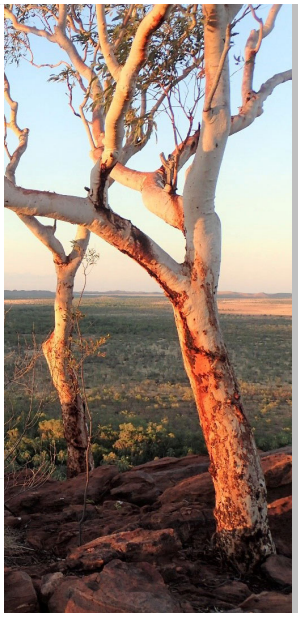

HEALTH CHECKS: A SIMPLE TOOL FOR ASSESSING THE CONDITION OF VALUES AND EFFECTIVENESS OF RESERVE MANAGEMENT

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ABSTRACT

Health Checks are qualitative tools for efficiently and routinely monitoring the condition of key natural, historic and visitor values on national parks and other reserves in the state of Queensland, Australia. They use criteria that can be applied state-wide across a diversity of values and are based on threatening processes and their impacts (e.g. infestations of pest plants, overgrazing, trampling, fire and cyclone impacts, vandalism), or particular parameters (e.g. faunal habitat features, recruitment of canopy species), that are good indications of condition. The assessor scores the condition of the value for each indicator, at representative sites, using simple, predetermined visual cues. No specialised equipment is needed. The Health Check reports use the International Union for Conservation of Nature (IUCN) condition categories (Good, Good with Some Concern, Significant Concern, Critical) and definitions to describe the overall condition of a value across the reserve based on all the Health Check indicators relevant to the value. We present a case study that demonstrates the utility of the tool in assessing condition and, when coupled with an understanding of the desired outcomes for a value and information on management inputs and outputs, evaluating management effectiveness.

Key words: Values, condition monitoring, health checks, management effectiveness

INTRODUCTION

The Queensland Parks and Wildlife Service (QPWS) is implementing the QPWS Values-based Management Framework (VBMF) (DES, 2019). The VBMF is built around the adaptive management cycle (Jones, 2000) and the management effectiveness and reporting standards established by IUCN and the World Commission on Protected Areas (WCPA) (Hockings et al., 2006). The goals of the VBMF include: providing a transparent approach for prioritising input to reserve management, given limited resources; ensuring planning is converted to on-ground actions; scrutinising whether the resources invested are resulting in desired outcomes, rather than just outputs; responding to improved information and understanding by adapting management; and demonstrating 'value for money' to the public.

Because the VBMF is predicated on adaptive management, it puts substantial emphasis on monitoring and evaluation, in particular of the condition of 'key values' – these being the most significant assets for which the reserve is recognised and a focus for management actions. In Queensland, the large number of public reserves (1,044), their area (approximately 13 million hectares of terrestrial estate including more than 450 islands), and the multitude of key values, preclude detailed quantitative monitoring on all reserves, let alone for all values. Nevertheless, it was considered essential to have at least a basic means to evaluate and report on the condition of most key values across the whole reserve estate over time. Simple tools known as Health Checks were developed for that purpose.

Importantly, Health Checks sit within a hierarchical framework of monitoring (Figure 1). They provide a foundation for regular evaluation of the effectiveness of on-ground actions in maintaining or improving the condition of key values and can trigger additional or modified actions including more detailed monitoring. Where highly significant values require management

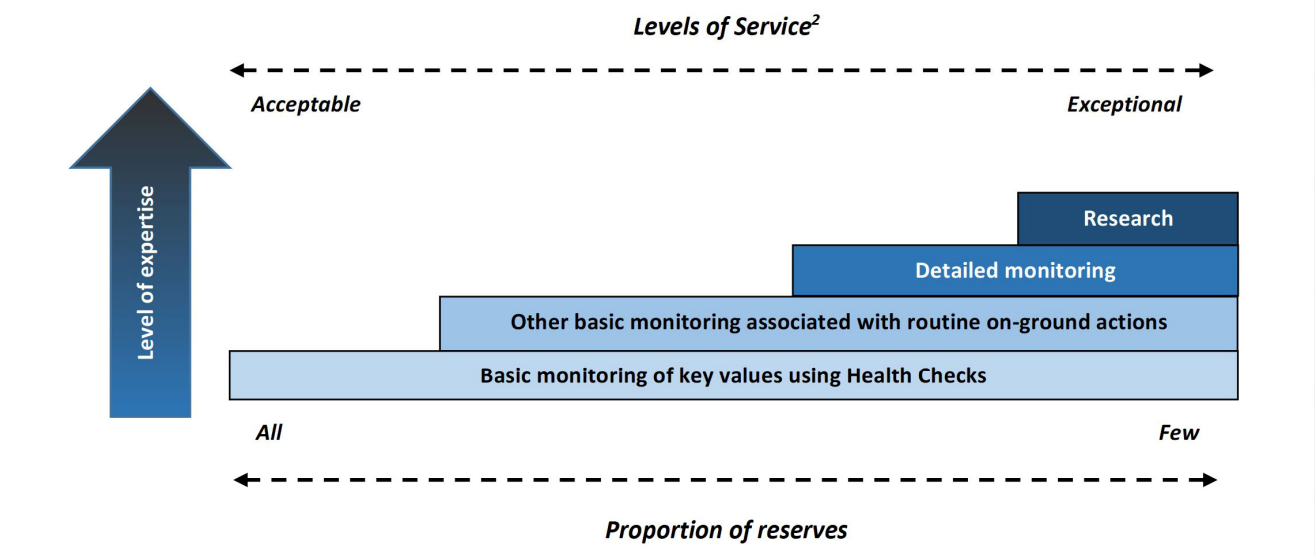


Figure 1. Hierarchical framework for monitoring and research on QPWS estate under the VBMF

intervention on high priority estate, then targeted bespoke monitoring or research is warranted.

