

10

**What are we doing
and what effect is
it having?**



Parkes Way near New Acton
Photo: © Rod Burgess

This assessment of management effectiveness was prepared for the ACT State of the Environment Report by Andrea Leverington and Marc Hockings.

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In 2014, they assessed the management effectiveness of the Great Barrier Reef Marine Park Authority for the World Heritage Strategic Assessment.



ACT border reference trees were damaged during the 2003 ACT fires

Photo: ACT Government

10.1 Main findings

This report has used the International Union for Conservation of Nature (IUCN) management effectiveness framework originally developed for assessing management of protected areas¹ and subsequently applied in the *Great Barrier Reef Outlook Report*¹ and the *Australian State of the Environment 2011* report.² This framework focuses on six management elements (context, planning, inputs, processes, outputs, outcomes) and the links between them, to provide a comprehensive picture of management effectiveness for the region.

This assessment examined five management topics:

- air quality
- heritage
- biodiversity
- water
- land.

All management topics scored well in the areas of context, planning, inputs and processes. Additional focus on outputs and outcomes will improve the management effectiveness across most topics. The overall assessment results are summarised in Table 10.1.

10.1.1 Air quality

Australian Capital Territory (ACT) air quality is within national standards and has seen continuing improvement as a result of legislative and program initiatives. However, further work can be done on public education to increase understanding concerning fuels and change the behaviour of owners of wood heaters.

10.1.2 Land

There are comprehensive data for land management with respect to contaminated lands and biodiversity, but there is limited information about the acidity, salinity, carbon storage and overall condition of soils in the ACT. Management processes are effective for contaminated lands; however, for land management more broadly, these attributes are difficult to ascertain with the limited information available. Although management of contaminated lands seems to achieve its outcomes, purely through no negative impact, outcomes of land management from a biodiversity and ecological perspective appear to be generally unknown.

Table 10.1 Performance of effectiveness for all topics

Element Topic	Context	Planning	Inputs	Processes	Outputs	Outcomes
Air quality	Effective	Effective	Effective	Effective	Effective	Effective
Land	Effective	Effective	Effective	Effective	Mostly effective	Mostly effective
Water	Effective	Effective	Effective	Effective	Mostly effective	Mostly effective
Biodiversity	Effective	Effective	Effective	Effective	Mostly effective	Mostly effective
Heritage	Effective	Effective	Effective	Effective	Mostly effective	Mostly effective

A society is defined not only by what it creates, but by what it refuses to destroy.

-John Sawhill

10.1.3 Water

There is sound knowledge about water quality and the factors influencing water quality, and planning for water is effective within the ACT. There is a strong focus on healthy catchments and waterways, a sustainable water supply used efficiently and community engagement. However, in the future, water needs to be linked to health, climate adaptation, population growth, planning for future critical issues and planning for infrastructure. The *ACT Water Strategy 2014–44: Striking the Balance* is a key initiative in delivering positive water outcomes for the ACT. However, it appears to be too early to determine if the outputs from the strategy are reducing threats.

10.1.4 Biodiversity

The ACT has an enviable record of biodiversity management due to its small size and its access to programs undertaken by the Government, universities and other organisations such as the Commonwealth Scientific and Industrial Research Organisation (CSIRO). More than 50% of Canberra's land area is under protected area management; however, fire management continues to make biodiversity outcomes uncertain. Although strategies and plans are in place for the management of pest animals and weeds, their impact on biodiversity is not monitored. Improvements in monitoring and reporting on outputs and outcomes are planned and will improve the management effectiveness of biodiversity considerably. The impact of fire on biodiversity is being considered, but it is yet to be determined if processes in place will deliver the positive outcomes anticipated.

10.1.5 Heritage

Although there is a good understanding of the main sources of impacts on heritage, the consequential and cumulative impacts that are affecting historic heritage are less well understood. The lack of monitoring means that knowledge of actual impacts on heritage condition is limited. Recently, management has focused on the changes to the legislation, but there are now opportunities for more strategic planning for heritage outcomes.



Cycling and walking are the way to get around for many Canberrans

Photo: ACT Government

10.2 Introduction

10.2.1 The State of the Environment Report

State of environment reporting is a requirement of the *Commissioner for Sustainability and the Environment Act 1993*, with the Office of the Commissioner for Sustainability and the Environment (OCSE) undertaking a State of the Environment Report every four years since 1994–95.

As part of the reporting for 2015, the OCSE decided to assess the effectiveness of its management arrangements to protect the values that underpin the environment of the ACT. Andrea Leverington and Marc Hockings were commissioned to provide this independent report.

10.2.2 Management effectiveness

Management effectiveness evaluation was developed to assess management of protected areas. It is defined as the assessment of how well a protected area is being managed – primarily the extent to which it is protecting values and achieving goals and objectives. The IUCN World Commission on Protected Areas has developed a framework for assessing management effectiveness,³ which has been widely applied around the world to develop specific assessment systems designed to meet the need to evaluate management effectiveness in different circumstances.

In this report, the approach to assessing management effectiveness of protected areas has been adapted to examine the effectiveness of management of aspects of the environment as a part of this State of the Environment Report. This work was based on the management effectiveness program undertaken for the *Great Barrier Reef Outlook Report 2009*¹ and subsequently applied in the *Australia State of the Environment 2011* report.² The management effectiveness for this ACT State of the Environment Report was developed using this framework and assessed all six elements of effective management.

Good management needs to be founded on a thorough understanding of the individual conditions related to management of an aspect of the environment, be carefully planned and implemented, and include regular monitoring, leading to changes in management as required. The management cycle identifies six important elements in this process that should, ideally, all be assessed if effectiveness of management is to be fully understood (Figure 10.1).

Effective management:

- begins with understanding the **context** of the topic, including its values, the threats it faces and opportunities available, its stakeholders, and the management and political environment
- progresses through **planning**, and establishing a vision, goals, objectives and strategies to conserve values and reduce threats
- allocates **inputs** (resources) of staff, money and equipment to work towards the objectives
- **implements** management actions according to accepted processes
- eventually produces **outputs** (goods and services, which should usually be outlined in management plans and work plans)
- results in impacts or **outcomes**, and hopefully achieves defined goals and objectives.

The criteria used in this report to assess each element of the framework are outlined in Table 10.2.



Figure 10.1 The framework for assessing management effectiveness that has been applied to state of the environment reporting for the ACT



The Hall Cemetery is protected under the Heritage Act because the rare Tarengo Leek Orchid grows there
Photo: ACT Government

Table 10.2 International Union for Conservation of Nature World Commission on Protected Areas framework for assessing management effectiveness

Elements of management cycle	Design		Adequacy/appropriateness		Delivery	
	Context	Planning	Inputs	Process	Outputs	Outcomes
Focus of evaluation	Assessment of importance, threats and policy environment	Assessment of design and planning for management of the environmental topic	Assessment of resources needed to carry out management	Assessment of the way in which management is conducted	Assessment of the implementation of management programs and actions, and the delivery of products and services	Assessment of the outcomes and the extent to which they achieved objectives
Criteria that are assessed	Significance or values Threats Vulnerability Stakeholders National context	Legislation and policy Management system design Management planning	Resources available for management of the topic	Suitability of management processes and the extent to which established or accepted processes are being implemented	Results of management actions Services and products	Impacts (the effects of management in relation to the objectives)

Source: Adapted from Hockings & Gilligan¹

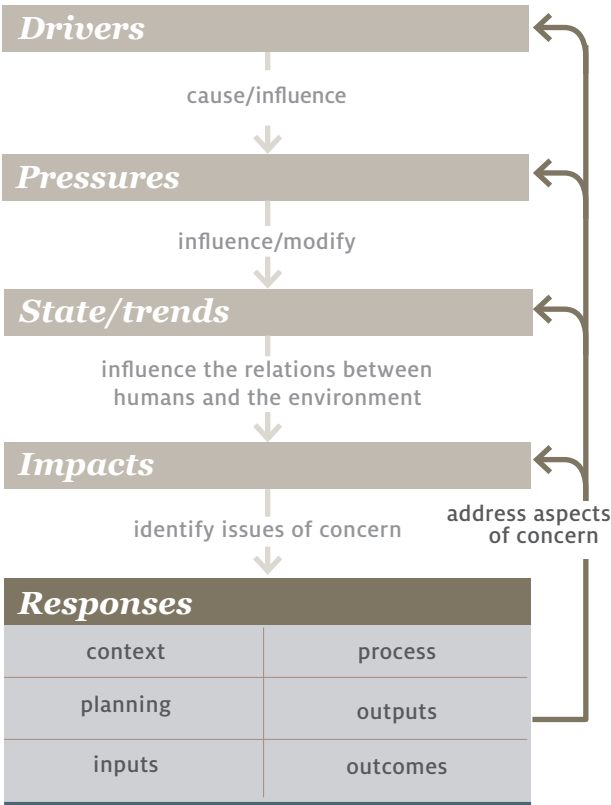
Evaluation that assesses each of the elements of Figure 10.1 (and the links between them) provides a comprehensive picture of management effectiveness. All six elements shown in Figure 10.1 are important in developing an understanding of how effectively the environment is being managed. They reflect three large management ‘themes’:

- **design** (context and planning)
- **adequacy/appropriateness** (inputs and processes)
- **delivery** (outputs and outcomes).

Only assessing outcomes may indicate the objectives have been achieved, but leaves it unclear whether it was due to good luck or good management. Conversely, if an outcome is not achieved, then unless all six elements are assessed, it is hard to know if it was due to insufficient resources (inputs), poor planning or a problem with the process.

Links and influences

The *Driver–Pressure–State–Impact–Response* model as used in the ACT State of the Environment Report



Cotter Hut at night
Photo: Mark Jekabsons

10.3 Methods

This report focuses on the aspects of management undertaken to manage particular environmental topics in the ACT. It comprises a qualitative assessment of performance against all six elements of the IUCN Management Effectiveness Framework (context, planning, inputs, processes, outputs and outcomes).

Five management topics are considered:

- air quality
- land
- water
- biodiversity
- heritage.

Criteria were developed under each framework element with a total of 24 indicators across the 6 elements. Information relevant to assessing performance against each of the indicators was assembled by OCSE staff, and provided to the independent assessors for review. The assessors sought additional information from relevant research papers and other source documents, stakeholder workshops and discussions. The assessors then rated performance, providing a justification for the rating and a documentation of the main evidence they considered in reaching this judgement.

A four-point rating scale commonly used in management effectiveness evaluation systems was adopted (Table 10.3).

Table 10.3 Description of the ratings

Rating	Score	Interpretation
4: Effective	76–100% of optimal condition	A score of 4 indicates that, in general, management is effective, although there is still room for improvement
3: Mostly effective	51–75% of optimal condition	A score of 3 indicates that management is mostly effective, but requires improvement. A score of 3 indicates that management effectiveness is better than 50%
2: Partially effective	26–50% of optimal condition	A score of 2 indicates that management is only partially effective and requires significant improvement. A score of 2 indicates that the system is operating at less than 50% effectiveness, and this would be demonstrated by systems failing, with likely clear evidence of adverse changes in management or condition of the environment
1: Not effective	0–25% of optimal condition	A score of 1 indicates that management is completely absent or very seriously deficient

Six indicators were used to assess the effectiveness of management for each management topic:

- Context
 - Managers know and understand the environmental values and attributes that management is seeking to maintain or enhance relevant to the topic.
 - Managers understand the threats and pressures (direct, indirect and cumulative) affecting the topic.
 - Managers are aware of and understand the broader regional-, national- and international- (if relevant) level influences relevant to the topic.
 - Managers understand the stakeholders' perspective about the topic.
- Planning
 - There is a planning system and/or policy framework in place that effectively addresses the topic.
 - Clear, measurable and appropriate objectives, outputs and outcomes for management of the topic have been documented.
 - The main stakeholders and/or the local community are appropriately engaged in planning to address the topic.
- Financial, staffing and information inputs
 - Financial resources are sufficient to meet objectives.
 - The skills and expertise are adequate to inform and implement management decisions.
 - Adequate information (eg biophysical, socioeconomic, heritage) is available to inform management decisions.
- Management systems and processes
 - The main stakeholders, and/or industry(ies) and/or community are effectively engaged in the ongoing management of the topic.
 - An appropriate governance system is in place to address the topic.
 - Performance monitoring of plans or programs is effective and timely.
 - Impacts (direct, indirect and cumulative) of the threats and pressures associated with the topic are appropriately considered.
- The most current and relevant (available) information (eg biophysical, research and/or monitoring; socioeconomic; heritage) is applied appropriately to make relevant management decisions regarding the topic.
- Approaches and methods used in managing the topic are appropriate and in line with best practice.
- Relevant standards and targets are identified and are being met for the topic.
- Delivery of outputs
 - The implementation/operation plans have progressed appropriately (time and budget).
 - The results have achieved their stated management objectives for the topic.
 - The implementation/operation plans have progressed appropriately (time and budget).
 - The results have achieved their stated management objectives for the topic.
- Achievement of outcomes
 - The outputs are on track to achieve stated outcomes.
 - The outputs are reducing the major risks and the threats for the topic.
 - The condition of values is within the acceptable range.

An example of the assessment process for biodiversity protection outcomes is shown in Table 10.4. Ratings were assigned for a management topic against each indicator; these individual ratings were added and then scaled to produce an overall rating of 'effective', 'mostly effective', 'partially effective' or 'ineffective'.

Table 10.4 Example assessment of management effectiveness for outcome indicators for biodiversity protection

Topic: Biodiversity Context	Score	Evidence	Source
Managers know and understand the environmental values and attributes that management is seeking to maintain or enhance relevant to the topic	4.00	<p>The ACT Nature Conservation Strategy, plans of management, business plans, works plans, weed operational plans, threatened species action plans, biodiversity offset management plans provide good knowledge and understanding of values and attributes</p> <p>The Parks and Conservation Service establishes strategic partnerships with third parties to assist in the preservation of biodiversity, including with Conservation Volunteers Australia, the Australian National University Fenner School and the University of Canberra. These relationships yield scientific information, formal and informal, which are applied in biodiversity conservation</p> <p>The <i>Nature Conservation Act 2014</i> and the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwlth) provide the statutory basis for management and regulatory response</p> <p>Knowledge of species and distributions is at a level of detail that is rare in other jurisdictions</p> <p>Considerable community and consultant data, but largely unverified</p>	<p><i>Nature Conservation Act 2014</i></p> <p><i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwlth)</p> <p>Threatened Species Recovery Plans</p> <p>Kangaroo Management Plan</p> <p>Namadgi National Park Plan of Management</p> <p>Tidbinbilla Plan of Management</p> <p>ACT Nature Conservation Strategy</p> <p>ACT Pest Animal Management Strategy</p>

ACT = Australian Capital Territory

Scores for each element of the IUCN framework were scaled to provide a total score out of 40 and a rating system was developed to convert scores to a rating of management:

- If the total score is 32.6–40.0, then the overall grading statement for that element is ‘effective’.
- If the total score is 25.1–32.5, then the overall grading statement for that element is ‘mostly effective’.
- If the total score is 17.6–25.0, then the overall grading statement for that element is ‘partially effective’.
- If the total score is 10.0–17.5, then the overall grading statement for that element is ‘ineffective’.

The refined assessment system was reviewed in a workshop attended by key staff from the ACT. Staff provided the independent assessors with data sources and supporting evidence relevant to making a judgement about performance for each of the 24 indicators for each management topic.

The independent assessors reviewed evidence and assigned an initial rating to each of the indicators. The rating was agreed to by consensus between the assessors following discussion of the available evidence. The rating and the reasons for assigning the rating (eg key points of evidence or other considerations relating to the rating) were noted in a standard proforma. The ratings and reasons were subsequently discussed with staff from OCSE and relevant ACT agencies to ensure all relevant supporting evidence had been considered. Based on this open and iterative process of discussion and review, the assessors adjusted a number of assessments where improved knowledge and understanding indicated that the original ratings were either too high or too low, and the list of evidence supporting the assessment was refined as necessary.

A summary of the scores is shown in Appendix 1. Detailed scores, justification and sources of information for each indicator for each topic are shown in Appendix 2.

10.4 Summary assessment by topic

Performance across all topics and elements of effectiveness was strong, with no aspects of management for any topic being rated at less than ‘mostly effective’ (Table 10.5). This reflects very well on management of the topics assessed in this section of the report (air quality, land, water, biodiversity and heritage). It may in part

be a result of the management context for the ACT, with a relatively small jurisdiction compared with the other Australian states and territory, the absence of major manufacturing and resource industries, and a large percentage of the area devoted to conservation management.

Table 10.5 Performance of effectiveness for all topics

Element Topic	Context	Planning	Inputs	Processes	Outputs	Outcomes
Air quality	Effective	Effective	Effective	Effective	Effective	Effective
Land	Effective	Effective	Effective	Effective	Mostly effective	Mostly effective
Water	Effective	Effective	Effective	Effective	Mostly effective	Mostly effective
Biodiversity	Effective	Effective	Effective	Effective	Mostly effective	Mostly effective
Heritage	Effective	Effective	Effective	Effective	Mostly effective	Mostly effective

10.4.1 Air quality

Table 10.6 Air quality management assessment summary

Context	Planning	Inputs	Processes	Outputs	Outcomes
Effective	Effective	Effective	Effective	Effective	Effective

Context

Air quality in the ACT is being managed effectively. Major sources of emissions in the ACT are transportation and fires from non-industrial activities. The ACT's only air pollutant of concern remains particulate matter, primarily associated with the use of domestic wood heaters in winter, and occasional influences from bushfires and controlled burns for asset protection and ecological management.

Planning

The *Environment Protection Act 1997* (the EP Act) aims to ensure that air quality in the ACT meets national standards and minimises environmental harm from local emissions of air pollutants. Canberra's overall air quality compared with other cities is excellent; however, it does have a winter particle pollution problem because of emissions from wood heaters used for home heating.

The objectives of the Air Environment Protection Policy (Air EPP) are to ensure air quality in the ACT at least meets national standards and to minimise environmental harm from local emissions. The Air EPP reflects the current national knowledge and understanding of air quality issues through the implementation of the National Environment Protection (Ambient Air Quality) Measure (Ambient Air Quality NEPM).

The Air EPP provides the policy and governance arrangements for managing air quality in the ACT, meeting national standards. The Air EPP details the relevant guidance material that staff use to help them understand the direct, indirect and cumulative threats and pressures affecting the regulation of the management of air quality. This includes the principal national guidance Ambient Air Quality NEPM and the Air Toxics NEPM. The Ambient Air Quality NEPM provides the regional, national and international influences that are relevant to the topic.

There is a sound planning and policy framework for the management of ambient air quality. In addition to the legislative framework provided for by the EP Act, the Environment Protection Regulation 2005, and the Ambient Air Quality NEPM, at the strategic level air quality is considered through the ACT land and planning framework. This is through the provisions of the *Planning and Development Act 2007* and, in particular, the environmental impact assessment (EIS) process required for significant developments, where impacts from emissions are considered. This has resulted in domestic wood heaters being restricted in new development areas where the topography has the potential to cause inversion and consequently adverse air quality. The areas where these restrictions apply are Dunlop, East O'Malley and the entire Molonglo development, excluding the suburb of Wright.

Clear measurable objectives, outputs and outcomes are detailed in the Ambient Air Quality NEPM, and are reported on both nationally and through the ACT air quality annual report produced by the Environment Protection Authority.

Financial, staffing and information inputs

Financial and staffing inputs appear to be adequate to meet the legislative requirements for air quality. However, it appears that there is little time or appetite to develop broader policy or to provide input into broader environmental issues.

Management systems and processes

Management systems and processes are appropriate for the highly regulated topic. National standards and policies set the broad framework, with the ACT undertaking annual performance monitoring. The annual reporting enables management decisions to be made if standards should fall. For example, issues about wood smoke have been identified and management decisions considered and implemented.

More can be done on public education to increase understanding concerning fuels, and to change the behaviour of owners of wood heaters.

The development of guidance at the national and local levels has provided the framework for engagement with key stakeholders. In the ACT, this has been through consultation in developing the EP Act and the Environment Protection Regulation.

Stakeholder engagement and consultation is through the legislative consultation mechanisms outlined in the EIS and development assessment guidelines, and is supported by the ACT Government's community engagement guidelines. Consultation is also reported in the Environment Protection Authority annual report; however, it is unclear if any consultation specifically about air quality has occurred in recent years. Information regarding air quality is readily available on the internet, and brochures informing households

about issues associated with wood heaters have been produced. However, more public education may be needed because regulatory approaches will only partly resolve this issue. The ACT has established a code of practice for firewood suppliers in the Territory, and licenses the sale and supply of firewood. Use of poor-quality fuel and incorrect operation of wood heaters need to be addressed as part of the solution.

Delivery of outputs and achievement of outcomes

The delivery of outputs and the achievement of outcomes is shown through the annual reporting framework. Air quality in the ACT is within national standards and has seen continuing improvements as a result of legislative and program initiatives.



Cotter Flat

Photo: Mark Jekabsons

10.4.2 Land

Table 10.7 Land management assessment summary

Context	Planning	Inputs	Processes	Outputs	Outcomes
Effective	Effective	Effective	Effective	Mostly effective	Mostly effective

Context

There is sound knowledge of factors relevant to land management. Much of the data needed for biodiversity management are also relevant to land management (see Section 10.4.4). However, there appears to be no comprehensive mapping or information about the acidity, salinity, carbon storage and overall condition of soils in the ACT. There is sound knowledge of the issues surrounding contaminated lands through the *Contaminated sites environment protection policy*⁴ and associated Australian and New Zealand Environment Conservation Council guidelines,⁵ the *ACT Strategic plan: contaminated sites management*⁶ and the Assessment of Site Contamination NEPM.⁷

Planning

Legislation governing land management is the Planning and Development Act. The Planning and Development Act required the development of the Territory Plan 2008, which sets out the strategic directions for the management of land-use change and development.

The pattern of development outlined in the Territory Plan is intended to reflect land capability constraints resulting from topography, soils, geotechnical factors, drainage, natural hazards, microclimate and ecosystem sensitivity. The plan states that particular attention has been given to the need to conserve soil, water and vegetation; maintain biological diversity; safeguard important ecosystems and ecological processes; and provide and protect wildlife corridors. Planning policies associated with the plan provide guidance to protect the landscape and environmental qualities of the hills and ridges surrounding urban areas, the Murrumbidgee and other river corridors, the mountains and forests west of the Murrumbidgee River, and productive rural landscapes. The *Nature Conservation Act 2014* and the *Environment Protection*

and Biodiversity Conservation Act 1999 (Cwlth) (EPBC Act) also provide the statutory basis for management and regulatory response for biodiversity on all land. The *Pest Plants and Animals Act 2005* and the EP Act support the management of rural and public lands. A biosecurity strategy is also currently being completed. The offsets policy enables compensation for unavoidable significant adverse environmental impacts from land development on matters of national environmental significance and relevant ACT-protected matters.

Custodians of public land must prepare management plans for the land they manage. The purpose of these management plans is to identify values of the area and objectives for management, and actions required to achieve the objectives. The Namadgi National Park covers 46% of all land and 90% of all public land in the ACT. The associated management plan considers management of biodiversity, fire, water, recreation and heritage. The plan includes a set of priority actions; however, there appears to be no detailed implementation plan outlining timeframes and milestones for actions or evaluation of the effectiveness of the plan. The Tidbinbilla Plan of Management articulates the proposed management for biodiversity, heritage, fire and water, and identifies three zones for core conservation, conservation and rehabilitation, and developed recreation and education. This plan also includes a list of prioritised actions.

The Planning and Development Act requires a Land Management Agreement (LMA) for all leases in the ACT that contain a rural purpose. There are currently 110 leases in the ACT. A lease cannot be granted without the approval of the Conservator of Flora and Fauna. The purpose of the LMA is to establish sustainable agricultural management and good farm biosecurity while maintaining ecological and cultural values on the land, and protecting the environment from harm. Links between the LMAs and the broader policy objectives outlined in the Territory Plan are not apparent.

When developing LMAs, the Parks and Conservation Service (PCS) provides ecological and heritage values to landholders. However, landholders are expected to provide information on areas subject to erosion and weed infestations from their personal knowledge. A condition of the 99-year leases is for these agreements to be reviewed every five years; however, this does not occur due to a lack of resourcing. Feedback from rangers is that biodiversity has not been managed well through this process.

Financial, staffing and information inputs

Resources for managing land are mostly effective, with the greatest gap being the lack of resources for assessing LMAs. Rangers are employed across all land tenures, with focus on the conservation tenures. Funding is available for the management of weeds and pest animals that cause land degradation, although this funding is often through specific program allocations and is not necessarily ongoing.

One officer is responsible for managing contaminated lands across the ACT. However, there is support from associated work groups, such as information technology experts, to ensure data are appropriately managed, and use of accredited external auditors. Staff members in all land management areas are acknowledged as well skilled and experts in their fields, and relevant data for decision-making is readily available.

Management systems and processes

Management systems and process are variable across the range of land management areas. For example, effective processes are in place for the management of contaminated land and conservation land tenures. Management of contaminated lands meets national standards. Less effective processes are apparent for the management of rural and other public lands, with little auditing of LMAs, or the Namadgi National Park and Tidbinbilla Plans of Management.

In preparing management plans, the land owners are expected to include extensive consultation with key stakeholders and members of the public. The Namadgi National Park Plan of Management received 175 submissions during its public consultation phase in 2005.

Delivery of outputs and achievement of outcomes

Outputs and outcomes for the management of land are difficult to ascertain with limited information available. Although management of contaminated lands seems to achieve its outcomes, purely through no negative impact, outcomes of the management of lands from a biodiversity and ecological perspective appears to be generally unknown.



This small fungus, also known as Yellow Navel (*Lichenomphalia chromacea*), is native to the southern parts of Australia, including Canberra

Photo: H Lepp, Australian National Botanic Gardens

10.4.3 Water

Table 10.8 Water management assessment summary

Context	Planning	Inputs	Processes	Outputs	Outcomes
Effective	Effective	Effective	Effective	Mostly effective	Mostly effective

Context

There is sound knowledge about water quality and the factors influencing water quality in the ACT. This is shown through technical reports, with much of the current knowledge summarised in the *ACT Water Strategy 2014–44: Striking the Balance*. The strategy focuses on three key elements: healthy catchments and waterways, a sustainable water supply used efficiently and community engagement. However, in the future, water needs to be linked to health, climate adaptation, population growth, planning for future critical issues and planning for infrastructure.

There is good knowledge of catchment condition through analyses and reports prepared as part of the Australian Alps Cooperative Management Program.⁸ These reports identified that two of the Australian Alps catchments in the ACT were in poor condition and six were in moderate condition, although the condition of all ACT catchments was either stable or improving. Horses, which have a major negative effect on catchment condition, are controlled in the ACT, although there are increasing numbers in New South Wales (NSW) and, consequently, some of these animals are coming into the ACT (GL Worboys, Australian National University Fenner School, pers comm, May 2015). A recent Auditor-General report also expressed significant concerns about the condition of the Lower Cotter Catchment and concludes that:⁹

Despite the improvements in water quality, the LCC [Lower Cotter Catchment] is exposed to significant risks which are interrelated and which, under adverse conditions, could accumulate and lead to a catastrophic failure of the water catchment.

Planning

The ACT Water Strategy clearly articulates the policy drivers, including the National Water Reform Initiative, the Council of Australian Governments urban water reform and the Murray–Darling Basin

Plan. It also describes the relationship between NSW underpinned by the ACT, and the NSW memorandum of understanding on regional collaboration.

Planning for water is effective within the ACT. The ACT Water Strategy and its associated implementation plan provide clear and measurable objectives, outputs and outcomes for water management. The ACT Water Strategy commits the ACT Government to the preparation of an Integrated Catchment Management Plan for the ACT, to guide land and water management for protection of water quality and water supply. Following the establishment of the ACT and Region Catchment Management Coordination Group, work is now proceeding on an ACT region integrated catchment management strategy, recognising the cross-border relationships that exist around water.

The Namadgi National Park includes 66% of the Cotter River Catchment that provides drinking water to Canberra, and the Namadgi National Park Plan of Management¹⁰ prioritises the protection of water quality in streams and the identification of sediment loads in streams as a result of fire. Thirty per cent of the Cotter Catchment is a former forest plantation, which is now managed as a water supply catchment by the PCS following the destruction of the pine plantation in the 2003 bushfires. In 2008, the Lower Cotter Catchment became public land managed for the protection of water supply, and a statutory management plan is now required. The management of former forestry lands and their restoration is recognised as an issue that has dimensions involving biodiversity, land and catchment management. The biggest risks to water quality are bushfires and the management of old forestry tracks and trails that are also used for fire access. A strategic management plan for restoring the Lower Cotter Catchment was developed in 2007.¹¹ A statutory management plan for the Lower Cotter Catchment is currently being developed and will replace the strategic management plan when completed.

The ACT is subject to the Murray–Darling Basin Plan (2012)^a and, as a requirement under this plan, the ACT must develop a Water Resources Plan by the end of 2015. The plan will demonstrate how the ACT will manage its water resources, in keeping with the sustainable diversion limits for surface water and groundwater.

The Territory Plan's Water Use and Catchment General Code specifies permitted uses and environmental values, and identifies the water quality– and stream-flow-related criteria for the full protection of these values and uses.

The *Waterways: Water-Sensitive Urban Design General Code*¹² aims to integrate the management of the total water cycle into the urban development process. A review of the code identified a number of areas for improvement, including new guidance documents that promote clarity and flexibility in achieving outcomes, improved modelling and monitoring capacity, and better community engagement.

The ACT Government's *Design Standards for Urban Infrastructure*¹³ are also being revised to reflect current maintenance requirements and capacity. However, *Canberra's Urban Lakes and Ponds Plan of Management*¹⁴ is well overdue for updating. This has been delayed due to lack of funding.

Financial, staffing and information inputs

The ACT Basin Priority Project is refining and expanding the data available for decision-making, and guiding the development of catchment management and water policy. These improved data will guide strategic investment in further stormwater management infrastructure.

The Environment and Planning Directorate manages a monitoring program for the ACT's water resources that includes the collection of water quality, stream-flow and biological data. The monitoring program is based on regular sampling of lakes and rivers. This information is used to determine whether waters flowing through the ACT are of appropriate quality and if the management strategies used to achieve or maintain such water quality are adequate.

Management systems and processes

Management systems and processes appear to be effective.

The *ACT Water Report 2011–12*¹⁵ provides a summary of water quality for a number of parameters (eg phosphorus, nitrogen, suspended solids, threatened fish, community engagement). Compliance with bore licences and other regulatory aspects of the *Water Resources Act 2007* is good, with no prosecutions in the past three years. Any issues have generally been dealt with by way of advisory or formal warning letters. Environmental flow requirements are defined in the *Water Resources Act 2007*, and the 2013 Environmental Flow Guidelines regulate the management of water resources by Icon Water. Icon Water also undertakes water quality and biological monitoring on the Cotter, Murrumbidgee, Molonglo and Queanbeyan rivers. These programs assess the impacts of Icon Water's operations on these rivers (eg assessment of environmental flow and sewage treatment plant releases). With a few exceptions during periods of drought, Icon Water has been compliant with these guidelines.

Key stakeholders are engaged through a number of forums, including technical panels, advisory groups, and catchment and Landcare associations. Catchment groups cover all areas and provide social capital, with a network of community associations and regular forums between Government and these bodies. There has been proactive use of community, targeting those not actively engaged.

Delivery of outputs and achievement of outcomes

The delivery of outputs is mostly effective. To date, the ACT Basin Priority Project has met all the project milestones that have been set out in the joint project schedule agreement between the Australian and ACT governments. The majority of the management actions in the strategic management plan for the restoration of the Lower Cotter Catchment were achieved; however, the 2015 Auditor-General Report raises concerns about the lack of effective high-level coordination for the implementation of the plan.

The progress report on the implementation of the ACT Water Strategy indicates that actions have progressed within timeframes. However, it would appear that it is too early to determine if the outputs from the ACT Water Strategy are reducing threats. Many of the actions are either ongoing or the completion dates are later than 2015.

a <https://www.comlaw.gov.au/Details/F2012L02240>

10.4.4 Biodiversity

Table 10.9 Biodiversity management assessment summary

Context	Planning	Inputs	Processes	Outputs	Outcomes
Effective	Effective	Effective	Effective	Mostly effective	Mostly effective

Context

For the State of the Environment Report, biodiversity is considered in terms of flora, fauna and ecological communities that are protected under the *Nature Conservation Act 2014*, as well as pests listed under the *Pest Plants and Animals Act 2005*. This report considers the effectiveness of management for these four elements across the ACT. The management of fire is specifically addressed primarily in terms of its role as an element of management of natural ecosystems, but also in relation to fire management more generally.

Knowledge and understanding of biodiversity in the region is well developed and at a level of detail rare in larger jurisdictions, with numerous reports and research relating to biodiversity undertaken by the ACT Government and partners. Examples include CSIRO's *Flyways & Byways* and Mulligans Flat work. In addition, the ACT has well-documented science informing the *ACT Nature Conservation Strategy 2013–23*¹⁶ and the ACT Strategic Bushfire Management Plan (SBMP).

Map layers of broadscale vegetation, woodlands, Natural Temperate Grasslands, bogs and fens, lowland Snow-Gum woodland, significant (of conservation interest but not listed as threatened) and threatened species, threatened invertebrates, reptiles, amphibians, fish and aquatic vertebrates are easily available and generally at a level of detail and scale that is unusual for larger jurisdictions in Australia. Information on habitat values (based on patch size) and regional links (corridors) are also available. There is good knowledge and understanding of weeds and pest animal species across the ACT. Although documented information on the condition of vegetation and the amount of clearing actually undertaken is lacking, all clearing must be approved through planning and strategic assessment processes, and there is no evidence of illegal clearing.

The cumulative impact of approved clearing of vegetation has not been documented or assessed.

Planning

The Nature Conservation Act and the EPBC Act provide the statutory basis for management and regulatory response in relation to biodiversity management. The Pest Plants and Animals Act, the EP Act and the Planning and Development Act support the protection of biodiversity.

The ACT Nature Conservation Strategy provides a robust planning framework for biodiversity in the ACT. This document is supported by an implementation plan (2013–2018). The strategy outlines a number of strategies, actions, targets and indicators for success. The implementation plan includes detailed actions, milestones, timeframes and an responsibilities. In addition, a specific *ACT Weeds Strategy 2009–2019*¹⁷ and *ACT Pest Animal Management Strategy 2012–2022*¹⁸ are in place. Development of the offsets policy enables compensation for unavoidable significant adverse environmental impacts from land development on matters of national environmental significance and relevant ACT-protected matters. This policy clearly articulates the types of offsets that are appropriate, and when they should occur.

Fifty-four per cent of the ACT is part of the reserve network, a much higher proportion of reserved land than in any other Australian state or territory. All ACT ecosystems and habitats of threatened species are represented in the reserve network. Large, well-connected reserve areas to the south and west of Canberra have ensured that upland ecosystems are well protected. Pressures on the ACT's natural ecosystems remain greatest in the lowlands, where reserves are inadequately connected in some areas, and native vegetation remnants on public and privately managed land are ecologically isolated, remaining vulnerable to threats including climate change.

Around 60% of the ACT's lowlands have been cleared. Key vegetation remnants have generally been retained as conservation reserves. However, ongoing urban expansion has fragmented these remnants and led to deterioration in their condition. Weed and exotic animal invasion, fire management and recreation pressures are significant factors. Climate change is likely to impose additional pressures. Greater attention needs to be paid to management of these remnant reserves, especially in relation to management of the boundary with urban areas.

Regional, national and international influences are recognised, with incorporation of the processes from the EBPC Act for threatened species and *Australia's Biodiversity Conservation Strategy 2010–2030*,¹⁹ and cross-border interactions with NSW on a number of biodiversity-related issues.

Climate change is recognised as a major factor likely to affect biodiversity in the ACT. The ACT protects areas subject to international agreements, such as Ramsar-protected wetlands in Ginini Flats and Latham's Snipe habitat at Jerrabomberra Wetlands. Threatened species recovery plans, the Kangaroo Management Plan, and national park and nature reserve plans of management are all evidence of how knowledge of biodiversity is used to make management decisions.

Bushfires have long been part of the ACT landscape. A combination of inherently flammable vegetation, dry summers, periodic drought and lightning ignitions has resulted in fires of small and large size, and of low and high intensity, with periodic conflagrations that have covered the landscape since at least European settlement. The ACT has recorded a history of severe and damaging bushfires. The 2003 Canberra bushfires, which were part of a severe fire season across much of Australia, were a catalyst for a range of reforms and additional measures put in place by the ACT Government and its agencies. There is now a well-articulated and robust planning system for fire management, with clear measureable objectives, outputs and outcomes. This assessment is supported by the Auditor-General's performance audit report on bushfire preparedness in 2013.

Since 2003, the ACT has developed an SBMP, which sets the context for fire management in the ACT and provides direction to Government and the community, including planning arrangements and future risks for fire management. Twelve objectives form strategies

to reduce the risk of bushfire. The objectives address the risks of bushfire starting, spreading and affecting people, property and the environment, although none of the objectives specifically address biodiversity. The plan details the policies and actions for each objective, and provides the framework for bushfire management in the ACT for five years. The current (third) version incorporates changes recommended by the 2013 audit report.

The SBMP outlines broad objectives, and annual Bushfire Operational Plans (BOPs) developed by Territory and Municipal Services (TAMS) detail specific actions, including:

- the mapped location
- the fuel management zones and subzones
- the number of hectares involved
- the type of work, who undertakes it and when the work is to be completed
- ecological advice (ie which ecological guidelines should be used).

The BOP outlines the bushfire environment, including types of bushfire fuels, influence of weather, importance of fire in ecological communities and consideration of future risks, including climate change, population and land-use changes. The BOP also outlines an audit and monitoring program.

It is not yet known what effect the recent changes to the *Emergencies Act 2004*, which gives the SBMP precedence over land management plans, will have on biodiversity conservation.

Bushfire management activities within the ACT are consistent with regional fire management works in NSW. There are a number of ways in which regional and national actions are managed. The Cross Border Emergency Services and Disaster Recovery Working Group is the primary high-level group, for the ACT and the NSW emergency services. It includes representation by the ESA Commissioner; the ACT Chief Minister, Treasury and Economic Development Directorate; and the NSW Premier's Department.

Although recreation is considered in plans of management for public lands, there is no overarching recreation strategy for the ACT to guide recreation management and development in natural areas. The interactions and impacts of recreational use on biodiversity and fire management in the broader landscape are not discussed.

Financial, staffing and information inputs

Biodiversity functions generally appear to be just adequately funded, but with some variability and lack of security because most funding is dependent on Australian Government or other short-term programs. Additional funding is available through the environmental offsets program. However, with such a high proportion of ACT land under government management, and challenges from weeds, pests and high levels of recreational use, not all priority management actions are possible with available funding. Staff are highly qualified and have development plans and performance agreements in place.

Financial, staffing and information inputs into fire management are appropriate. Funding appears to be adequate for fire management. The SBMP outlines the resources available to undertake the work planned and the annual BOPs include funding information. Generally, after the SBMP is reviewed and revised, actions require additional funding for the term of the plan. Those bids go through the ACT Government budget process. These bids have been successful to date, although the audit report is critical of TAMS' budgeting processes. The staff in the fire management teams are highly skilled and trained in all aspects of fire management, and the BOP details training needs. The *ACT Bushfire Management Standards*, and the Ecological Guidelines for Fuel and Fire Management Operations provide the data necessary to make management decisions.

There are more than 700 permanent fuel plots across the ACT in all vegetation types, which are measured at the same time every year. This information is used to assess how fuel is accumulating in that vegetation type and in that location. This fuel information – as well as ecological and historical information – is used to determine annual subregional plans.

Management systems and processes

Management systems and process are effective. Quarterly and annual reporting to the ACT Bushfire Council is required. TAMS reports through its annual report, and external audits of BOP activities are undertaken by the ACT Rural Fire Service. Governance is through the *Emergencies Act 2004* and the required SBMP.

Although robust governance is in place for all aspects of biodiversity management and excellent information is available to assist decision-making, it is unclear how the monitoring and evaluation of the strategies takes place. Monitoring is discussed in many of the biodiversity strategic and work plans (eg the unpublished ACT Woodlands Restoration Project Works Plan Majura Valley Area); however, the monitoring results have not been provided. There is a commitment to develop major monitoring of key environmental factors based on the Parks Canada ecological integrity monitoring model,^b which will provide the basis to assess the effectiveness or otherwise of on-ground works. This should provide better strategic direction for monitoring and research; however, at this stage, there is little information to understand overall biodiversity outcomes. Such a monitoring system should also meet the requirements of the Biodiversity Research and Monitoring Program under the Nature Conservation Act.

The SBMP outlines the governance and accountability processes relating to fire management. This includes three tiers of reporting:

- the ESA SBMP Implementation Working Group
- the agency reporting under s. 85 of the Emergencies Act
- the ACT Bushfire Council, which provides independent oversight of bushfire management consistent with its role in advising the Minister for Police and Emergency Services.

The SBMP also outlines the current information used to make management decisions. The current (third) version of the SBMP has built on previous work and is updated every five years.

Bushfire management standards are also prepared under the SBMP. The standards detail the measurable outcomes required under the current and ongoing management policies and procedures. This document supports the fire services, land managers and developers, as well as the general community, in achieving effective results in reducing bushfire risk.

Strategic partnerships with third parties – including with Conservation Volunteers Australia, the Australian National University Fenner School and the University of Canberra – assist with

^b www.pc.gc.ca/eng/pn-np/pe/pei-ipe/natcul/page01.aspx

biodiversity preservation. These relationships yield formal and informal scientific information, which is applied in biodiversity conservation.

Stakeholders are well known and engaged. Formal consultative mechanisms exist through the Flora and Fauna Committee and the Natural Resource Management Advisory Committee. They meet regularly, and advise the ACT Government on diverse matters relating to biodiversity management, including listing of threatened species, reviewing plans and strategies, and advising on priorities for funding. Discipline-specific forums that are designed to engage with stakeholder opinion and expertise include the Rural Landholders Forum, recreational users groups, the Equestrian Users Group, ParkCare groups, the Bush on the Boundary group and the Canberra Off-Road Cyclists. On a more strategic level, the Conservation Council ACT Region is engaged on policy matters related to biodiversity conservation. Communication strategies are also produced on a topic-by-topic basis.

All required (statutory) management planning includes a mandatory consultation element. All policy changes are typically made after a formal public consultation or the engagement of specialist committees, such as the Animal Welfare Committee.

Although there is no overarching communication plan in relation to fire management, stakeholders are engaged at the broad strategic level and are informed at the operational level about prescribed burns. For example, a formal combined public consultation process was held with a number of public meetings that sought input and feedback on the SBMP and the 2014–19 Regional Fire Management plans. Consultation with conservation groups and the ACT Bushfire Council was also held. Media releases or targeted letterbox drops are made when prescribed burn or physical removal activities are undertaken. The Bushfire Council and ESA are also engaged during the bushfire management development and implementation processes.

Recent changes to the Emergencies Act give the SBMP precedence over plans of management. However, the changes also include a requirement to consult with the Conservator of Flora and Fauna when preparing the SBMP, and report to the Minister on this consultation.

Delivery of outputs and achievement of outcomes

It is difficult to assess whether the outputs from biodiversity management are delivering their objectives or whether the desired outcomes are being achieved. Specific reports, such as the report on uncommon plants, outline a significant improvement in condition across the surveyed lands over approximately 10 years, and there has been an increase in the abundance of uncommon plant locations in the survey areas.

The offsets policy has only recently been approved, and it is too early to report on its success. Further work is required to provide criteria for assessing the effectiveness of the offsets policy with respect to offsets achieving a conservation gain.

Pest animal management shows a reduction in the number of wild dogs in the 2013–14 annual report, with \$515 000 being allocated to control wild dogs, rabbits and pigs in Canberra Nature Park and Namadgi National Park. In addition, \$2.4 million has been invested in more than 14 000 hectares to control weeds. However, there are few quantitative indicators of the environmental damage inflicted by pest species.

The delivery of outputs and achievement of outcomes indicate generally effective management for fire. As reported in the annual TAMS BOP and annual report, the output rate is highly variable, depending on the weather. For example, although planned burns were undertaken on 61% of sites, only 9% of the area of planned burns was achieved in 2013–14 because of wet weather in autumn. In the previous year, 100% of the area of planned burns was completed. Outcomes are in line with the SBMP. Qualitative assessments by the Environment and Planning Directorate report that all completed prescribed burns from the 2012–13 and 2013–14 fire seasons met the ecological guidelines stipulated at the BOP review stage and during development of burn plans.

However, a significant fire risk was identified by the Auditor-General in 2015 in the Lower Cotter Catchment because of the management of the catchment post-forestry operations and a proliferation of pine wildings.⁹

Although the evidence indicates that context, planning, inputs and management systems are effective, greater focus on outputs and outcomes will result in improved management of biodiversity.

10.4.5 Heritage

Table 10.10 Heritage management assessment summary

Context	Planning	Inputs	Processes	Outputs	Outcomes
Effective	Effective	Effective	Effective	Mostly effective	Mostly effective

Context

Heritage consists of natural heritage, Aboriginal heritage and historic heritage.

There is generally a good understanding by managers of the values relevant to historic issues. However, although there is a good understanding of the main sources of impacts on heritage, the consequential and cumulative impacts that are affecting historic heritage are less well understood. The lack of monitoring means that knowledge of actual impacts on heritage condition is limited.

Bushfires are recognised as the greatest threat to heritage places in rural areas, and demolition, deterioration and development are seen as the major threats in urban areas.

Planning

The *Heritage Act 2004* and statutory Heritage Guidelines provide the legislative power for the protection of historic heritage values and consideration of potential impacts to heritage through the development approval process. The independent ACT Heritage Council has developed a number of general conservation policies for managing heritage, although these general conservation policies do not have statutory authority.

An overarching heritage strategy that will provide objectives, actions or milestones is in development, although the lack of thematic studies to guide priorities in heritage assessment and management is a significant impediment to developing a more structured approach to heritage management in the ACT. Each heritage application is assessed using guidelines.

Before a new urban area is developed, studies of the Aboriginal and non-Aboriginal heritage of the development area are prepared by external consultants on behalf of the development proponent or Government, and are submitted to ACT Heritage

for approval. Although Aboriginal stakeholders are engaged through Government surveys that inform land development, focus has been on physical sites and artefacts, with less consideration of landscape and a sense of place. This is improving – for example, work has been done on the Story of Three Rivers with the Molonglo development. ACT Heritage is also developing an Aboriginal cultural heritage assessment policy to address Aboriginal heritage issues.

Government-owned buildings listed on the ACT Heritage Register are audited every three years. However, there is no comprehensive auditing or monitoring in place for heritage management or the condition of privately managed heritage places and objects. Linked to a lack of capacity for compliance monitoring and enforcement identified in the 2010 Marshall Review,²⁰ this means that heritage resources may be subject to threat or degradation without Government being in a position to quickly and effectively respond (or even be aware of the threat). Compliance is based on complaints from the public or general awareness by staff; however, compliance monitoring and enforcement is improving, with two staff now trained in this area.

Financial, staffing and information inputs

Resourcing of the management of heritage is adequate, given current functions and approaches. Small but effective staff resources in ACT Heritage have focused on reducing the backlog of nominations to the ACT Heritage Register, providing advice on development proposals and completing changes to heritage legislation. Now that legislative changes are in place, staff are able to focus on strategic issues such as developing an overarching heritage strategy and policies. More proactive work on heritage themes and monitoring of heritage condition would require additional resources.

Management systems and processes

The framework for engagement with stakeholders, industry and the community is through the registration process and development application processes, with both the community and consultants responding to requests for comments on development applications. An Aboriginal Liaison Officer takes responsibility for direct consultation with the Aboriginal community. Extensive consultation was undertaken in the development of the changes to the heritage legislation.

Community engagement is also through Heritage Grants, which are available to support conservation works, conservation management plans and community projects. The Canberra Tracks program is responsible for interpretative signs, with more than 32 interpretative signs erected over the past four years (see Case study 8.2 on page 347). A Canberra Heritage festival is also run each year, showcasing the region's Aboriginal, natural and built heritage.

A detailed communications strategy is to be included as part of the Heritage Strategy that is currently being developed. The Heritage Act guides processes for community consultation on registration decisions and Heritage Guidelines. Consultation is also reported annually in the Environment and Planning Directorate annual report, and consultation guidelines are in place.

Delivery of outputs and achievement of outcomes

The ACT Heritage Register, the independent statutory ACT Heritage Council and heritage agreements are in place. The revised heritage legislation has been passed by parliament, and the objectives of the Heritage Act are being met. Approval processes require consideration of heritage significance, and the outputs for development approval advice are on track to achieve ACT Government objectives for the provision of advice within statutory timeframes. Continued progress on nominations to the heritage register provides statutory protection to heritage places and objects.

10.5 Elements of effectiveness

Overall, air is the most effectively managed of the topics, followed by water, biodiversity, land and heritage, noting that all topics are generally well managed (Table 10.5). The technical and regulatory aspects of air quality management – where there are national guidelines and standards, and in the absence of major industries and very large urban populations that could affect air quality – generally scored higher against assessment criteria than other topics. Apart from air, other topics were less effective in delivering outputs and outcomes than in the earlier elements of the management cycle. In every case, all of the indicators for outputs and outcomes were scored in the third quartile (51–75% of desirable performance). This was frequently because explicit evidence of outputs and outcomes from management was not available or presented to the assessors.

As outlined in the Section 10.3, ‘effective’ and ‘mostly effective’ management indicates that there is room for improvement. These scores indicate that management is better than 50% effective. For example, in general, biodiversity is not being lost from the landscape and key processes relevant to biodiversity management are in place. On-ground performance is possibly better than the documented evidence indicates, because of the lack of systematic data on outputs and outcomes.

10.5.1 Context

Context indicators were strong across all topics with good understanding of values and threats to values, and of stakeholders and broader influences on management of each topic. In all cases, management was assessed as effective.

10.5.2 Planning

Planning was also generally effective across all topics, with some weaknesses in heritage planning identified. However, the revised heritage legislation and current strategic planning for heritage will largely address existing issues. Most management programs had clear and measurable management objectives, with evident improvements in the structure and content of planning documents. Documents such as the ACT Nature Conservation Strategy, supported by implementation plans, demonstrate improvement in planning, and should also provide output and outcome reporting. Stakeholders are generally well known and integrated into planning and management.

10.5.3 Inputs

Staff skills and availability of adequate and appropriate information to support decision-making were generally strong points in management, but adequacy of financial resources was the weakest indicator across the set of indicators. Although financial resources were generally sufficient to meet legislative and other minimum standards, more extensive monitoring, engagement and other desirable aspects of management were constrained by available funds.

10.5.4 Process

Management processes and standards were generally effective across all topics, with strongest indicators relating to governance, stakeholder engagement, use of information in decision-making and management of impacts. The weakest indicators related to performance monitoring and evidence that standards and targets are being met. Proposed developments in monitoring programs will improve performance in this area in the future. Programs in place can be readily adapted to demonstrate these processes.

10.5.5 Outputs and outcomes

Apart from air, indicators that assess whether management programs are meeting output and outcome targets were assessed as only 'mostly effective'. In many cases, there was evidence of program implementation, but evidence of effectiveness in meeting objectives was incomplete or missing. Although evidence of documented effectiveness in meeting objectives was apparent in some cases, the absence of evidence that the systems are in decline provides confidence that management is at least 'mostly effective' (ie better than 50%). As described in the Section 10.3, 'mostly effective' includes systems where clear improvement is still necessary or desired to reach effective status.

10.5.6 Conclusion

The pattern of stronger performance in the early parts of the management cycle (context, planning, inputs and processes) and in topics that are limited in complexity (such as air quality in the ACT) is similar to the findings of other assessments of effectiveness.¹ Ensuring that monitoring of outputs and outcomes is in place will not only strengthen reporting on these elements of the management cycle but, more importantly, will provide the information needed for an adaptive approach to management of environmental issues.

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