



Department of Biodiversity,
Conservation and Attractions

Review of the Sandalwood (Limitation of Removal of Sandalwood) Order (No. 2) 2015

2026 Draft Review Report



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Front cover Sandalwood. *Photo – DBCA.*

Invitation to comment

This report was released on 6 July 2026 to provide the public with an opportunity to comment on the *Review of the Sandalwood (Limitation of Removal of Sandalwood) Order (No. 2) 2015*. This report has been prepared in accordance with the *Santalum spicatum* (Sandalwood) Biodiversity Management Programme. A *Draft Technical Report* has also been released and can be read in conjunction for those wanting a more in-depth overview of habitat stratification and sandalwood population modelling.

The Department of Biodiversity, Conservation and Attractions (DBCA) is keen to gauge public opinion on specific areas of the report and has posed some questions throughout to help encourage comment and constructive feedback. Feedback is welcomed, and these guiding questions are provided to support the discussion, though there is no expectation to respond to every question nor is feedback restricted to these questions.

- Do you consider the recommended annual take limit to be acceptable considering that proposed harvest should be sustainable and include appropriate seeding and monitoring?
- Do you think an option to allow for up to 50 per cent of unused quantities to 'roll-over' for use in the following year is acceptable, and if so, why?
- Do you have any suggestions to help inform a change to Biodiversity Conservation regulation 67(3)(c), which specifies minimum diameter under bark for the harvest of living (green) trees?
- How can DBCA better engage with Aboriginal representative bodies/corporations to better plan for sustainable harvesting of sandalwood?
- Do you have any suggestions for improvement of future engagement processes?
- Is there any other information that should be included and considered in the final Sandalwood Order review report?

Reports and other information relevant to this review can be viewed and submissions made online at dbca.wa.gov.au/review-sandalwood-order. Please also refer to the *Scope of works for the review of the Sandalwood (Limitation of Removal of Sandalwood) Order (No. 2) 2015* for information about what is within the scope of the review, which is available on the link provided.

Alternatively, you can also:

- phone **(08) 9219 9000** and ask to speak to someone from the Sandalwood Project Team. Meetings can be arranged on request.
- send an email to sandalwood@dbca.wa.gov.au
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Please note any submissions received by mail may result in a delayed response due to postage times. The closing date for public submissions is 4pm Monday 17 August 2026.

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Acronyms and abbreviations

(AS/NZS) Australian and New Zealand standard
(BC Act) *Biodiversity Conservation Act 2016*
(BC regulations) Biodiversity Conservation Regulations 2018
(BMP) Biodiversity Management Programme
(CALM) Department of Conservation and Land Management
(CEO) Chief Executive Officer
(Cth) Commonwealth
(CSIRO) Commonwealth Scientific and Industrial Research Organisation
(DBCA) Department of Biodiversity, Conservation and Attractions
(DPaW) Department of Parks and Wildlife
(DPIRD) Department of Primary Industries and Regional Development
(EP Act) *Environmental Protection Act 1986*
(EPBC Act) *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*
(ESD) Ecologically Sustainable Development
(ESU) Ecologically Sustainable Use
(FP Act) *Forest Products Act 2000*
(FPC) Forest Products Commission
(IBRA) Interim Biogeographic Regionalisation of Australia
(ICIP) Indigenous Cultural and Intellectual Property
(ILUA) Indigenous Land Use Agreement
(IUCN) International Union for Conservation of Nature
(KFDF) K Farmer Dutjahn Foundation
(NT Act) *Native Title Act 1993*
(PEFC) Programme for the Endorsement of Forest Certification
(RNTBCs) Registered Native Title Bodies Corporates
(SFM) Sustainable Forest Management
(STF) Sandalwood Tracking Forms
(WA) Western Australia or Western Australian
(WASAG) WA Sandalwood Advisory Group
(WASP) WA Sandalwood Plantations
(YHLC) Yilka Heritage and Land Care

1. Acknowledgements

The Department of Biodiversity, Conservation and Attractions (DBCA) acknowledges the Aboriginal peoples who were the first custodians of sandalwood (*Santalum spicatum*) and the Traditional Owners of the lands and deserts where sandalwood originated and thrived. We respect the connection and Cultural Knowledge of their Elders past, present and emerging.

This review of the Sandalwood Order incorporates Cultural Knowledge and traditional cultural expressions that embody the Indigenous Cultural and Intellectual Property (ICIP) of the Yilka Heritage and Land Care Pty. Ltd., the K. Farmer Dutjahn Foundation, Dutjahn Sandalwood Oil Pty. Ltd., Kutkabubba Aboriginal Corporation, Windidda Aboriginal Corporation, and Bindulbu Aboriginal Corporation, and has been created with the consent of these groups. Use of any data or any part of this report that includes ICIP for any purpose that has not been authorised by the Traditional Owners may be a serious breach of their customary law. For enquires about permitted reproduction, please contact sandalwood@dbca.wa.gov.au or phone (08) 9219 9000.

We thank the Forest Products Commission (FPC), Ian Kealley, Hugh Chevis and Grant Pronk for providing information on sandalwood ecology, conservation and population demography. We also thank DBCA and FPC staff for their extensive efforts in collecting field data and for their contributions for the preparation of this report. We thank Dr Martin Rayner and Paul Roberts for their contributions to this review. We also thank Jack Bradshaw who carried out the sandalwood population modelling. Lastly, we thank all those who have not been specifically mentioned here who have provided various contributions—either indirectly or more directly via their work or engagement with DBCA—which have helped to provide input into the Sandalwood Order review process.

2. Preface

Since the publication of the *Santalum spicatum* (Sandalwood) Biodiversity Management Programme (Sandalwood BMP) (DBCA, 2023), a *Scope of works for the review of the Sandalwood (Limitation of Removal of Sandalwood) Order (No. 2) 2015* (Scope of works) was released at the end of 2024 outlining the process for the review of the *Sandalwood (Limitation of Removal of Sandalwood) Order (No. 2) 2015* (2015 Sandalwood Order) (Government of Western Australia, 2015). This critical work is important for the future of wild sandalwood management. It is a complex and demanding task to implement a thorough and rigorous review process, given the multitude of factors that must be considered. However, the Minister for the Environment is required to decide a new Sandalwood Order that defines new quantity limits for the removal/take¹ (or harvest) of wild sandalwood to replace the current *2015 Sandalwood Order*.

This *Review of the Sandalwood (Limitation of Removal of Sandalwood) Order (No. 2) 2015, Draft Review Report* (Draft Review Report) has been informed by broad consultation and best available information and will be refined during the public consultation process for its review. This report is intended to be as concise as practicable while still informing readers and decision-makers. A more detailed report entitled *Review of the Sandalwood (Limitation of Removal of Sandalwood) Order (No. 2) 2015, 2026 Draft Technical Report* (Draft Technical Report) has also been prepared, and it is encouraged that the two reports are read together. The *Draft Review Report* is designed to read as a stand-alone document and the *Draft Technical Report* contains more in-depth information on habitat stratification and population modelling.

¹ Refer to the glossary for a definition of 'take'. Throughout this report the terminology of 'harvest' or 'remove/removal' are used interchangeably to refer to the take of sandalwood.

Sociological factors (i.e. the relationship between humans and the natural environment) have had a profound impact on the conservation and use of wild sandalwood. Setting an Order without considering economic, environmental, social and equitable considerations, can result in a perverse outcome and is not consistent with the *Biodiversity Conservation Act 2016* (BC Act). As such, effective consultation with stakeholders and Aboriginal people is essential to the review process as it is acknowledged that it is not possible that the authors have all the information, expertise or solutions. In particular, input from Aboriginal people and Native Title holders is sought. It is acknowledged that thousands of years of caring for sandalwood Country by Aboriginal people needs to be respected and opportunities should be pursued for their voices to be heard, particularly as sandalwood is culturally significant. Legal rights and land tenure also have significant implications for sandalwood governance and must be considered for the review.

There is scope to consider further available information for the review, and it is envisaged that the public consultation process will add value in that regard. Within this report some text has been bolded to highlight key points. In addition, there are some targeted questions (also indicated in bold text) identified to encourage constructive consultation. At this stage of the review process, draft recommendations—including proposed new harvest/take limits—have been made. In addition, results of initial modelling and past and more recent consultations have been considered. As the recommendations are draft, they are subject to further review and may change. Draft recommendations throughout the review are sequentially numbered and highlighted in shaded boxes.

It is intended that the final Sandalwood Order review report will clearly articulate the rationale behind any recommendations, considering all relevant factors necessary to ensure alignment with the BC Act.

3. Executive summary

This *Draft Review Report* provides a review of the current *2015 Sandalwood Order*, which prescribes removal/harvest limits for wild sandalwood. Research shows that there is a lack of natural regeneration of wild sandalwood occurring. This report reinforces the need for seeding/regeneration programs. Any decisions on the future of sandalwood management must consider that a ‘do nothing’ approach is not an option if sandalwood is to be managed in accordance with the BC Act and to meet objectives of the *Sandalwood BMP*.

The process of reviewing the Sandalwood Order has involved collation of best available information (including sandalwood plot data with over 300 newly measured plots in 2022–2024), sandalwood habitat stratification, analysis of sandalwood population condition and development of a sandalwood population projection model to simulate the impact of various management scenarios. The *Draft Technical Report* provides more detailed information on the methods and results of the sandalwood population modelling. This process involved a risk assessment of sandalwood species persistence within and across its distribution. In line with requirements of the BC Act, an assessment of various management scenarios considered what options would best support Ecologically Sustainable Use (ESU) of sandalwood. Further, the recommendations in this report consider the implications for Ecologically Sustainable Development (ESD). All recommendations consider the input that has been received to date from stakeholders and Aboriginal people. Separate summaries have been produced to outline some key feedback received to date. This includes a summary of feedback DBCA has received prior to the public consultation period and since the release of the *Scope of works* for the review of the Sandalwood Order.

This report highlights some key preliminary findings including:

- Without management intervention, sandalwood in most regions is at risk of long-term decline due to a lack of natural regeneration.

- Sandalwood populations surveyed are declining in condition (extent, abundance, health, and regenerative potential) with stem densities in the 127 mm diameter and above size classes in the Arid and Semi-Arid Rangelands decreasing over time.
- In the Arid Rangelands, sandalwood populations are more confined to water-gaining habitats and there seems to be a trend of sandalwood populations contracting to these habitats particularly due to the predicted impacts of climate change.
- The ability to achieve ESU of sandalwood is not solely dependent on a take limit, but also on other factors such as success of regeneration programs.
- Commercial harvest activity has the potential to improve conservation outcomes at a local scale where sustainability actions are met.
- Increasing the minimum harvest size for living (green) sandalwood has minimal benefit to population condition if sustainability actions for harvest operations are met.

Draft recommendations made in this report are as follows:

Recommendation 1: DBCA progress as an urgent priority the preparation, funding and implementation of a sandalwood establishment strategy (across all tenures) consistent with management strategy 10 of the *Sandalwood BMP*.

Recommendation 2: DBCA investigate options to ensure that take/removal of sandalwood under the FP Act is legally bound by the maximum removal limits set in a Sandalwood Order. The provisions of the BC Act that exclude lawfully cleared sandalwood from the requirement for a licence to take sandalwood should be reviewed.

Recommendation 3: A formal arrangement be put in place between FPC and DBCA to ensure there is consistency of regulation of sandalwood harvest activities.

Recommendation 4: DBCA to review potential funding mechanisms to increase the ability to continue to assess the effectiveness of current regulatory mechanisms and overall risk of illegal take of wild sandalwood and the level of resource available for compliance monitoring and detection. In addition, investigate funding for a dedicated position/s to oversee wild sandalwood harvesting and regeneration operations.

Recommendation 5: To better understand plantation supply, and future intent of plantation owners (including intended harvest age and products), State Government to investigate the option to implement periodic survey of the sandalwood plantation industry to better predict long-term forecasts of plantation supply. This information will assist in future reviews of the sandalwood industry.

Recommendation 6: DBCA to coordinate ongoing monitoring of sandalwood populations across the landscape to better understand change to populations over time and management effectiveness, and to obtain more baseline information on populations where data is lacking. This includes monitoring across all tenures including in conservation reserves.

Recommendation 7: DBCA to develop and maintain a central repository for all sandalwood monitoring information (regeneration and plot/inventory data) to inform adaptive management.

Recommendation 8: Proponents undertaking sandalwood take/harvest, and DBCA where applicable, commit to ongoing monitoring of sandalwood regeneration programs to evaluate their effectiveness to ensure ongoing improvement. This monitoring would

need to be coordinated by DBCA with the intent that monitoring potentially continue beyond a licence period (if applicable). This monitoring should be integrated with ongoing research with the aim to enhance effectiveness of regeneration programs, for example, by developing innovative approaches.

Recommendation 9: Undertake a socio-economic study led by Aboriginal researchers and organisations, so that short and long-term socio-economic impacts can be better considered for future decision-making to enable better consideration of principles of ESD. This could include an assessment of the sandalwood plantation industry (Recommendation 5).

Recommendation 10: DBCA to investigate opportunities to promote and incentivise additional supplementary seeding of sandalwood on all tenures to provide for restoration outcomes. This is also relevant to Recommendation 1.

Recommendation 11: In consideration of Native Title rights and consistent with commitments under the Western Australian (WA) Government's *Closing the Gap Implementation Plan 2023–2025*, the State Government ensures the appropriate arrangements are in place to provide equitable access for Aboriginal people to the sandalwood industry. This should be adaptive to new information, such as a decision made following threatened species assessment of *S. spicatum* and any findings from Recommendation 9.

Recommendation 12: The maximum quantity of wild sandalwood taken annually under the new Sandalwood Order be 750 tonnes for living (green) trees, and 1,250 tonnes for dead sandalwood.

In considering applications to take under the Order, DBCA will be informed by (among other things) new information arising during the term of the Order, Native Title rights, regional differences in current and projected population size and condition, data reliability and threatening processes.

Recommendation 13: The licensing of take should provide for flexibility of individual licence holders to 'roll-over' up to 50 per cent of unused quantities to the following year.

Recommendation 14: The duration of the Sandalwood Order should be 10 years with the maximum harvestable quantities to be specified on an annual basis.

Recommendation 15: It is recommended that the products included in the Sandalwood Order (for removal or take) remain the same as the current *2015 Sandalwood Order*. This applies to both living (green) and dead wild sandalwood on both Crown and private land and that all parts of the tree except leaves, bark and small branches (less than 25mm diameter at the large end under bark) are included in the removal limit. In accordance with the BC Act, the next Sandalwood Order (commencing in 2027) continue to exclude plantation-grown sandalwood.

Recommendation 16: DBCA to undertake further data collection to inform a change to BC regulation 67(3)(c) to accommodate for the variation to under-bark measurement relative to minimum over-bark measurement.

Recommendation 17: Of the total 2,000 tonnes combined living (green) and dead wood take limit, 500 tonnes (including up to 250 tonnes living (green) wood) should be made

available via a BC regulation 67 take licence from 2027. This amount will be adjusted as required with the intent to increase the allocation under a BC regulation 67 take licence, contingent upon any outcome arising from Recommendation 2 or 3, over time. This Recommendation will require some funding to support an additional landscape-scale seeding program (as relevant to Recommendation 1).

Recommendation 18: Regional licence protocols continue to apply to BC regulation 67 sandalwood take licences, and these are reviewed annually as knowledge is improved.

Following public consultation and further collation and analysis of information, recommendations will be finalised. New removal (harvest) limits for both living (green) and dead sandalwood will be recommended in a final review report. Note that some of the recommendations made, especially the recommended limits for the next Sandalwood Order, may be impacted by any decisions related to the current assessment of *S. spicatum* by the Commonwealth government for its potential listing under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

4. Introduction

Sandalwood (*Santalum spicatum*) is a slow-growing, long-lived small woody shrub or tree, and is one of four *Santalum* species native to Western Australia (WA). Other *Santalum* species are sometimes referred to as 'sandalwood', but use of that term hereafter pertains to *S. spicatum* only. Sandalwood occurs across 173 million hectares of the Wheatbelt, Goldfields, Murchison, Gascoyne and southern Pilbara regions of WA. These lands are a mixture of Crown, private and Native Title lands managed for a range of activities including conservation, recreation, pastoralism, mining and for Aboriginal customary activities. The distribution of sandalwood covers the Country of more than 60 registered Native Title Bodies Corporates (RNTBCs) and Native Title Representative Bodies. Sandalwood is culturally significant to Aboriginal people who have used the species as a food source and medicine for thousands of years (DBCA, 2023), as well as in story, song, dance and for art.

Sandalwood is a highly valuable resource and is currently commercially harvested for a range of products due to the aromatic oils contained in the heartwood, which extends throughout the tree. Harvesting of living (green) (alive or very recently dead) or dead sandalwood involves removal of the whole tree including the roots. Dead pieces of sandalwood can also be collected from the ground. The wild sandalwood industry has existed in WA since the 1840s and in the 2023–24 financial year FPC generated \$16.4 million in sales revenue from sandalwood forest products (FPC, 2024).

Sandalwood is controlled under the *Biodiversity Conservation Act 2016* (BC Act) and the Biodiversity Conservation Regulations 2018 (BC regulations). In accordance with Part 5 of the BC Act, the *Sandalwood BMP* was developed in 2023 to conserve, protect and manage wild sandalwood and ensure Ecologically Sustainable Use (ESU²) (DBCA, 2023).

The removal or harvest of sandalwood can occur via several legal mechanisms, including:

- commercial harvest of wild sandalwood in WA as undertaken by FPC via contracts issued under the *Forest Products Act 2000* (FP Act).
- harvest via licences issued under the BC Act, which is administered by DBCA.

² Under the BC Act, ESU is defined as 'in relation to biodiversity components, means use of the biodiversity components in a way and at a rate that does not lead to the long-term decline of biodiversity, thereby maintaining the potential of the biodiversity components to meet the needs of present and future generations.' See Section 13 Glossary.

- lawful take under the *Environmental Protection Act 1986* (EP Act) and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (Clearing regulations).

The *Native Title Act 1993* (Cth) (NT Act) is also legislation relevant to the harvest of wild sandalwood. A determination under the NT Act is an area-based court determination that recognises the rights and interests of Aboriginal people to the land and waters according to their traditional laws and customs. Many Native Title determinations extend across the expansive sandalwood distribution in WA (DBCA, 2023), conferring either exclusive or non-exclusive Native Title rights and interests (noting that non-exclusive Native Title does not confer a right to control access to, or use of, the non-exclusive Native Title determined area or its resources, but recognise such use may constitute a future act). Where rights to resources are implicit in a Native Title determination, the exercise of them remains subject to State law requirements (meaning licensing applies and sustainable management needs to be demonstrated) and impacts on those rights are governed by the NT Act. The rights and interests recognised and their implementation under the NT Act vary among Native Title holders within the sandalwood region.

While sandalwood harvest provides important economic and social benefits, including opportunities for Aboriginal people, it is important that the take is managed sustainably for the long-term conservation of the species (DBCA, 2023). Under Section 187 of the BC Act the Minister for the Environment, in consultation with the Minister for Forestry, may, by order, fix the maximum quantity of wild sandalwood that can be taken in a stated period (DBCA, 2024).

The current maximum quantities of wild sandalwood that may be removed or taken in specified periods in WA are set out in the *2015 Sandalwood Order* (Government of Western Australia, 2015), which commenced on 1 July 2016 and is in effect until 31 December 2026. Under the *2015 Sandalwood Order*, the annual wild sandalwood removal (or harvest/take) limit is 2,500 tonnes, of which no more than 1,250 tonnes may be living (green) sandalwood. Section 67(3)(c) of the BC regulations prescribes the minimum size permitted for take of living (green) sandalwood (DBCA, 2024).

Under the BC Act, Section 187, the Minister for the Environment may, by order:

- (a) fix the maximum quantity of sandalwood that can be taken in a specified period; and
- (b) fix the maximum quantity of sandalwood that can be taken in a specified part of the specified period.

In addition, an order made under the BC Act, Section 187, subsection 3 may provide that it applies, or does not apply to:

- (a) sandalwood of a specified kind; or
- (b) sandalwood taken in specified circumstances.

Furthermore, a decision made under the BC Act must be made in furtherance of the objects of the BC Act. These are:

- (a) to conserve and protect biodiversity and biodiversity components in the State; and
- (b) to promote the ESU of biodiversity components in the State.

In the pursuit of the objects of the BC Act, regard must be given to the principles of ESD. Under Part 1, Section 4 of the BC Act, the principles of ESD are as follows:

- (a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;

- (b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- (c) the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;
- (d) the conservation of biodiversity and ecological integrity should be a fundamental consideration in decision-making;
- (e) improved valuation, pricing and incentive mechanisms should be promoted.

