

Research Review and Recommendations for Effective, Whole of Government Management of Bell-Miner Associated Dieback (BMAD) in NSW.

Project Review

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Introduction

The NSW Environmental Trust provided a grant to the NSW Office of Environment and Heritage to conduct a research review on the issue of Bell-Miner Associated Dieback (BMAD). The grant agreement was signed on 22nd April 2016.

Bell-Miner Associated Dieback is a widespread problem in New South Wales, causing decline in health of the dominant eucalypt tree species and consequent cascading ecological impacts resulting in a decline in biodiversity. The phenomenon may be related to an increase in weed invasion and other invasive species.

BMAD has been recognised as an ecological and forest management issue for some time. In 2004 a National Forum on BMAD was held and the Bell Miner Associated Dieback Working Group published a BMAD Strategy which included an agreed set of actions to address the issue.

The research review funded by the NSW Environmental Trust sought to address the following questions:

What is the extent of BMAD affected land in NSW and what areas are at risk

What are the options for systematic monitoring of BMAD status and trend

What causative factors lead to BMAD

What are the ecological, social and economic impacts of BMAD

What are the most effective management interventions to control BMAD, prevent BMAD and restore healthy forest

What are the costs of intervention

What impact does landholder size have on treatment options

This technical evaluation report is intended to provide an independent review of the project and its implementation. In addition, I have been asked to identify recommendations for future Trust investment in BMAD projects.

Stakeholder Consultation

One aspect of the project brief for this evaluation was a requirement to consult with identified stakeholders. The NSW Environmental Trust identified a short list of relevant stakeholders. Each identified stakeholder was sent an email including a set of questions with a request that a phone interview be undertaken. Stakeholders from OEH, NSW Forestry Corporation and Department of Primary Industry (DPI) responded and were interviewed regarding the Project, the degree to which it met expectation, its recommendations and future work arising from those recommendations. An independent stakeholder was also approached but had not responded at time of completion of this draft report.

The stakeholders were universally positive about the Project, the high quality of the literature review and the conduct of the workshop.

The commitment of all agencies to ongoing work (see below) is an indication that the Project has successfully encapsulated the issues surrounding BMAD and the causal model leading to its manifestation.

Elements of the stakeholder interview responses are included in specific points within the evaluation sections below.

Findings – Governance Issues

Appropriateness

The project was developed in close consultation with the Environmental Trust. The method of review chosen, involving a systematic approach known as realist review, was appropriate and allowed rigorous analysis of the scope and quality of published research on the problem.

Given the state of knowledge prior to the project and the public debate regarding causes and impacts, it is considered that the project addressed the need identified and was the most effective mechanism to further the science surrounding BMAD.

Effectiveness

The project budget was underspent by just over \$2000 as the consultant was obtained at a lower price. The final financial statement was submitted some months after the deadline, although the accounting was relatively simple with just two primary items of expenditure.

Project planning and management was guided by a steering committee. The review once completed was referred appropriately for peer review.

The project was initially intended to be completed within eight months (end 2016) with a progress report completed after four months. The project timing was extended on two occasions, so that, ultimately the project completion date was December 2017. The extension of the project related to two primary reasons, a delay in the time taken for the consultant to prepare their report, and a variation of the project to include funding for the stakeholder workshop. The project manager took appropriate action to alert the Trust relating to the delay and it is considered that the delay was unavoidable.

The project Business Plan expressed the following objective *“This purpose of this project is to consolidate and review existing knowledge on the science and management of BMAD and*

identify the gaps in scientific knowledge which are currently impeding effective action. The research review will gain a more comprehensive understanding of the scale, causes and effects of BMAD. From this consolidated review, a prioritised set of options and actions will be developed to guide management and policy development beyond this project, driving a strategic, whole-of-government, cross-tenure approach to managing this issue in NSW. These actions may include further research to fill knowledge gaps, and recommendations to guide management across a range of tenures.”

The outcome from the Project was a comprehensive review of literature relating to BMAD, the development of a causal model based on best-available information, a review of treatment interventions and their efficacy, a stakeholder workshop reviewing the findings and the development of a prioritised list of actions arising from the project.

One issue for the review was the extent of BMAD and the identification of areas likely to be at risk from BMAD. This question was not answered in a complete manner as the review relied on mapping by the Department of Primary Industries which was not available when the final review report was completed. Further the mapping only covered the northern section of the State, north from the Hunter Valley, although the phenomenon occurs to the Victorian border and beyond; and, does not cover areas at risk. The lack of timely and comprehensive mapping has not impeded other aspects of the project and work on BMAD related projects is continuing in parts of the State not covered by the mapping.

These outcomes from the Project set the scene for future work on the issue and two key agencies, the Office of Environment and Heritage and the NSW Forestry Corporation are conducting ongoing work following from the Project. In particular, OEH has commenced a project, ‘Managing BMAD susceptible and affected forests on the NSW North Coast – the next steps’ and are developing a Key Threatening Process strategy for BMAD, the Forestry Corporation of NSW are an active participant being involved in treatment trials involving use of fire, including cultural burning approaches, and mapping by the DPI of the extent of BMAD from the North Coast to the Hunter Valley has been completed.

It is unclear whose role it is to take forward the development of the land manager toolkit.

Efficiency

The Project simply involved a literature review, with a stakeholder workshop included as funds allowed for this additional element. Therefore, the question of efficiency is reduced to an issue as to whether the review was delivered in a complete and timely manner. My conclusion is that it certainly met both points. Stakeholders consulted as part of the review were satisfied that these elements were addressed, that progress can continue based on the work conducted, and that there is broader agreement relating to the causal model for BMAD.

Process

The project manager was Mike Roache, of OEH. A steering committee included officers from OEH, Forestry Corporation of NSW, Environmental Protection Authority and the Department of Primary Industry. The Project progressed in a timely way (subject to delays discussed previously in this evaluation) and completed within budget.

The successful completion of a comprehensive literature review and generally positive responses through the workshop indicate the Project was well managed. The stakeholders consulted as part of this evaluation were highly positive about the management of the Project with no negative comment received.

Opportunities

The Business Plan identified a number of risks which had the potential to impede the success of the Project.

These included:

- delay in delivery due to lack of time and/or resources,
- lack of commitment from organisations involved in the project, and
- reputational risk arising from the perceptions of community organisations.

Controls were included to address these risks and the outcome of the Project demonstrates that these issues were overcome.

The Project developed a priority list of recommendations for further action. This was last updated in February 2018, drawing on outcomes from the stakeholder workshop. The high priority actions are being progressed and there is an intention to act on the medium priority actions although there is no formal structure for cross agency co-operation into the future.

Findings – Technical Review Issues

Stakeholder communication was achieved through a range of measures. A range of Government agencies were included in the Project Steering Committee. The scope of the Project was communicated to identified stakeholders among community groups and these groups were involved in identifying examples of treatment interventions. Subsequently a broad range of stakeholders were involved in the workshop. Whilst, the addition of an independent scientist on the steering committee may have been more inclusive, it is considered that the breadth of stakeholder communication was appropriate, and that the outcome of the Project demonstrates this. Updating information about the ongoing work related to BMAD by Government agencies through their websites would show continued commitment to public communication on this issue.

Whilst OEH, NSW Forestry Corporation and DPI have ongoing projects related to BMAD, and the high priority actions are being progressed, it is unclear at what level the agencies have formally resolved to continue this work.

There is no ongoing formal process for communication among agencies and it is unclear the extent to which each agency is aware of other projects. There needs to be a formal structure which co-ordinates a BMAD response including taking up the independent review recommendations. Stakeholders expressed the view this needed to be a high-level cross-agency group. A lead agency would need to be selected and an agreed structure for communication developed with periodic updates. If needs dictate, the role of lead agency could be rotated among agencies.

Issues which need to be covered include:

- curation of the causal model, including identifying a single data custodian and providing for further adaptation of the model based on improved scientific understanding
- development and publication of the decision support toolbox
- maintenance of a register of interventions and their efficacy

It is too early to determine the effectiveness of land managers' implementation of actions. Nevertheless, the project seems to have given renewed impetus to awareness of BMAD, and to implementing actions which improve on knowledge of intervention approaches. Further development of a formal process to take the work ahead will increase the likelihood of effective and co-ordinated action.

One of the project's desired outcomes was to determine the scale of the problem. The lack of state wide mapping of the extent of BMAD could be seen as a deficiency of the project. However, the Business Plan sought to identify gaps in knowledge which may impede effective action, and this is an issue which has been revealed through the process. It could also be argued that work on BMAD affected areas is continuing outside the mapped areas and that this work is improving understanding of the extent of BMAD, although mapping methodology is not universal.

The mapping of BMAD extent has, to date, been a single point-of-time process. That is, there is no mapping available which shows a time sequence of occurrence of the phenomenon. Evidence for an expansion of BMAD appears to be anecdotal, rather than based on objective science. In this light, there is no reliable evidence that the area affected by BMAD has stabilised or reduced. Indeed, the conduct of the project was not likely to have such an effect, being primarily a review of the status of BMAD. Further steps need to be taken to consolidate the work which has been achieved through this project.

Future work which provides a trend analysis could include a program of re-visiting the existing intervention sites, as well as trend monitoring within the new projects being run by OEH and NSW Forestry Corporation. A review of the ecological status at identified or mapped BMAD sites affected by recent wild fire events may also refine the causal model and guide future interventions.

Recommendations and Future Trust Investment

The evaluation brief required the preparation of recommendations for future areas of Trust investment in BMAD related projects.

In considering this task, attention was paid to the Objects of the Trust and the nature of projects funded by the Trust. Trust funded projects include restoration and rehabilitation works which reduce environmental degradation, research into environmental problems, assessment of environmental degradation and promotion of environmental education relating to environmental issues.

Priorities for funding include projects involving complementary actions, community partnerships, strategic collaboration, and should generally align with priorities of Government. Projects which represent core business of an agency or organisation are not eligible for Trust funding.

The BMAD review project established a prioritised set of recommendations for future work (appended to this report), together with a list of actions related to a proposed decision support toolbox. Developing, testing and refinement of the decision support toolbox is a high priority action.

Funding for further development of the decision support toolbox is problematic as there is a lack of certainty about the causal model. Other dieback related projects such as that on Psyllid-induced dieback of Grey Box on the Cumberland Plain indicate the dieback problem is broader than indicated. At this stage it is recommended that the further research relating to BMAD being conducted by OEH and NSW Forestry Corporation be used a mechanism for the further refinement of the toolbox. Publication of a refined toolbox is one element which would appear to correspond to the environmental education Object of the Trust and should be considered as an area of future Trust investment.

Generally, there seems to be a need to build of the work of this successful project by bringing more to public attention. This could include dissemination of information about the report itself, about research and implementation projects being pursued following up from the project and updating Lantana control information on the DPI/LLS websites to incorporate information about the overlap between Lantana infestations and BMAD.

As stated previously both OEH and NSW Forestry Corporation are working on projects which will address High Priority recommendations 1, 2 and 4. In terms of Medium priority recommendations from the Project, 5, 10 and 11 may align with Trust objects.

Recommendation 5 relates to publication and curation of the causal model and action on this recommendation would be consistent with the environmental education object of the Trust.

Recommendations 10 and 11 relate to improving mapping and modelling of sites where there is an elevated risk of BMAD. These are predictive risk mapping projects which would be consistent with research development in relation to BMAD and which would facilitate collaboration between agencies and private land holders.

Another research question which could be addressed to allow for strategic intervention is the degree to which BMAD affected sites impact on threatening processes related to particular threatened species. An example raised by one of the interviewed stakeholders was the relationship between BMAD affected sites and habitat for the threatened species, Eastern Bristle Bird. Projects which investigate relationships between BMAD affected sites and threatened species should be a priority for future Trust investment as they would be likely to improve knowledge about aspects of environmental degradation, they involve new research into environmental problems and they may involve complimentary actions through improving knowledge about vegetation dynamics, fire ecology and threatened species protection.

A further research question relates to further refinement of the causal model and the role of fire. Over the past 15 years there have been many bush fires across areas identified as being BMAD affected, including the intervention sites discussed in the literature review. There has been no systematic review of such sites and their current ecological status in comparison to conditions identified when they were first assessed.

A further issue which did not receive consideration in the review report is the role of climate change in the development and spread of BMAD. Thickening of woody vegetation is a

world-wide phenomenon which a number of authors have attributed to climate change. Understanding better the role of fire and vegetation dynamics may refine the causal model and any association between BMAD and climate change.

A systematic field assessment of fire affected sites would improve understanding about recovery pathways, refine the causal model and more clearly delineate suitable intervention practice, contributing to improvement of the decision toolbox.

There is also a need to define appropriate treatment options at different scales. That is, the treatment option best for small holdings is necessarily different to that which would need to be applied in production forests.

In terms of restoration and rehabilitation projects on private land and those led by community groups, the Trust could fund strategic projects which are linked to key elements of the BMAD implementation priorities. Namely, those which implement the decision support toolbox, and which contribute to an adaptive management response to BMAD. Such funding would be part of the normal funding streams but would be expected to have a level of design and monitoring which would add benefit.

DRAFT ANALYSIS of Recommendations from the Independent review of bell miner associated dieback.

Note: This analysis does not capture every detail of the recommendations from the independent review, but is provided for high-level discussion only.

Table 1: Summary of revised recommendations ordered by assessment of importance

#	Revised recommendation	Assessment of feasibility	Assessment of importance
1	Adopt the causal model of this review as a working hypothesis of BMAD in NSW.	High	High
2	Establish a BMAD research and development program to answer a series of questions in a logical sequence to determine best practice management.	High	High
3	Develop, test and refine a decision-support toolbox for land managers for the identification, prevention and treatment of BMAD.	High	High
4	Monitor BMAD across NSW using the latest survey and modelled data.	High	High
5	Publish the causal model online and update it regularly based on analysis of primary data.	High	Medium
6	Support public submissions of BMAD-affected areas to aid mapping.	High	Medium
7	Analyse the overlap of mapped areas of BMAD with threatened flora and fauna distributions. Where possible, use modelled BMAD mapping to extend the analysis across NSW.	Medium	Medium
8	Analyse the economic impact of BMAD on forestry operations in state-owned forests.	Medium	Medium
9	Monitor and publish cost- and benefit-related information from all BMAD interventions to inform future guidelines for prevention and treatment.	Medium	Medium
10	Complete aerial mapping of BMAD for higher-risk areas of NSW. Prioritise areas with known high density of bell miners.	Medium	Medium
11	Analyse existing BMAD mapping to identify the best risk indicators or preconditions for BMAD. Develop a BMAD risk map or site-based assessment process using the results of that analysis.	Low	Medium
12	Develop a research program on lantana control.	Medium	Low

Table 2: Summary of recommendations related to the proposed decision-support toolbox

#	Revised recommendation
T1	Develop and implement guidelines to minimise the establishment or spread of BMAD in areas where disturbance to the canopy is unavoidable.
T2	Re-establish a canopy as soon as possible after disturbance to limit unnatural understorey density.
T3	Conduct ongoing management of invasive weeds, particularly those that minimise natural regeneration and can act as superior nesting sites for bell miners.
T4	Develop and implement guidelines for appropriate fire regimes to minimise the establishment of BMAD where fire management is applied. Note that a significant proportion of BMAD sites would not have had fire at regular intervals so this needs to be carefully implemented using the best available science and a process such as HotSpots (http://hotspotsfireproject.org.au).
T5	Conduct site assessments to ensure that bell miners are present and psyllids or other insects are the primary cause of dieback prior to investment in BMAD interventions.
T6	Consider not intervening to address BMAD where the prevailing vegetation community is naturally dense in the understorey or mid-storey. BMAD may be a natural process in some areas.
T7	Assess the viability of the seedbank for rehabilitation without planting at those sites with unnaturally dense understorey and/or mid-storey.
T8	Consider culling bell miners followed by site rehabilitation at sites with high-value assets being impacted by BMAD (e.g. threatened flora or fauna).
T9	Support ongoing learning and improvement within the BMAD land manager community. <ul style="list-style-type: none"> • Publish the products of this review online, including the causal model, case studies and guidelines. Update the products periodically with new evidence, including through submissions from the BMAD land manager and research community. • Once a land manager decision-support toolbox and guidelines for prevention and treatment of BMAD have been developed, design and implement a training program and associated resources. Examples may include provision of bell miner recordings

#	Revised recommendation
	for identification purposes or guidance on the appropriate use of a splatter gun to treat lantana.
T10	The likely viability of different BMAD interventions based on the area affected should be included in a decision-support toolbox for land managers.