A Health Check tool has been developed for natural values that are ecosystem-based (Melzer, 2019), visitor values (Olds et al., 2019), and post-European contact historic values (Melzer et al., 2019b). Similar concepts and methods apply across all three. This paper uses the Natural Values Health Check to outline those concepts and methods. The tools have been trialled, refined and gradually implemented over the last four years (2015–2019). To demonstrate the value of implementing Health Checks over the medium- to long-term, we developed a Retrospective Health Checks case study. This case study has been invaluable for promoting uptake of the method.

BASIC CONCEPTS AND METHODS

Key values are selected during the management planning process for a reserve. Their current and desired condition is defined using the IUCN categories (Good, Good with Some Concern, Significant Concern, Critical) and definitions (IUCN, 2012; Osipova et al., 2014) (Figure 2). The actions required to move from the former to the latter, and the priority for those actions, are also determined during the planning process. Health Checks are used to help track whether the condition of a value is trending in the right direction over time. Their purpose includes:

- providing the opportunity and means to help land managers determine whether their on-ground actions are achieving goals, in terms of the condition of key values as documented in plans and strategies, and so inform future management;
- increasing the likelihood that emerging threats will be detected more rapidly than they might otherwise have been;
- identifying the need for more detailed investigation such as quantitative monitoring or research;
- and providing the means to regularly capture a standard set of information for review and reporting that is transparent and easily understood internally and externally including internationally.

Most tangible values can be monitored using Health Checks. Species are an exception. The Natural Value Health Check is designed for assessing the condition of values that are 'ecosystems' (e.g. vegetation communities) not species. Nevertheless, for many species the condition of the ecosystem may be a useful indicator for the species' habitat. However, we generally counsel against only monitoring habitat – whether by Health Checks or bespoke monitoring – when the key value is a threatened species, because species decline may occur as a result of threats, such as disease or predation, despite apparently healthy habitat.

A comprehensive guide, providing instructions for how to undertake Health Checks and complete the record sheets, and detailed information on the indicators and criteria used in the assessment, is available for natural values (Melzer, 2019), visitor values (Olds et al., 2019), and post-European contact historic values (Melzer et al., 2019b). The guides are provided in their entirety as Supplementary Online Material. A brief overview is provided below.

Each Health Check tool uses a set of predetermined Health Check *Indicators* (HCI) based on threatening processes and their impacts (e.g. pest plant infestation, overgrazing, wildfire) or features indicative of condition (e.g. ground cover, recruitment of canopy species) (Figure 2). Their merit is that they are relatively easy to standardise, applicable across the variation in values and, when coupled with defined desired outcomes and information on management inputs and outputs, provide a good indication of the effectiveness of management or are good triggers for action.

Each HCI has a standardised set of criteria – quantitative and or qualitative – that enable the assessor to categorise the condition of the indicator as Good, Good with Some Concern, Significant Concern or Critical at each monitoring site. An example – the criteria for the HCI: *Infestations of ecosystem-changing pest plants* – is provided in Figure 2. The assessment does not require specialised equipment and requires only basic land-management skills.

The monitoring sites are not selected randomly. They are selected to provide the best representation possible of the key value and its condition states across a reserve and to facilitate the evaluation of outcomes from management actions over time. For key values that are extensive and/or represented by many examples (e.g. dispersed patches of a vegetation community), the need to adequately 'sample' the value is addressed not only by undertaking a Health Check at selected sites but also by observing (by walking, driving, flying [including drones], boating) as much as possible of the value to get an overview of its condition. The *General Impression* assigned to each HCI (Figure 2) and the *Overall Condition Class* (Figure 2) assigned to the key value at the end of the Health Check assessment are based on both the site-based inspections and the overview. The *General Impression* rating assigned to a HCI is based on the criteria for that particular HCI, whereas the *Overall Condition Class* is based on the IUCN definitions for the four condition categories (i.e. Good, Good with Some Concern, Significant Concern, Critical).

Health Check Indicator	Condition Class					General impression
	Site 1	Site 2	Site 3	Site 4	Site 5	Not an 'average'!
1. Infestations of ecosystem-changing pest plants						
2. Infestations of pest plants other than ecosystem-changers						
3. Risk of future invasion by significant pest plants not already present						
4. Rainforest invasion						
5. Woody thickening (other than by rainforest species)						
6. Overgrazing/browsing by feral animals, stray stock or natives						
7. Trampling, digging or rooting by feral or native animals, stray stock...						
8. Impacts on wetlands						
9. Vehicle impacts						
10. Dumping						
11. Ground cover						
12. Fire damage to fire-sensitive and ecosystems not fire-dependent						
13. Fire damage to peat-based ecosystems						
14. Age class distribution, fire-adapted ecosystems in conservation zones						
15. Severe wildfire in fire-adapted wooded ecosystems						
16. Severe storm, cyclone or tornado in wooded ecosystems						
17. Overtopping, erosion and associated impacts resulting from tidal...						
18. Tree/shrub health and dieback						
19. Key features for faunal biodiversity in terrestrial ecosystems						
20. Recruitment of canopy species						
Overall Condition Class (refer below)						

Description	Condition Class
Pest species are absent including on the margins.	Good
Native species dominate; pest species inconspicuous/mainly on margins. • Pest spp. in ground stratum – comprise up to 5% of cover &/or • Pest shrubs/trees – comprise up to 5% of stems or cover &/or • Pest climbers – cover up to 5% of canopy	Good with Some Concern
Pest species are a conspicuous component of the vegetation. • Pest spp. in ground stratum – comprise 5-25% of cover &/or • Pest shrubs/trees – comprise 5-25% of stems or cover &/or • Pest climbers – cover 5-25% of canopy	Significant Concern
Pest species dominate • Pest spp. in ground stratum – comprise >25% of the cover &/or • Shrubs/trees – comprise >25% of stems or cover &/or • Pest climbers – cover >25% of canopy	Critical

Overall Condition Class – what the categories mean.	
Good	The Key Value is in good condition and is likely to be maintained for the foreseeable future, provided that current conservation measures are maintained.
Good with Some Concern	The Key Value is likely to be essentially maintained over the long-term with minor additional conservation measures to address existing concerns.
Significant Concern	The Key Value is threatened by a number of current and/or potential threats. Significant additional conservation measures are required to preserve the value over the medium to long-term.
Critical	The Key Value is severely threatened. Urgent additional large-scale conservation measures are required or the value may be lost.

Figure 2. The primary field data sheet for a Natural Value Health Check.
The insert shows the criteria ('Description') for determining the condition class for the Health Check Indicators – Infestations of ecosystem-changing pest plants and Infestations of pest plants other than ecosystem-changers.

The frequency at which Health Checks are undertaken is determined by reference to a decision matrix[1] incorporating the *Levels of Service* (i.e. management standard)[2] of the reserve and magnitude of risk from threatening processes to the key value, and observations and outcomes of recent Health Checks assessments. It ranges from less than 12 months to a maximum of five years.

CASE STUDY: *RETROSPECTIVE* HEALTH CHECKS

A novel approach to demonstrating the utility of a new monitoring programme in detecting change is to retrospectively apply it using historical park records. With a wealth of archival information for many of Queensland's reserves, it is possible to conduct retrospective Health Checks to track the past condition of key values. This exercise also gives an insight into how Health Checks can examine and inform management effectiveness, provided there is a good understanding of the desired outcomes for a value and information on management inputs and outputs (e.g. expenditure, on ground actions). One such example is explored here.

The Boodjamulla National Park complex, comprising ten adjoining protected areas covering a large (378,333 ha) area in remote north-west Queensland, was selected for the case study: comparing the results of current on-ground Health Checks (2017) with Health Checks ten years earlier for several key values. The 2007 Health Checks were completed by using aerial photographs, satellite imagery and park records including survey data, photographs from monitoring sites, fire history maps and first-hand knowledge of experienced staff to determine the condition class at representative sites across a key value. These were then used to determine the *General Impression* for each HCI, and the *Overall Condition Class* of the key value. When undertaking the 2007 desktop Health Checks, particular attention was paid to those HCIs reflecting known ecosystem drivers (e.g. pest animals such as feral pigs and horses, wildfire, ecosystem-changing weeds) at Boodjamulla. The results for one key natural value at Boodjamulla – the ecological community 'Eucalypt woodlands dominated by spinifex (*Triodia pungens*)' – hereafter, spinifex woodlands, are provided here.

The spinifex woodlands, which include several regional ecosystems[3] on Boodjamulla, dominate vast areas of the park and provide habitat for threatened species including the endangered Carpentarian grasswren (*Amytornis dorotheae*) which relies on mature, long-unburnt spinifex (Threatened Species Scientific Committee, 2016). It is a highly fire prone community in a semi-arid environment that experiences high spring and summer temperatures (mean maximum November and February temperatures are 39.1 °C and 36.5 °C respectively) and a long austral winter dry season. Fire is therefore a critical driver in this community and for Boodjamulla generally. The fire management guidelines[3] for the community recommend fire free intervals of four to 10 years generally, but with the retention of some areas not burnt for ten to 20 years. The strategy recommended in the guidelines is to undertake burns across the landscape at a range of frequencies, with numerous small burns being applied every year in different places, to achieve the mosaic of age classes required to reduce the risk of wildfire burning across vast areas and retain long-unburnt spinifex in the system.

Overlooking plains and hillslopes of Eucalypt woodlands dominated by spinifex in Boodjamulla National Park © R. Melzer

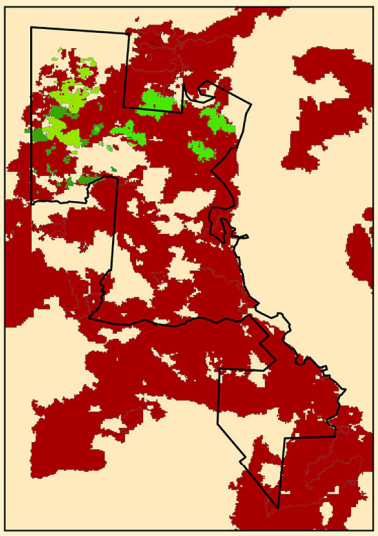
Since its gazettal in 1984, a five-year cycle of broad-scale wildfires was a feature of Boodjamulla, due mostly to insufficient landscape-scale planned burning. The wildfires, typically in the late dry season, resulted in significant financial and environmental costs as outlined below.

The results of the 2007 and 2017 Health Checks for the spinifex woodlands are presented in Figures 3 and 4.

3a. 2007 Health Check

Key: **G = Good**; GC = Good with Some Concern; SC = Significant Concern; **C = Critical**; NA = Not Applicable.

Health Check Indicator	Condition Class					General impression
	Site 1	Site 2	Site 3	Site 4	Site 5	Not an 'average'!
1. Infestations of ecosystem-changing pest plants	G	G	G	G		G
2. Infestations of pest plants other than ecosystem-changers	G	G	G	G		G
3. Risk of future invasion by significant pest plants not already present	GC	GC	GC	GC		GC
4. Rainforest invasion	G	G	G	G		G
5. Woody thickening (other than by rainforest species)	G	G	G	G		G
6. Overgrazing/browsing by feral animals, stray stock or natives	G	G	G	G		G
7. Trampling, digging or rooting by feral or native animals, stray stock....	G	G	GC	G		G
8. Impacts on wetlands	NA	NA	NA	NA		NA
9. Vehicle impacts	G	GC	G	G		G
10. Dumping	G	G	G	G		G
11. Ground cover	C	C	C	C		C
12. Fire damage to fire-sensitive and ecosystems not fire-dependent	NA	NA	NA	NA		NA
13. Fire damage to peat-based ecosystems	NA	NA	NA	NA		NA
14. Age class distribution, fire-adapted ecosystems in conservation zones	C	C	C	C		C
15. Severe wildfire in fire-adapted wooded ecosystems	C	C	C	C		C
16. Severe storm, cyclone or tornado in wooded ecosystems	G	G	G	G		G
17. Overtopping, erosion and associated impacts resulting from tidal...	G	G	G	G		G
18. Tree/shrub health and dieback	GC	GC	GC	GC		GC
19. Key features for faunal biodiversity in terrestrial ecosystems	C	C	C	C		C
20. Recruitment of canopy species	SC	SC	SC	SC		SC
Overall Condition Class						C



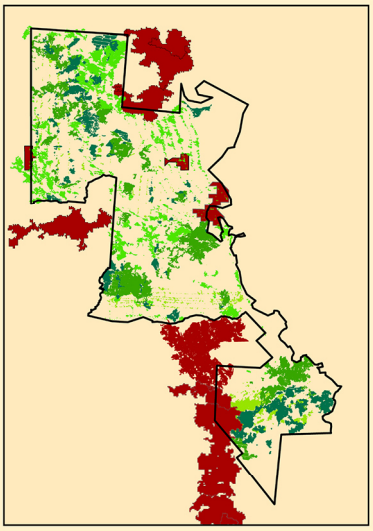
Park boundary

Overall Condition Class: Critical

3b. 2017 Health Check

Key: **G = Good**; GC = Good with Some Concern; SC = Significant Concern; **C = Critical**; NA = Not Applicable.

Health Check Indicator	Condition Class					General impression
	Site 1	Site 2	Site 3	Site 4	Site 5	Not an 'average'!
1. Infestations of ecosystem-changing pest plants	G	G	G	G		G
2. Infestations of pest plants other than ecosystem-changers	G	G	G	G		G
3. Risk of future invasion by significant pest plants not already present	GC	G	G	G		GC
4. Rainforest invasion	G	G	G	G		G
5. Woody thickening (other than by rainforest species)	G	GC	G	G		G
6. Overgrazing/browsing by feral animals, stray stock or natives	G	G	G	G		G
7. Trampling, digging or rooting by feral or native animals, stray stock...	G	G	GC	G		G
8. Impacts on wetlands	NA	NA	NA	NA		NA
9. Vehicle impacts	G	GC	G	G		G
10. Dumping	G	G	G	G		G
11. Ground cover	G	G	G	G		G
12. Fire damage to fire-sensitive and ecosystems that are not fire-	NA	NA	NA	NA		NA
13. Fire damage to peat-based ecosystems	NA	NA	NA	NA		NA
14. Age class distribution, fire-adapted ecosystems in conservation zones	GC	GC	G	G		G
15. Severe wildfire in fire-adapted wooded ecosystems	G	G	GC	GC		GC
16. Severe storm, cyclone or tornado in wooded ecosystems	G	G	GC	GC		GC
17. Overtopping, erosion and associated impacts resulting from tidal...	G	G	G	G		G
18. Tree/shrub health and dieback	G	G	G	G		G
19. Key features for faunal biodiversity in terrestrial ecosystems	G	G	GC	GC		GC
20. Recruitment of canopy species	G	G	G	G		G
Overall Condition Class						GC



Park boundary

Overall Condition Class: Good with Some Concern

Figure 3. Health Checks record sheets for 2007 (a) and 2017 (b) for the key value – spinifex woodlands.
Note: the map inserts depict the distribution of burnt areas at Boodjamulla with planned burns shown in shades of green and wildfires in red. In 3b, wildfires self-extinguished on areas burnt in the planned burn program.

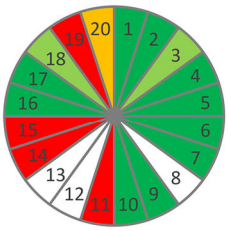
Health Check Indicator				
Good	**Good with Some Concern**	**Significant Concern**	**Critical**	**Not applicable**
1. Infestations of ecosystem-changing pest plants				
2. Infestations of pest plants other than ecosystem-changers				
3. Risk of future invasion by significant pest plants not already present				
4. Rainforest invasion				
5. Woody thickening (other than by rainforest species)				
6. Overgrazing/browsing by feral animals, stray stock or natives				
7. Trampling, digging or rooting by feral or native animals, stray stock…				
8. Impacts on wetlands				
9. Vehicle impacts				
10. Dumping				
11. Ground cover				
12. Fire damage to fire-sensitive and ecosystems that are not fire-dependent				
13. Fire damage to peat-based ecosystems				
14. Age class distribution, fire-adapted ecosystems in conservation zones				
15. Severe wildfire in fire-adapted wooded ecosystems				
16. Severe storm, cyclone or tornado in wooded ecosystems				
17. Overtopping, erosion and associated impacts resulting from tidal…				
18. Tree/shrub health and dieback				
19. Key features for faunal biodiversity in terrestrial ecosystems				
20. Recruitment of canopy species				

2007

Overall Condition Class:

Critical

***General Impression* rating for each HCI:**



2017

Overall Condition Class:

Good with Some Concern

***General Impression* rating for each HCI:**

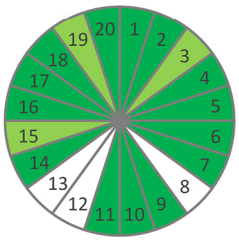


Figure 4. Comparison between the condition of the key value – spinifex woodlands, in 2007 and 2017 in terms of the Overall Condition Class and the General Impression rating for each Health Check Indicator.

The 2007 Health Checks fall within six to 12 months after a 244,229 ha wildfire swept across Boodjamulla in November 2006. The fire resulted in widespread loss of ground cover, vast areas of even-aged vegetation, severe wildfire impacts (dead trees, crown damage and epicormic growth) and loss of fauna habitat such as large old trees, shrub cover and woody debris. These impacts are clearly evident in the 2007 condition ratings for the associated HCI (11, 14, 15 and 19, respectively – refer Figure 4 for HCI numbering), with both the site-based and *General Impression* condition for those four indicators assessed as Critical (Figures 3 and 4). The *Overall Condition Class* (based on the IUCN definitions) for the spinifex woodlands was deemed to be Critical. The 2017 Health Checks were conducted on-ground after six years of a proactive broad-scale aerial burn programme, aimed at creating a complex spatial and temporal mosaic of burnt and unburnt patches across the landscape. The HCI showed a significant improvement in condition, with both the site-based and *General Impression* condition for the four aforementioned indicators assessed as either Good or Good with Some Concern and an *Overall Condition Class* of Good with Some Concern (Figures 3 and 4).

The *Retrospective* Health Checks exercise demonstrated the tangible improvement in condition of a key value over time and the ability to capture the change using simple Health Checks. It also provided an opportunity to examine the inputs, outputs and outcomes associated with fire management at Boodjamulla over time and explore how the implementation of Health Checks may have influenced those parameters. Figure 5 tracks the progress, via the *General Impression* condition class, of the HCI – *Age class distribution in fire-adapted ecosystems*, given the underlying context of the Boodjamulla fire management programme at the time and assuming annual Health Checks had been conducted between 2007 and 2017. The *General Impression* condition class for this HCI is based on the representation of age classes across an ecological community in a park and so is determined from fire history mapping and associated information.

Figure 5 reveals an interesting story. The 2006 wildfire response cost QPWS approximately $AUD 180,000 (the aerial component alone cost $AUD 110,000) and involved high risk fire-fighting operations in very remote areas. Increased planned burning was

undertaken between 2007 and 2011 in an effort to minimise the risk of future broad-scale wildfires ($AUD 57,000). This management response resulted in the *General Impression* condition rating for the HCI improving from Critical to Significant Concern as a greater range of vegetation age classes gradually developed across the landscape. The burn programme was however too conservative – failing to achieve a complex mosaic of vegetation (and hence fuel) age classes sufficient to prevent another large (218,892 ha) and costly ($AUD 66,869) wildfire in September 2011. The 2011 wildfire again resulted in even-aged spinifex woodlands. Health Checks for late 2011 resulted in the *General Impression* condition rating for the HCI being rated as Critical (Figure 5). Thereafter, the burn programme received significant operational support and financial investment ($AUD 100,000 including charter of aircraft and cost of incendiaries for conducting aerial burning, staff travel costs, satellite imagery for mapping burn areas, over five years). A proactive landscape-scale planned burning operation was implemented annually and achieved a spatial and temporal (less than one to greater than 10 years) mosaic of vegetation age-classes resulting in a *General Impression* condition rating of Good for the HCI in 2017. In 2016 (five years on from the previous wildfire), only 5,000 ha of park burnt in wildfires, with these self-extinguishing on patches recently burnt in planned burn operations. The same occurred in 2017, with only 7,950 ha being burnt. No financial costs were incurred by QPWS in either the 2016 or 2017 wildfire season. The cost-benefit of a well-supported annual burn programme is obvious. The investment (annually averaging approximately $AUD 20,000) was significantly less than the financial outlay associated with the two large wildfire events and, importantly, had broken the five-yearly wildfire cycle (Figure 3b) without the intervention of, and risk associated with, on-ground firefighting.

The case study also highlights the capacity of the Health Checks programme to sound a warning to land managers of an emerging threat to a key value. For example (Figure 5), four successive annual ratings (2007–2010) of Significant Concern for the HCI – *Age class distribution in fire adapted ecosystems* leading up to the fifth year of a park with a history of five yearly

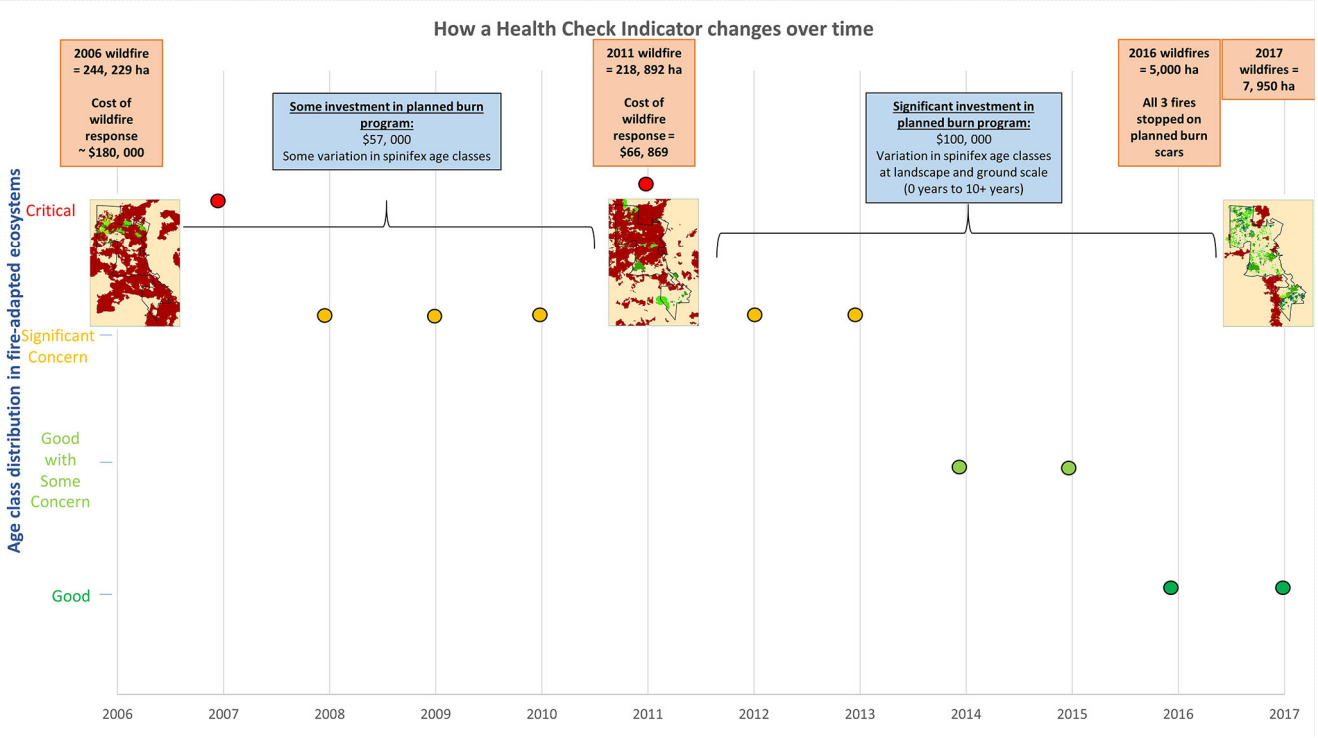


Figure 5. Examination of the change over time in the General Impression condition class for an important Health Check Indicator – Age class distribution in fire adapted ecosystems, in the context of inputs, outputs and outcomes (ecological, financial, human safety). The small maps shown at years 2006, 2011 and 2017 depict the distribution of burnt areas at Boodjamulla, with red being the extent of wildfire in the previous 12 months, greens the extent of planned burns over the previous four years (for more detail for 2007 and 2017 refer to figure 3). Note the lack of planned burns preceding the 2006 and 2011 wildfires.

wildfires, would have highlighted the need for management intervention.

Retrospective case studies, such as the one provided here, provide an insight into how Health Checks could be embedded into routine work programmes and used to inform future management and achieve positive, cost-effective conservation outcomes. The exercise demonstrated the effectiveness of simple Health Checks in assessing the condition and trend of a key value over time, and also their utility in alerting land managers to emerging threats and issues. The exercise has been well received by those who will be implementing Health Checks and has helped to overcome the inevitable reluctance of a busy workforce to embrace a new programme.

Health Checks are now routinely used on Boodjamulla to monitor the condition of the key values of the park to evaluate progress towards defined desired outcomes. Although the programme is in its infancy, the results from the annual Health Check assessments are used to help formulate the prospective work programme and guide on-ground actions, particularly with respect to fire, pest and stray stock management.

DISCUSSION

The establishment of organisation-wide monitoring programmes for conservation reserves is not novel (e.g. Vital Signs Monitoring in the United States National Park Service – Fancy et al., 2009) and there are many detailed quantitative condition monitoring programmes (e.g. BioCondition – Eyre et al., 2015) as well as rapid, often qualitative, protocols developed for specific purposes (e.g. Parks Victoria's rapid assessment technique for evaluating the condition and management needs of small reserves – Tolsma & Cheal, 2013; Reef Health and Impact Survey used on the Great Barrier Reef – Beeden et al., 2014). There is also a growing number of monitoring programmes, in Australia and internationally, incorporating both quantitative and qualitative data, involving citizen scientists and producing report cards of ecosystem health (e.g. McKinney et al., 2011; Tipa et al., 2017; Chesapeake Bay Foundation, 2018). Some of the best known of these in Australia include the Great Barrier Reef Report Card (Queensland Government, 2016) and South East Queensland Healthy Waterways report cards (Healthy Land and Water, 2017).

The QPWS Health Check tools sit within the domain of the rapid, qualitative monitoring protocols, but evolved out of an imperative to evaluate and report on the condition and trend of a large number and diversity of key values across a large and dispersed QPWS conservation estate with limited resources. While acknowledging the value of a more quantitative method, these limitations demanded the development of a rapid, simple, qualitative approach that requires limited technical expertise, to achieve that imperative. Health Checks align with the IUCN framework for reporting on condition (IUCN, 2012; Osipova et al., 2014) and the *Retrospective* Health Checks have demonstrated their utility and captured the attention of land managers. Their use of indicators of threat impacts, which are relatively easy to standardise, avoids the difficulties associated with trying to define what constitutes a healthy structure and composition for each ecosystem type (for example) and their natural variation through space and time. Moreover, it negates the requirement for expertise to evaluate such parameters.

Spinifex woodlands were in Critical condition in 2007 after the impact of the 2006 wildfire © QPWS&P

Health Checks have limitations. These include the use of a small number of sites where values are extensive, the

Boodjamulla planned burn program between 2012 and 2016 improved the spinifex woodlands condition to Good with Some Concern in the 2017 Health Checks © Lea Ezzy

potential bias in site selection, the potential for some inconsistency between assessors in determining condition ratings and the lack of quantitative data demonstrating the link between indicators and biodiversity outcomes. Input, in the planning phase, by staff experienced in undertaking monitoring, the use of site-based and overview assessments to derive the *General Impression* and *Overall Condition Class,* together with training and mentoring help to overcome or minimise the effect of some of these limitations. Critical, however, is the recognition that Health Checks form the most basic level of monitoring in a hierarchy of monitoring (Figure 1). We have purposely not used numerical scores to arrive at condition ratings – to avoid any illusion that Health Checks are a quantitative form of monitoring: something they are not!

The *Natural Value* Health Check is not designed for monitoring species. However, it is applicable where ecosystem health is a good surrogate for the health of a species' habitat requirements. Further, the Health Checks framework lends itself to developing specific protocols for monitoring the condition of a species' habitat when its habitat requirements are well understood and able to be defined using qualitative parameters. The first such protocol has recently been developed for the koala (*Phascolarctos cinereus*) (Melzer et al., 2019a). The *Koala Habitat* Health Check is applicable to all known and potential koala habitat across the Australian states of Queensland and New South Wales.

In summary, Health Checks are simple tools that can be used across reserves as part of routine management activities to provide basic information on the condition and trend of a wide range of values. They require minimal training and no specialist equipment, and facilitate regular review by land managers of the effectiveness of their management in maintaining or recovering key values. Engaging in basic Health Checks monitoring makes it more likely that a need for detailed monitoring or research will be identified. A regular, structured, albeit qualitative, monitoring programme also makes it more likely that issues or emerging threats will be identified earlier than might otherwise occur – especially in the case of reserves that are rarely visited or

Spinifex woodlands with a mosaic of age classes of spinifex © H. Hines

where other forms of monitoring or opportunities for monitoring are lacking. Although in the early phase of implementation, the value of Health Checks in engaging staff not previously involved in monitoring, eliciting rapid management response to redress hitherto unnoticed threats to key values, and informing future work programmes, has been pleasing. Last, but not least, they provide a means to regularly capture a standard set of information about a value that can be used for reporting at a range of levels including internationally.

ENDNOTES

[1.] The decision matrix is provided as Figure 2 in the guides for undertaking natural (Melzer, 2019), visitor (Olds et al., 2019), and historic values (Melzer et al., 2019b). Background information and comprehensive instructions for undertaking Health Checks are provided in the guides. They are available at https://parks.des.qld.gov.au/managing/framework/monitoring/ and as Supplementary Online Material.

[2.] Levels of Service (LoS) benchmarks are used to set the desired management standards across all parks – recognising that all parks deserve great management, but that more effort needs to be directed to parks with higher values. LoS are set for eight management elements, such as fire and pest management, and guide the amount of time, people and money invested for each element. There are five LoS: acceptable, medium, high, very high, exceptional. https://parks.des.qld.gov.au/managing/framework/planning/

[3.] Regional ecosystems are based on bioregions, land zones and vegetation types – as reflected in the unique three-part code (e.g. 1.10.4 – one of the regional ecosystems comprising the ecological community referred to in this paper – eucalypt woodlands dominated by spinifex) assigned to each regional ecosystem. An explanation of the regional ecosystem framework is provided at https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/descriptions/framework. A range of information, including fire management guidelines, is available for each regional ecosystem. It can be accessed by searching on the regional ecosystem code at https://apps.des.qld.gov.au/regional-ecosystems/

SUPPLEMENTARY ONLINE MATERIALS

Natural Values Health Check Guide
Historic Values Health Check Guide
Visitor Values Health Check Guide

ACKNOWLEDGEMENTS

Central Region QPWS staff, particularly Sarah Jess, Anthony Contarino and Marty McLaughlin for supporting the Health Checks programme at Boodjamulla. John Olds, Jannene Smith, Matt Pyke and Dani Mansfield for their contribution as authors and co-authors of Health Checks. Alistair Melzer for constructive comments on the manuscript. Mick Smith for reviewing a draft and for the inspired use of pie charts to portray changes in HCI and Emma Giorgio for supplying statistics on the number and area of estate. Susan Tilgner for formatting the guides and Kym Thomson for assistance with developing and formatting figures.

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RESUMEN

La comprobación de la condición es una herramienta cualitativa clave para monitorear eficiente y rutinariamente la condición de los valores naturales, históricos y de visitantes en los parques nacionales y otras reservas en el estado de Queensland, Australia. Utilizan criterios que se pueden aplicar en todo el estado a través de una diversidad de valores y se basan en los procesos de amenaza y sus impactos (por ejemplo, infestaciones de plantas con plagas, pastoreo excesivo, pisoteo, efectos de los incendios y los ciclones, vandalismo) o parámetros particulares (por ejemplo, características de los hábitats de la fauna, reclutamiento de especies de dosel), que son buenos indicios de la condición. El evaluador califica la condición del valor para cada indicador, en sitios representativos, mediante la utilización de señales visuales predeterminadas simples. No se necesita equipo especializado. Los informes de comprobación de la condición utilizan las categorías sobre el estado de conservación de la Unión Internacional para la Conservación de la Naturaleza (UICN) (Bueno, Bueno con alguna preocupación, Preocupación significativa, Crítico) y definiciones para describir la condición general de un valor en la reserva en función de todos los indicadores del informe de comprobación de la condición que son pertinentes para el valor. Presentamos un estudio de caso que demuestra la utilidad de la herramienta para evaluar la condición y, cuando se combina con el conocimiento de los resultados deseados para un valor e información sobre los aportes y resultados de la gestión, para evaluar la eficacia de la gestión.

RÉSUMÉ

Les bilans de santé sont des outils qualitatifs permettant de surveiller efficacement et régulièrement l'état des principales valeurs naturelles, historiques et touristiques dans les parcs nationaux et autres réserves de l'État du Queensland en Australie. Ils se servent de critères qui peuvent être appliqués à l'ensemble du territoire à travers une diversité de valeurs, tenant compte des menaces éventuelles et de leurs conséquences (par exemple des infestations de plantes nuisibles, surpâturage, piétinement, impacts d'incendies et de cyclones, vandalisme) ou des paramètres particuliers (par exemple, les caractéristiques de l'habitat faunique, le recrutement d'espèces de la canopée), qui sont de bonnes indications d'un état de santé. L'évaluateur note l'état de la valeur pour chaque indicateur sur des sites représentatifs, en utilisant des repères visuels simples et prédéterminés. Aucun équipement spécialisé n'est nécessaire. Les rapports de bilan de santé utilisent les catégories de conditions (Bon, Bon avec certains aspects préoccupants, Préoccupation importante, Critique) de l'Union internationale pour la conservation de la nature (UICN) et des définitions pour décrire l'état général d'une valeur dans l'ensemble de la réserve en se fondant sur tous les indicateurs de bilan de santé pertinents à la valeur. Nous présentons une étude de cas qui démontre l'utilité de cet outil dans l'évaluation de l'état de santé, ainsi que, quand cela est associé à une appréciation des résultats escomptés pour une valeur et une information sur les intrants et les extrants, de l'efficacité de la gestion.