As part of determining a new Sandalwood Order, a review of current take arrangements and limits is necessary. The aim of this review is to ensure the Minister for the Environment can make an informed decision in alignment with the objectives of the BC Act to promote the ESU of wild sandalwood while supporting the conservation and protection of the species (DBCA, 2024).

For further information on how sandalwood is managed in WA, including an overview of the legislative framework, please refer to the *Sandalwood BMP*.

4.1 Overview of the review process

The *Scope of works* (DBCA, 2024) provides information on the purpose, scope and governance of the review of the *2015 Sandalwood Order*. The *Scope of works* also contains the Terms of reference for an Independent Panel (see below) and information about the internal DBCA working group. The members of the internal DBCA working group are listed at the front of this draft report and have combined expertise in sandalwood ecology, biodiversity conservation, and stakeholder and Aboriginal engagement. Two consultants with expertise in data modelling were also employed to assist with the process. This draft report will undergo review (after considering further feedback from stakeholders and Aboriginal people) by an Independent Panel made up of four members also with combined expertise in sandalwood ecology, biodiversity conservation, data modelling, and stakeholder and Aboriginal engagement.

The *Scope of works* also outlines the primary and secondary tasks of the Sandalwood Order review and specifies what is out of scope. A summary of the review process is shown in Figure 1. Note that the timeframes for key milestones were adjusted throughout the process and differ from the timelines published in the *Scope of works* and remain indicative only (with the exception of already completed steps). Note that the process shown in Figure 1 is not inclusive of all steps and input from stakeholders and Aboriginal people is welcome throughout the process.

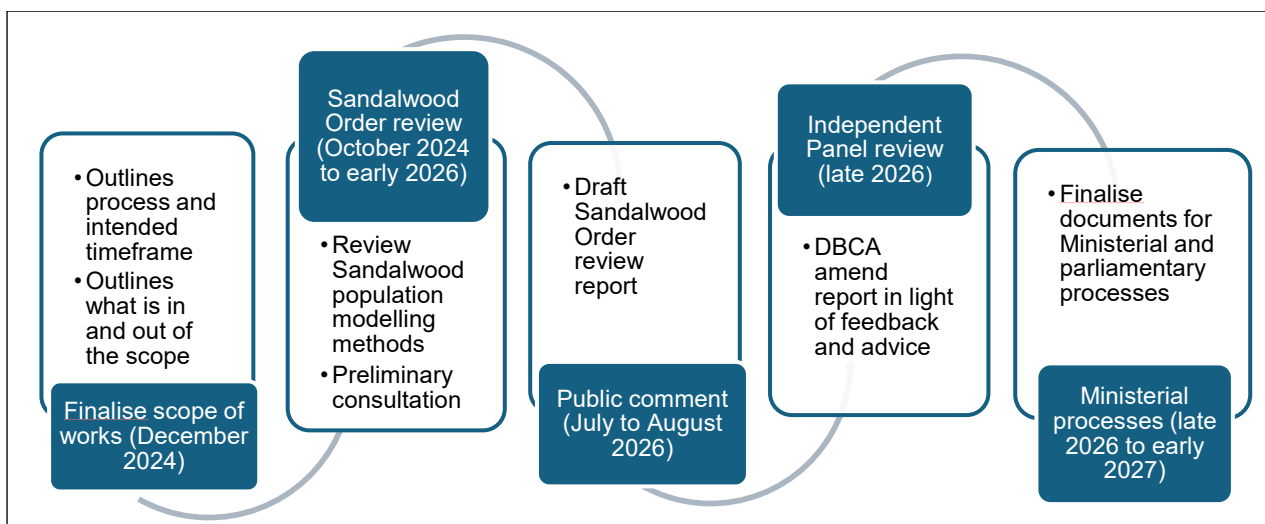


Figure 1. An overview of the review process.

As stated in the *Scope of works*, it is acknowledged that in 2021 *S. spicatum* was listed on the International Union for Conservation of Nature's (IUCN's) Red List as a threatened species, with a ranking of 'vulnerable'. In addition, *S. spicatum* is subject to review of its conservation status under the EPBC Act by the Commonwealth Government. The review of the 2015 *Sandalwood Order* is proceeding concurrent with the Commonwealth's assessment. It is anticipated that information gathered through the review will provide critical information for the conservation of the species regardless of the outcomes of any determination on conservation status.

Substantial background work was undertaken in the lead up to the initial Sandalwood Order review period. Since 2022, more than 300 monitoring plots (6 hectares in size each) were measured to better understand sandalwood population condition. In addition, an extensive literature review was undertaken to identify current knowledge gaps relevant to sandalwood biodiversity conservation (Northover et al., in press). Table 1 provides a summary of the information used for this review and outlines some of the limitations of this information. Principles of ESD have been considered when seeking out best available information. For example, socio-economic information and Cultural Knowledge was considered and there is an overlap between ESD and ESU.

Table 1. A Summary of the best available information used to inform the review of the 2015 *Sandalwood Order* (includes comments on the information used and the limitations as applicable).

Best available information	Comment
Socio-economic information related to the sandalwood industry.	There has been no extensive socio-economic impact study undertaken for the WA sandalwood industry. Therefore, the review report is limited to available information. However, information received from FPC, Department of Primary Industries and Regional Development (DPIRD), other stakeholders and Aboriginal people has provided context. For more information refer to Section 6.4 (Socio-economic information).
Information on the sandalwood plantation industry.	Information on the sandalwood plantation industry was obtained from Silvalis (formerly WA Sandalwood Plantations – [WASP]) and FPC. DBCA also attempted to quantify how many smaller sandalwood plantations (such as hobby farms) have been planted throughout the State. It is believed that most of the extent of the sandalwood plantation resource and relevant age classes and oil quantities and qualities has been considered within the review.

Best available information	Comment
Information on illegal harvest of sandalwood.	The current scale of illegal harvest activity is unknown, as there is no way of accurately quantifying levels of illegal take. See Section 6.3 (Illegal harvesting).
Sandalwood condition assessment data, providing information on rates of regeneration in both harvested and non-harvested areas.	Sandalwood covers a vast area and although more than 300 monitoring plots (each 6 hectares) were recently measured across a variety of landscapes, this still represents a relatively small portion of the total distribution of sandalwood habitat. Where available, and permission was granted, DBCA also examined inventory and plot data from other stakeholders. Another limitation was that DBCA has not been able to establish plots in all regions across the sandalwood distribution. However, sandalwood habitat has been mapped using the best available spatial data. For more information refer to Section 7 (Modelling further population condition) and 8 (Management of risks and uncertainty).
Sandalwood regeneration data.	Comprehensive data on regeneration establishment and persistence is limited for many regions. Alongside previously published results from research trials, establishment results from FPC's landscape-scale regeneration program (called 'Operation Woylie') since 2011 were examined. External consultants also provided survival assessments from long-term (1920s) seeding trials, complemented by recent establishment and survival rates for hand-seeding programs conducted by Aboriginal people at specific locations. However, some other regeneration programs have been in place for only a short period of time and hence their effectiveness has yet to be determined.
Information on the impact of threatening processes, that vary across the sandalwood distribution and over time, such as: • invasive predators, which have impacted local populations of ground dwelling marsupials important for sandalwood seed dispersal and recruitment; • introduced herbivores that forage on sandalwood seedlings and trees; and • infestation of pests and weeds, which in turn can impact biodiversity.	This information was gathered from existing peer-reviewed research and summarised in a paper on sandalwood knowledge gaps and research priorities (Northover et al., in press).
Peer reviewed research and an extensive literature review undertaken as part of management strategy 12 of the <i>Sandalwood BMP</i> .	An extensive literature review has been completed and is included in a paper currently in press (Northover et al., in press).
Future climate conditions.	CSIRO climate change projections to 2070 were examined for this review. Possible longer-term impacts of a drying climate (including sandalwood distribution in a drying landscape and predicted impacts on mortality and regeneration rates) were investigated. For more information refer to Section 5.5 (Climate change).
Occurrence of bushfires and prescribed burning, as moderate to high intensity fire and short interval fires can result in sandalwood	Fire history data was used to refine the mapping of potential sandalwood habitat. Areas prone to recurrent fires were not considered suitable persistent sandalwood habitat.

Best available information	Comment
mortality and have a negative impact on regeneration.	
Relevant information from the State of the Forests Report (2023).	State of the Forest reporting was examined but does not explicitly identify wild sandalwood occurrence—rather, it is included within general forest types such as <i>Acacia</i> -dominated woodlands. In addition, the area of <i>S. spicatum</i> plantations was not separately reported.
Information on FPC's operations and certification.	Most recent audit reports were used as the basis of assessing FPC's management. Additional information provided included information on Operation Woylie (mechanised seeding regeneration program), and harvest history data.
Cultural Knowledge where available and permitted for use, adhering to Indigenous Cultural and Intellectual Property (ICIP) rights.	Some Cultural Knowledge has been used for the review and acknowledged, as appropriate. Further work is needed to respectfully incorporate Cultural Knowledge into future decision-making for WA sandalwood management.

4.1.1 Stakeholder and Aboriginal consultation

As part of the review process, a gap analysis was undertaken (Appendix 1) to consider previous consultation processes where information received was deemed relevant to the Sandalwood Order review. This is to acknowledge input/feedback from stakeholders and Aboriginal people who have already provided feedback relevant to consideration of harvest limits. It is, however, acknowledged that over time feedback may change due to changing circumstances and that much of the consultation to date has not focused solely on the review of sandalwood harvest limits, nor been undertaken within the same scope as this review. In any case, stakeholders and Aboriginal people have been provided an opportunity to consult directly with DBCA in recent times and in particular, feedback is also invited during the public consultation period for the review of this report. An overview of previous consultation (including projects and consultation processes external to DBCA including that undertaken by FPC) is provided in Appendix 1. Appendix 1 is not inclusive of all consultation processes and provides only a summary.

Question: Do you have any suggestions for improvement of future engagement processes?

5. Sandalwood information

This section provides a brief overview of wild sandalwood distribution, size classes, genetic variations, threatening processes, climate change and regeneration. The text below is a summary only and not a comprehensive literature review, as more detailed information is available in the cited publications. While this section focuses on information relevant to sandalwood biology and ecology, sandalwood information relevant to the principles of ESD is presented throughout this report (see also Section 6 Management of wild sandalwood harvest/take and Section 9 Principles of Ecologically Sustainable Development).

5.1 Distribution

Wild sandalwood is naturally distributed across approximately 173 million hectares within WA, including in the Wheatbelt, the Semi-Arid Rangelands and the Arid Rangelands. It occurs within 15 of WA's 27 Interim Biogeographic Regionalisation of Australia (IBRA) regions (DBCA, 2023). Figure 2 depicts the IBRA subregions where wild sandalwood naturally occurs in WA and the legend shows subregions that have been grouped into similar sandalwood habitat types. These groupings differ from the regional groupings in DBCA's *Flora taking (sandalwood) licence wild stands application kit* (this can be found on DBCA's website at dbca.wa.gov.au/licences-and-permits/sandalwood-licences), which are broader groupings for the purpose of regional licence protocols. In addition, the regional groupings presented in the *Draft Technical Report* incorporate further subdivisions based on the availability and type of sandalwood population data. These include:

- Subregions with sandalwood monitoring data suitable for population modelling, i.e. Southern Cross, Eastern Goldfields (collectively referred to as the Semi-Arid Rangelands), and Eastern Murchison;
- Subregions with licence inventory data (collectively referred to as the Deserts), which provide illustrative and contextual insights into current population condition, i.e. the Great Victoria Desert grouping of the Shield and Central IBRA subregions and the Western Deserts grouping of the Carnegie, Trainor and Lateritic Plain subregions; and
- Subregions without any population data.

Please refer to the *Draft Technical Report* for more information.

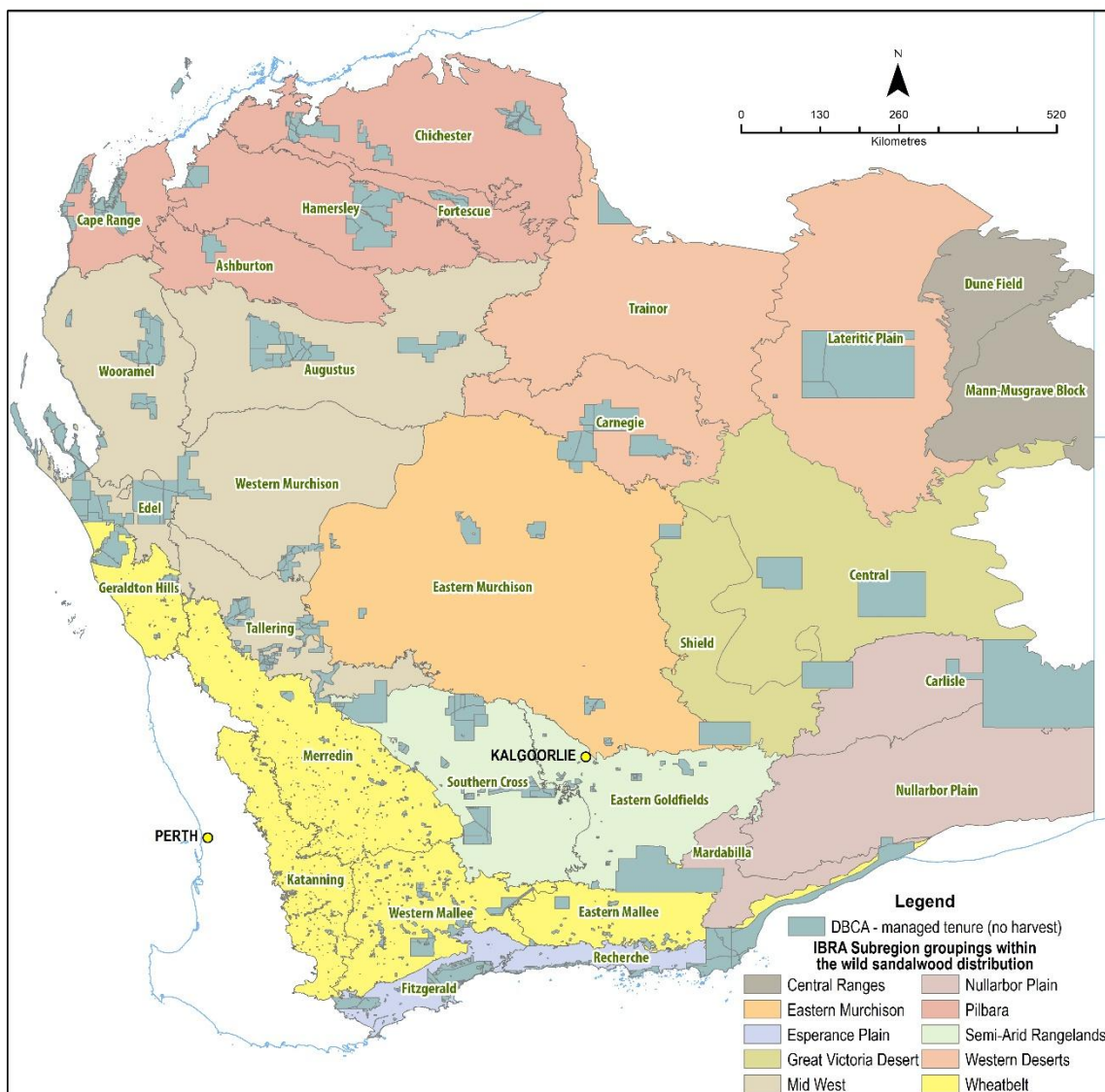


Figure 2. Broad distribution of wild sandalwood within WA. Within this distribution, some IBRA subregions have more scattered populations, particularly in the Wheatbelt where the remaining populations are highly fragmented due to historical clearing for agriculture.

5.2 Tree size class distributions

The distribution of tree sizes within landscapes is a useful indication of the overall structure and condition of sandalwood populations. Figure 3 provides a summary of the number of stems per hectare within diameter classes combined across all sandalwood plots measured by DBCA during the period 2022 to 2024 (in the Eastern Murchison and Semi-Arid Rangeland regions), and compares this with the corresponding stem densities from earlier measurements during the late 1990s to early 2000s. Mean live stem numbers have declined most strongly in the two larger size classes. Due to the availability of historical plot data, the plot measurements undertaken in 2022 to 2024 were mainly in the Eastern Murchison and Semi-Arid Rangeland regions to enable assessment of change in population condition.

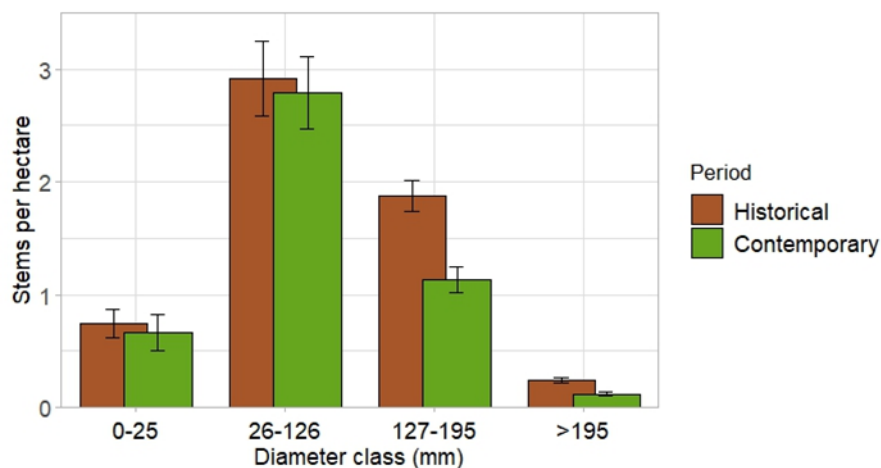


Figure 3. Mean number of live sandalwood stems per hectare in four diameter classes for two monitoring periods (historical: 1990s–early 2000s; contemporary: 2022–2024) from plots within the Semi-Arid Rangelands and Eastern Murchison regions. Error bars represent standard errors of the mean.

Figure 4 shows the mean number of live stems per hectare in the Eastern Murchison and Semi-Arid Rangelands regions recorded in plots between 2022 and 2024. The smaller diameter classes correspond to seedling and juvenile trees. Ordinarily, in a resilient, structurally sustainable population, the number of young trees would be many times that of the larger, older trees and hence provide for progressive replacement of the older trees as the latter senesce. **Figure 4 indicates that in both regions the cumulative historical impacts of multiple events removing seedling and juvenile trees have been such that natural regeneration is insufficient to sustain populations in the long term. Modelled projections of future size class distributions (described in the *Draft Technical Report*) support this observation.** Key historical anthropogenic impacts such as historical over-harvesting, grazing pressure and the loss of seed dispersing marsupials (due to introduced predators and other threats) have had a significant negative impact on wild sandalwood populations.

The marked reduction in tree sizes larger than 127 mm diameter in (as illustrated in Figure 3) is likely due to a combination of factors. While harvesting likely occurred on many plots that contributed data to Figure 3, distinguishing its impact from other pressures such as grazing and the loss of seed dispersers is challenging, partly because harvest records are incomplete for many areas. Moreover, these declines cannot be attributed solely to climate change, as multiple interacting factors are at play. Therefore, observed declines are best interpreted as the result of multiple interacting ecological and anthropogenic factors, rather than any single cause.

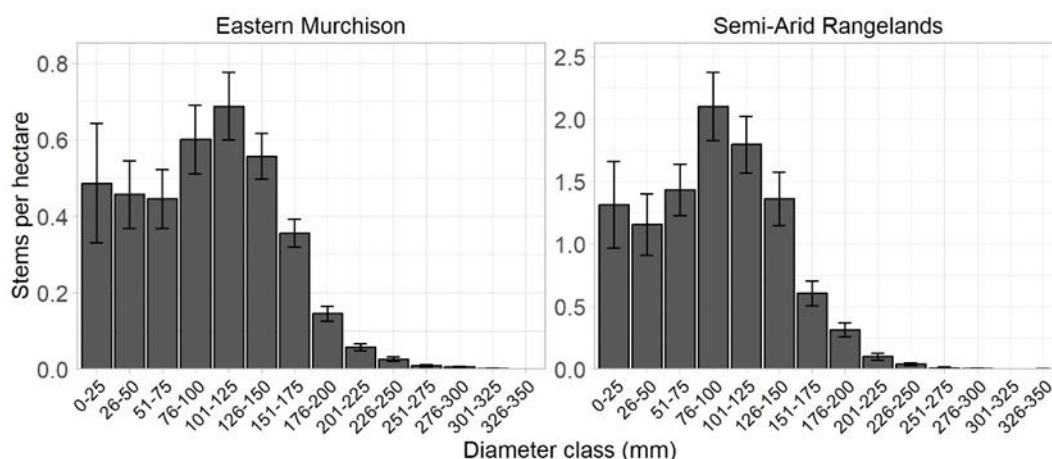


Figure 4. Mean stem numbers of live sandalwood trees in 25mm diameter classes in the contemporary monitoring period (2022–2024), stratified by region. Error bars represent standard errors. Note that the y-axis scales differ between panels.

5.3 Genetic variations

The *Santalum spicatum* species comprises two distinct genetic groups, recognised as a northern and southern group (Byrne et al., 2003a; Byrne et al., 2003b). The northern provenance is believed to contain higher genetic variation (Byrne et al., 2003b) and on average higher quality oil (Moniodis, 2014). However, oil quality and quantity also vary with tree age (Brand and Norris, 2017). Improved understanding of genetic variations in sandalwood is a recognised research need. This may inform management strategies, including options for building climate change resilience, and potentially assisting with tracing geographic origin of sandalwood to help combat illegal harvesting (Northover et al., in press). Further research may also identify if any other distinct ecotypes occur within the broad distribution of sandalwood. Currently, and consistent with Recommendation 8 of the previous *Review of the Sandalwood (Limitation of Removal of Sandalwood) Order 1996* (Review of the 1996 Sandalwood Order) (DPaW, 2015), a licence to take wild sandalwood under BC regulation 67 requires that sandalwood seed used for post-harvest regeneration is preferably sourced from the wild from the same genetic provenance/IBRA subregion or if unavailable, from plantations of the same genetic provenance.

5.4 Threatening processes

Wild sandalwood populations have been impacted by a range of threats that vary over space and time throughout the sandalwood distribution. An overview of the key threats is provided in Table 2. Some threats are interlinked, such as the negative impact of invasive predators on ground-dwelling marsupials that are important for sandalwood seed dispersal and recruitment, which has in turn adversely affected natural regeneration. Some threats such as competition and land degradation by feral goats (*Capra hircus*) and rabbits (*Oryctolagus cuniculus*), predation by the European red fox (*Vulpes vulpes*) and feral cat (*Felis catus*), and fire regimes that cause declines in biodiversity are also key threatening processes identified under the EPBC Act, some of which also have threat abatement plans.

Table 2. Key threats to wild sandalwood. Note that these threats are not listed in any order of priority. Climate change is discussed separately in Section 5.5 (Climate change). In addition, other threats relevant to economic, cultural, social and intergenerational matters are not listed here.

Threat	Comment
Lack of natural regeneration	Limited natural regeneration is occurring in the wild.
Historical clearing for agriculture	Particularly in the Wheatbelt, historical clearing and alienation of land for agriculture has resulted in substantial, permanent loss of sandalwood habitat.
Historical over-harvest	Sandalwood was harvested as early as the 1800s, with Australia becoming a major exporter of sandalwood to Asia in the early 1900s. Although historical over-harvest has already occurred, it is still considered a key threat, as the consequences are still having an impact on population viability today (i.e. on population demographics).
Introduced herbivores that forage on sandalwood seedlings and trees	Feral herbivores including goats, rabbits and camels (<i>Camelus dromedarius</i>) are known to impact wild sandalwood populations by causing damage and death to sandalwood plants and inhibiting natural regeneration through browsing, and in some IBRA subregions this impact can be significant.
Infestation of weeds	Weeds may threaten sandalwood populations through direct competition or their influence on fire dynamics of ecosystems. For example, buffel grass increases the flammability of vegetation, including sandalwood communities.
Invasive predators	Invasive predators such as red fox and feral cat have had a dire impact on local populations of ground dwelling marsupials such as woylies and boodies (<i>Bettongia spp.</i>), which are ecologically important for sandalwood seed dispersal and recruitment.
Illegal harvesting	See Section 6.3 Illegal harvesting.
Large and intense bushfires	Sandalwood is highly susceptible to moderate to high intensity bushfire events.

5.5 Climate change

Climate change is predicted to result in higher temperatures and more frequent extreme heat, along with increased heavy rainfall events, drought and more severe fire weather across sandalwood's distribution. For wild sandalwood, it is predicted that the northern-most sandalwood populations will gradually contract and may disappear by 2090 (Crawford, 2016). In addition, climate change is likely to result in a progressive contraction of sandalwood populations to more water-gaining habitats (such as creek systems) as well as increased mortality and reduced regeneration rates. Refer to the *Draft Technical Report* for more information.

Successful germination and establishment of sandalwood regeneration relies upon adequate rainfall occurring over multiple years. Sawyer (2013) reported that a minimum 264 mm rainfall per annum (including autumn rainfall of greater than 12.5 mm) is required to enable seedlings to establish and persist in arid and semi-arid regions. The seasonal distribution of rainfall is also important, with regeneration favoured by autumn and early winter events (Brand and Sawyer, 2016; Brand, 2017). More research is needed to understand what strategies can be implemented to promote climate resilience of wild sandalwood, particularly in the northern-most arid regions (Northover et al., in press).

5.6 Regeneration

Historic and cumulative impacts on wild sandalwood have taken a toll on current populations, and there is now limited natural regeneration in the wild. This has been known for some time (Kealley, 1991; Loneragan, 1990; McLellan et al., 2021) and recent results (Section 5.2 Tree size class distributions) demonstrate a progressive further decline in wild populations. Levels of natural regeneration vary throughout the wild sandalwood distribution but are reported to be in greatest decline in the northern rangelands (Gowland, 2021), and

this area includes Midwest and Pilbara regions. However, due to limited information, the full extent of the threat posed by reduced levels of natural regeneration has not been fully quantified.

There is a clear need to implement regeneration programs such as localised, stand-alone supplemental seeding initiatives (such as Operation Woylie) or as a requirement of commercial harvest activities (as is currently in place) to contribute to sandalwood conservation (see 'Regeneration' in Section 13 Glossary).

Recommendation 1: DBCA progress as an urgent priority the preparation, funding and implementation of a sandalwood establishment strategy (across all tenures) consistent with management strategy 10 of the *Sandalwood BMP*.

6. Management of wild sandalwood harvest/take

6.1 Overview

Currently, the maximum total quantity of wild sandalwood authorised by the 2015 *Sandalwood Order* to be removed is 2,500 tonnes per annum, of which no more than 1,250 tonnes may be living (green) sandalwood.

As per Section 187(5) of the BC Act, a Sandalwood Order applies to sandalwood that is authorised to be taken under the BC Act. Therefore, other authorised legal removals of sandalwood (not authorised under the BC Act) are not legally constrained by the Sandalwood Order. Although not legally binding, it is the intent that all legal removals/take of sandalwood are taken in an ecologically sustainable manner and within the limits of the Sandalwood Order.

Management Strategy 8(e) of the *Sandalwood BMP* states:

“All public authorities (including the FPC) with lawful authority to take sandalwood other than under a flora taking (sandalwood) licence will liaise with DBCA to ensure that the sandalwood is taken in an ecologically sustainable manner and consistently with the limits in the Sandalwood Order.”

DBCA can only licence sandalwood take that does not exceed the removal limit available under the Sandalwood Order. Prior to commencement of the BC Act on 1 January 2019, all harvesting of wild sandalwood on Crown land took place under *Sandalwood Act 1929* licences and/or production contracts issued by FPC. Under Section 172(1)(a) of the BC Act, sandalwood may be lawfully taken without the authority of a licence by a person engaged in clearing if that clearing does not involve the commission of an offence under Section 51C of the EP Act. This applies to the taking of flora (sandalwood) by licence under the BC Act (administered by DBCA). In addition, removal of sandalwood by FPC in accordance with the FP Act meets requirements of the EP Act (refer to Schedule 6 of the EP Act for exemptions) and no BC regulation 67 flora taking (sandalwood) licence is required. However, FPC is required to obtain other licences including a supply licence for wild sandalwood from DBCA. In addition, although not legally binding, FPC manages production contracts to ensure harvest volumes do not exceed limits available to them under the Sandalwood Order. In addition, a BC regulations licence is not required to take sandalwood arising from lawful clearing for mineral and petroleum activities as well for a range of other purposes such as for fire protection and infrastructure development. Sandalwood can also be taken by Aboriginal persons for non-commercial customary purposes.

Previously, the FPC had access to up to 90 per cent of the total limit for wild sandalwood following Recommendation 4 of the *Review of the 1996 Sandalwood Order* (DPaW, 2015) regarding Crown land allocation. The Western Australia Sandalwood Taskforce's *Advancement of Aboriginal Economic Development Using Wild Harvested Sandalwood* (WA Sandalwood Taskforce) recommended that the amount of allocation provided for Crown and

private land licences issued by DBCA increase from 10 per cent to 20 per cent to cater for an increase in Aboriginal people seeking to undertake sustainable harvest operations (WA Sandalwood Taskforce, 2020).

Up until the end of 2026, FPC has access of up to 80 per cent of the total Sandalwood Order removal limit. The State Government is also supportive of greater involvement of Aboriginal people in the wild sandalwood industry. Although the scope of the review of the 2015 Sandalwood Order is focused on recommending appropriate harvest limits, it is acknowledged that the fact other public authorities can authorise and/or undertake legal removal of sandalwood without being legally bound by the Sandalwood Order is inconsistent with the intent of the Sandalwood Order. Although beyond the scope of this review, it is recommended that a separate review is undertaken to ensure that take under the FP Act is in future legally bound by a Sandalwood Order.

As indicated, most sandalwood harvest currently occurs outside the control of the BC Act by FPC. To ensure oversight, DBCA should ensure that all those undertaking commercial harvest activity are meeting or exceeding requirements of the BC Act and regulations for the take of sandalwood.

Recommendation 2: DBCA investigate options to ensure that take/removal of sandalwood under the FP Act is legally bound by the maximum removal limits set in a Sandalwood Order. The provisions of the BC Act that exclude lawfully cleared sandalwood from the requirement for a licence to take sandalwood should be reviewed.

Recommendation 3: A formal arrangement be put in place between FPC and DBCA to ensure there is consistency of regulation of sandalwood harvest activities.

Note that Recommendation 2 will not occur immediately as legislative change can take time and/or change may not necessarily occur following investigation of options. Recommendation 3 should be implemented more immediately, however, may become redundant if Recommendation 2 results in legislative change.

6.2 Regulation of take

Figure 5 provides a breakdown of the type and quantities of wild sandalwood commercially removed each year since commencement of the 2016–17 financial year. These levels are below the available maximum quantities specified in the current *2015 Sandalwood Order*. The figures do not include any seized or unknown illegally harvested quantities, nor any amounts that may have been legally removed by means other than for commercial harvest, such as clearing of sandalwood ahead of mineral extraction.

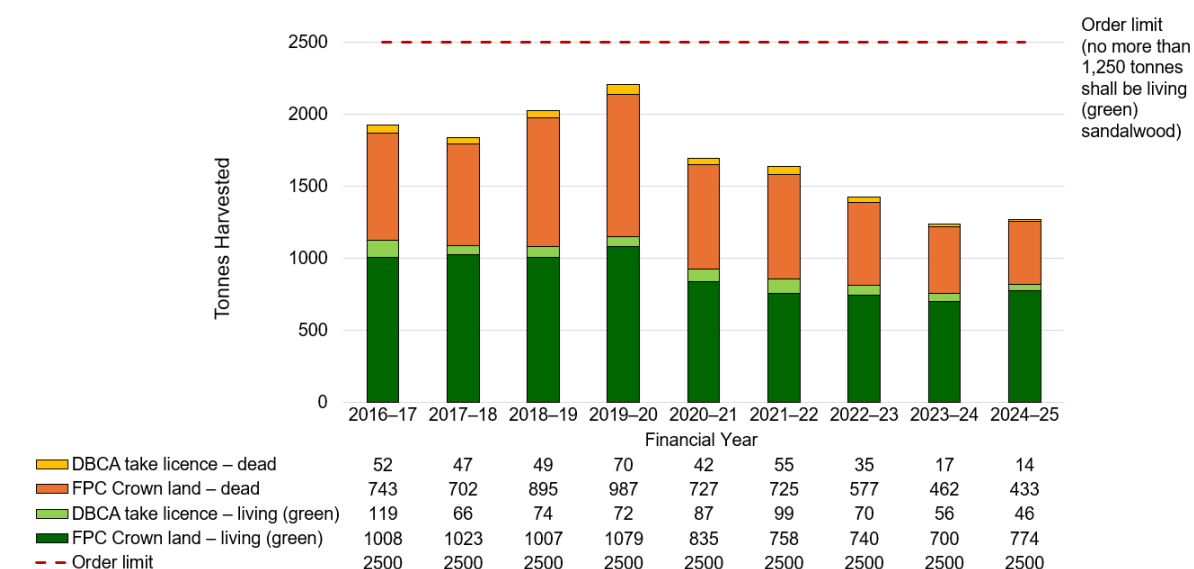
In recent years, the quantities harvested have been lower than the maximum quantities allowed, with FPC reporting that harvested quantities have been lower than demand. The amount of living (green) sandalwood harvested has exceeded the dead sandalwood harvested. The proportion of sandalwood harvested by FPC is much higher than that harvested through DBCA-issued take licences.

FPC reports that harvest quantities are not meeting demand due to several factors including:

- Difficulty in sourcing a stable contractor worker base while there is uncertainty over future allocations as a result of this review process, as well as significant competition for resources (labour) from the mining industry.
- The introduction of several smaller Aboriginal contractor entities employed by FPC (rather than some larger contractors who have exited the industry) focusing on dead wood harvest has had mixed production outcomes.

The total quantities available through licence from DBCA have not been utilised and the total annual removal limits available through the licence process have not all been allocated. There is no requirement for a licence holder to take the full amount of limit in their licences.

Levels of wild sandalwood harvest per financial year from 2016–17 until 2024–25*



*These figures exclude, leaves, bark and branches that have a diameter less than 25mm at the larger end. These figures report on volumes removed for commercial harvest and therefore any possible removals by other legal means are not reported above.

Figure 5. Levels of wild sandalwood harvest (both living [green] and dead) as compared with limits available under the 2015 Sandalwood Order since 2016–17 until 2024–25.

Licensing arrangements are in place for all specifically controlled sandalwood, which includes plantation sandalwood. Sandalwood Tracking Forms (STF) are required to authorise the transfer of specifically controlled sandalwood whenever it is moved from one location to another, such as when it is transported from the place of harvest to a storage location, a processor or a dealer. STFs must be provided in an approved format to DBCA at least 72 hours prior (in the case of wild sandalwood) to its movement and includes details such as the licence number under which the sandalwood was taken, vehicle and trailer registrations used during transportation and recipient details. The STF can be checked during compliance inspections by Authorised DBCA Officers. Where any sandalwood products are salvaged for commercial use from legal clearing operations, these sandalwood products are traced from their source to point of sale to ensure chain of custody to confirm the legal origin of sandalwood.

6.2.1 Size class restrictions on harvestable living (green) trees

Part of the scope of the review of the 2015 Sandalwood Order includes to:

“...review [BC] regulation 67(3)(c) (that prescribes the minimum size permitted for take of sandalwood) and recommend changes if considered necessary to maintain best practice consistent with contemporary species biology and population knowledge” (DBCA, 2024).

The current minimum harvest size for living (green) sandalwood is 400 mm circumference (diameter about 127 mm) over bark or 380 mm under bark at about 150 mm above ground level in accordance with BC regulation 67(3)(c). As part of the review of BC regulation 67(3)(c), the appropriateness of the minimum under-bark measurement was also reviewed to reflect new measurement information on the variation of bark thickness across tree sizes.

When determining an appropriate minimum diameter for harvesting living trees, it is important to consider both the age and size at which trees reach senescence, as well as

when they begin fruiting. Older trees nearing the end of their lifespan may have a reduced capacity to contribute to regeneration. It is therefore essential to assess whether BC regulation 67(3)(c) effectively promotes the retention of a sufficient number of seed-bearing or fruiting trees in the landscape. Tree population dynamics and growth rates vary significantly across regions, and some areas may naturally support fewer large, living trees. Additionally, both senescence age and the onset of fruiting are highly variable across the sandalwood distribution. For instance, some regions may contain smaller senescent trees, and fruiting can begin as early as four years of age (Barrett, 1987). As such, any recommendations in this report must carefully consider the implications of applying a uniform minimum tree size limit across all areas potentially available for harvest. Under DBCA licence conditions, harvest operations are also required to ensure that an adequate number of seed-bearing trees are retained in the landscape.

6.2.2 Forest Products Commission (FPC)

Most commercial harvest of wild sandalwood is currently undertaken by FPC, via contracts issued under Part 8 of the FP Act. FPC is currently independently certified to the AS/NZS 4708:2021 Australian and New Zealand standard for Sustainable Forest Management (SFM), as well as Chain of Custody certification against the international Programme for the Endorsement of Forest Certification (PEFC) Standard 2002:2020 (PEFC, 2025). Products certified to the PEFC standard offer assurances of sustainable management, which may be identified through the labelling of forest-based products. Annual audits review the adequacy of procedures and processes underlying a comprehensive regeneration program and supporting Aboriginal economic opportunities.

As stated earlier in Section 6 (Management of wild sandalwood harvest/take), FPC currently has access to up to 80 per cent of the *2015 Sandalwood Order* removal limit. In considering FPC's sandalwood operations for the Sandalwood Order review, DBCA has been provided a range of information including a recent audit report.

FPC has been aware of the lack of natural regeneration and, in addition to the routine hand seeding undertaken at harvest, has introduced a landscape-scale mechanical regeneration program known as 'Operation Woylie'. Operation Woylie is a voluntary activity that is funded from the proceeds of harvest. The program was so named as it is intended to supplement the regeneration that would otherwise naturally occur if seed-caching marsupials like woylies and boodies were not locally extinct in sandalwood areas.

Operation Woylie was initiated in 2011 to offset an estimated annual harvest of 50,000 sandalwood trees by targeting a 1.5 per cent successful germination rate, to be achieved through sowing 3.5 million seeds (about 10 tonnes) annually. This has since increased to 6 million seeds (about 20 tonnes) per year. With a reported seedling survival rate of 1.16 per cent, Operation Woylie has met its target, averaging 55,000 established seedlings annually from 2011 to 2023 (FPC, 2024).

FPC also manages 5,631 hectares of sandalwood plantations. Further information about FPC's sandalwood plantations is included in Section 6.4.4 (Sandalwood plantation industry) and further information on FPC's sandalwood operations is available on its website.

6.2.3 Flora taking (sandalwood) licences

Private individuals can apply to DBCA for a licence to commercially harvest wild sandalwood, under BC regulation 67. Further information is available from the DBCA's website at dbca.wa.gov.au/licences-and-permits/sandalwood-licences.

These licences can authorise the harvest of both living (green) and dead sandalwood, with total volumes restricted depending on the limit available under the Sandalwood Order and based on the applicant meeting a range of criteria. These include sustainability actions, requiring applicants for harvest of both dead and living (green) sandalwood to have an approved sandalwood establishment and sustainability plan.

The sustainability actions outlined in DBCA's *CEO Guideline to support the Biodiversity Conservation regulations – Sandalwood Licensing* (DBCA, 2025) include an assessment of:

“the likelihood that the applicants proposed sandalwood establishment and sustainability plan will improve sandalwood populations’ health, condition and abundance at the location” (DBCA, 2025, clause 17.3, p. 3).

A seeding strategy for regeneration is also required for harvest of both dead and living (green) sandalwood. A further requirement states that:

“...overall, the take of sandalwood will maintain and/or enhance the sandalwood populations at the harvest location. In particular, there will be sufficient retention of mature, seed producing trees at appropriate densities and patterns of distribution in the landscape” (DBCA, 2025, clause 17.4, p. 4).

DBCA licence holders must also fulfill licence conditions requiring submission of harvest returns and providing seedling establishment monitoring data on an annual basis. For example, monitoring by licence holders at Mungilli and Cosmo Newbery has reported successful recruitment from hand seeding during past harvest operations, particularly when paired with conservative harvesting. This means that enough juvenile trees have been established to ensure a healthier age class distribution, i.e. there is a sufficient density of younger trees to replace the older cohort (refer to Figure 9). Informed by Cultural Knowledge and strategic site selection, these efforts demonstrate the viability of culturally-led restoration across the species’ range, supporting both ecological outcomes and cultural stewardship (Kealley and Chevis, 2022; Kealley, 2022, 2024).

6.2.3.1 Regional protocols

Applications to take sandalwood through a BC regulation 67 licence are also assessed against regional protocols relevant to the location of the proposed harvest activity. These regional protocols are outlined in the *Flora taking (sandalwood) licence wild stands application kit* and a map of each region is provided based on regional groupings using IBRA boundaries. The regional protocols have been developed based on environmental factors including climate, soils, population viability, and pressures such as previous harvesting history, livestock pressure and numbers of feral animals, which also vary regionally. For example, for licences issued in the Arid Rangelands where wild sandalwood is generally more scattered and at lower densities, harvesting must be restricted to creek systems and other water-gaining areas where there is higher regenerative potential; whereas there is generally higher regenerative potential in the Semi-Arid Rangelands and sandalwood is more broadly distributed across the landscape in this region. In addition, the total volumes of seed required to be sown at harvest differs between the Wheatbelt and other regions, as germination rates are higher in the Wheatbelt. For more information, refer to the *Flora taking (sandalwood) licence wild stands application kit* available at dbca.wa.gov.au/licences-and-permits/sandalwood-licences.

6.2.3.2 Consideration of Native Title

For lands where Native Title has been determined, the applicant must be the relevant RNTBC or have the appropriate consents from the RNTBC, such as an Indigenous Land Use Agreement (ILUA) with the appropriate consents from the RNTBC. For an application on an area where Native Title has not been determined but is under Native Title claim, the applicant must have approval from all registered claimants, which may be in the form of an ILUA. This is a requirement for licence application forms approved by the CEO (DBCA, 2025). Where Native Title holders have rights to resource including sandalwood, if they are wishing to harvest sandalwood for commercial purposes, they must apply for a licence and meet all licence requirements including sustainability requirements. These have been developed to meet requirements under the BC Act, including that sandalwood is harvested in accordance with ESU. Native Title rights do not provide an exemption from meeting requirements of the BC Act where commercial harvest activity is concerned. The exception is

that a licence is not required if the sandalwood is used for non-commercial customary purposes. For more information on licence requirements and the legal framework see Section 6 (Management of wild sandalwood harvest/take).

Figure 6 indicates that most of the sandalwood distribution (including areas currently harvested) is within areas of registered Native Title claims and determinations (current as at August 2025), which are subject to a right to use natural resources including sandalwood. These Native Title rights exist over most tenures including some pastoral leases. It does not apply to freehold land or where Native Title has been extinguished. The recognition of the right to participate in the economy of the sandalwood industry provides an opportunity for Aboriginal-led sustainable management outcomes.

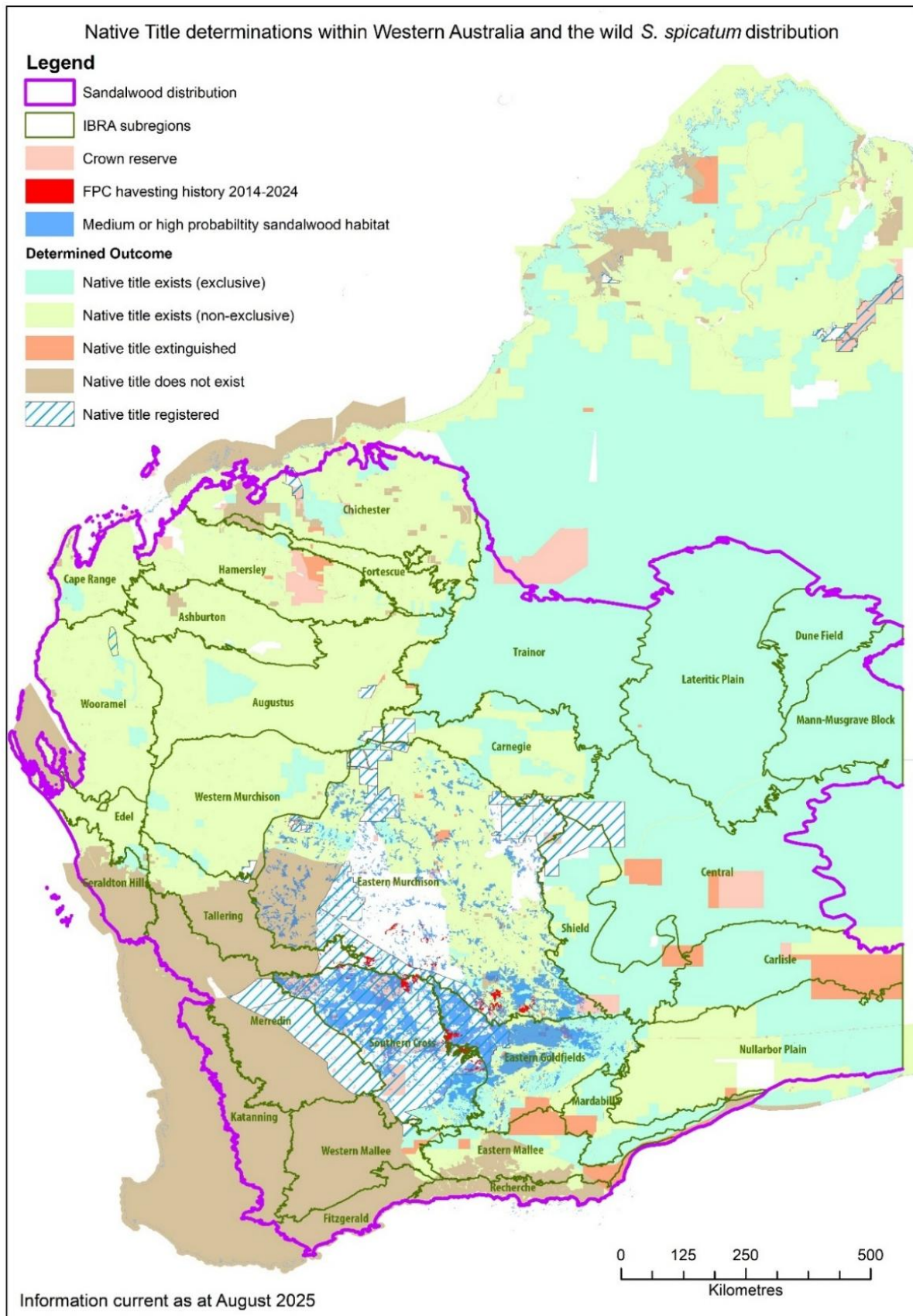


Figure 6. Map of Native Title determinations and the wild sandalwood distribution. Areas left blank can be subject to a Native Title determination in the future.

6.3 Illegal harvesting

As sandalwood commands lucrative prices, there is and will be an incentive for illegal activity. This illegal activity undermines the legitimate sandalwood industry, suppressing values, demand and confidence in the industry. The last review of the Sandalwood Order considered the impact of illegal harvesting and made specific recommendations to address these impacts.

On 1 January 2019 the penalties for the illegal harvesting of wild sandalwood increased substantially with the commencement of the BC Act. The new maximum penalties are \$200,000 for individuals and \$1 million for corporations. As a further deterrent, the BC Act also enables a court to impose an additional penalty of up to \$20,000 per tonne for the unlawful taking of sandalwood upon conviction.

The BC Act also created modified penalties (infringements) as a means of dealing with administrative or low impact sandalwood offences. These infringements range between \$500 and \$6,250. These increased penalties are intended to be a deterrent to illegal harvesting but will be effective only if there is a visible and effective enforcement regime.

The distribution of sandalwood creates a challenging environment in which to undertake surveillance and enforcement. Access and vast distances make it, at times, impossible for enforcement staff to detect non-compliance at the point of take. Intelligence from stakeholders is often limited or lacking sufficient detail to follow-up, owing to cultural or industry barriers.

The BC Act has greatly increased transparency of the market chain and provided increased inspection, investigation and enforcement tools. Audit points throughout the supply chain make it more difficult for illegal sandalwood to enter the market without risk of detection.

There is currently no way to accurately quantify the level of illegal take. However, a lack of dedicated resources and the increasing sophistication of offending is believed to have contributed to an apparent reduction in the number of detections and prosecutions. Any limit set for sandalwood take should consider market demand (including available plantation resource) noting that if demand is higher than any limit set, enforcement will be even more essential.

Table 3 provides a summary of the number of seizures and total tonnes seized since 2011. Based on stakeholder information and reliable intelligence that DBCA has received it is believed that the actual amount of illegal harvest is well above these levels.

Table 3. Seized sandalwood and volumes (in tonnes) since 2011. Note that in 2017 and 2024 to 2025 investigative staff dedicated to sandalwood compliance were unavailable.

Year	Seizures	Tonnes seized	Average tonnes per seizure
2011	4	11.1	2.8
2012	20	184.0	9.2
2013	1	17.3	17.3
2014	2	309.0	154.5
2015	2	208.0	1.4
2016	4	22.5	5.6
2017	0	0.0	0.0
2018	2	2.5	1.3
2019	2	4.0	2.0
2020	3	0.4	0.1
2021	7	2.6	0.4

Year	Seizures	Tonnes seized	Average tonnes per seizure
2022	6	16.5	2.7
2023	5	2.8	0.6
2024	0	0.0	0.0
2025	0	0.0	0.0

Since commencement of the BC Act, a number of sandalwood seizures have been made as indicated in Table 3. Although the overall trend in seizure quantity appears to be reducing, significant seizures are still being made and the number of seizures made in the first five years of the BC Act, albeit generally smaller in tonnage, are more than double that of the preceding five years.

Note that in 2017 and since 2024, in the absence of DBCA investigative staff dedicated to sandalwood there was no seized sandalwood. This emphasises the importance of resourcing for staffing to monitor sandalwood compliance.

If illegal harvesting is not effectively regulated, it could undermine the purpose of establishing a new maximum harvest limit, rendering a Sandalwood Order ineffective. Compounding this issue is that any removal of living trees (unsustainable illegal harvest) without regeneration would further contribute to accelerated species decline. An effective regulatory regime needs to incorporate stakeholder engagement, licensing, monitoring, assessment and enforcement functions to detect and respond to non-compliance. These functions provide intelligence that enables an effective enforcement response by DBCA.

In addition to the above, DBCA has no dedicated sandalwood assessment or stakeholder engagement resources to monitor the sandalwood industry. DBCA currently dedicates 0.28 of a full-time equivalent staff member to support sandalwood licensing assessment. Outside of this, sandalwood management is devolved as a component of several positions across a number of divisions. This disparate approach to delivering services to support sandalwood compliance and enforcement has led to fragmented, delayed and *ad hoc* outcomes.

Recommendation 4: DBCA to review potential funding mechanisms to increase the ability to continue to assess the effectiveness of current regulatory mechanisms and overall risk of illegal take of wild sandalwood and the level of resource available for compliance monitoring and detection. In addition, investigate funding for a dedicated position/s to oversee wild sandalwood harvesting and regeneration operations.

6.4 Socio-economic information

In the absence of a detailed study, there is limited socio-economic data specific to wild sandalwood that has been incorporated in this review. However, the commercial wild sandalwood industry is of key importance to WA, especially in many regional areas and some Aboriginal people.

In the 2023–24 financial year, FPC generated \$16.4 million in sales revenue from sandalwood forest products (FPC, 2024). The industry is particularly important in regional and remote areas where employment and livelihood options are more limited. In some remote areas the local economic and social situation is dire (WA Sandalwood Taskforce, 2020), with a major issue being a lack of meaningful employment for young Aboriginal people and the consequential impacts on their wellbeing (FPC, 2015).

Aboriginal people have a strong connection to Country where wild sandalwood occurs, and these communities maintain Cultural Knowledge of sandalwood ecology and land

stewardship. While commercial sandalwood harvesting may not be a traditional practice for some Aboriginal people, the broader caring for Country practices can include sandalwood regeneration activities and involvement of and funding for Aboriginal ranger programs (further information can be found on DBCA's website at dbca.wa.gov.au/management/aboriginal-engagement/aboriginal-ranger-program).

In addition, in the presence of a commercial wild sandalwood industry, the broader benefits to community are reported to include providing further resources for environmental custodianship activities, such as providing revenue to support camel control programs. Furthermore, revenue from commercial activities helps ensure sandalwood regeneration through seeding programs, which is an essential requirement to meet sustainability actions required for licences. Additional seed collection and seed sowing can also occur to support the recovery of Country post-harvest.

In addition, through FPC's Operation Woylie program a bulk amount of seeding is undertaken each year, and in 2024 FPC reported that 19 tonnes of seed (equivalent to 6.25 million seeds) were sown (FPC, 2024). This provides economic opportunities through both the collection of seed and through employment opportunities during seeding.

6.4.1 Employment and livelihoods

As indicated in Section 6.2 (Regulation of take), much of the current harvest of wild sandalwood is undertaken by the contractors employed directly by FPC. Fourteen contractors are involved in the harvesting of sandalwood including 10 registered Aboriginal businesses undertaking dead wood harvest and the collection and sowing of sandalwood seed together with a contractor who recovers residue from harvest operations. A dedicated haulage contractor transports the products to the processing factory.

The FPC employs a processing contractor to receive, process and despatch the sandalwood that has been harvested. A further contractor manages the landscape-scale regeneration program. These contractors may operate intermittently across the year and each of the contractors employ staff as required depending on the level of activity.

The employment of Aboriginal people by FPC is an initiative called 'Sandalwood Dreaming'. Under FPC's Sandalwood Dreaming initiative, harvest contractors are employed to plant and collect wild seeds and harvest dead sandalwood, generally from their traditional lands. There is also a community benefit whereby each contractor nominates how they will contribute funds back to their communities. FPC also employs six staff directly in sandalwood, as well as a further 15 staff who are indirectly funded through sandalwood activity. FPC reports that these employment figures have been relatively stable but vary over time depending on circumstances.

FPC has recently concluded a Heritage Agreement with one Aboriginal Corporation formalising processes to undertake heritage surveys and setting up a mechanism for FPC to provide employment and financial benefits to the community.

Under licences issued by DBCA under BC regulation 67, as at August 2025 there are two³ Aboriginal businesses involved directly in sandalwood harvesting⁴: Yilka Heritage and Land Care Pty Ltd and Kutkabubba Aboriginal Corporation, with a combined total licensed harvest amount of up to 200 tonnes of living (green) sandalwood and 160 tonnes of dead sandalwood over three years. These licences currently expire in September 2026. Kutkabubba Aboriginal Corporation has stated that it pays a royalty to its registered Native Title Body Corporate (RNTBC) to provide financial support, and that sandalwood harvest activity is said to support housing, infrastructure and running costs for their local community.

³ As of February 2026, there is now a third licence holder.

⁴ Note, the BC regulation 67 sandalwood flora take licence must be held in the name of an individual, but the individual licence holders represent an Aboriginal business.

The other licence holder represents Yilka Heritage and Land Care (YHLC) (operating in Cosmo Newbery), which is a wholly owned subsidiary of Yilka Talintji Aboriginal Corporation (RNTBC) and is established to undertake heritage, land management and sandalwood harvesting operations and other related matters for the Yilka People. YHLC reports that its sandalwood harvesting operations are undertaken by trained Yilka rangers and the profit from the sale of sandalwood goes back into YHLC to fund Yilka's Land Management and ranger program. YHLC says that this ensures Yilka Country is well managed and cared for, and provides long-term employment opportunities for Yilka People.

In addition, the products harvested from sandalwood provide direct employment and livelihoods for those businesses that on-sell sandalwood products. This includes Dutjahn Sandalwood Oils, which is 50 per cent Indigenous owned.

6.4.2 Aboriginal involvement

A key focus for the commercial wild sandalwood industry is support for Aboriginal involvement. The WA Sandalwood Taskforce reported a desire to support Aboriginal involvement in the WA sandalwood industry (WA Sandalwood Taskforce, 2020). Sandalwood is recognised as having significant cultural and traditional importance to Aboriginal people. Aboriginal Cultural Knowledge has contributed to sustainable land management and this extends to sandalwood.

In addition to FPC's Aboriginal harvesting contractors, the State Government has been investing in efforts to build capacity and opportunities for Aboriginal people to be more involved in the commercial sandalwood industry. Funding has been provided for an Aboriginal Sandalwood Industry Capability Program. This is also relevant to commitments in the WA Government's *Closing the Gap Implementation Plan 2023–2025* (Government of Western Australia, 2023), and in particular Outcome 15 – *Aboriginal people maintain a distinctive cultural, spiritual, physical and economic relationship with their land and waters*.

The review of previous engagement (WA Sandalwood Taskforce, 2020) and more recent consultation with Aboriginal people indicates there are Aboriginal people who wish to be more empowered and involved in commercial opportunities in sandalwood and/or some who wish for support from the State Government to be involved in the industry. As emphasised in the *Sandalwood BMP*, it is important that the views and interests of Aboriginal people are considered in the ongoing management of sandalwood.

The preferred approach is to ensure that the Native Title requirements are addressed as well as seeking the views and interests of Aboriginal people to meet long-term aspirations. To achieve this, there is a need to ensure relevant RNTBC's or representative claimant groups for Native Title holders can be engaged in the decision-making and participation in outcomes to ensure ESU and equitable access to resources on Country by facilitating such opportunity.

Further to this, it is recognised that meeting ESU and principles of ESD could be best achieved through involving Aboriginal people (individually and through groups including the Aboriginal Sandalwood Alliance, which formed in 2025 – see aboriginalsandalwoodalliance.com.au) to provide opportunities to participate effectively in the commercial sandalwood industry. It is recognised that Cultural Knowledge and cultural connection to Country places Aboriginal people in a strong position to care for Country, which is not only essential for meeting some Native Title rights but has the potential to provide a range of flow on benefits for ESU and principles of ESD. For example, management by those who are living on and actively managing Country throughout the year may potentially reduce issues such as illegal harvest due to more active year-round presence on Country. Preliminary findings from a project entitled '*Seed to Sovereignty – Implementation Framework for Strengthening Aboriginal Leadership in Western Australia's Sandalwood Sector*' (K Farmer Dutjahn Foundation, 2025), highlight the view that deep Cultural Knowledge combined with cultural stewardship can provide for positive environmental outcomes and community resilience.

6.4.3 Markets and export

Current products exported by FPC include a mix of different products to maximise utilisation of an entire tree (both living (green) and dead wood). Listed from highest to lowest commercial value, sandalwood grades and their corresponding uses include:

- solid green butts—religious ceremonial uses and medicine;
- roots and butts—for oil extraction (high, medium and low quality);
- dead butts and logs for high-quality powders;
- green logs for medium-quality powders; and
- twigs, residue and plantation logs for low-quality powders.

FPC, through its sales agent Wescorp, have been involved in long-term sales of sandalwood products to international customers. Many of the powder customers have been buying product for more than 30 years, which includes the period of management by the Department of Conservation and Land Management (CALM) prior to the formation of FPC. FPC reports that this strategy maximises the value of sandalwood to the State and allows for the full range of products from the sandalwood tree to be sold. The range of markets including the agarbatti (a powder product used to produce incense sticks) markets are therefore important for effective utilisation.

FPC sells green oil-producing butts and roots to two main domestic customers for oil extraction. FPC reports that products sold assist the customers to position into high-value oil markets. High-value oil markets for perfumery, cosmetics and pharmaceuticals, as well as for aromatherapy, are also the focus for non-State government stakeholders involved in the commercial sale of sandalwood products, including sales of oil from plantations.

Figure 7 provides a breakdown of the countries to which wild sandalwood products are currently exported. FPC reports that the sandalwood market is complex and sale of sandalwood services unique requirements for customers across a range of countries and for a range of uses. Most of these customers have been buying sandalwood products from FPC operations for many years and value the price stability and the quality consistency that the current arrangement provides.

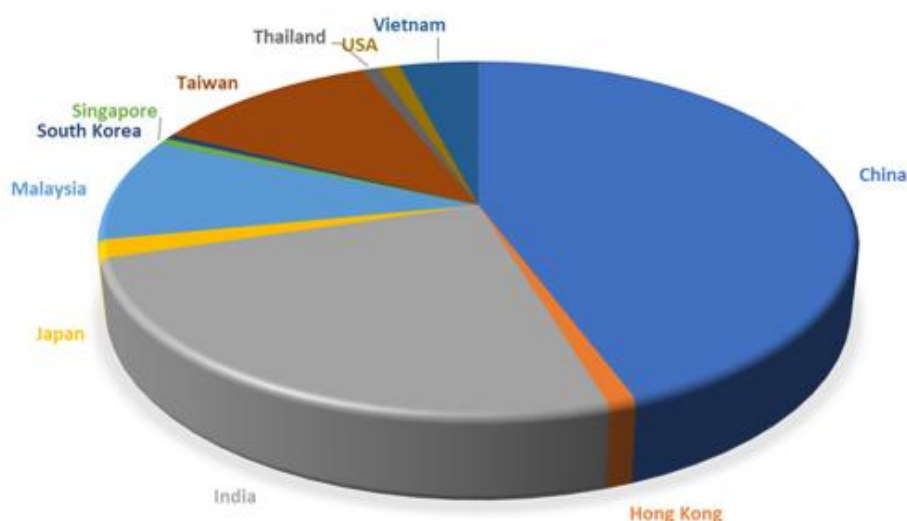


Figure 7. Proportions (by monetary value) of *Santalum spicatum* sales to various international markets for the financial year 2023–24. These sales generated AUD\$16.4 million in sales revenue, of which 94 per cent was derived from international sales to eleven countries dominated by China,

Taiwan, India, and Malaysia. The information in Figure 7 excludes sales from plantation sandalwood (Source: Information and data supplied by FPC).

In considering markets, key stakeholders have pointed out that both legitimate and illegally supplied species with odours similar to sandalwood have the potential to disrupt the industry.

There is a strong opportunity to continue to support the employment and livelihoods of Aboriginal people in the wild sandalwood sector in WA, while also supporting biodiversity and environmental benefits. However, the future success of the commercial sandalwood market will depend on several factors including maintenance of market prices for sandalwood, competition from alternatives and synthetics, the ability to regulate any future possible illicit trade in sandalwood, and stability of the international market environment.

Key stakeholders currently involved in the commercial wild sandalwood industry recognise the need to facilitate the involvement of Aboriginal people and support the linkage and strong connection that Aboriginal people have to sandalwood lands.

6.4.4 Sandalwood plantation industry

Current sandalwood plantations comprise 5,631 hectares of FPC plantations established from 1999 to 2012. In addition, Silvalis reports it manages more than 15,000 hectares of private plantations, established between 2003 to 2021. This figure excludes some smaller private plantations such as small-scale hobby farms.

Importantly, the sandalwood plantation industry currently also uses a portion of wild sandalwood in its business models for both agarbatti and oil products to improve overall product quality. Currently, both the domestic and international markets utilise more than 1,200 tonnes of wild sandalwood sourced from FPC.

The oil yield output from plantations will have a high impact on commercial viability. Older trees generally have a significantly greater volume of oil-bearing heartwood. The wild sandalwood product is generally of superior quality, as the wood is from much older, living trees (with a minimum harvest diameter of 127 mm and greater heartwood development) in which the oil quality is generally higher than in a younger plantation product.

Future plantation resource availability must be considered for future reviews, and it has been identified that due to the plantation resource, there may be a risk of over-supply of *S. spicatum* in the future, which may impact demand and prices (WA Sandalwood Taskforce, 2020).

Recommendation 5: To better understand plantation supply, and future intent of plantation owners (including intended harvest age and products), State Government to investigate the option to implement periodic survey of the sandalwood plantation industry to better predict long-term forecasts of plantation supply. This information will assist in future reviews of the sandalwood industry.

Further to the above, the *Review of the 1996 Sandalwood Order* (DPaW, 2015) recommended to ‘significantly reduce the quota for wild sandalwood when the plantation resource becomes available for harvest’ (Recommendation 3) and to ‘utilise the plantation resource to reduce the reliance on wild-harvested trees after 2026’ (Recommendation 10). However, not only has the socio-political environment changed with a State Government priority to enable more opportunities for Aboriginal people to participate in the commercial wild sandalwood industry, but there is also now more recognised Native Title rights to the wild sandalwood resource and as such, a greater recognition of the deep ties of sandalwood to identity, intergenerational knowledge, healing and connection to Country.

While sustainably managed plantation resource has a role in the industry, wild sandalwood management supports Aboriginal-led ecological stewardship, where cultural protocols,

Cultural Knowledge and land management practices are inseparable. Findings from a project entitled '*Seed to Sovereignty – Implementation Framework for Strengthening Aboriginal Leadership in Western Australia's Sandalwood Sector*' (K Farmer Dutjahn Foundation, 2025) state that some Aboriginal people regard wild sandalwood as the 'tree of life' and it is said that this same meaning is not attributed to plantation sandalwood. Considering the changes since the *Review of the 1996 Sandalwood Order*, and the work done to undertake further sandalwood population modelling, it is now considered that wild sandalwood harvest should not necessarily be significantly reduced on the basis of plantation resource becoming available. However, decisions on the limits of wild sandalwood harvest should be made on the basis of meeting ESU and more broadly principles of ESD (which are still relevant to the *S. spicatum* plantation industry).

7. Modelling future population condition

The analysis of available data on the distribution of tree sizes (see Section 5.2 Tree size class distributions) indicates a marked imbalance in the proportion of young seedling and juvenile trees relative to older trees across landscapes in each region. In the long-term, the absence of younger trees available to grow through to older ages will lead to natural decline in population structure at varying rates that will be influenced by factors such as site and stand characteristics in addition to threatening processes such as drought and bushfire events. Strategies to redress this imbalance through seeding to create regeneration, with or without harvesting, were explored through a simulation model developed to project the future tree size distributions. Modelling was undertaken to illustrate the potential outcomes of varied levels of seeding and harvesting relative to the scenario where no active management of sandalwood populations is undertaken. These scenarios were devised to inform consideration of the long-term ecological condition of landscapes where harvesting might occur over the 10-year period of a new Sandalwood Order commencing in 2027.

Consistent with the *Sandalwood BMP* Strategies 2 and 11, modelling of future populations was undertaken on a regional basis. However, data limitations meant long-term projections of future population condition were only possible for the Eastern Murchison and Semi-Arid regional groupings, while a separate analysis was undertaken for the Desert Regions. A Sandalwood Order limit will apply to all regions based on conservative modelling for the regions where data is available. However, harvest is only to occur under circumstances where there is evidence of sustainability. This may also mean that in some areas there is no harvest, or only dead wood harvest, subject to conditions being met such as seeding or the exclusion of grazing.

The following sections provide a brief overview of the detailed data analysis, modelling simulations and results presented in the *Draft Technical Report*.

7.1 Methodology

Figure 8 provides an overview of the information used to inform sandalwood population modelling.

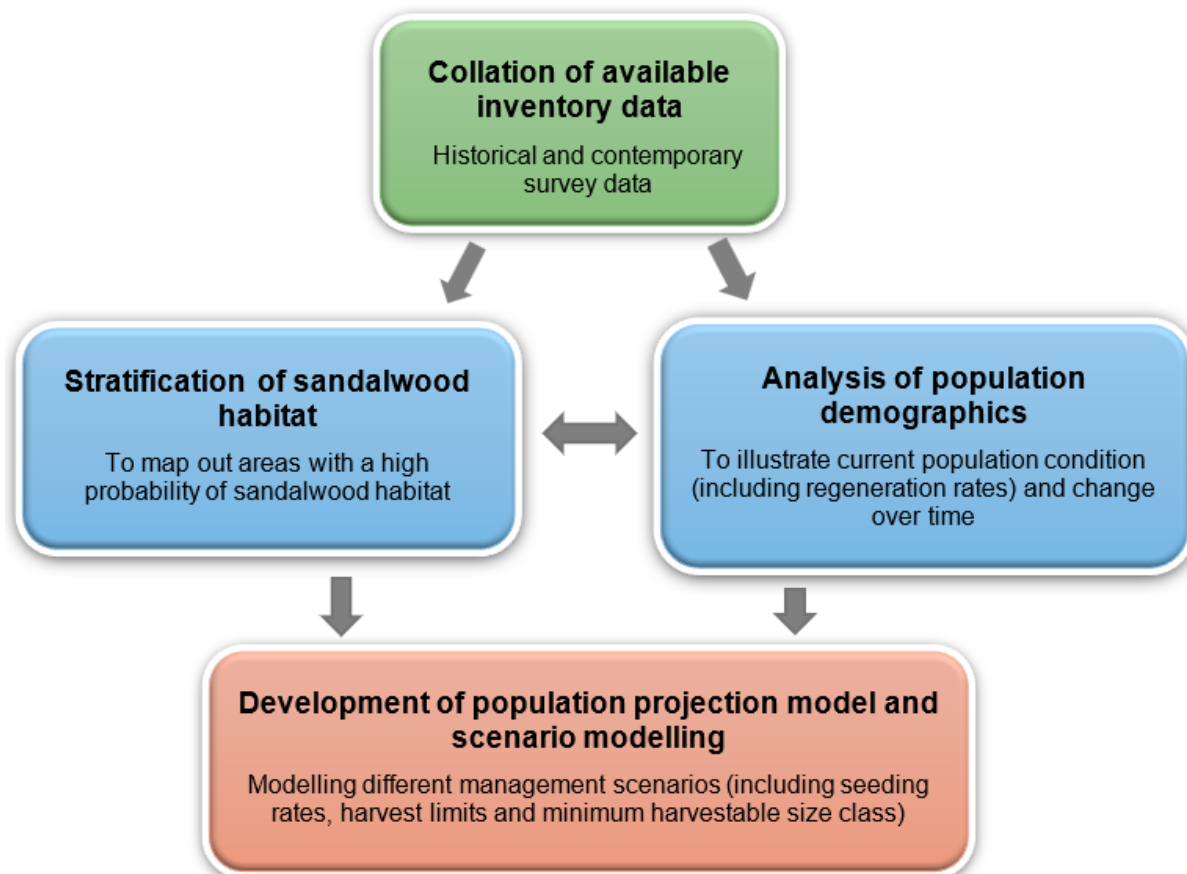


Figure 8. The key steps undertaken for sandalwood population modelling.

A focus for the review was to assess the most recent DBCA condition assessment information (with about 300 six-hectare plots measured between 2022 to 2024) and compare this with historical plot information (from FPC's strategic inventory) to assess change in population condition. Recent sandalwood inventory data provided by DBCA licence holders and applicants was also examined. Mapping of potential sandalwood habitat across its distribution also used improved spatial datasets to refine habitat mapping to areas sandalwood is likely to occur (a medium or high chance of occurrence). For example, in the Arid regions, where sandalwood is known to occur in water-gaining areas, hydrology information was used to assist with mapping likely sandalwood habitat. This allowed a more conservative approach to be taken to ensure sandalwood extent was not over-estimated.

The *Draft Technical Report* provides more detail on the methods for the sandalwood population modelling including how data was collected and analysed, what information was used for the mapping of sandalwood habitat, and more extensive results and discussion.

7.2 Area of potential sandalwood habitat within regions

Sandalwood occurs dispersed within other vegetation assemblages and detailed mapping of the sandalwood component is not available. Extensive investigation by FPC during 2022–2024 of the potential to directly map the location of sandalwood trees using remote-sensed multi and hyperspectral data proved inconclusive and confirmed the ongoing challenges in replacing expensive, time-consuming field survey with remote sensing solutions.

Consequently, in the Eastern Murchison and Semi-Arid regions, the areas of potential sandalwood habitat were inferred from vegetation and land systems mapping (where available) and refined using bushfire history. In the Desert regions, where sandalwood

preferentially occurs in water-gaining sites, hydrological features were used to refine the area of potential habitat.

Importantly, the mapping process included only those vegetation, land systems and hydrological features where sandalwood had previously been identified as having a medium or high probability of occurrence. This meant subsequent modelling was based only on the substantially reduced area more likely to regenerate and carrying higher stem numbers rather than the overall potential occurrence of sandalwood.

Table 4 summarises the potential sandalwood habitat areas derived for each regional grouping.

Table 4. Net area of potential sandalwood habitat for each subregion grouping.

Subregion groupings	Area (hectares)				
	A	B	C	D	E(=B-D)
	Areas of high or medium probability sandalwood habitat in land systems and/or vegetation associations	Area remaining after habitats with short return fire intervals subtracted	Conservation estate	Sandalwood habitat on conservation estate	Net area potentially available for harvesting
Eastern Murchison	2,949,363 ¹	2,628,168	632,942	106,717	2,521,451
Semi-Arid Rangelands	5,392,087 ²	4,149,266	1,300,410	519,139	3,630,127
Deserts	Area of high probability sandalwood habitat in stratified creek lines less areas with short fire return intervals = 326,248			163,823	1,207,937 ³

¹ Note that this area was derived from land systems with a 'High' probability of sandalwood occurrence.

² Note that this area was derived from vegetation associations that were considered either a 'Medium' or 'High' probability of sandalwood occurrence.

³ Indicative sandalwood habitat derived from buffered hydrological features (including creek lines) but not verified vegetation extent *per se*.

Collectively, the net area derived as potentially available for harvesting comprises a small proportion of the total region, and considerably less than the overall natural occurrence of sandalwood. Consistent with Recommendation 5 of the *Review of the 1996 Sandalwood Order* (DPaW, 2015), the potential sandalwood habitat in conservation reserve tenures is not available for harvest, with conservation reserves being important candidate areas for seeding restoration activities where threatening processes (including illegal harvesting) can be managed.

7.3 Current tree size distributions relative to sustainability

During the period 2022–2024 more than 300 sandalwood monitoring plots—within areas of higher sandalwood stem numbers per hectare—were measured within the regions. Most of the plots were located over or close to earlier plots measured during the 1990s, enabling both the contemporary tree size distributions to be examined (and subsequently used as input to modelling future distributions) as well as a comparison of changes over the 20 to 35-year period.

Figure 9 indicates that within each of these regions over the three decades there has been a general decrease in the mean stem numbers of live trees across most size classes. These changes are the collective result of both natural mortality and harvest events, but importantly, these results suggest that within these plots there has been no overall

improvement in the number of naturally-regenerated seedling and juvenile trees (0–25 mm size class) over this period. Note that the plots did not sample areas regenerated through supplemental seeding by Operation Woylie and therefore under-represent the likely overall level of regeneration in the landscapes.

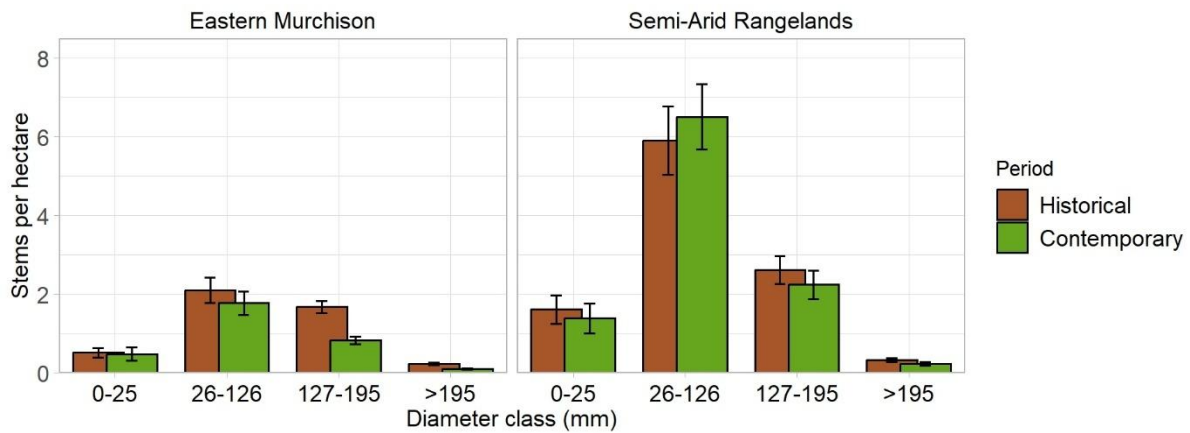


Figure 9. The mean number of live sandalwood stems per hectare for four size classes and two monitoring periods (historical 1990s-early 2000s; contemporary: 2022–2024) in the Eastern Murchison and Semi-Arid Rangelands regions. Note: error bars represent standard errors; plot numbers are 221 for Eastern Murchison, 54 for Semi-Arid Rangelands.

Comparison of these contemporary natural population distributions against the theoretical size class distribution expected for a healthy (self-sustaining) population (Figure 10) illustrates both the critical absence of the smaller (younger) size classes at the landscape scale and the relative number of stems necessary to progress the distribution toward an improved structure over time.

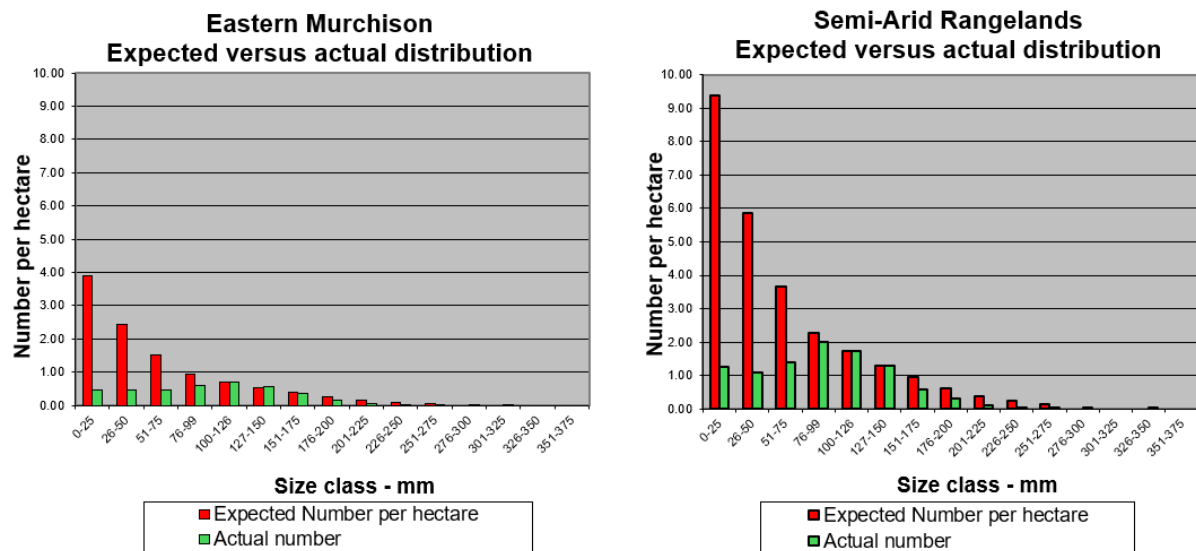


Figure 10. Population structures for the Eastern Murchison and Semi-Arid Rangelands regions—actual versus expected (in the absence of anthropogenic disturbances and threatening processes). The size classes refer to diameter over bark at 150 mm above ground level.

7.4 Predicted scale of seeding required to restore populations

The scale and duration of seeding and protection activity necessary to restore the population structure across these regions provides valuable context. Modelling of continuous annual seeding at varied rates to achieve a negative exponential diameter distribution suggests a continuous seeding program of around 120 tonnes per year in Eastern Murchison and 100 tonnes per year in the Semi-Arid Rangelands would be needed for at least a century to

redress the lack of natural regeneration and progress the tree size distributions toward the 'expected' pattern depicted in Figure 10. Consequently, landscape-scale restoration of landscapes across all regions is not considered logistically feasible (e.g. insufficient seed availability for the provenance) and prohibitively expensive under current settings, whereas successful local-scale programs targeted to areas with ongoing management from threatening processes will benefit conservation outcomes for the species. Please refer to the *Draft Technical Report* for more information.

7.5 Impact of varied levels of harvest

7.5.1 Minimum legal harvest for living trees

In areas potentially available for harvest of living (green) and/or dead sandalwood, direct seeding accompanying the harvest provides an option to promote a regeneration cohort, albeit while removing a proportion of trees larger than the minimum legal size limit (≥ 127 mm diameter at 150 mm above ground). The annual area harvested will relate to the total quantity of sandalwood taken, such that higher removal limits will generate a larger disturbance 'footprint' but also potentially dispersed across landscapes. Landscapes with geographically dispersed regeneration can spread the risk of subsequent loss from bushfires and other threatening processes.

The current minimum tree size permitted for take of living (green) sandalwood trees is 127 mm diameter over bark. The scenario modelling also investigated the effect on the projected size class distributions of adopting a larger minimum tree size of greater than or equal to 151 mm over bark. In terms of ESU, the larger 151 mm minimum diameter was selected because it would potentially ensure that trees that are closer to the end of their life span will be harvested. It may be that these older trees are contributing less to recruitment due to reduced seed bearing.

The inventory datasets indicate a general trend of progressively fewer stems per hectare as merchantable tree size increases. Consequently, substantially larger areas would need to be accessed to meet a specified total quantity target if the merchantable limit was greater than or equal to 151 mm compared to greater than or equal to 127 mm. Projections of future size class distributions in the Eastern Murchison and Semi-Arid Rangelands for each minimum size limit are detailed in the *Draft Technical Report*, which concludes that by Year 40 following harvest in years one to 10 there was no clear differentiation in population structure for either the whole region or within the areas harvested. However, there was a 44 per cent increase in the area required to be harvested if the minimum merchantable tree size was increased to larger than or equal to 151 mm.

The *Draft Technical Report* also provides the results of further research investigating the range of bark thickness across tree sizes. The current minimum circumference for under-bark (380 mm) is disproportionately large relative to the observed range in minimum circumference of over-bark trees when actual bark thickness is accounted for.

7.6 Management scenarios modelled

A Sandalwood Population Projection model, described in the *Draft Technical Report*, was developed and calibrated to enable simulations of future tree size distributions. This tool enabled exploration of the impact of varying levels of harvest and supplemental seeding on population structure at the landscape scale, as well as varying the permitted minimum size of merchantable trees from 127 to 151 mm.

Table 5 summarises a preliminary suite of management scenarios simulated in the model to illustrate the impact of varied combination of living (green) and dead sandalwood harvest in combination with seeding levels. A scenario of no harvesting and no seeding (Scenario 1) was used as a base for comparison.

Table 5. The different management scenarios modelled to illustrate changes in sandalwood population structure arising from harvesting and seeding¹.

Scenario	Justification
1. No harvesting and no regeneration program.	Scenario modelled to examine the outcome of a 'do nothing' approach.
2. No harvesting, but with a modest landscape-scale regeneration program (20 tonnes of seed/year).	Scenario modelled to understand potential ecological impacts of a landscape-scale regeneration program.
3. Harvesting of only dead wood (2,500 tonnes) with regeneration. This consists of 1,000 tonnes for Semi-Arid Rangelands, 1,200 tonnes for Eastern Murchison and 300 tonnes for Desert and other regions.	Scenario modelled to understand potential ecological impacts of a dead wood only harvest.
4. 'Status quo' (modelling current maximum harvest levels and regeneration) with a total harvest limit of 2,500 tonnes combined living (green) and dead sandalwood, consisting of a limit of 500 tonnes of living (green) and 500 tonnes of dead wood for each of the Eastern Murchison and Semi-Arid Rangelands and 250 tonnes of each of living and dead wood from Desert and other regions.	Modelled to understand potential ecological implications of no change to current harvest limits.
5. Various harvest limits with regeneration programs ² and two different minimum harvest size requirements for living (green) sandalwood.	Various reductions to harvest limits and an increase in minimum harvestable size to understand potential implications on Ecologically Sustainable Use of sandalwood.
5.1 A total harvest limit of 2,000 tonnes combined living (green) and dead sandalwood, consisting of a limit of 300 tonnes living (green) and 500 tonnes dead wood in the Semi-Arid Rangelands and Eastern Murchison regions and 200 tonnes of each of living and dead wood from Desert and other regions.	Scenario modelled to understand potential ecological impacts of a reduction in the total harvest limit (to 2000 tonnes) and in the living (green) harvest limit from Scenario 4.
5.2 A total harvest limit of 2,000 tonnes combined living (green) and dead sandalwood, consisting of a limit of 250 tonnes living (green) and 500 tonnes dead wood in the Semi-Arid Rangelands and Eastern Murchison regions and 200 tonnes of living and 300 tonnes of dead wood in the Desert and other regions.	Scenario modelled to understand potential ecological impacts of a further reduction in the living (green) harvest from Scenario 5.1.
5.3 A total harvest limit of 1,500 tonnes combined living (green) and dead sandalwood, consisting of a limit of 200 tonnes living (green) and 350 tonnes dead wood in the Eastern Murchison and Semi-Arid Rangelands regions and 150 tonnes of living and 250 tonnes of dead wood in the Desert and other regions.	Scenario modelled to understand potential ecological impacts of these reduced harvest limits.
5.4 A total harvest limit of 1,000 tonnes combined living (green) and dead sandalwood, consisting of a limit of 200 tonnes living (green) and 200 tonnes dead wood in the Semi-Arid Rangelands and Eastern Murchison regions and 100 tonnes of each of living and dead wood in the Desert and other regions.	Scenario modelled to understand potential ecological impacts of these reduced harvest limits.

¹ The tonnes modelled in the Eastern Murchison and Semi-Arid Rangelands are for an appropriate portion of the total tonnes allocated (i.e. total modelled removal limit) under each management scenario. For more information see the *Draft Technical Report*. Note that numbering of scenarios presented differs in the *Draft Technical Report* as more permutations (including sensitivity analysis) of each scenario are presented.

² All harvesting scenarios included seeding operations—for details on quantities of seed sown, see the *Draft Technical Report*. All management scenarios were also modelled with a scenario of regeneration failure so that the risk of regeneration failure could be considered in the risk assessment.

The *Draft Technical Report* provides assumptions, details and results for model simulations for the management scenarios listed in Table 5.

Figures 11 and 12 show the results of population modelling under the different management scenarios for the Eastern Murchison and Semi-Arid Rangelands regions. They compare the projected future tree size class distributions at Year 40 following the initial (Year 0) size class distribution being harvested to varying combinations of annual levels of living (green) and dead take for 10 years, together with varying combinations of seeding undertaken at harvest to supplement natural regeneration. Comparisons at Year 40 enable sufficient time to have elapsed for a simulated regeneration cohort to establish and ‘grow’ into the 0–25 mm and 26–50 mm size classes, and recognises that the cumulative uncertainty associated with projections increases over time as growth, mortality and other factors vary.

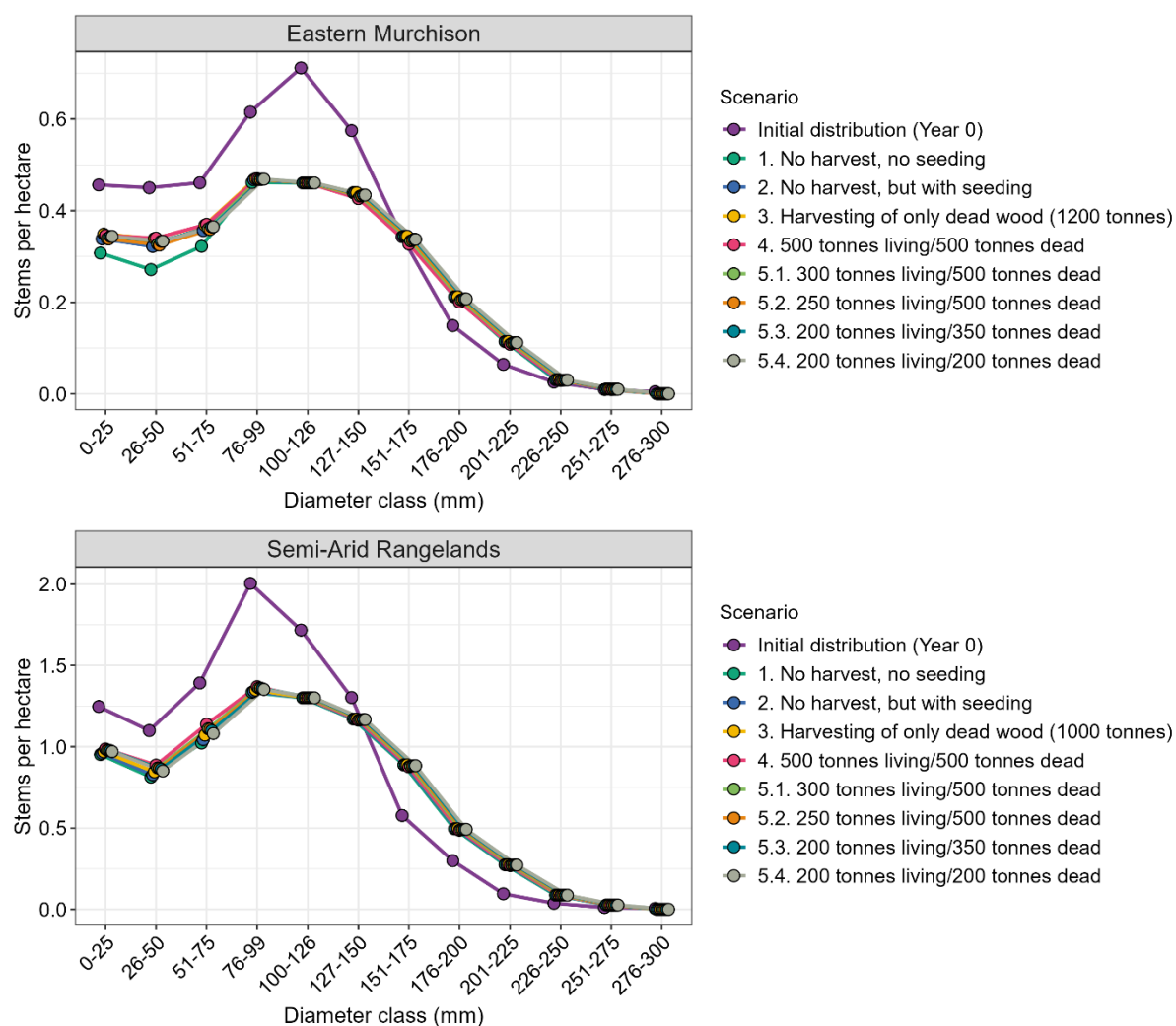


Figure 11. Comparison of stem densities of living (green) sandalwood as estimated for a range of management scenarios for the ‘whole of the region’ for the Eastern Murchison (top) and the Semi-Arid Rangelands (bottom). All scenarios represent the ‘Year 40’ timestep from the simulation modelling, except for ‘Year 0’, which represents the starting values. Note that ‘whole-of-region’ refers to the total sandalwood habitat identified for a region during stratification.

Figure 11 suggests that at the whole-of-region population scale, there was limited difference in the simulated future tree size class distributions between scenarios involving no harvest and those at the various levels of harvest. These results are in part a consequence of the relatively small areas harvested (and seeded) to meet the respective quantities relative to the total area of potential sandalwood habitat in the region. Similarly, at the whole-of-region

scale the projected size class distribution by Year 40 for the scenario of no harvesting but with modest seeding programs was not materially different from those of harvest scenarios.

Within the areas harvested, however, there is a marked difference in the simulated size class distributions between the 'no harvest' versus the scenarios of varying levels of removals. Figure 12 illustrates the potential for seeding associated with varied levels of harvest to generate a cohort of regeneration and recruitment into the 0–50 mm size class that is substantially greater than the 'no harvest, no seeding' scenario. This improvement is offset by the removal of trees in the merchantable size classes (larger than 127 mm diameter) in the harvest scenarios, to varying degrees in the Eastern Murchison to the Semi-Arid Rangelands simulations.

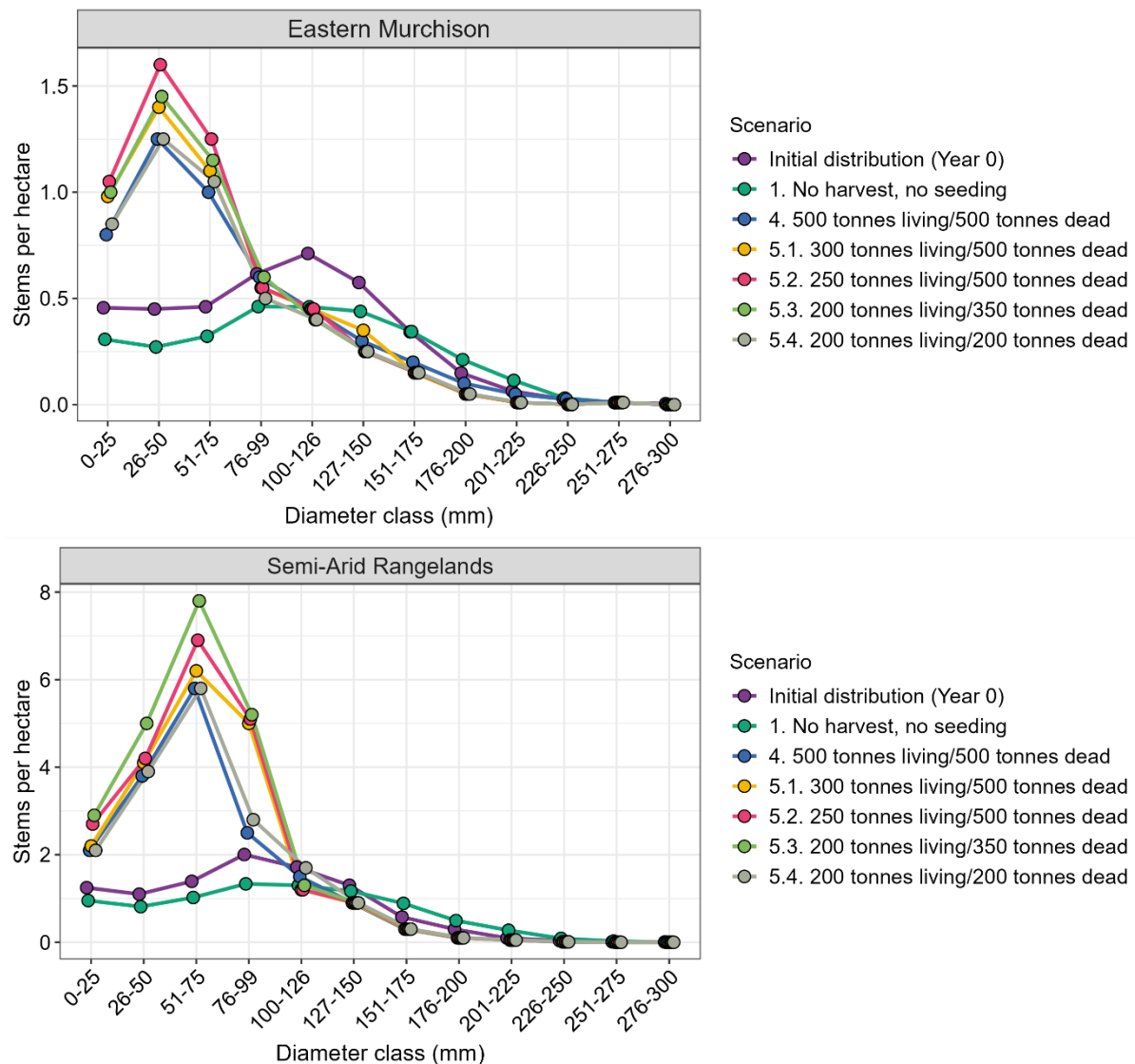


Figure 12. Comparison of the stems per hectare of living (green) sandalwood at Year 0 with those simulated with the impact of varying management scenarios at Year 40 for the Eastern Murchison and Semi-Arid Rangelands for only the areas proposed to be harvested over the next 10 years (simulating localised impact at the sites of harvest).

As with all modelling there are various assumptions inherent in the model and these projections are described in the *Draft Technical Report*. Importantly, these projections assume the seeding associated with the harvest successfully establishes regeneration at rates currently achieved in landscape-scale operations, which is then able to persist subject only to natural mortality and recruitment into the larger (older) tree sizes. Note also that the

quantities of sandalwood modelled in the harvest scenarios for these two regions (Figure 11 and 12) are illustrative and would comprise only a portion of the total volumes to be considered for a new Sandalwood Order, as recommendations will also need to consider the allocation between all regions.

Overall, the modelled projections suggest that under a 'do nothing' scenario (with no harvest and no seeding), limited natural regeneration will occur and the ensuing long-term decline of population structures will persist. Scenarios that illustrate harvesting in accordance with current licence conditions (requiring seeding and retention of a portion of merchantable-sized trees) are projected to generate an improved sandalwood population structure at the local scale. While harvest operations remove some seed-bearing trees (in the case of living (green) harvest), depending on the quantity of living (green) trees removed, the improved regeneration and subsequent ingrowth in these scenarios (along with the requirement to retain substantial seed-bearing trees in the landscape) has the potential to improve overall population structure and reduce the risk of localised collapse in the long term. The scenario with no harvest, but with a modest landscape-scale regeneration program can also result in improved population structure and resilience at the local level.

These simulation results support the importance of management actions identified in Strategy 10 of the *Sandalwood BMP* to maintain wild sandalwood's natural distribution and improve population condition through a combination seeding and regeneration encouragement operations on priority locations both independently and in conjunction with harvesting (see also Recommendation 1 in this report).

Effective monitoring of regeneration outcomes is an essential component of assessing and managing for ESU. Simulation results presented in Figures 11 and 12 incorporate different establishment success and seedling survival rates in Eastern Murchison and Semi-Arid Rangelands. These different seedling survival rates reflect best available data. Ongoing monitoring can be used to help refine any future simulations and contribute to improved regeneration and seeding strategies.

8. Management of risks and uncertainty

A summary of the current management framework for wild sandalwood and its impact on risks for sandalwood conservation is provided in this section. Some risks identified relating to legal harvesting, regulation and legal take outside of the BC Act have already been discussed (see Section 6 Management of wild sandalwood harvest/take) and are not discussed in detail again in this section. This section of the report concludes with a summary of a risk assessment of the various management scenarios modelled to understand the impact on ESU (Section 8.4 Risk assessment summary). This section has a strong focus on ecological and environmental factors, while necessarily considering to a limited extent human and nature interactions e.g. human activity of harvesting, managing threatening processes and undertaking seeding activity. However, further consideration of ESD is provided in Section 9 (Principles of Ecologically Sustainable Development). In other words, initially an assessment against ESU was undertaken and this was further reviewed to consider options for sandalwood management that takes into account the principles of ESD.

8.1 Managing risks through the regulatory framework for take/harvest

In developing future management scenarios for take of living (green) sandalwood, measures to mitigate risks to conservation of the species are considered through a hierarchy of settings and actions nested within varying spatial scales from the whole population, regional, landscape and local scales.

At the whole-of-species scale, the legal and regulatory framework prohibits the take of wild sandalwood within the conservation reserve system; restricts the annual total quantities of living (green) and dead sandalwood that may be licensed for removal within areas available

for harvest; restricts the minimum size of living (green) trees that can be lawfully taken; and provides for a review of the *Sandalwood BMP* at least every five years. These reviews consider changes in species condition, threatening processes, and improved data and knowledge on species growth and survival. This information can inform recalibration of quantities as necessary. Ongoing review to account for new information also allows opportunity for periodic adjustments due to unforeseen natural events (such as bushfire or drought) or changes in processing technologies, market or socio-economic factors using best available information. Within the overall period of the Sandalwood Order (currently 10 years), individual licences to take can only be issued for up to three years. Licence conditions (actions required) involve protection of vegetation, monitoring, seeding and other measures.

Management of risks to sandalwood decline at the local level is also addressed through the licence application and approvals process. Applicants are required to detail sandalwood conservation measures including designating 'no harvest' zones (thereby augmenting the landscape-scale conservation reserve system) and specify local actions that will be taken in conjunction with seeding and retention of seed trees (at appropriate densities and patterns of distribution in the landscape) to promote regeneration survival (such as feral animal control programs). All applicants must demonstrate capability and capacity to meet a range of sustainability measures before approval of a sandalwood take licence. For more information refer to DBCA's website at dbca.wa.gov.au/licences-and-permits/sandalwood-licences.

8.2 Overall risk analysis of long-term persistence of sandalwood

Risks to the long-term decline of biodiversity associated with wild sandalwood populations must be assessed in the context of the species' biology, current condition (reflecting the cumulative historic impacts of threatening processes) and future threats.

Sandalwood is a slow growing, long-lived species with individual trees capable of surviving for several hundred years. The extensive natural distribution covers multiple climatic zones and its hemi-parasitic nature requires assemblages of healthy host species to persist.

The cumulative impact on populations of historic harvest, grazing, weed infestation and other practices, combined with bushfire and natural events has varied between regions. For example:

- Sandalwood populations in the Semi-Arid Rangelands are generally more broadly distributed across the landscape, occur at higher stocking densities and have better regenerative potential than the populations in either the Arid Rangelands or Wheatbelt.
- Within the Wheatbelt, most of the remnant native vegetation is fragmented and disturbed to a degree that most natural ecological processes such as pollination and seed dispersal have been significantly impacted. Most of the remaining sandalwood populations have been extensively harvested. Weeds, livestock and fires also negatively impact the viability of remaining populations.

While there is evidence in some landscapes of natural regeneration occurring in favourable sites protected from (or avoiding) grazing and other risks, in all regions to varying degrees the dearth of sandalwood trees in the seedling and juvenile size classes presents a direct risk to persistence of the species over the long term. In the medium term, the relative frequency of trees in the 50–126 mm size classes (i.e. mature, seed-bearing trees smaller than merchantable size limit) suggests the risk of collapse in population structure is low. Depending on the scale and intensity of harvest (mitigated by removal limits), the removal of trees larger than 127 mm diameter accelerates the removal of the larger mature trees in landscapes at rates higher than natural mortality.

The illegal harvest of trees, often indiscriminately of their size, presents an ongoing direct risk to the species' persistence, particularly in those landscapes with seriously depleted distributions such as the Wheatbelt region.

Indirect risks to the long-term persistence of sandalwood and associated biodiversity include climate change effects on regeneration, growth and mortality rates, altered extent and intensity of bushfires, drought and heatwave events.

Incomplete data and knowledge gaps, along with variability in likelihood and consequences across the sandalwood distribution and changes over time and space also further complicate consideration of risks to sandalwood persistence over the long-term. **It is therefore essential that ongoing monitoring of sandalwood populations occurs across the landscape to better understand change to populations over time, management effectiveness and obtain more baseline information for regions where data is lacking. In addition, monitoring information should be stored in a central repository to inform adaptive management.** However, as this repository would contain confidential information from stakeholders, some of the information would be subject to sensitive data sharing protocols (refer to Section 275 of the BC Act). In addition, precise locations of sandalwood plots (indicating where densely populated sandalwood can be found) may potentially be used as intelligence for illegal activity and as such it may not be wise to publicise specific locational data.

Recommendation 6: DBCA to coordinate ongoing monitoring of sandalwood populations across the landscape to better understand change to populations over time and management effectiveness, and to obtain more baseline information on populations where data is lacking. This includes monitoring across all tenures including in conservation reserves.

Recommendation 7: DBCA to develop and maintain a central repository for all sandalwood monitoring information (regeneration and plot/inventory data) to inform adaptive management.

The *Sandalwood BMP* incorporates a series of strategies and management actions to mitigate the overall risk to the conservation of sandalwood. These include continuing to manage and progress additions to the conservation reserve system for protection of sandalwood on DBCA-managed and other lands; implement a prioritised, targeted regeneration strategy for sandalwood across tenures in areas conducive to establishment and ongoing protection from grazing and other threats (including predicted climate change); and incorporate regional protocols for conservation, protection and management into licence conditions for harvest of sandalwood. The latter includes requirements for seeding in association with harvest and monitoring of regeneration success.

Importantly, the annual area cutover to meet the harvest levels modelled in this review are a very small proportion of the potential sandalwood habitat in the Eastern Murchison and Semi-Arid Rangelands, while the quantities removed would comprise a small proportion to the estimated total growing stock in each region.

Overall, a conservative level of harvest, undertaken in accordance with licensing protocols and in an adaptive management framework informed by ongoing research and review, has potential to be an enabler of restorative regeneration. In this context, **the overall risk to sandalwood species conservation with harvest levels at or below the current limit over 10 years is considered low where successful seeding programs are undertaken and dispersed across multiple landscapes within which conservation reserves and unharvested areas dominate.**

8.3 Managing risks and uncertainties during modelling

While the regulatory framework described above provides the foundation, the process of developing potential management scenarios and modelling their projected level of take involved adoption of conservative assumptions to mitigate the risks associated with data and knowledge gaps; and further addressed risks and uncertainties through a structured approach involving:

- Distinct take levels being modelled for regional groupings. This recognises regional and landscape variations in natural extent of sandalwood, historic harvest, grazing and bushfire impacts on current structure and condition, and variation in future impacts from landscape-scale processes such as climate trends.
- Improved delineation of sandalwood habitat within regions. Substantial refinement in the extent of potential sandalwood habitat available for licenced take was incorporated through improved mapping of vegetation type, bushfire impacts and topographic influence on likely regeneration survival. In the Desert regions, application of this approach has provided preliminary estimates of a substantially reduced area adjacent to water drainage features where sandalwood might persist in the long-term under drying climatic conditions. The overall outcome of these refinements is a substantial reduction in the net area considered potentially available for harvest in each region, by excluding from consideration large areas with low or scattered sandalwood occurrence.
- Application of regional tree growth, natural mortality and recruitment rates. Observed and expected differences in tree growth rates, natural mortality and recruitment were reflected in the modelling approach, with conservative rates informed from measurements and variations in tree growth pattern with age. Importantly, where modelled scenarios assume the establishment (and persistence) of a regeneration cohort from seeding at time of take, the rates of seeding and recruitment were based on historic trials and monitored outcomes from ongoing operational programs. However, effective monitoring and reporting of outcomes would be essential to manage the residual risk of regeneration delay or failure.
- Comparison of long-term consequences of management scenarios on population structure. Decadal changes in tree size-class structure were projected over a 100-year period to examine possible long-term impacts from varied levels of take, recognising the inherent cumulative uncertainty of projections over time.

However, there remains a major residual risk that the model projections assume seeded regeneration establishes following the harvest event. If this doesn't occur, modelling suggests the harvest event will exacerbate the long-term decline in tree numbers across the merchantable size classes, without restoring a pool of seedlings for future recruitment into larger trees. Similarly, there is a residual risk that licence conditions (such as requiring retention of a proportion of larger trees or taking only trees larger than 127 mm diameter) are not complied with.

The ability to achieve ESU of sandalwood is not solely dependent on a harvest limit but is also dependent on other factors such as the implementation and success of regeneration programs.

Recommendation 8: Proponents undertaking sandalwood take/harvest, and DBCA where applicable, commit to ongoing monitoring of sandalwood regeneration programs to evaluate their effectiveness to ensure ongoing improvement. This monitoring would need to be coordinated by DBCA with the intent that monitoring potentially continues beyond a licence period (if applicable). This monitoring should be integrated with ongoing research with the aim to enhance effectiveness of regeneration programs, for example, by developing innovative approaches.

8.4 Risk assessment summary

In considering a harvest limit for the new Sandalwood Order, a risk analysis of the species' potential for persistence within and across its distribution was undertaken. The risk analysis evaluated the predicted outcomes of the implementation of various management scenarios (outlined in Table 5) on biodiversity and long-term decline/health of sandalwood. The risk assessment considered key environmental factors such as the impacts of loss of mature living trees in the landscape and localised disturbance as well as benefits such as regeneration and management of threatening processes. Practicalities of funding were also considered. For example, a 'no harvest with seeding' scenario would require substantial external resources. However, practicalities of funding did not contribute directly to the overall rankings (only indirectly through funding impact on ability to contribute to conservation outcomes including management of threatening processes and likelihood of undertaking landscape-scale seeding programs). The outcomes of the risk assessment are presented in detail within the *Draft Technical Report* and are summarised below in Table 6. The *Draft Technical Report* also details how the criteria and reasoning behind the rankings for each scenario were developed.

The risk assessment of scenarios has resulted in several scenarios that rank higher for ESU for wild sandalwood than other scenarios. The highest-rated scenarios (in order of ranking) were Scenario 3 (harvesting of only dead wood with a 2,500 tonne limit), Scenario 2 (no harvesting but with a modest landscape-scale regeneration program) and Scenarios 5.1 and 5.2 (harvesting a combined total of 2,000 tonnes living (green) and dead sandalwood with a higher proportion of dead wood).

Table 6. The different management scenarios modelled to illustrate changes in sandalwood population structure arising from harvesting and seeding. Refer to Table 5 for the proportion of living (green) and dead volumes modelled.

Scenario number	Scenario	Preferred options ¹ (1 the preferred)
1	'Do nothing' – no harvesting and no regeneration program.	7
2	No harvesting, but with a regeneration program.	2
3	Harvesting of only dead wood with a regeneration program.	1
4	'Status quo' – no change from the Sandalwood Order (2015 no. 2), with a combined total limit of 2,500 tonnes living (green) and dead sandalwood.	5
5.1 and 5.2	These scenarios reflect a combined total of 2,000 tonnes combined living (green) and dead sandalwood.	3
5.3	This scenario reflects a combined total of 1,500 tonnes living (green) and dead sandalwood.	6
5.4	This scenario reflects a combined total of 1,000 tonnes living (green) and dead sandalwood.	4

¹ Refer to the *Draft Technical Report* for the complete risk assessment, which provides further information on the criteria and rankings. Two scenarios had the same overall ranking because although having different individual scores for likely positive and negative outcomes, when added up equalled the same overall ranking. However, in this case the scenario involving less take of living trees was ranked higher.

Scenario 3 was ranked the best for ESU outcome primarily because some level of harvest of dead wood would generate funds to allow some level of regeneration and monitoring as well as control of threatening processes to occur, and more so than in Scenario 2. However, Scenarios 5.1 and 5.2 demonstrate that modest levels of sandalwood harvesting, considering the impacts from removal of living (green) mature trees, can provide for better overall outcomes for sandalwood through increased ability to undertake seeding and management of threats. Although considering the impacts of removal of living (green) trees of a minimum 127 mm diameter in localised areas, it is still considered that Scenarios 5.1 and 5.2 provide a net benefit to sandalwood management.

Following an assessment of risks to ESU, the preferred suite of options were assessed further to consider principles of ESD and the preferred option was adjusted (Section 9 Principles of Ecologically Sustainable Development, Figure 12).

9. Principles of Ecologically Sustainable Development

ESD relates to a range of environmental, economic, social and equity considerations as outlined in the BC Act.

Section 6.4 (Socio-economic information) provides a brief overview of the current direct employment and financial statistics from FPC operations, but the full extent of the contribution of the wild sandalwood harvest sector to regional and State economies (such as indirect employment multipliers for transport and downstream processing) remains an information gap. Conversely, the environmental, economic and social value of retaining the current wild sandalwood populations unharvested similarly remains unquantified and will likely vary between regions and Native Title holders. These information gaps are a limitation to an overall consideration of ESD principles. Therefore, a recommendation is made to undertake further study to inform future reviews.

Recommendation 9: Undertake a socio-economic study led by Aboriginal researchers and organisations, so that short and long-term socio-economic impacts can be better considered for future decision-making to enable better consideration of principles of ESD. This could include an assessment of the sandalwood plantation industry (Recommendation 5).

An absence of commercial harvest opportunities would have significant negative financial and social impacts on some remote Aboriginal people currently participating or seeking to engage in commercial sandalwood harvest, supply and processing opportunities. In locations where harvest can demonstrably be undertaken on a long-term sustained basis, opportunity arises to facilitate intergenerational equity and provide an independent funding source for caring for Country initiatives.

Table 7 provides an overview of the principles of ESD and how they were considered for the review of the Sandalwood Order.

Table 7. Consideration of ESD principles during the review.

ESD principle (shown in bold) from Section 4 of the BC Act
a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations Both short and long-term environmental and economic factors (e.g. commercial activity providing self-sustaining funding for seeding and management of threatening processes) have been considered as part of the ESU risk assessment for management scenarios. Consideration of the economic, social and equitable settings necessary to achieve sustainability of a wild sandalwood industry has also underpinned recommendations. As much of the sandalwood distribution is covered by Native Title determinations with rights to natural resource including sandalwood, State Government's long-term role in sandalwood management is likely to facilitate better opportunities for Native Title holders to exercise their rights. Further work is needed to investigate options for future industry structures that provide more opportunities for Aboriginal people. A future industry structure will need to ensure market stability and equitable access to resources. Risks to market stability in an uncontrolled market environment should also be considered for the future structure of the industry.
b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation Assessment of the current population structures in regions indicates there is a serious risk of long-term sandalwood decline if actions are not taken to restore an increased regeneration cohort in landscapes. While knowledge gaps and limitations of data detract from full scientific certainty, the review recommendations emphasise the need for active regeneration/seeding programs. A constrained harvest limit is considered preferable to the option of 'no harvest with seeding' as there is a need to provide for rights to resource for Native Title holders, noting also that this latter model would rely on sufficient funding to ensure regeneration.
c) the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations This principle overlaps with the definition of ESU in the BC Act, which includes "...<i>maintaining the potential of the biodiversity components to meet the needs of present and future generations</i>". This principle has underpinned consideration of strategies to restore population structure and enhance resilience of sandalwood. The <i>Sandalwood BMP</i> provides greater detail and outlines a suite of management actions to support sandalwood biodiversity conservation, irrespective of any harvest limits.
d) the conservation of biodiversity and ecological integrity should be a fundamental consideration in decision-making This principle has been a fundamental consideration across all levels of the sandalwood regulatory framework, expressed through requirements and conditions on licences to take, through to the recommendations in this review for new maximum limits on the composition, quantities and duration of take under the next Order.
e) improved valuation, pricing and incentive mechanisms should be promoted This principle is not explicitly linked to removal limits, but rather the mechanisms in place to promote conservation. For example, in this review the recommendation on which parts of the tree to include in the limit (Section 10.1.3 Products included in the Sandalwood Order) recognises the benefit of promoting full utilisation of each living (green) tree removed—fewer trees and less area would be cutover for a given level of take compared to if only part of each tree was counted toward the limit. This approach consolidates progressive improvements over many years in utilisation and harvesting technology.

ESD principle (shown in bold) from Section 4 of the BC Act

Incentives promoting sandalwood conservation outcomes are also contained in DBCA's *CEO Guideline to support the BC regulations – sandalwood licensing* (DBCA, 2025). Where applicable, licence applications will be ranked from the highest to least likelihood of successful sandalwood establishment and conservation—whereby those ranked highest have preferential access to sandalwood quantities. This is intended to provide an incentive for applicants to expand conservation outcomes.

Given the need for extensive sandalwood regeneration, further investigation of opportunities to incentivise additional supplementary seeding of sandalwood is warranted. This could include working with Aboriginal people seeking to invest resources in sandalwood regeneration and managing threatening processes such as grazing by goats.

Recommendation 10: DBCA to investigate opportunities to promote and incentivise additional supplementary seeding of sandalwood on all tenures to provide for restoration outcomes. This is also relevant to Recommendation 1.

Recommendation 11: In consideration of Native Title rights and consistent with commitments under the WA Government's *Closing the Gap Implementation Plan 2023–2025*, the State Government ensures the appropriate arrangements are in place to provide equitable access for Aboriginal people to the sandalwood industry. This should be adaptive to new information, such as a decision made following threatened species assessment of *S. spicatum* and any findings from Recommendation 9.

Recommendation 10 has been made to help ensure management in accordance with ESD principle (e) of the BC Act. Further, Recommendation 11 has been made to help ensure management in accordance with ESD principle (a) of the BC Act—as this arrangement will help ensure more equitable access to resource. In addition, a recommended take/harvest limit is relevant to all principles of ESD as specified in the BC Act.

A recommended annual harvest limit for wild sandalwood was made following an assessment of the risks against achieving ESU and considering principles of ESD. Figure 13 provides an overview of the considerations used for the risk assessment for selection of a 2,000 tonne per annum limit (with a maximum of 750 tonnes for living sandalwood) as the most suitable management option. Figure 13 summarises some of the key considerations in recommending the 2,000-tonne harvest limit. Some factors not explicitly mentioned in this diagram, were considered e.g. the removal of mature living trees may disrupt the breeding system of sandalwood, including pollination, leading to reduced genetic diversity and compromised regeneration potential, as well as loss of habitat. Further information on the assessment against ESU is provided in the *Draft Technical Report*.

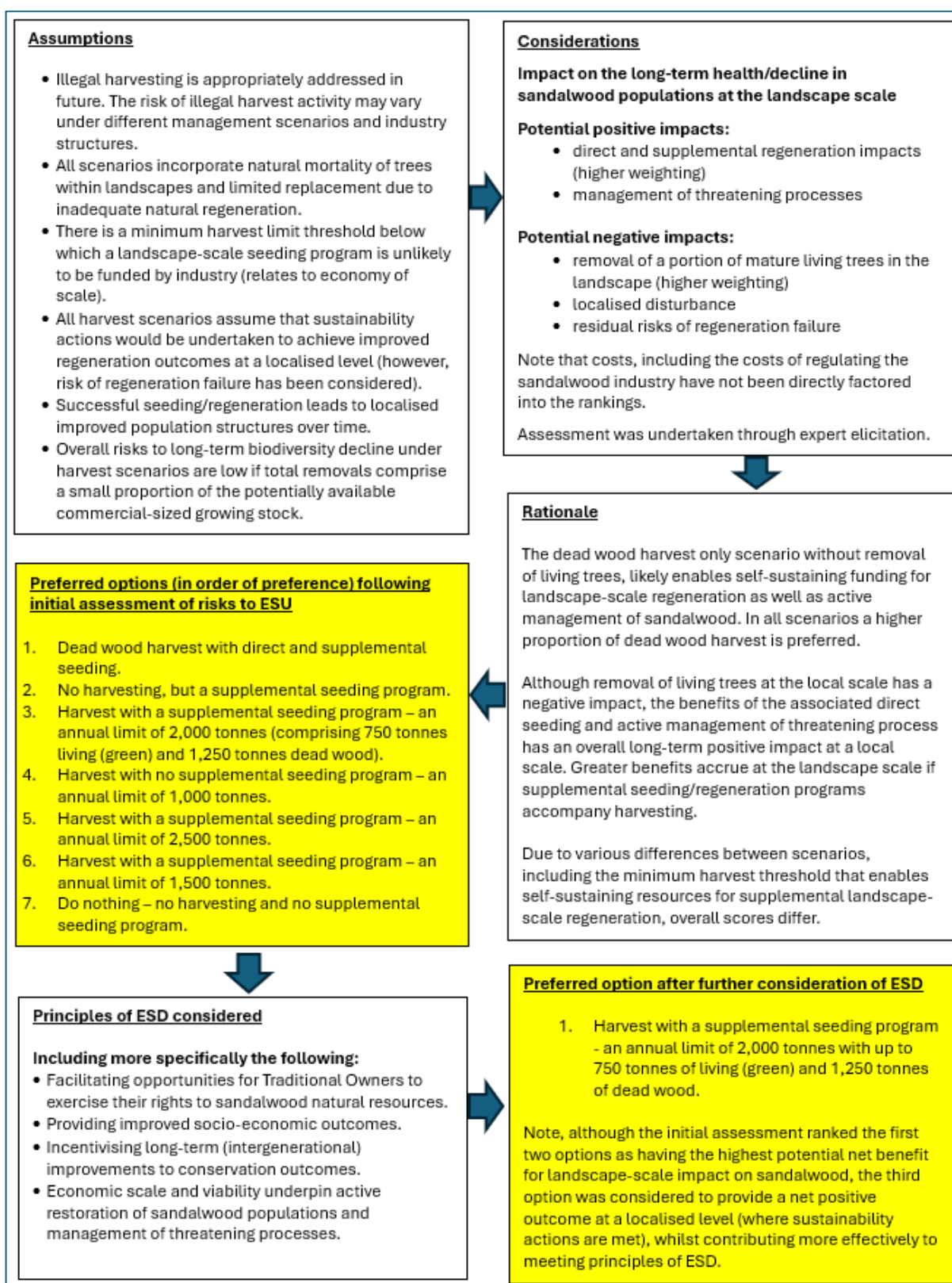


Figure 13. Process and summary of considerations for integration of ESU and ESD principles for recommending a maximum take limit for wild sandalwood. The yellow boxes indicate decisions made following assessment.

10. Recommendations for a new Sandalwood Order

This section outlines recommendations for the content of the Order itself (primary task) and additional relevant recommendations (secondary tasks) that are not already made earlier in the report.

10.1 Recommendations for the content of the Sandalwood Order (primary task)

The primary task of the review is to specify the content for the Sandalwood Order, in accordance with Section 187 of the BC Act.

10.1.1 Acceptable take limit for living (green) and dead wood

For this report, effective integration of ESU and ESD⁵ is interpreted as an acceptable level of take/harvest for the period of duration of the Order which, incorporating mitigation measures, represents an acceptable risk of avoiding long-term biodiversity decline, while also balancing socio-economic aspirations.

The measures to mitigate risk against long-term biodiversity decline include assumed compliance with licensing conditions on harvest operations such as setting the minimum tree size taken; seeding quantities for each tree harvested; retention of a proportion of larger seed-bearing trees; exclusion of sensitive areas at head of drainage features; as well as retention of some patches of undisturbed mature stands to complement the conservation reserve system.

In areas made available for harvest, regeneration success is essential to avoid long-term decline of population structure. Because regions differ in their current population structure, ongoing threatening processes and future growing conditions, it is appropriate to adopt regionally-based harvest limits. However, IBRA regional boundaries are based on biological features and do not necessarily align with tenure or Native Title boundaries, requiring some flexibility in implementation. Further, it is likely the take of dead wood will be independent of, and not integrated with, the take of living (green) trees in some circumstances.

The modelling scenarios described in the *Draft Technical Report* cover a range of acceptable take limits and combinations of living (green) and dead sandalwood removals. Given the data limitations, knowledge gaps and imprecision in the modelling and background work contributing to the estimation of potential acceptable take limits, a precautionary approach is warranted.

Considering the modelling (including that estimated quantities modelled can be maintained beyond the new Sandalwood Order), the risk assessment of ESU (Section 8.4 Risk assessment summary), ESD considerations (Section 9 Principles of Ecologically Sustainable Development) and adopting a balanced, precautionary but pragmatic approach, it is recommended that the new Sandalwood Order specify an annual removal limit of 2,000 tonnes of sandalwood but with an allocation of 1,250 tonnes of dead sandalwood. Compared with the current *2015 Sandalwood Order*, this represents an overall reduction in the total level of removal as well as a substantial reduction in the level of living (green) sandalwood harvest. These new limits seek to maintain harvest at levels that provide opportunity to improve the persistence of sandalwood—and thereby avoid long-term biodiversity decline—as well as maintaining and fostering future economic and social benefits, including facilitating opportunities for Native Title holders to exercise their legal right to the resource.

⁵ Please refer to the glossary for a definition of ESU and ESD.

Recommendation 12: The maximum quantity of wild sandalwood taken annually under the new Sandalwood Order be 750 tonnes for living (green) trees, and 1,250 tonnes for dead sandalwood.

In considering applications to take under the Order, DBCA will be informed by (among other things) new information arising during the term of the Order, Native Title rights, regional differences in current and projected population size and condition, data reliability and threatening processes.

In relation to Recommendation 12, it is proposed that the maximum quantity will not apply to native vegetation clearing permits issued under the EP Act. The allocation of the maximum limits specified in Recommendation 12 are discussed in Section 10.2.2 (Allocation of harvest limits).

Question: Do you consider the recommended annual take limit to be acceptable, considering that proposed harvest should be sustainable and include appropriate seeding and monitoring?

10.1.2 Duration of limits and the Sandalwood Order

10.1.2.1 Duration of limits

The BC Act (s187(2)) provides for the Order to specify the period relating to the maximum quantity of wild sandalwood that can be taken. The current *2015 Sandalwood Order* sets the maximum limits for take of sandalwood as an annual limit and specifies that for the final six months of the duration of the Order (1 July 2026 to 31 December 2026) this equates to 50 per cent of the maximum annual limit, that is 1,250 tonnes with no more than 625 tonnes being living (green) sandalwood.

While specifying an annual limit provides clarity and licensing efficiencies, DBCA recognises this can give rise to operational challenges for stakeholders in managing production schedules due to the intermittent seasonal nature of access in remote areas and maintaining capacity. Flexibility for limits to apply over a two-year period, combined with the capacity to allow some unused allocation from one year to roll-over to the second year, has been proposed as one alternative.

Environmental arguments in favour of allowing roll-over of unused allocation include providing for the scale of harvest and regeneration activities to better align with seasonal conditions, such as reducing harvest activity in periods of drought to avoid regeneration failure. Arguments against allowing roll-over of unused allocation relate to reducing the overall pressure of harvesting on populations through retaining more living (green) trees in the landscape than would otherwise be removed. Economic arguments raise concerns about the potential for supply continuity if the roll-over period is prolonged.

On balance, DBCA's preference is to retain an annual limit, but provide for 50 per cent of unused allocation to an individual licence holder to be utilised in the following year.

Recommendation 13: The licensing of take should provide for flexibility of individual licence holders to 'roll-over' up to 50 per cent of unused quantities to the following year.

Question: Do you think an option to allow for up to 50 per cent of unused quantities to 'roll-over' for use in the following year is acceptable, and if so, why?

10.1.2.2 Duration of the Order

The current *2015 Sandalwood Order* applies for a 10-year period. In an adaptive management framework where monitoring of outcomes informs future actions, shorter durations are generally favoured where there is significant uncertainty or knowledge gaps to

be addressed in the short term. Shorter durations can also be desirable where major changes or transitions in the industry are likely to emerge and require changes in settings.

Conversely, business models for production, supply and marketing of sandalwood generally prefer longer term certainty (including beyond 10 years). The risk assessment of each scenario considered the impact of continuous harvest over a 10-year period and modelling of impact up to 100 years. The risk assessment also considered the possibility of regeneration failure (such as during ongoing drought) even with multiple mitigation measures in place to ensure successful regeneration. It is considered that the risks associated with setting the next Sandalwood Order to apply for a 10-year duration are minimal enough to warrant recommending this duration.

Notwithstanding the duration specified in the Order, government policy changes can potentially give rise to revisions, such as might arise should sandalwood be listed as a threatened species under the EPBC Act.

Recommendation 14: The duration of the Sandalwood Order should be 10 years with the maximum harvestable quantities to be specified on an annual basis.

10.1.3 Products included in the Sandalwood Order

The current *2015 Sandalwood Order* applies to both living (green) and dead sandalwood as defined in the BC Act. In addition, currently all parts of the tree in the removal limit except leaves, bark and small branches (less than 25 mm diameter at the large end under bark) are included. This promotes maximum utilisation of each stem taken to reduce the overall number of living trees harvested (i.e. fewer trees harvested per tonne accounted for under the Order). The Sandalwood Order does not apply to cultivated flora (refer to Section 5(1) and regulation 4(a) of the BC regulations), and hence not to plantation-grown products. As cultivated flora/sandalwood plantations have been purposely grown for commercial and other purposes, their take should not be limited to a maximum quantity per year as this could be a disincentive for establishment. It is recommended that a new Sandalwood Order includes these same products.

Recommendation 15: It is recommended that the products included in the Sandalwood Order (for removal or take) remain the same as the current *2015 Sandalwood Order*. This applies to both living (green) and dead wild sandalwood on both Crown and private land and that all parts of the tree except leaves, bark and small branches (less than 25 mm diameter at the large end under bark) are included in the removal limit. In accordance with the BC Act, the next Sandalwood Order (commencing in 2027) continue to exclude plantation-grown sandalwood.

10.2 Recommendations associated with the Order (secondary tasks)

The secondary tasks of the Sandalwood Order review process are specified in the *Scope of works* and relates to Management Strategy 2(a) from the *Sandalwood BMP*, which specifies what needs to be accounted for in determining and recommending a sandalwood take quantity for the Minister to issue a new Sandalwood Order in 2027.

10.2.1 Minimum size permitted for take

Increasing the minimum size of permissible take/harvest of sandalwood may result in some areas becoming unviable for harvest of living (green) trees given the variability of population demographics across the sandalwood landscape. As licence conditions must ensure that an appropriate number of sandalwood trees are retained in the landscape in any case, it is not recommended that changes to minimum harvest size are made. Modelling of the current minimum legal take size of living (green) sandalwood (≥ 127 mm) and a proposed increase to

≥151 mm indicates that, by Year 40, size class distributions (at the landscape scale) will be similar. Consequently, there is no significant difference in population condition or potential benefits between the two size limits.

However, it is recommended that BC regulation 67(3)(c)(ii)—which prescribes minimum take size for living (green) sandalwood measured under bark at about 150 mm above ground level—is adjusted to a smaller circumference because the current under-bark minimum circumference does not reflect the likely differential between over-bark and under-bark measurement (due to only allowing a bark thickness of 3.2 mm, when bark thickness can be greater).

The BC regulations currently specify that a living (green) tree harvested under licence must not be less than 400 mm in circumference (about 127 mm diameter) when measured over the bark at a point of about 150 mm above ground level and that it must not be less than 380 mm in circumference when measured under bark at this same point.

Recent field measurements of sandalwood stems showed that bark thickness can account for greater than 100 mm of sandalwood stem circumference. Analysis of that data predicted that the average under-bark circumference of a sandalwood stem will be 329 mm when over-bark circumference is 400 mm, that is a mean circumference differential of 71 mm. Please refer to the *Draft Technical Report* for more information. Therefore, the regulations as they are currently written do not allow for an under-bark measurement that is in proportion with the permitted over-bark measurement, as it allows only for thin bark with a 20 mm circumference differential.

It is recommended that further research on sandalwood bark thickness is undertaken to confirm the recommended change given the small amount of data available and the possibility of variability across IBRA subregions. The current BC regulations will remain in place until they are amended and further evidence to substantiate an appropriate change that accurately reflects bark thickness should be used to make a change to BC regulation 67(3)(c).

Recommendation 16: DBCA to undertake further data collection to inform a change to BC regulation 67(3)(c) to accommodate for the variation to under-bark measurement relative to minimum over-bark measurement.

Question: Do you have any suggestions to help inform a change to BC regulation 67(3)(c)?

10.2.2 Allocation of harvest limits

Aboriginal people should have preferential access or opportunity to benefit from commercial wild sandalwood harvest, assuming that sustainability actions are met. In this context the word ‘benefit’ is not related solely to an economic benefit from commercial harvest, but increased opportunity to care for Country and participate in sustainable operations and sandalwood regeneration programs. There is a recognition that currently more support is needed for Aboriginal people to be involved in the commercial sandalwood industry, and that any recommendations must consider the market environment and an industry structure that supports continuity of supply and market stability.

Facilitating outcomes for Aboriginal people through their involvement in the sandalwood industry helps address the State’s *Aboriginal Empowerment Strategy 2021-2029* (Government of Western Australia, 2021) and contributes to targets under the *Closing the Gap Implementation Plan 2023–2025*, as well as strengthening relationships between the State Government and Native Title groups in the region established under joint management agreements, ILUAs and the Aboriginal Ranger Program.

The quantities available under a new Sandalwood Order should be allocated through a process that ensures equitable access and capacity to undertake sustainable management of sandalwood. In other words, Aboriginal people with Native Title rights and capacity to sustainably manage sandalwood harvest should be provided with access to the harvest limit. The amount of wild sandalwood that is allocated to Aboriginal people may vary from year to year, depending on impetus and capacity of groups to undertake sustainable harvest operations including seeding. As per Recommendation 3, the agreement with FPC will incorporate an allocated amount. The current 80 per cent and 20 per cent allocation split equates to 250 tonnes of living (green) wood available per annum via a BC regulation 67 take licence until 31 December 2026. **This 250 tonnes of living (green) and 250 tonnes dead wood (500 tonnes total) annual amount available via BC regulation 67 take licences is a baseline amount that should be a minimum allocation from 2027 under a new Sandalwood Order with the intent that this allocation increases over time.**

Recommendation 17: Of the total 2,000 tonnes combined living (green) and dead wood take limit, 500 tonnes (including up to 250 tonnes living (green) wood) should be made available via a BC regulation 67 take licence from 2027. This amount will be adjusted as required with the intent to increase the allocation under a BC regulation 67 take licence, contingent upon any outcome arising from Recommendation 2 or 3, over time. This Recommendation will require some funding to support an additional landscape-scale seeding program (as relevant to Recommendation 1).

In implementing Recommendation 17, it is acknowledged that industry is less likely to have the resources to self-fund a landscape-scale supplemental seeding program compared to scenarios with a higher harvest limit, because a higher limit allows for better economies of scale. In recent times, in addition to seeding undertaken at harvest, the FPC has been funding an additional seeding program through Operation Woylie at a cost of approximately \$1 million annually for up to 20 tonnes of seed sown (FPC, 2025). As a stand-alone program the costs of this landscape-scale regeneration would likely be higher, as there are cost savings when the direct supervision costs are shared across a range of activities including commercial harvest. In addition, disturbance approvals already obtained prior to harvest can incorporate the approvals for the regeneration activity. This recommendation has funding implications, and further highlights the need for Recommendation 1 (regarding the urgent need for a sandalwood establishment strategy) to be implemented with funding options to be explored.

Question: How can DBCA better engage with Aboriginal representative bodies/corporations to better plan for sustainable harvesting of sandalwood?

10.2.3 Regional conditions

It is recommended that regional protocols as specified in the BC regulation 67 *Flora taking (sandalwood) licence wild stands application kit* are followed and that these are amended when knowledge is improved. Regional differences are appropriate to consider due to varying environmental factors. However, any potential take of sandalwood must continue to be assessed on a case-by-case basis to ensure sustainability.

Recommendation 18: Regional licence protocols continue to apply to BC regulation 67 sandalwood take licences, and these are reviewed annually as knowledge is improved.

11. Conclusion

At this stage of the review of the Sandalwood Order there is a need to solicit feedback from a range of stakeholders and Aboriginal people, with this being an important function of this report. It is acknowledged that there are limitations in the best available information used for the Sandalwood Order review to date. However, although there are limitations, the sandalwood population modelling has provided an indication of the consequences of a 'do nothing' approach compared to the possible effect of various reduced harvest limits on future sandalwood population dynamics. A risk analysis and consideration of the precautionary principle have also been undertaken in making conservative recommendations on harvest limits. Any new harvest limits need to be in line with the objects of the BC Act and regard must also be had to the principles of ESD.

In considering the above, it is essential to strike a balance between conducting a review that is as comprehensive as practicable—encompassing the full range of ESD considerations—and ensuring that decisions are made in a timely manner.

Question: Is there any other information that should be included and considered in the final Sandalwood Order review report?

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⁶ This manuscript has been accepted for publication to the Australian Forestry journal, published by Taylor & Francis. A copy of the pre-print (Author’s Original Manuscript) is available here: [library.dbca.wa.gov.au/attachments/216655/Northover%20et%20al_manuscript_PREPRINT\(2\).pdf](https://library.dbca.wa.gov.au/attachments/216655/Northover%20et%20al_manuscript_PREPRINT(2).pdf), accessed 30 March 2026.

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13. Glossary

‘Aboriginal person’ means a person wholly or partly descended from the original inhabitants of Australia, as defined in the CALM Act and the BC Act.

‘Alienated land’ or **‘private land’** is defined under Section 3(1) of the *Land Administration Act 1997* as land held in freehold.

‘Condition’ in the context of biodiversity conservation ‘sandalwood condition’ in this report refers to the status of naturalness of the vegetation, assessed through structure and tree size class distribution, reflecting processes generating vegetation pattern and dynamics (adapted from Mucina, 2009).

‘Crown land’ is defined under Section 3(1) of the *Land Administration Act 1997* (and subject to other subsections) as all land, except for alienated land.

‘Cultivated flora’ is defined under Section 5(1) of the BC Act as flora that has been intentionally sown, planted or propagated unless—

(a) it has been sown, planted or propagated as required under the BC Act or another written law; or

(b) it is of a class declared by the BC regulations to be excluded from this definition.

‘Cultural Knowledge’ refers to a range of knowledge held and continually developed by Aboriginal peoples and includes:

- traditional cultural expressions such as stories, dance and art; and
- traditional knowledge relating to a range of areas such as science, ecology, agriculture and medicine.

‘Ecologically Sustainable Development’ (ESD) is as per the principles of ecologically sustainable development listed in the BC Act Section 4(a) to (e).

‘Ecologically Sustainable Use’ (ESU) has the meaning given in Section 5 of the BC Act, and specifically in relation to biodiversity components, means use of the biodiversity components in a way and at a rate that does not lead to the long-term decline of biodiversity, thereby maintaining the potential of the biodiversity components to meet the needs of present and future generations.

‘Landscape scale’ refers to a mosaic where the mix of local ecosystems and landforms is repeated in a similar form over a kilometres-wide area. Several attributes including geology, soil types, vegetation types, local flora and fauna, climate and natural disturbance regimes tend to be similar and repeated across the whole area. In the rangelands context, ‘landscape’ may comprise areas of a few thousand to tens of thousands of hectares (Source: adapted from the Forest Management Plan 2014–2023).

‘Local scale’ refers to a discrete area of land to which one or more operations (such as harvest or seeding) have been or are planned to be applied. In the rangelands context a single operation may extend across hundreds to a few thousand hectares.

‘Plantation sandalwood’ means sandalwood (*Santalum spicatum*) that is planted and grown on previously cleared lands as a commercial crop. This is also recognised under the BC Act as **‘cultivated flora’**.

‘Regeneration’ means the population establishment and recruitment process of sandalwood in the wild through either natural processes involving seed production, dispersal, germination and hemi-parasitic establishment via haustoria or by artificial processes of ‘seeding’ involving the sowing of seed into the landscape via mechanical or hand methods either as

part of harvest operations or by supplemental means (such as FPC's Operation Woylie), which also result in hemi-parasitic establishment via haustoria.

'Regional scale' refers to the Interim Biogeographic Regionalisation for Australia (IBRA) subregions, or groupings thereof, adopted as the primary unit for stratifying and interpreting sandalwood distribution and demographic data as described in the *Draft Technical Report*. Consequently, the spatial scale is millions to hundreds of thousands of hectares.

'Sandalwood habitat' in this report refers to that subset of the total extant distribution of wild sandalwood that is considered to have sufficient stems per hectare to be a candidate area for modelling resource scenarios, as distinct from areas without sandalwood or with only low, sparsely distributed stem numbers.

'Silviculture' is the theory and practice (silvicultural practices) of managing the establishment, composition, health, quality and growth of forests and woodlands to achieve specified management objectives.

'Specifically controlled sandalwood' means (a) wood of sandalwood if it has a diameter of greater than 25 mm at the smallest end when stripped of bark; or (b) roots of sandalwood.

'take' of sandalwood (flora) under Section 5 of the BC Act includes the following—

- (i) to gather, pluck, cut, pull up, destroy, dig up, remove, harvest or damage flora by any means;

- (ii) to cause or permit anything referred to in subparagraph (i) to be done.

'Traditional Owners' means Aboriginal people who belong to, have the right to speak for, and have spiritual responsibilities for the care of a certain place or places based on their own laws and customs. Traditional Owners may be directly descended from the original Aboriginal inhabitants of the land and may also be the common law holders of Native Title for the Country being discussed.

'Wild sandalwood' in this report refers to *Santalum spicatum* that is not cultivated/plantation sandalwood.

Appendix 1 – Overview of relevant consultation

The following table provides a summary of relevant processes involving some level of stakeholder and/or Aboriginal consultation as it relates to wild sandalwood management and harvest limits in Western Australia. Note that due to the table being a summary, stakeholder descriptions have not been provided, as key findings/descriptions provided may be relevant to more than one stakeholder or Aboriginal person.

Year	Process/consultations
2012–2014	Parliamentary Inquiry into the sandalwood Industry in Western Australia • There were more than 20 public submissions received. • Key recommendations (relevant to current Sandalwood Order Review): ○ That the Minister for Environment immediately review sandalwood harvest limits with a view to reducing the quantity that may be harvested from both Crown and private land. This recommendation was subsequently supported and the removal limit reduced in 2015. The government also supported the approach of considering the future yields from sandalwood plantations. Lack of natural regeneration was also acknowledged.
2015–2016	2015 – Review of the Sandalwood (Limitation of Removal of Sandalwood) Order 1996. A report was produced by an internal DBCA working group. • Note that this process did not include public consultation. • The report made a number of recommendations including (abridged): ○ To significantly reduce the removal limit for wild sandalwood when plantation resource becomes available for harvest. ○ All existing and proposed conservation reserves be excluded from harvest. ○ Conduct further research and inventory to refine the acceptable level of living (green) and dead wood harvest on alienated land. ○ FPC should expand its regeneration program to cover agreed areas within existing and proposed conservation reserves. ○ Recommend the removal limit be reduced to 2,500 tonnes per year (down from the previous 3,000 tonnes with 1,500 tonnes of living (green) and 1,500 tonnes of dead per year in a previous Sandalwood (Limitation of Removal of Sandalwood Order) 1996) with a maximum 50 per cent living (green) wood, allowing for a lower living (green) wood harvest if new markets for dead wood emerge or other factors favour an increase in harvest of dead wood. ○ Include all parts of the tree in the removal limit except leaves, bark, and small branches (less than 25 millimetres diameter at the large end under bark). ○ Harvest limits (Order) remain in place for 10 years in which time additional research and inventory is undertaken. ○ The limits should be reviewed by the end of 2024, in light of available plantation resource and any additional research findings and inventory results. Wild Sandalwood Harvest on Crown Lands (2016–2026) was referred by a stakeholder to the Environmental Protection Authority (EPA) • Proponent was the FPC. • The EPA determined proposal did not meet the requirements for assessment. • The EPA released public advice in 2016 on the environmental aspects of the proposal.

Year	Process/consultations
	2015 – FPC commissioned a consultant to gather feedback from relevant Aboriginal communities to seek their input into the wild sandalwood industry – specifically inviting ideas for innovative harvesting, marketing and sales initiatives. Feedback included (abridged and not inclusive of all feedback): • There was generally an interest in more opportunities for Aboriginal people. • Some groups stated that the sandalwood belongs to Aboriginal people. • Some Native Title holders said that they should receive an additional royalty from sales of sandalwood. • