Headed Ant can turn out 20 species array into a single species array by Big-Headed Ants, by sheer numbers. So it invades by overwhelming all of the other native ant species and other sorts of insects as well.[25]

[20] Mr B. Williams, *Submission 42*, pp.1-2.
[21] Dr A.Walters, *Transcript of Evidence*, 15 November 2006, p.282.
[22] Dr A.Walters, *Transcript of Evidence*, 15 November 2006, p.282.
[23] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, pp.4-5; Mr John Carroll, DPIFM, *Submission no.13*, pp.10-11.
[24] Dr A.Walters, *Transcript of Evidence*, 15 November 2006, p.282.
[25] Mr C.James, *Transcript of Evidence*, 7 September 2006, p.76.

This illustrates how "exotic invertebrates have the capacity to affect the entire ecosystem".[26]

In testimony, species of tramp ants were linked to a number of locations in the Territory, including Alice Springs and Jabiru.[27] An important observation was that inadvertent transportation of these species in house removals is un-managed and uncontrolled: a significant gap in present arrangements:

> Big Headed Ants can move in a matchbox, one ant can move and typically the way they spread around Australia is that they have got nests in pot plants and you put them in a removal truck and you take them to the next place.[28]

This kind of inadvertent transfer appears to be quite routine. A witness suggested that when: people ...drop plants in to Jabiru or any sort of material that comes from Darwin there is likely to be ants travelling with them.[29]

There are similar gaps in arrangements for plant nurseries:

> the nursery trade is one of the vectors for that thing spreading around Australia, because there is no regulation there saying, that you must move plants interstate that have passed some sort of treatment or quarantine period for getting rid of big headed ants in the pot plants. And the nursery trade, of course, while you do not have any regulation there, they would be perfectly happy just to lay off another truck full of plants to go somewhere.[30]

[26]Dr A.Walters, *Transcript of Evidence*, 15 November 2006, p.282.
[27]Mr C.James, Alice Springs, pp.76-77; Ms. A.Ferguson, *Transcript of Evidence*, 5 October 2006, p.135.
[28]Mr C.James, *Transcript of Evidence*, 7 September 2006, p.76.
[29]Ms A.Ferguson, *Transcript of Evidence*, 5 October 2006, p.135.
[30]Mr C.James, *Transcript of Evidence*, 7 September 2006, p.88.

As a result, "there is no point eradicating them in Alice Springs . . . because they are just going to come in again, just come back".[31]

There are other gaps in the Territory's readiness to manage these species. A witness suggested that "[we] don't have much expertise in Government" for such invasive ant species as the Yellow Crazy Ant and the African Big Headed Ant and, consequently, "we tend to . . . lean on institutions like the CSIRO" for suitable expertise.[32]

On the other hand, the Territory contributes to national processes on tramp ants, in particular on Red Imported Fire Ants. Infestations for this species are at their highest density in south-east Queensland. The rationale for the Territory's contribution is that:

> we are probably better throwing some resources into a common bucket to try and nip the problem in the bud perhaps while it is still controlled in south-east Queensland rather than wait to have to deal with the issue when it gets here to the Territory. By the time it gets in here it will be a major, major problem . . .[33]

Collectively, this pattern of input to a greater national capacity "to try and knock something on the head while it is still in that early phase", and that is regarded as a clear benefit.[34]

Within the Territory, current community-based programs to control tramp ants can be considered another positive aspect of conditions at time of hearings. Attachments to submissions outlined programs that engaged Indigenous people in these control efforts, and reported positive outcomes for both the participants and the environment.[35]

[31]Mr C.James, *Transcript of Evidence*, 7 September 2006, p.88.
[32]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, pp.4-5.
[33]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.5.
[34]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.5
[35]See CSIRO, *Submission no.16, part 4*, Ben Hoffman, *Pest Ants and their Management on Aboriginal Lands in the Northern Territory — Report for the Northern Land Council*, CSIRO,

5.3 Discussion

The history of management of invertebrates and diseases is consistent with those of other types of invasive species. Direct outbreaks of disease appear to attract higher levels of interest from outside the Territory, particularly for diseases of livestock. However, lack of follow-through in the BTEC program shows that principles of good practice are not always adhered to even in this area. For invertebrates, also, there is mixed success at managing invasive species that have become endemic. While submissions detail programs in regional areas,[36] policy-level initiatives in the Territory lag behind in some respects. For invertebrates and diseases, as for weeds, "you never save money by not controlling" invasive species, and this part needs to fit into a larger picture of concerted, deliberate action to exercise control.[37]

5.4 Findings and recommendations

Findings

There are lower levels of awareness about risks from Invertebrates than for other categories of invasive species in the Territory. This is not, however, an indication of their significance. Invasive ant and bee species threaten environmental integrity by disturbing and replacing the environmental actions of native species, leading to negative effects on such key environmental services as pollination. They also have negative impacts on human health.

As for other categories of invasive species, the dispersal of invasive invertebrates can result from interactions with other species, such as ants

Darwin, 2004.

[36] See CSIRO, *Submission no.16, part 4*

[37] Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.112-113.

being carried in soil and plant material associated with commercial nurseries, or during domestic relocations. Despite this, such risks remain unmanaged under Territory regulation and control measures.

Disease risks in the Territory may be closely associated with other categories of invasive species, as noted. Instances are established links between feral pigs and Japanese Encephalitis, and the historical connection between buffalo and tuberculosis. In both cases, these diseases can infect humans. Disease management attracts a higher level of support from national-level programs, particularly from Biosecurity Australia, and the Australian Quarantine Inspection Service (AQUIS). The Territory has, however, only very limited capacity in the event of an invertebrate or disease incursion, which for the latter measured only in weeks, and this represents a key point of vulnerability.

Recommendations

Recommendation 20

The Committee recommends that the Northern Territory Government expands the capacity of the Territory to respond to disease incursions.

Recommendation 21

The Committee recommends that the Northern Territory Government Government promotes public awareness of impacts of invertebrate invasives.

Recommendation 22

The Committee recommends that the Northern Territory Government legislate to control the movements of plant material, soil, and other materials with respect to their capacity to act as a vector for invertebrate invasives.

Recommendation 23

The Committee recommends that the Northern Territory Government increase management and control for vertebrate pests which are known vectors for infectious diseases, in particular feral pigs and buffalo.

Recommendation 24

The Committee recommends that the Northern Territory Government expand and develop research on invertebrate invasives in the Territory.

Chapter 6

Community-based programs

6.1 Introduction

One of the most important changes in the management of invasive species in the Territory has been the shift from government as sole-provider of services to a model of partnerships between government and the community.[1] Indeed, if invasive species in the Territory amount to the large-scale problem that witnesses portray, beyond the scope of government resources alone, this appears to be the most practical course of action. And, as the Inquiry heard in relation to weeds, arrangements of this kind — particularly legislative arrangements — have been successful in other jurisdictions.[2]

As noted through this Report, however, there are also indications that the balance between community-based programs and government — in particular the levels of support government brings to community-based programs, has not achieved the best possible setting. This chapter considers the experience of a number of community-based groups involved in invasive species management. They include: grass-roots community

[1] See Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.16.
[2] See Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.114-115.

groups; entities set up under legislation; Indigenous community-based management programs; and primary producers. The chapter also shows something of the experience of local government in this domain. A number of these perspectives are evident in a final case-study showing how different aspects of the situation interact in practice.

A brief description of the weaknesses and strengths of these non-government players would cover the almost universal frustration with funding arrangements, particularly at the more "community" end of the spectrum — larger, more powerful organisations are better able to negotiate this environment. The overall balance in method of funding has shifted in favour of competitive grants, and there is a perception that application processes have become increasingly arduous and complex.[3] The change is described in these terms:

> Previously what would happen, is the weeds branch would apply for funding on behalf of some of the community bodies ... and then we devolve those grants out to people, which let people get on with their work, but the majority of the paperwork was actually processed by the Department ... Now with the community groups tapping into that, that whole work load has now gone to the community group as well, so yes they do get the money for a lot of this control work but they also get the paperwork and the financial management that goes with it.[4]

6.2 Case study: Tennant Creek

6.2.1 Introduction

A hearing in Tennant Creek provided the Inquiry with an insight into conditions, difficulties, and successes of invasive species management in

[3] Mr R.Knight MLA and Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.21.
[4] Ms A.Beilby, *Transcript of Evidence*, 2 December 2005, p.21

a significant regional area of the Territory. This was notable in that it presented perspectives from local government, which deals, to a large extent, with the complexities of managing invasive species in practice. If there are flaws in present arrangements for invasive species management, they should be corroborated by the accounts of people such as these, working on the front-line of invasive species management.

The Inquiry heard of a number of challenges for invasive species management in the Barkly region, including:

- Significant infestations of Athel Pine,[5] Rubber Vine, Mesquite,[6] and Neem Trees;[7]
- A re-emergence of Spear Grass and Kapok Bush;[8]
- A high prevalence of Parkinsonia,[9] and Rubber Bush, particularly along waterways, and[10]
- A high prevalence of wild horses and donkeys,[11] feral cats,[12] and resurgent populations of rabbits.[13]

The Inquiry heard that these challenges were magnified by responsibilities, on the part of invasive species managers, for an area of approximately 550 kilometres in radius. As one witness observed, this is equivalent to the size of "some countries", a characteristic that is shared with many other areas of invasive species management across the Territory.[14]

[5]Mr Eric Brahim, Julalikari Council, and Mr Erich Schoppe, Tennant Creek Town Council, *Transcript of Evidence*, 6 September 2006, p.45.
[6]Mr Troy Munckton, Julalikari Council, *Transcript of Evidence*, 6 September 2006, p.44.
[7]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.55.
[8]Mr E.Brahim, *Transcript of Evidence*, 6 September 2006, p.47.
[9]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.47.
[10]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.49.
[11]Mr E.Schoppe and Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, pp.44, 53; Mr E.Brahim, *Transcript of Evidence*, 6 September 2006, p.47.
[12]Mr E.Schoppe and Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.50.
[13]Mr E.Brahim, *Transcript of Evidence*, 6 September 2006, p.47.
[14]Mr E.Brahim, *Transcript of Evidence*, 6 September 2006, p.44; Mr E.Schoppe, *Transcript of*

6.2.2 Structures and relationships

The practical experience of these players is determined by the structures and relationships through which they work. This includes their relationships with other players in the Territory, and interactions with federal funding regimes. In some instances these are enabling factors: others create obstacles between programs and their objectives.

The Inquiry heard that the advent of the Weeds Act had prompted Tennant Creek Town Council to initiate a weeds management program.[15] This echoes testimony, elsewhere, detailing the positive effects of weeds legislation in Queensland.[16] This is confirmation of a positive influence from the Territory's Weeds Act.

Similar developments stemmed from external funding: funding from the National Heritage Trust had led the Julalikari Council to form a steering committee which engaged other major players in invasive species management, such as the Weeds Branch, Fire Council, the Northern Land Council, Central Land Council, and Barkly Land Care Conservation, providing a basis for better communication and coordination between these players.[17]

This is not always the case. A witness to the Inquiry suggested that programs — such as Barkly Landcare Conservation, the Central Land Council Ranger Program, and local government — performed similar functions, in the same region, but their efforts were not coordinated.[18] Their main point of contact was by virtue of common membership of the Barkly Landcare and Conservation Association rather than any deliberate effort at coordination.[19] Opportunities were also identified for the three local coun-

Evidence, 6 September 2006, pp.44, 56.

[15]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.44.

[16]Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, pp.114-115.

[17]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.44.

[18]Mr E.Brahim, *Transcript of Evidence*, 6 September 2006, p.45.

[19]Mr E.Brahim, *Transcript of Evidence*, 6 September 2006, p.46.

cils in the region to work more closely together.[20]

However, duplication between local government and Caring for Country, at time of hearings, was beginning to ease.[21] Local government representation on Landcare bodies was considered an important step toward achieving better levels of coordination, as was its ability to "work close in hand" on weeds with staff from DPIFM.[22]

As noted, the Inquiry heard of a number of instances in which invasive species represent different threats, or values, to different stakeholders, and this can be an obstacle to effective management. This was evident in the Barkly Region, where these differences emerged in relation to Buffel Grass, due to tensions between its environmental impacts and its economic value to pastoralists,[23] and donkeys, due to the value that local Indigenous people place upon them.[24]

But these differences also affected day-to-day practice due to tensions between the practical imperatives of invasive species control and the rights of traditional landholders. There are two issues involved. First, there is the matter of obtaining consent from traditional owners to come onto traditional land for the purpose of invasive species management.[25] Witnesses directly involved in weeds management report delays and a lack of predictability in the process of acquiring permits to do control work.[26] The Inquiry was told, for example, that fire permits issued by the Central Land Council took, at time of hearings, from one to two months from the time of application, and "maybe they give you a permit in a months time on top of that", considerably slowing down the pace of weeds control work.[27]

[20]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.45.
[21]Mr E.Brahim, *Transcript of Evidence*, 6 September 2006, p.61.
[22]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.44.
[23]Mr E.Schoppe and Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.55.
[24]Mr E.Munckton, *Transcript of Evidence*, 6 September 2006, p.44.
[25]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.48.
[26]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.51.
[27]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.52.

A second point of tension lies in applications for grants. Applications need support from land councils to be viable, and this adds to a perceptions of excessive bureaucracy: "we cannot do anything without the permission of the NLC or CLC, that is how it is if you do not go and see them, you will not get any of the funding".[28]

6.2.3 Funding and staff on-the-ground

Organisations engaged in invasive species management face a number of difficulties in performing their function. The intricacies of relationships with land councils and traditional owners are just a part of a wider administrative burden they face. In the "new" environment, in which community-based or other non-government groups apply for funding within a competitive grants environment, these challenges have a direct influence on their ability to run programs, and to hire and retain staff to do so.

As indicated, at time of hearings Julalikari Council was in receipt of funds from National Heritage Trust — for weeds, feral animals and fire.[29] Tennant Creek Town Council had not at that stage applied for grant money to manage invasive species, and did not receive any other appropriations for this purpose: money for this purpose came from general revenue based on local government rates.[30] Witnesses remarked on the perceived complexities in sending grant applications up through peak regional bodies,[31] but there was also speculation as to whether new local government arrangements — the introduction of new shires — might provide new avenues for funding for invasive species management.[32]

[28]Mr E.Brahim, *Transcript of Evidence*, 6 September 2006, p.47.
[29]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.44.
[30]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, pp.44, 46.
[31]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.51.
[32]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.44.

There were a number of critical perceptions on funding arrangements — in particular, on the competitive grants process. A Member of the Committee later summarised these as focused on problems with: getting the funding; achieving sufficient flexibility of funding; difficulty attracting funding for wages; and a lack of continuity of funding, leading to a lack of follow-up work — an integral part of successful invasive species control.[33]

Witnesses at Tennant Creek provided details of these problems. The Inquiry heard that staff in these organisations were often obliged to take time away from practical control work to prepare applications: "you spend a lot of time in the office actually applying for other funds to keep your job going".[34] Moreover, there were a significant number of instances where applications were not successful.[35] Witnesses who had been through this process expressed the view that requirements were overly bureaucratic — wording in the wrong style, or too many words, led to the application being excluded from the process at an early stage.[36]

Of this, another witness observed:

> There is a limited range of grant applications for him to apply for and he has to specify the exact number of fire breaks he will undertake, the exact number of man hours that will require, the exact number of communities he will visit and if things change within that three years there is no room for flexibility. His funding applications are up to 20 pages or more and no funding application can be submitted without at least two experts writing a written reference in support of that application. So many organisations never get their applications up. It is incredibly

[33]Mr G.Wood MLA, *Transcript of Evidence*, 7 September 2006, p.79, and see Mr T.Munckton and Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.48.
[34]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.47.
[35]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, pp.44, 46.
[36]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.58.

hard to get these through.[37]

This workload in securing grants is increased by a need, within the system, to reapply if there are interruptions, such as those which occur due to the vagaries of weather. This means that "you have to keep on applying all the time".[38] The consequence of this is a series of interruptions and variations in funding that make it difficult for programs to attract and retain staff. Programs need "people that are full time, committed, educated, trained and understand what they are doing", and they cannot retain them unless funding achieves higher levels of continuity.[39] Long turnarounds on funding applications create further problems for programs wishing to retain staff.[40]

There were also concerns about caveats on programs as a result of the grants process. Witnesses saw these as unnecessarily restrictive, and suggested that these reduced the efficiency of programs by putting certain species and functions off-limits.[41] Grants processes, the Inquiry was told, tie grantees to nominated objectives to the extent that they can only report against these, "only listing what is within the allocated funding", and as a result "the government is nearly never truly aware of what exactly ... the situation is".[42] The consequence is that if a weeds program finds infestations other than those listed in its application, the program can neither deal with them or report them. By this, opportunities are missed to acquire further information at negligible cost.

[37]Unnamed Witness, *Transcript of Evidence*, 6 September 2006, p.57.
[38]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, pp.58-59.
[39]Unnamed Witness, *Transcript of Evidence*, 6 September 2006, p.58.
[40]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.59.
[41]Unnamed Witness, *Transcript of Evidence*, 6 September 2006, p.59.
[42]Unnamed Witness, *Transcript of Evidence*, 6 September 2006, p.59.

6.2.4 Information needs and sharing

Judging from statements to the Inquiry, the degree to which information moves through the system is a matter of importance for people working in practical roles in Territory regions. This includes concerns about the ability to both share and access information.

Witnesses appearing before the Inquiry showed a clear sense of gaps in present arrangements on information. In one instance a witness told of observing the outbreak of an invasive plant (Kapok Weed), but expressed a lack of knowledge about to whom it should be reported.[43] In another, a witness had "absolutely no idea whatsoever" of as to whether the operator of the main railway performed weeds control.[44]

There was a prevailing sense amongst witnesses that there were opportunities for information gathering by government employees and contractors who were active in the region. Proposals were made that they could be involved in gathering and reporting information on weeds, for example, as an adjunct to their main task. This would reduce the difficulties involved in maintaining awareness of conditions for invasive species in a large, sparsely-populated area.[45]

Underscoring this need for better information, the Inquiry was told of the value of having had, previously, a research officer based in the local area.[46] This had resulted in a boost to local skills, and the production of a series of field guides still in use.[47]

These matters extended into concerns about mapping. Witnesses involved in practical efforts to control invasive species, particularly weeds,

[43]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.54.
[44]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.57.
[45]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, pp.53, 54; Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.55.
[46]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.55.
[47]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.55.

emphasised the importance of mapping as an integral part of management.[48] This was seen as integral to the capacity to follow-up on weeds once control work had been performed — in some sense the "most crucial thing".[49] As a result, it was noteworthy than the Central Land Council and the Barkly Landcare and Conservation Council were collaborating on weeds mapping at time of hearings.[50]

Witnesses to the Inquiry stressed the importance of public education within the wider effort on invasive species. They noted a general level of "ignorance" on invasive species in the wider community.[51] So far Cane Toads had achieved the greatest visibility in public information campaigns, and "some good TV programs" on invasive species, but they needed to go further.[52] There was also a need to communicate with Indigenous people about these matters, and this represented a challenge in view of their remoteness from regional centres and towns.[53]

6.3 Indigenous programs

A number of submissions to the Inquiry describe the importance of Indigenous people to invasive species management, and its future outcomes.

The position of Indigenous people is distinctive in a number of ways. First, they "have responsibility for vast areas of the Northern Territory",[54] and they feel "particular concern" at the "appearance of unfamiliar plants

[48]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.56; Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.49.
[49]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.49.
[50]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.49.
[51]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, p.62.
[52]Mr E.Schoppe, *Transcript of Evidence*, 6 September 2006, pp.61, 60.
[53]Mr T.Munckton, *Transcript of Evidence*, 6 September 2006, p.52; Unnamed Witness, *Transcript of Evidence*, 6 September 2006, p.57.
[54]Greening Australia, *Submission no.10*, p.5.

and animals".[55] Indigenous people in rural and remote parts of the Territory are in a unique position from which to contribute to invasive species management:

> It is axiomatic that early detection, prevention of incursions and early eradication of outbreaks are more economic and effective than efforts to eradicate or control established populations. It is therefore crucial to recognise and support the role Indigenous people play in surveillance and monitoring of pest species incursions, particularly in remote areas.[56]

One submission emphasised the potential significance of this for both Indigenous economic development and invasive species management:

> The Northern Territory Government's priority for Indigenous economic development would be well served by exploiting the synergy that exists between this economic activity and the regional dispersion and skills and knowledge of Indigenous communities. Particular opportunities may exist for Indigenous communities and businesses to undertake contract control work not only on Indigenous land but also on Crown, leasehold land and conservations reserves. Additionally, existing successful models such as the Indigenous Marine Ranger program could be modified and extrapolated to encompass management of invasive species.[57]

From submissions to the Inquiry, as well, a picture emerges of a growing Indigenous Natural Resource Management (NRM) sector: Indigenous ranger programs, for example, are acknowledged as having done important work on weeds control.[58]

[55] Northern Land Council (NLC), *Submission 25*, p.3.
[56] Indigenous Land Corporation (ILC), *Submission no.12*, p.3.
[57] Department of Business, Economic and Regional Development (DBERD), *Submission no.21*, p.[1]
[58] Greening Australia, *Submission no.10*, p.5.

Management of Mimosa by Indigenous programs is one example of this. A submission to the Inquiry described first the impact of this plant on Indigenous people:

> this weed has had the effect of radically altering people's relationship with their country. The impenetrable thickets have denied access for hunting, ceremony, economic activity and the ability to pass on intimate knowledge of country to younger generations.[59]

And then the response: "mimosa has been the catalyst for a number of communities to form land management groups to combat this invasive species".[60]

The results have been positive: "numerous communities have made significant gains in . . . control, impact reduction . . . and containment . . . across the Top End".[61] Moreover, "a number of these groups . . . have successfully secured contracts to control Mimosa and Gamba Grass on adjoining NT Land Corporation lands".[62] As a result, "it is now acknowledged that successful mimosa control is dependent on ongoing ground control activities by local Indigenous people".[63]

Beyond this, "with the formation of these groups" there has "also been a growing awareness of a range of other established and potential invasive species".[64] This includes weeds, but also "fire abatement and the monitoring of feral animals for disease".[65] Indigenous people have also been involved in feral animal control, such as wild pigs.[66] Complexities surrounding this, however, in that wild pigs are seen as a resource as well

[59]NLC, *Submission 25*, p.3.
[60]NLC, *Submission 25*, p.3.
[61]NLC, *Submission 25*, p.1.
[62]NLC, *Submission 25*, p.1.
[63]NLC, *Submission 25*, p.4.
[64]NLC, *Submission 25*, p.3.
[65]NLC, *Submission 25*, p.2.
[66]ILC, *Submission no.12*, p.2.

as a pest, and cultural sensitivities around slaughtering animals "not required for food", are an argument for careful negotiation in this area.[67]

These programs have a range of surprisingly well-developed formal relationships with significant players in the area:

> Every one of the existing community land management groups are currently engaged in weed and feral animal control, are incorporated into the wider NT natural resource management network, and many have formed partnerships with relevant government agencies.[68]

These partnerships include those between: marine and coastal ranger groups and the Australian Quarantine and Inspection Service (AQIS),[69] and between the NLC Caring for Country network, the NT Weeds Management Branch, NT Fisheries Group, Parks and Wildlife, the Indigenous Land Corporation, and a growing relationship with the Bushfires Council;[70]

There appears to be a high level of cooperation between these players. Particular mention is made in submissions, amongst other things, of "substantial" support given by NT Fisheries Group to "six marine rangers groups, with surveillance for exotic species being one of the functions expected to be performed".[71] Support has also been rendered by NT Parks and Wildlife,[72] and the Weeds Management Branch, which has "greatly assisted in the provision of training, technical support and planning".[73]

In the northern part of the Territory, much of this is coordinated under the Top End Aboriginal Land Management and Employment Strategy,

[67]ILC, *Submission no.12*, p.2.
[68]NLC, *Submission 25*, p.3.
[69]NLC, *Submission 25*, p.3.
[70]NLC, *Submission 25*, pp.4, 5.
[71]NLC, *Submission 25*, p.5.
[72]NLC, *Submission 25*, p.5.
[73]NLC, *Submission 25*, pp.4, 5.

product of an agreement between the NLC and ILC in 1999.[74] This was designed to foster "cross-agency support" for Indigenous land management programs.[75] Contributing partners in this process have been: the Northern Land Council; the National Heritage Trust; the Indigenous Land Corporation; the then federal Department of Employment and Workplace Relations (through the then Community Development and Employment Program); STEPS (Southern Training, Employment and Placement Solutions); and the then NT Department of Education Employment and Training, which provided training.[76] The then federal Department of Education, Science and Training (DEST) was also reported to be providing training.[77]

This process has resulted in a rise in contract work for Indigenous land management programs:

> the value of some groups has been recognised in the private sector. For example, Ngaliwurru Wuli Rangers (Timber Creek) have been regularly sub-contracted by Wildman Land Management for, inter alia, weed control work on Bradshaw Military Training Area. This same group has also won contracts for weed control work through Victoria River District Conservation Association.[78]

It is noteworthy that this activity has given rise to a significant literature on Indigenous community-based programs, invasive species management, and Natural Resource Management (NRM), and that this has included substantial evaluations of programs and as well as contributions to policy and debate.[79] This is one area where there is visible growth in

[74]NLC, *Submission 25*, p.4.
[75]NLC, *Submission 25*, p.4
[76]NLC, *Submission 25*, p.5.
[77]NLC, *Submission 25*, p.5.
[78]NLC, *Submission 25*, p.5.
[79]See Sithole, B., Hunter-Xenie, H., Williams, L., et al, *Aboriginal land and sea manage-*

capacity to manage invasive species, and this is both important and encouraging.

However, there are also obstacles. In describing these, submissions from this sector echo comments made elsewhere. They argue that there is a need to strike a better balance between the "respective responsibilities of Australian, State and Territory Governments and landowners".[80] Funding, to be effective, needs to become more capable of delivery on a more "secure, long-term" basis in order to "avoid wasting resources on piecemeal, short-term projects", and "there must be flexibility to rapidly respond to emerging threats".[81] Also noted is a tendency to give preference to funding invasive species management where the impact of species are "primarily economic rather than environmental or social", and the uneven outcomes this yields for traditional landowners.[82]

Training and technical support are a special emphasis in this regard. The Inquiry heard of this elsewhere in hearings, where this was noted as a key issue for handling hazardous chemicals.[83] Submissions argue that:

> Training and resources to increase Indigenous peoples' capacity to manage invasive species will be critical to the Territory's success in preventing future incursions and managing established species.[84]

In this, the Top End Aboriginal Employment and Land Management

ment in the Top End: A community driven evaluation, report for the Northern Land Council, CSIRO, Darwin, 2007; Altman, J., Dillon, M.C., 'Commercial development and natural resource management on the Indigenous estate: A profit-related investment proposal', *Economic Papers*, 24 (3): 249-62, 2005; Altman, J., 'Promoting Aboriginal economic interests in natural resource management in NSW: Perspectives from tropical North Australia and some prospects', *Topical Issue 2004/06*, 7 pp., 2004.

[80]ILC, *Submission no.12*, p.3; NLC, *Submission 25*, pp.5-6.

[81]ILC, *Submission no.12*, p.3, and see also NLC, *Submission 25*, pp.5-6.

[82]ILC, *Submission no.12*, p.3.

[83]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.144.

[84]ILC, *Submission no.12*, p.4.

Training Strategy has been important, however:

> there is a pressing need for additional land management support in the form of training, technical support and funding to develop the capacity of Indigenous landholders to effectively manage the impact of invasive species and to prevent further incursions on their land.[85]

While this may be a challenge for the Top End, however, there is also a need to consider similar arrangements for Central Australia, if the Territory as a whole is to benefit from such an approach. Developments in the Top End have shown that this is a viable approach to invasive species management, in the face of intense difficulties placing manpower where it is needed and providing coverage across remote areas. There is now a potential for the model to be extended. At the same time, there is a need to attend to the structural constraints that have a negative effect on these and other players in invasive species management: the difficulty of securing long-term funding due to scattered jurisdictional responsibilities; differences in program parameters and objectives depending on the government department that owns them; and the consequent difficulties faced by government agencies in attempting to monitor investments.[86] Progress toward resolving these difficulties would have a beneficial influence in helping to "cut down to size" present challenges for invasive species management.

6.4 Pastoral industry

Views of the role of the pastoral industry in invasive species management have often centred on its use of the "improved pasture" species considered problematic by other land users. Testimony to the Inquiry elaborates

[85] ILC, *Submission no.12*, p.3.
[86] NLC, *Submission 25*, p.6.

upon this, however. First, producers within the pastoral industry use these species to different degrees, depending on choices they make on stocking-rates and other matters.[87] Second, producers are themselves involved in the management of invasive species. This can be obscured if too great a focus is placed upon improved pasture species.

The Inquiry heard that while it is often difficult to prioritise invasive species management within farm business, "most primary producers realise that without the land they have not got income".[88] As a result, while "industry" and "community" may sometimes be regarded as opposites, in fact "a big percentage of [cattle producers] are members of Land Care groups", and are "quite concerned about ... sustainability and would like to maintain [their] land in better conditions"[89] Consistent with this, the Inquiry heard that weeds management expenditure by primary producers in the Territory averaged, at time of hearings, $37,000 per property.[90] As a result, it is "a big issue for people outside just the usual suspects".[91]

Mimosa control by pastoralists was a case-in-point. The Inquiry heard that at time of hearings infestations of Mimosa amounted to 100,000 hectares in the Territory, 50% of which was on pastoral properties.[92] While eradication could lift the carrying capacity of the land by up to 50,000 head of cattle, there were also high costs involved in achieving that eradication.[93] The Inquiry was told that while the National Landcare Program had granted $600,000 for a mimosa control program over three years, 17 primary producers were spending $2.2 million each year on Mimosa control, and projected spending was "up to $6 million over five years.[94] In certain ar-

[87] Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.309.
[88] Mr T.Searle, *Transcript of Evidence*, 16 November 2006, pp.302-303.
[89] Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.302.
[90] Mr K.Ferdinands, *Transcript of Evidence*, 15 November 2006, p.218.
[91] Mr K.Ferdinands, *Transcript of Evidence*, 15 November 2006, p.218.
[92] Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.309.
[93] Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.309.
[94] Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.303.

eas, primary producers were also achieving high levels of coverage: every property in the Mary River scheme had joined a program to control Mimosa, making it "one of the very few areas in Australia where the whole catchment is involved in a weed eradication scheme."[95] On one individual property, the Inquiry was told that one particular property had already spent $3 million on Mimosa control, were spending $0.5 million each year, and were expecting to spend that "for the next fifteen years".[96] While no subsidies, as such, were provided on a property-by-property basis, properties received $200,000 for having a "property plan".[97]

Primary producers then, in some sense, belong to both "industry" and community-based programs. They are perhaps unlike other community-based programs in that they have the capacity, through their peak body the Northern Territory Cattlemens' Association, to do "a little bit of lobbying in Canberra", and a better ability to gain the attention of Territory government agencies.[98]

However, in the negative aspects of their experience in invasive species management, pastoral producers have more in common with others who speak from the community sector. The Inquiry heard that pastoral producers, like other players, experienced frustration with the grants process, and that, as for other players, the high time demands associated with grant applications took them away from other important tasks:

> the whole process is quite onerous, time consuming and you have no certainty in terms of outcomes and that is a key issue. Anybody, any group can sit down and write a document for twenty, thirty, forty hours, that is the consumption of time. And you suddenly find; 'I think this is a great application and it fits the criteria'. But for some unknown reason it is not really given

[95]Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.306.
[96]Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.305.
[97]Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.305.
[98]Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.306.

> back to you. It is deemed not to be successful. So give up. Not doing it again. I could spend thirty, forty hours somewhere else and generate revenue from somewhere else through my work activities.[99]

This is consistent with other testimony by pastoralists, in which they told of being "just so tied down with funding timings and regimes" within the present grants system.[100] In other testimony, witnesses also spoke of problems similar to those aired in other parts of this Report. This included descriptions of cuts in numbers of frontline staff by government agencies and its effects,[101] and wider perceptions that there had been "a retraction of government services to the rural communities".[102] As a result, it has become "very much Darwin central", with reductions in staff "available to service natural resources management issues and also agricultural industry issues", "extension staff", and "support staff".[103] Echoes of other testimony came when witnesses associated with the pastoral industry, spoke about high levels of weed infestation on government-controlled land,[104] and the absence, at that time, of a suitable process for the management of sleeper weeds.[105]

This testimony shows that these were indeed, at time of hearings, gaps in the overall response to invasive species, underscored by the fact they were reported by more than one constituency. Other contributions to the Inquiry elaborated on this. One submission, from the Victoria River District Conservation Association, spoke of an instance where a government agency had been unwilling to set aside top-down processes, resulting in

[99] Mr D.Halloran, *Transcript of Evidence*, 5 October 2006, p.154.
[100] Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.81.
[101] Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.81.
[102] Mr D.Halloran, *Transcript of Evidence*, 5 October 2006, p.163.
[103] Mr D.Halloran, *Transcript of Evidence*, 5 October 2006, p.163.
[104] Mr T.Searle, *Transcript of Evidence*, 16 November 2006, p.306.
[105] Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.80.

a lack of support for a funding application and its subsequent failure.[106] This same source made potentially important observations about the differences in administrative capacity of small community-based organisations, and this account could go some way toward explaining, further, the predicament of these organisations in the grants-application process.[107] Moreover, the submission suggested that little differentiation is made, within the grants system, between "large membership, small area Catchment Management Authorities in the southern states and small membership, large area natural resource management sub-districts in the northern areas".[108] This, it suggests, results in a mismatch between funding arrangements and the organisations they are designed to support. The submission suggests that the VRDCA "operates with 1 full-time and 1 casual staff with an area of operations in excess of 140,000 km2",[109] and argues that:

> The increased volume and complexity of application and reporting requirements (it takes around 40 hours to write a grant application), while laudatory in intent, are unmanageable for small organisation and lack the feed-back loop necessary to bring about long-term changes to governance and on-ground practices.[110]

As a result, there are "currently no weed management activities that have been funded through grants attained by the VRDCA".[111] While money had been allocated for invasive species control in the VRD area, it was "open for application" since "much of this funding [was] linked to the existing projects".[112] The amount of funding, at $800,000 for the year

[106]Victoria River District Conservation Association (VRDCA), *Submission 38*, p.5.
[107]VRDCA, *Submission 38*, p.2.
[108]VRDCA, *Submission 38*, p.2.
[109]VRDCA, *Submission 38*, p.2.
[110]VRDCA, *Submission 38*, p.2.
[111]VRDCA, *Submission 38*, p.8.
[112]VRDCA, *Submission 38*, p.8.

2006-2007, was considered "woefully inadequate".[113]

Witnesses from this constituency told the Inquiry of other instances where bottom-up initiatives had failed to find support from government. One hinged on a local group's interest in assisting the biological control of an invasive species.[114] In another, there was a proposal for a program to control Bellyache Bush in the Victoria and Roper River districts "by eradicating four isolated outbreaks and implementing recommended containment controls at two further sites".[115] This was the subject of a grant application by the VRDCA, but:

> Despite significant support from all stakeholders, funding to assist on-going landholder control of this weed were rejected as being "non-strategic" as the project was confined to 1 NRM region (the Northern Territory), even though the Victoria and Roper Districts cover over 200,000km2.[116]

It is true that within any competitive grants scheme there will be winners and losers, and some criticism of the process by the writers of failed applications. It may be, however, that the picture that witnesses presented to the Inquiry is different from this. It suggests a broader sentiment on the part of community players in invasive species management that there is a difference between the rhetoric and the practice of community engagement by government in this area. While not all applicants can be successful, if there is too great a sense, overall, that proposals cannot be initiated from community-based programs, to filter and influence the higher levels of invasive species management and policy, then this represents a failure of the system as it has been designed. That these are not the experiences of a single group within invasive species management suggests that they should be taken seriously, else a significant part of current goodwill and

[113]VRDCA, *Submission 38*, p.8.
[114]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.152.
[115]VRDCA, *Submission 38*, p.9.
[116]VRDCA, *Submission 38*, p.9.

voluntary contribution to invasive species management be lost.

Contributors to the Inquiry make a number of important observations about the situation on invasive species at time of hearings. One submission suggested that the "tied, short-term and highly competitive funding" arrangements currently in place for invasive species management was incompatible with the "landscape-scale, multiple-outcome, long-term benefits" such grant schemes are intended to deliver.[117] Another problem lies in funding for follow-up programs being "discouraged even though the necessity of this component of tropical invasive species management is well documented".[118] A third inherent problem with funding arrangements is that because current arrangements are "outcome-based": "very little" grant money can "be directed to "infrastructure (administration & governance) or monitoring and evaluation (travel, equipment)", and this compromises the capacity of management programs.[119]

Suggested solutions to the problems outlined in contributions to the Inquiry can be summed up in the proposition that a better "balance" be achieved between government and community-based programs for invasive species management. From the point of view of some in the pastoral industry, invasive species management has seen a shift, over twenty years, from "a big emphasis on government services to industry, across a range of industries", to a "paradigm shift across in the other direction".[120] From this perspective, this "has gone a little bit too far", and it is "time to swing it back and try to find that balance".[121]

A better result on invasive species would come from seeing "coordinating activities adequately resourced", and making "sure the programs are compatible, coordinated and are functioning with the desired out-

[117]VRDCA, *Submission 38*, p.4.
[118]VRDCA, *Submission 38*, p.4.
[119]VRDCA, *Submission 38*, p.4.
[120]Mr D.Halloran, *Transcript of Evidence*, 5 October 2006, p.165.
[121]Mr D.Halloran, *Transcript of Evidence*, 5 October 2006, p.165.

comes".[122] Under present conditions, this does not represent a return to former days, but rather a move to follow-through on the community engagement expressed on paper in such documents as the NT Weeds Management Act, but not entirely implemented in practice. To achieve this, suggest advocates from this sector, government must "establish truly collaborative networks with grass-roots groups", and define exactly what is meant by "consultation" in its dealings with them.[123] These assertions match common elements arising in testimony to the Inquiry from representatives of community-based programs. They also represent a significant challenge for government: to complete the process of cultural change, in government agencies and the community, initiated by the Weeds Act and similar initiatives.

6.5 Girraween Lagoon Landcare Group

In a submission to the Inquiry, the Girraween Lagoon Landcare Group (GLLG) shows itself to be a grass-roots community-based weeds management group. Clearly GLLG has had some success. But it is at pains to suggest that this is not entirely a good-news story for the management of invasive species in the Territory.

GLLG's advantages, it suggests, are not representative of community-based programs in the Territory. Rather, these differences highlight the forbidding challenges faced by such groups in relation to invasive species management. This has important consequences for government policy: that is, that government should not rely too heavily on community-based programs. The distinctive qualities of the group are its membership, the small, well-defined area GLLG attends to, and its position in an area that has a relatively high population density:

[122] Mr D.Halloran, *Transcript of Evidence*, 5 October 2006, p.145.
[123] VRDCA, *Submission 38*, p.7.

> Many members of our land care group live near by this very beautiful lagoon, many have qualifications in environmental management, all are highly motivated to preserve the ecological values of this wet-land area.[124]

The submission also notes good contributions from the officers of government agencies.[125] With these advantages in mind, the submission is at pains to put GLLG's successes "into perspective":

> some measure of weed control has been achieved over a small area in a very special area close to Darwin, spearheaded by a particularly active local member, supported by a strong and motivated local group.[126]

Consequently, this is best seen as "a special case . . . not the norm".[127] Conditions for other community-based programs are different:

> How can community groups control these weeds, scattered so far throughout Litchfield, Batchelor and the Daly when NTG cannot even adequately control these invasive species on its own land and individual private landholders are derelict in their responsibilities?[128]

The conclusion to be drawn from this is that:

> there is no hope for weed control . . . relying on a community driven land care group process and community awareness. Small areas of success will only be possible in an area as small, as special, as densely populated with motivated people as Giraween Lagoon: even then, a number of very demanding pre-

[124]Giraween Lagoon Landcare Group (GLLG), *Submission 32*, p.2.
[125]GLLG, *Submission 32*, p.2.
[126]GLLG, *Submission 32*, p.2.
[127]GLLG, *Submission 32*, p.2.
[128]GLLG, *Submission 32*, p.2.

> conditions will have to be met for successful weed control.[129]

Therefore, while GLLG "applaud NT Government's support of land care groups, and the work of their diligent officers", it argues that:

> NTG cannot use a rhetoric of community group action to avoid the real necessary action. Such a level of community effort will only be available for only the most special of sites, like Girraween Lagoon ...[130]

In essence, then, GLLG advocates a re-balancing of responsibilities between government and the community sector. While GLLG urges the Territory government to continue to "support and strengthen community action groups", ..."we do not imagine that they present any solution".[131] It argues that placing "too many eggs into the community group basket ... will fail". This will "place in jeopardy the biodiversity of the Top End", which is "a major driver of the tourism industry and a backbone to our sense of an NT identity".[132]

GLLG agrees with a number of other contributions to the Inquiry that weed control is beyond the scope of Territory resources alone.[133] It recommends new arrangements between the Territory and the federal government to overcome this. At a more practical level, GLLG proposes that the Territory government enact the provisions of the Weeds Act, prosecuting "negligent landowners and lease holders", or else "abandon it in favour of more realistic legislation that might otherwise address the problems".[134] One alternative would be to classify Gamba Grass "under the Weeds Act to at least the same status as Mission grasses (a Class B weed requiring growth

[129]GLLG, *Submission 32*, p.2.
[130]GLLG, *Submission 32*, p.2.
[131]GLLG, *Submission 32*, p.3.
[132]GLLG, *Submission 32*, p.3.
[133]GLLG, *Submission 32*, p.3.
[134]GLLG, *Submission 32*, p.3.

and spread to be controlled under the NT Weeds Act 2001)".[135]

6.6 Discussion

Through hearings and submissions, the Inquiry gained a unique insight into the experience of different players in invasive species management. On occasion there appear to be distinct differences of opinion between these different players. It is all the more striking, then, that in spite of their differences of role and position they report very similar experiences in interacting with government. Small and large landholders of various kinds, local government, Indigenous groups and programs all comment on inconsistency in government programs, lack of local support staff, and break-downs in communication between themselves and government agencies. They all report confusion, high administrative workloads, and mixed success with competitive grants processes. This is the case for grants processes sponsored by both the Territory and the federal governments, and there appears to be a strong case for reform.

Across all players, there was a sense that morale, and confidence in government agencies, was not high. Given the community-based design of current policy on invasive species, this is a matter of concern. Good morale must be considered a key asset where there is reliance on a culture of volunteering, so these matters must attract priority within a larger picture on invasive species management.

[135]GLLG, *Submission 32*, p.3.

6.7 Findings and recommendations

Findings

Community-based programs have been fostered under such legislation as the Weeds Act, but participants face a turbulent environment that requires major investments of time in order to pursue grant money — in addition to, or at times instead of, direct efforts at invasive species control. Participants also experience confusion and frustration at the various caveats that come with grants, such as restrictions to work on particular species, and with intricate and apparently inconsistent parts of present administrative arrangements. The obligation, under many grants, to re-apply for funding when weather interrupted control work was seen as unreasonable and difficult to work with. In general, interruptions to the continuity of funding attracted strong criticism, as this compromised the effectiveness of control efforts, allowing time for invasive species populations to recover. Funding interruptions resulted in a loss of staff from control programs due when money for wages was not available.

These participants perceive difficulties communicating with and accessing government agencies, and express disappointment at a lack of agency staff to support extension, education and control work. Opportunities were perceived for better data gathering on the distribution of invasive species, that could be achieved through better public awareness and coordination. There was a sense of frustration in relation to mapping and information: a number of participants were not aware of a way to contribute information on distributions of invasive species, or to themselves access accurate information on this, and this was viewed as an important gap in arrangements.

In addition to conventional community groups, pastoralists and Indigenous programs also figured as key players in this non-government sector. In a practical sense, pastoralists overlap with other participants through

their membership of Landcare and similar groups. In some instances, pastoralists displayed high levels of coordinated activity, and were able to bring more resources to bear on invasives. They also echoed the frustrations of other players on inconsistent arrangements made by government agencies for the practical control of invasives, and flagged as a problem lower numbers of field officers from government agencies. This is despite the fact that pastoralists had at times been able to exert greater political influence than other players.

Indigenous groups and programs have a high level of involvement with invasive species control, undertaking control work on Indigenous land, but also under contract for other landholders. Notable programs were being undertaken by Indigenous programs to protect Kakadu National Park from invasive species. These involvements represent avenues for employment for Indigenous people while leveraging their knowledge of country. However, skills requirements, such as handling chemicals for weed and invertebrate control, have proven a limiting factor, and this underscores the need for employment in this area to be complimented with further training input. There are other problems in that Indigenous people have trouble managing invasive species on their traditional land due to low revenue returns from that land, and this requires consideration. Like other players in this area, Indigenous invasive species management programs experience an uncertain funding environment, characterised by a high degree of variation in policy objectives between granting bodies, in and outside of the Territory.

Taking the experience of all of these community players into account, they have in common: breakdowns in relationships with government agencies; a perception that government is not investing sufficiently in practical capacity; and an acute awareness of instances where current policy settings are not working on the ground. They are also aware that, amidst the complex funding environment they face, that their capacity is reduced due to the limited ability of government agencies to take a "matching"

or "partnership" role in applications to external funding bodies. These shortfalls have profound implications for the Territory's capacity to manage invasive species.

Recommendations

Recommendation 25

The Committee recommends that the Northern Territory Government achieve a better balance between government programs and community programs to manage invasive species, by:

a). Setting appropriate levels of front-line staff to support community-based programs in a region, and in view of local threats from invasive species.

b). Improving the level and quality of engagement with community-based programs and reference groups.

c). Increasing support to community-based programs to assist with grants applications (see Recommendation 28.c.).

d). Instituting a stronger regional focus by placing more government agency staff in regions, to clear obstacles to community-based programs and provide expertise at point of need.

e). Fostering processes that provide greater continuity of funding to community-based groups.

Recommendation 26

The Committee recommends that the Northern Territory Government improve information-gathering processes on invasive species by:

a). Considering ways to enable staff from other agencies, and government contractors, to report sightings of invasive species.

b). Increasing opportunities for community-based programs, and members of public, to contribute to and access mapping facilities for invasive species.

Chapter 7

Capacity

7.1 Resourcing

7.1.1 Introduction

A number of contributors to the Inquiry were of the view that the Northern Territory's capacity to respond to invasive species was deficient. It is known that new arrangements share responsibility for invasive species management between government and the non-government sectors. It was the view of the majority of witnesses that insufficient resources had been allocated to make this relationship work effectively. This had a large part to play in leaving the Territory unprepared for its present challenges.

In this chapter, questions of capacity are divided into sections. The first section considers the state of human resourcing for invasive species management, particularly in regional areas of the Territory. With a view to considering how staffing could be increased, the second section considers the question of whether invasive species management could ever be self-funding through a combined pursuit of commercial and control imperatives. A common perception is that the Territory faces difficulties in allotting necessary investment in the area. Consequently, the next

section considers avenues to obtain external funding for the Territory's efforts to manage invasive species. Given the "partnership" model expressed, for example, in the Weeds Act, there are further dimensions to this than finance alone. The partnership model assumes and expects that non-government players will join with government on this matter. The latter sections of the chapter consider crucial information-related aspects which underlie this model. This includes the dimensions of public education and engagement; information sharing, particularly in the form of maps; and research capacity, considering the adequacy of these to support the partnership model and, consequently, the Territory's efforts on the management of invasive species.

7.1.2 Human resources

This Report shows a number of instances where witnesses have identified human resource shortfalls in capacity for invasive species management. These are also raised in the section on education and engagement below. Most often, non-government players cite human resource shortfalls in relation to frontline workers based in Territory rural and regional areas. This presence has been reduced from its former level. One witness spoke of the Weeds Branch having been "decimated" under the former (CLP) Territory government, and "it has just continued".[1] Other witnesses agreed, saying of the Weeds Branch in Katherine that there are:

> less people now in the weeds branch than there was in 1996. They are down to three. One is on long service leave, so they are down to two covering the whole Katherine region. So that is you are never going to win. And they are supposed to be writing property weed management plans for properties and all this other stuff. Encouraging people to be in control, educating. It is impossible for two people to do that. So we are just

[1] Mr J.Etty, *Transcript of Evidence*, 5 October 2006, p.166.

spending money on an issue that is doomed to fail, I think.[2]

There are two results from this scarcity of Weeds Branch officer. First, there is a lack of coordinating capacity at point of need:

> You know we do not see weeds officers from one year to the next, to be honest, because they are probably very busy out doing the jobs in other areas. But we need somebody to say; "hey council this weed on vacant crown land is doing this, small producers should be doing this", and at least provide a coordination route and information sharing ...[3]

Second, under the present competitive grants environment, support for community-based programs going through the applications process is important. Without sufficient front-line workers from government agencies, this is compromised:

> there is a huge opportunity to tap into a lot of Commonwealth funding for some of these community based programs, particularly monitoring programs, but a key impediment, I think is basically that there is not enough on the ground facilitators to assist particularly regional communities, to fill in the applications.[4]

7.1.3 Profit and control

The perception that the Territory has too little money to fund invasive species management is clearly of relevance to this discussion of staffing levels. The full argument is that the Territory is too vast, has too few people, and too little money to remedy its problems with invasive species. This led to the Inquiry investigating avenues for funding from sources

[2]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.150.
[3]Mr R.Elliot, *Transcript of Evidence*, 5 October 2006, p.162.
[4]Professor Karen Edyvane, NRETA, *Transcript of Evidence*, 16 November 2006, p.294.

other than the Territory government, including avenues through which invasive species management could be self-funding. Scenarios considered in this context were feral pig-shooting "safaris", live-export of camels, and other forms feral animal harvesting, such as shooting for pet meat.[5]

However, advice to the Inquiry has been unanimous in suggesting that this does not represent a practical means to fund invasive species management. There is an inherent tension, it is suggested, between the imperatives of commercial management, and those of eradication and control.[6] Witnesses illustrated this for weeds:

> We just need to be cautious of going down this route, because when it comes to eradication and when it comes to using the exotics as a natural resource, the management goals are quite different. So if you are looking at dealing with a weed or feral you go for eradication, your goals are different. If you are going for a commercial enterprise, you need to use your resource sustainably, so you are not going to eradicate.[7]

This same point was made for feral animals:

> I think some of the shoots have been capitalised on by "pet meaters", they have got in got some of the easy stuff first but when your really doing controlled programs you actually need to work quite hard at getting that last residual bit of number down. And you very quickly reach a point where it is actually not economical, for the people trying to make money out of it, pet meat is an example, they will go in cream off the top and then it is not economic for them to actually go and chasing

[5]Dr C.Bradshaw and Dr R.Lim MLA, *Transcript of Evidence*, 16 November 2006, p.351; Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.12; Mr G.Edwards, *Transcript of Evidence*, 7 September 2006, p.75.

[6]Dr T.Bowland, *Transcript of Evidence*, 15 November 2006, p.215.

[7]Dr T.Bowland, *Transcript of Evidence*, 15 November 2006, p.215.

> around the last few animals, they just want to get out and then you will actually have to go and pick that up yourself.
>
> ...in my view I think really, you just have to decide "well are we going to go in actually control these things", and in which case there might be some scope for allowing some commercial to get in there first and cream of a little bit of the top, but they're never actually going to achieve the level of control that you want or what the Government want and you are always going to have to have some effort to go in and get the numbers down to the levels that you want.[8]

Consequently, it is doubtful that:

> you can make [a] buck and achieve your target. I do not think you can do that. You can off-set the costs of control. You cannot make a profit. If you go with ... reduction, you have to spend the money. It is going to cost you.[9]

7.1.4 External funding

As suggested, evidence to the Inquiry suggests that there are human resource shortfalls for invasive species management in the Territory's regions. There is also an absence of opportunities to fund invasive species management through commercial exploitation of species. Together, these make it more imperative that the Territory be able to access funding from outside its jurisdiction.

There are positive and negative estimations of its current progress in this regard. Witnesses appearing before the Inquiry on behalf of NRETA took a positive view. Their assessment was that grant applications made by Territory government agencies were producing good results, including

[8] Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.12.
[9] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.353.

a substantial level of ongoing funding from the Commonwealth toward research on biological control of Mimosa.[10] Other initiatives by Territory government agencies, such as a "bilateral management plan" signed-off with the Commonwealth, were important because they made funds from the Commonwealth Natural Heritage Trust accessible to applications by the Territory government.[11] Feral animals were noted as a particular focus of these funding mechanisms.[12]

NRETA staff also made a positive assessment of the ability of community-based programs in the Territory to apply for Commonwealth grants:

> ...we [NRETA]have only put in projects bidding for around $200k. Down in the VRD they bid for about $706k, the Jawoyn bid for about $530k, down on the Roper $380k, the Tiwi have asked for $352k, the Wagaman $150k and Anindilyakwa $221k. So these community based groups are actually substantially asking for much more money than what we as Government are and I think that is probably a good sign that we are going to get some of the on-ground management out to the people who are actually out on the ground.[13]

But there are also difficulties attached to this. Commonwealth funding arrangements — like those in the Territory — have moved to a partnership model. Under these, the government of the originating jurisdiction is expected to contribute to the project budget, either with money or "in-kind", that is: by allocating a specific level of support for the program by agency staff.[14] It transpires that low levels of resourcing in the relevant NT government agencies are proving to be a barrier. Agencies have "already peaked out in our ability to match up from within internal re-

[10]Mr B.Williams, *Transcript of Evidence*, 15 November 2006, p.216.
[11]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, pp.5-6.
[12]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, pp.5-6.
[13]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, pp.40-41.
[14]Mr B.Williams, *Transcript of Evidence*, 15 November 2006, p.216.

sources".[15] Other sources corroborated this, suggesting that the Territory may in fact be over-committed, on paper, in this regard.[16] In fact, many of the on-paper contributions have been made "in-kind" due to budgetary constraints on agencies.[17] Faced with the question of how to increase investment in invasive species management, the Inquiry placed a priority on these matters.[18]

A witness from the federal jurisdiction described how these "external" funding processes work. The fundamental principle is that "each jurisdiction has to make some basic commitment ... then this money that comes from the Australia government is additional".[19] As a result, "you do need to show that the Territory is prepared to make a contribution to leverage the Australian government money".[20] This was reiterated a number of times. Money from within a jurisdiction is the "real core": Australian government money "goes on to do the extra things and value add", which acts as the "top-up" for adequate basic program funding.[21]

Attempts to avoid this obligation are picked up in the funding process: "cost shifting is usually dissected", and the "reviewers see that; they are not fools".[22] Federal granting bodies prefer to avoid situations where states "get Australian government money, they close their state program and all the Australian government's money is doing is paying for what has been taken away".[23]

While this may seem forbidding to a small jurisdiction with limited funds and a significant exposure to invasive species threats, there are also

[15]Mr B.Williams, *Transcript of Evidence*, 15 November 2006, p.216.
[16]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.41.
[17]Dr G.Leach, *Transcript of Evidence*, 2 December 2005, p.41.
[18]See for example Mr M.Bonson MLA, *Transcript of Evidence*, 2 December 2005, pp.12, 40.
[19]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.259.
[20]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.277.
[21]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, pp.259, 260.
[22]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.277.
[23]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.259.

grounds for encouragement. Queensland, Victoria, and South Australia[24] provide examples of successful practice under the current funding regime:

> I have thought about what they do; they take a person off-line and they are dedicated to working out how to apply for funding, coordinating the development of funding proposals, and over-seeing the proposals so they are uniform and of high quality.[25]

In practical terms, the recommended approach to achieving this is to:

> appoint a half to a one FTE position to work with other WONS Management Committees, and other committees, to develop and coordinate funding applications in advance of the call. You cannot develop a funding application in the four or five week given. These need to be ongoing and worked up so that when the bell goes for the next round of funding, you have got one just about there about to be put in. You just look at it and say, "okay what are their criteria, how do we need to finesse it", fix it up and in it goes, and you are really well organised for that.[26]

The case for this approach is strengthened by the level of competition for Commonwealth government grants. The Inquiry heard that when grant applications were called under the Defeating the Weeds Menace program, $12 million was available to be allocated, but it attracted grant applications to the total of $200 million.[27] Due to these pressures, it is also important to apply to a diversity of the "really quite large" funding bodies active in the area, such as "Enviro Fund, Landcare, Water Fund, and so on".[28] There is "a lot more money out there than just NHT or Defeating

[24]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.277.
[25]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.277.
[26]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.277.
[27]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.257.
[28]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.277.

the Weed Menace",[29] and:

> if you go to the Australian Weeds web site, you will find there are three pages of sources of funds where you can get weeds money. I know it takes time to get it, but if you can put in a funding application and spend two weeks work and get $1.5m, why wouldn't you do it.[30]

The advice to the Inquiry on external funding is clear. There is no alternative to providing the core money for invasive species management programs. In the present funding environment, external — that is Commonwealth — funding is not for "routine work": that must be addressed within a jurisdiction's own budget.[31] This reflects basic constitutional relationships, under which that states and territories are responsible for lands within their jurisdiction. However, where states and territories do satisfy their obligations in this regard, a diversity of large granting bodies in the federal sphere are ready to add to efforts already in place.

There are specific, practical things that the Territory can do to give it the best possible chance of attracting this additional funding. The fundamental condition must be to provide adequate investment in invasive species management. In view of advice to the Inquiry that such management is unlikely to be self-funding, this puts the onus on government to provide sufficient budgetary allocation for this purpose.

7.1.5 NRM regions

An important issue which has a negative impact on the Territory's ability to attract external funding lies in its status under the national National Resource Management (NRM) system. This system provides for a series of NRM regions that covers Australia. Witnesses told the Inquiry that the

[29] Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.277.
[30] Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.273.
[31] Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.257.

Territory was significantly disadvantaged through being considered one NRM region. Advocates in the Territory had argued not to "make the NT one region, it should be four regions", but this did not carry the day.[32] Present arrangements place obligations on grant applicants to show benefits of programs for the whole NRM region. There are two problems arising, related to the scale and the specificity of programs. If:

> you are seeking external funding from the feds, [this] is hamstrung by the NT being one NRM region. So we have to have huge projects to even be able to try and tap into the funding.[33]

Smaller projects, with more modest budgets, fail to achieve requisite scale under this system, and cannot succeed:

> ...from the Federal government point of view is that everything is being sucked up in to this vortex, where it says "national interests". So the monies that have been spent or allocated have to have a national relevance of be of national significance.[34]

From this there is also a reduced capacity for grants applications to address local needs, and local climates and environments. As one witness observed, as a consequence projects lose "the local regional flavour very quickly".[35] Another witness confirmed the need to change this by arguing that risk-management systems were needed for "sub-regions" of the Territory.[36] Central Australia, under the present system, "does not get adequately covered" because "value of the economy is not spread evenly across [the] Territory", due to the pastoral industry being concentrated, largely, in the Top End.[37]

[32]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.154.
[33]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.154.
[34]Mr D.Halloran, *Transcript of Evidence*, 5 October 2006, p.154.
[35]Mr D.Halloran, *Transcript of Evidence*, 5 October 2006, p.154.
[36]Mr. J.Thorpe, *Transcript of Evidence*, 15 November 2006, p.256.
[37]Mr J.Thorpe, *Transcript of Evidence*, 15 November 2006, p.256, and see p.278. See also Mr P.McDowall, *Transcript of Evidence*, 7 September 2006, p.85.

This represents an opportunity for bureaucratic change, that would be revenue-neutral for the Territory government, but would have positive consequences for applications from the Territory within federal grants schemes.

7.2 Information needs

7.2.1 Research

The first chapter of this Report shows the importance of the developing risk-management systems for invasive species management in the Territory. Other parts of the Report consider resource constraints, most particularly financial and staffing shortages, that may prevent them from achieving their potential. The Inquiry heard, however, that there were other, related, constraints that could limit the effectiveness of such systems.

Risk-management systems marshal research-based data and information to allow more sophisticated means of setting priorities and objectives. As a result, they create a "market" or demand for research data. Witnesses told the Inquiry that present research capacity in the Territory was not sufficient to make these systems operate quickly or well. While this affects management of different categories of invasive species to a different extent, witnesses told the Inquiry that limitations to research data represented a crisis for invasive species management in the Territory:

> the problem with any invasive species from plants to animals, invertebrates to buffalo, that we've [had is] that we've essentially been running on no fuel, that is no information.[38]

These problems do not only apply for the Territory, but they do nevertheless represent an important limitation on the effectiveness of control

[38] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.340.

programs. The witness, a researcher contributing advice to management programs, suggested that:

> the most frustrating thing for me has been trawling through the practically non existent literature to help me inform my own research and then give practical recommendations to various management agencies and I simply can't do it. So it's we're at crisis at the moment, I think in the NT and beyond and I think we can rectify that now.[39]

For more particular areas, too, this was borne out. A witness focussing on marine invasives suggested that "on the marine front" research data is almost ... a total blank":[40] "we still simply do not know what the impact of introduced marine pests are ... the monitoring has been focused largely on the Darwin region."[41]

As for other parts of the picture on invasive species, this situation occurs within a context of change. First, there has been a shift in expectations about funding: that industries which benefit from research will make contributions to research in those areas.[42] This is consistent with changes in other areas that see government continuing with part, rather than the whole, of responsibilities for invasive species management and related functions. Second, processes for improving the level and handling of research data are coming into play: one witness described the Weeds of National Significance program as a "Trojan horse", in that it has brought together "the best management information in the nation",[43] The argument is: if it can be done for weeds, then it can be done for other species.[44]

The availability of research data is important for a number of reasons.

[39]Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.339.
[40]Ms K.Weatherbane, *Transcript of Evidence*, 16 November 2006, p.301.
[41]Ms K.Weatherbane, *Transcript of Evidence*, 16 November 2006, pp. 301-302.
[42]Mr R.Gobbey, *Transcript of Evidence*, 15 November 2006, p.195.
[43]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.276.
[44]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.276.

A clear example is declaration of invasive species, where research data must be brought to bear on the status of the species: particularly, as the Inquiry heard, for species where there are conflicts over costs and benefits. Declaration is pivotal not only because it allows species to become subject to legislation, but also because it opens further avenues to external funding.[45] Although not a Territory-based process, this principle is demonstrated in the consequences of species being listed under the WONS process which, the Inquiry was told, brings about a higher "availability of information" and a "higher emphasis on research and development into control", and that is considered a significant benefit.

The Inquiry heard other examples of the importance of research, such as the use of modelling tools to reflect implications of cull levels to local people, thus supporting dialogue on management in area where there are differences of opinion on policy.[46] Similar research makes it possible to predict the results of feral animal culls, so that resources can be applied in the best possible way.[47]

A particularly important instance of this, research focuses on the economic valuing of environmental assets and services.[48] In a number of cases the Inquiry heard that policy and research on invasive species was skewed in favour of primary production simply because it was difficult to quantify the economic value of environmental assets free from invasive species.[49] Under the present conditions, decisions on investment, for example, for invasive species management, are made on a very partial basis of knowledge. This emergent research will form an integral part of future risk-management processes as it develops, and will not only inform choices within invasive species management, but will have some bearing

[45] Dr M.Douglas, *Transcript of Evidence*, 15 November 2006, p.215.
[46] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.350.
[47] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.351.
[48] Dr A.Drucker, *Submission no.43*.
[49] See Mr B.Williams, *Transcript of Evidence*, 15 November 2006, p.247.

on the total allocation given the area by government.

The Inquiry heard from a number of witnesses regarding funding conditions for research into invasive species in the Territory. A researcher based at Charles Darwin University described "funding strength" in this area as "small", and related the failure of a recent application for funding to do research on the costs of weeds to the Territory — as noted, an essential area of research if risk-management systems are to fulfill their promise.[50] This witness told the Inquiry that his research had been funded exclusively by federal sources — no funds had come from within the Territory.[51] In an echo of what was said by other witnesses on obtaining funding external to the Territory, the witness suggested contributions from the Territory could have a significant impact on the ability of researchers to bring funding into the Territory and so expand research capacity:

> if there was money through a research and innovation fund for example [which] was available for seeding funding we can . . . match the money or five times as much if it goes through the ARC for research in these areas . . . that small initial investment from an industry body such as the government is a critical factor in getting that sort of money in from other sources.[52]

This also has an impact on the *kind* as well as the amount of research that is done, and this too could be important for the research effort on invasive species, in this case on weeds:

> when we were trying to get money to do more of this research they want to see that you have got industry support and industry can be government. We are asking questions that the pastoral industry do not want to hear the answers to in many cases, so it is very hard to get industry support for this. So you are

[50] Dr M.Douglas, *Transcript of Evidence*, 15 November 2006, pp.213, 214.
[51] Dr M.Douglas, *Transcript of Evidence*, 15 November 2006, pp.214-215.
[52] Dr M.Douglas, *Transcript of Evidence*, 15 November 2006, p.215.

> really relying on getting money from conservation managers and other stake holders who generally do not have a lot of extra money because they would like to spend it on dealing with the problem they have got and I fully understand that.[53]

The pastoral industry is less likely to provide research funds in areas about which it is sensitive (such as "improved pasture" species), and yet it is clearly important that research be done. This means that, again, the Territory government has a special role to play in ensuring the best possible flows of financial support to research on invasive species, from Territory and federal sources.

Another witness, a leading researcher based outside of the Territory, added to this picture. While there were limited research funds available for work in this area Australia-wide, it was critical that this research be pursued because, for many of the subjects of research in invasive species management, "what we do in Australia is about the total sum of research in the world and if we do not do it, no one is going to do it for us".[54] Consequently:

> We really need to be reminding Ministers at federal level that we need to have very strong R&D in there, because you are just not going to make the gains you need to, without more assistance at the R&D level and also control level.[55]

This witness emphasised the importance of the Territory "having a seat at the table" on national bodies, including the Cooperative Research Centre with which he is associated.[56] There was a relatively small amount of funding available for invasive species research from the federal government: at that time $3 to 4 million from the "Environment Department", and a

[53] Dr M.Douglas, *Transcript of Evidence*, 15 November 2006, p.215.
[54] Dr T.Peacock, *Transcript of Evidence*, 15 November 2006, p.269.
[55] Dr T.Peacock, *Transcript of Evidence*, 15 November 2006, p.265.
[56] Dr T.Peacock, *Transcript of Evidence*, 15 November 2006, pp.265, 268.

further $700,000 from the National Feral Animal Control Program.[57] This amount was considered, in total, to be "pathetically small", and was even acknowledged as such by the then federal minister.[58] Maintaining and further developing the Territory's representation at national level would not only help it to attract a proportion of these existing grant monies, but would also allow it to join with other jurisdictions in seeking to increase the federal government's allocation in this area overall.[59]

This witness also presented another perspective on funding from industry. From this point of view, Australian research and development — including for invasive species research — is "too dependent on Commonwealth Government funding":

> If you compare Australia with other OECD countries, our share of research funds is weighted to government and that gives them a good reason to be saying industry should stump up.[60]

This is not necessarily at odds with views presented by the previous witness. Rather, there are areas of research that need to attract greater support from government where specific features prevent industry funding. There is an opportunity for government to occupy a flexible role where it provides "seed money", "matching", or more substantive funding according to the situation to hand. But it needs a consistent, informed basis on which to perform that role, and risk-management systems could, again, form part of that foundation.

7.2.2 Public awareness, education, and engagement

At the other end of the spectrum lie information needs as they apply to the community. While they are often lay-people rather than the experts of

[57] Dr T.Peacock, *Transcript of Evidence*, 15 November 2006, p.265.
[58] Dr T.Peacock, *Transcript of Evidence*, 15 November 2006, p.265.
[59] Dr T.Peacock, *Transcript of Evidence*, 15 November 2006, pp.265, 268.
[60] Dr T.Peacock, *Transcript of Evidence*, 15 November 2006, pp.265-266.

the research effort, the information made available to this sector is critical within the effort on invasive species as a whole. Activating the awareness, and the willingness to contribute, of the wider community is the object of such legislation as the NT Weeds Act, and to achieve this people in the community must be informed.

Estimations of the communities awareness of invasive species set it at low levels. Witnesses told the Inquiry that small-holders in rural areas of the Territory had relatively low levels of awareness for weeds, for example.[61] In Alice Springs, the Inquiry was told that, due to high population turnover, "people do not know what they have lost" in terms of biodiversity: "a lot of corporate knowledge is lost".[62] Even for some Indigenous people "it is not perceived as a problem", at least by "new generations" who have less awareness of the state of the landscape before the advent of invasive species.[63] This led contributions to the Inquiry to advocate public-awareness campaigns, suggesting that people in the community were not aware either of species involved, or the gravity of their impact.[64] More specific recommendations centred on the need for field-guides for invasive species management in rural areas, and compared progress on this in other jurisdictions favourably in comparison with that in the Territory.[65]

This amounts to a case for an increased effort on public awareness and education. The view of how this currently stands appears different to those inside of government to those in the community sector. Speaking of Biosecurity NT, one witness suggested that:

> I don't think the general community or the industry recognises that much of the work that we do in relation to our compliance

[61] Mr R.Elliot, *Transcript of Evidence*, 5 October 2006, p.150.
[62] Mr R.Cramer, *Transcript of Evidence*, 7 September 2006, p.90.
[63] Mr R.Cramer and Mr S.Andresen, *Transcript of Evidence*, 7 September 2006, p.90.
[64] Mr W.Goedegebuure, *Transcript of Evidence*, 16 November 2006, p.297.
[65] Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, pp.148-149.

> program is actually extension. Because very, very little of our work is actually of a true compliance nature. Most of it is about education and awareness so it is just as valid extension as it is in providing information to growers about production issues.[66]

This may be true, but for other parts of the wider picture on invasive species — weeds for example — witnesses stated that "there is no public education", particularly in regional areas of the Territory:

> the couple of fellas we have got here, the two or three people here are flat out doing paper work or out on the stations spraying weeds for the stations, when they really should be coordinating the people who have to deal with weeds constantly.[67]

In fact, another witness stated that the effort in this area had been reduced from former levels:

> we used to have Land Care Education and Awareness officers and that was their role; to go into schools and to just talk about environmental issues, but the NT government decided that they would rather put that money somewhere else and those positions ended and the people left, they were never replaced.[68]

This left a situation, at time of hearings, where there was demand for education on invasive species in schools, "but no one to deliver it" due to lack of funding and other resources.[69] Another witness suggested media coverage of invasive species was selective, leaving many species and subjects untouched.[70]

An expert witness in this area, with respect to weeds, acknowledged

[66]Mr R.Gobbey, *Transcript of Evidence*, 15 November 2006, p.239.
[67]Mr R.Elliot, *Transcript of Evidence*, 5 October 2006, p.162.
[68]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.160.
[69]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.159.
[70]Mr K.Ferdinands, *Transcript of Evidence*, 15 November 2006, pp.217-218.

that this "communication" (as opposed to "technical") side of the information effort on invasive species was "hard work", for:[71]

> You have got to know who to ring when and when they are in and talk to them about it and know what they need and really try and communicate ...I think that is an area we need to put much more effort in to, to be effective with our weed management.[72]

Witnesses also uncovered an important further dimension of this when they referred to information exchange not only between staff of government agencies and people in the community, but between people in the community. One highlighted the "experience, local knowledge, and successful projects" of primary producers on invasive species, "which could be disseminated" to good effect.[73] Another highlighted the value of "workshops" where, similarly, landholders displayed modified equipment and techniques for better management of invasive species: weeds in particular.[74]

A number of witnesses underscored the importance of this line of effort. One quoted a source to the effect that "the average Aussie does not think weeds are a problem" and, consequently, "arousing the Australian people and our governments to the immanence and magnitude of the weed threat is our most pressing ecological task".[75]. Another suggested that "doing an Al Gore" on weeds would "soon change mind sets", by that analogy again suggesting the gravity of the present situation for the integrity of the environment.[76]

[71]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.257.
[72]Mr J.Thorp, *Transcript of Evidence*, 15 November 2006, p.257.
[73]Mr D.Halloran, *Transcript of Evidence*, 5 October 2006, p.151.
[74]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.152.
[75]Mr W.Goedegebuure, *Transcript of Evidence*, 16 November 2006, p.292, quoting Professor Julian Cribb
[76]Mr J.Etty, *Transcript of Evidence*, 5 October 2006, p.158.

The positive side of this was, however, pointed out by another contributor to the Inquiry, who suggested that as public awareness of invasive species rises from its present low base, as it "begins to understand the problem greater funding will become acceptable".[77] Another witness suggested that the means to achieve this change of awareness were available, citing the example of public information campaigns on "drink driving or speeding".[78] This witness also suggested that better levels of awareness, and direct engagement, would help to resolve quandaries on invasive species management in the community. Involving land-user groups in decision was an example of this, which made it ultimately "easier to justify [the methods of] control".[79]

7.2.3 Mapping

The two other topics considered under Information needs both come into play for this final section of the chapter. Contributions to the Inquiry consistently identified a need for a better level of accessibility to mapping facilities. This point was made both in terms of people in the community being able to contribute information on sightings of invasive species, that could be logged on maps, and for better access to maps displaying the distribution of invasive species.

Present and historical facilities in this area were rated poorly. In relation to weeds, one witness suggested that:

> This weed mapping issue has been going on for a long time in the Territory and we still do not have any bloody decent maps, because every time a new person comes in they use a new technique and a new whatever and it is not compatible and here we are twenty years later and we still do not have decent weed

[77] Mr W.Goedegebuure, *Transcript of Evidence*, 16 November 2006, p.292.
[78] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.350.
[79] Dr C.Bradshaw, *Transcript of Evidence*, 16 November 2006, p.350.

maps.[80]

Another witness told of contributing information for the purposes of mapping weeds, but not getting access to information in return:

> With Green Corp, we did weeds mapping, last year. The Green Corp team did the weed mapping in the river corridor and weed control. That information went to the government department, we still do not have a map. It has not been put into the map because they were doing it as a favour, it hasn't been a priority and we cannot push, but you know, it has been months and months and months and we still do not have a map.[81]

The Inquiry was also told of information on weeds distribution being entered into web-based database facilities, with similar results. In this case maps were not being assembled on the basis of the contributed information due to insufficient staffing in the responsible government agency.[82] Other witnesses echoed this desire for access to information, stating that the available online databases were not sufficiently comprehensive in in their coverage of Australian plants, and weeds in particular.[83] Similar requirements were identified for feral animals.[84]

This need, for people outside of government to contribute and access information, appears substantive. It is consistently reported by a diversity of witnesses. One submission to the Inquiry summed this up when it suggested that:

> Better mapping and access to existing mapping resources is needed. Better mapping will help to inform management decisions and provide a framework to evaluate management actions.

[80]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, p.152.
[81]Mr R.Elliot, *Transcript of Evidence*, 5 October 2006, p.162.
[82]Mr M.Crothers, *Transcript of Evidence*, 5 October 2006, pp.152-153.
[83]Mr Peter Bekkers, *Transcript of Evidence*, 6 October 2006, p.178.
[84]Dr T.Bowland, *Transcript of Evidence*, 16 November 2006, p.301.

> There needs to be an easily accessible mechanism for community input into weed mapping.[85]

The submission cited the example of the "recent establishment in Queensland of the Weed Spotters Network", a program also established in Tasmania and Victoria.[86]

7.3 Discussion

A review of community-based programs affirms the basic elements, discovered in other areas, that can make invasive species management more effective in the Territory. Funding is important, and there are clear signs, in this area as well, that resource constraints are preventing better outcomes. But funding is not the whole picture — witness statements to the Inquiry also that better practice on information sharing, and a greater priority and focus on raising awareness, could bear significant dividends in the fight against invasive species. These statements also show high levels of interest, as yet limited to groups with a special interest, that could, with wider dissemination of information on invasive species, take hold in a larger proportion of the Territory community. This would lead to better practice, higher levels of volunteering and, as suggested, a greater willingness, on the part of the public, to see sufficient resources allocated to the management of invasive species.[87]

[85] Greening Australia, *Submission no.10*, p.5.
[86] Greening Australia, *Submission no.10*, p.5; Dr G.Calvert, *Transcript of Evidence*, 5 October 2006, p.116.
[87] Mr W.Goedegebuure, *Transcript of Evidence*, 16 November 2006, p.292.

7.4 Findings and recommendations

Findings

Community-based programs have been fostered under such legislation as the Weeds Act, but participants face a turbulent environment that requires major investments of time in order to pursue grant money — in addition to, or at times instead of, direct efforts at invasive species control. Participants also experience confusion and frustration at the various caveats that come with grants, such as restrictions to work on particular species, and with intricate and apparently inconsistent parts of present administrative arrangements. The obligation, under many grants, to re-apply for funding when weather interrupted control work was seen as unreasonable and difficult to work with. In general, interruptions to the continuity of funding attracted strong criticism, as this compromised the effectiveness of control efforts, allowing time for invasive species populations to recover. Funding interruptions resulted in a loss of staff from control programs due when money for wages was not available.

These participants perceive difficulties communicating with and accessing government agencies, and express disappointment at a lack of agency staff to support extension, education and control work. Opportunities were perceived for better data gathering on the distribution of invasive species, that could be achieved through better public awareness and coordination. There was a sense of frustration in relation to mapping and information: a number of participants were not aware of a way to contribute information on distributions of invasive species, or to themselves access accurate information on this, and this was viewed as an important gap in arrangements.

In addition to conventional community groups, pastoralists and Indigenous programs also figured as key players in this non-government sector. In a practical sense, pastoralists overlap with other participants through

their membership of Landcare and similar groups. In some instances, pastoralists displayed high levels of coordinated activity, and were able to bring more resources to bear on invasives. They also echoed the frustrations of other players on inconsistent arrangements made by government agencies for the practical control of invasives, and flagged as a problem lower numbers of field officers from government agencies. This is despite the fact that pastoralists had at times been able to exert greater political influence than other players.

Indigenous groups and programs have a high level of involvement with invasive species control, undertaking control work on Indigenous land, but also under contract for other landholders. Notable programs were being undertaken by Indigenous programs to protect Kakadu National Park from invasive species. These involvements represent avenues for employment for Indigenous people while leveraging their knowledge of country. However, skills requirements, such as handling chemicals for weed and invertebrate control, have proven a limiting factor, and this underscores the need for employment in this area to be complimented with further training input. There are other problems in that Indigenous people have trouble managing invasive species on their traditional land due to low revenue returns from that land, and this requires consideration. Like other players in this area, Indigenous invasive species management programs experience an uncertain funding environment, characterised by a high degree of variation in policy objectives between granting bodies, in and outside of the Territory.

Taking the experience of all of these community players into account, they have in common: breakdowns in relationships with government agencies; a perception that government is not investing sufficiently in practical capacity; and an acute awareness of instances where current policy settings are not working on the ground. They are also aware that, amidst the complex funding environment they face, that their capacity is reduced due to the limited ability of government agencies to take a "matching"

or "partnership" role in applications to external funding bodies. These shortfalls have profound implications for the Territory's capacity to manage invasive species.

Recommendations

Recommendation 25

The Committee recommends that the Northern Territory Government achieve a better balance between government programs and community programs to manage invasive species, by:

a). Setting appropriate levels of front-line staff to support community-based programs in a region, and in view of local threats from invasive species.

b). Improving the level and quality of engagement with community-based programs and reference groups.

c). Increasing support to community-based programs to assist with grants applications (see Recommendation 28.c.).

d). Instituting a stronger regional focus by placing more government agency staff in regions, to clear obstacles to community-based programs and provide expertise at point of need.

e). Fostering processes that provide greater continuity of funding to community-based groups.

Recommendation 26

The Committee recommends that the Northern Territory Government improve information-gathering processes on invasive species by:

a). Considering ways to enable staff from other agencies, and government contractors, to report sightings of invasive species.

b). Increasing opportunities for community-based programs, and members of public, to contribute to and access mapping facilities for invasive species.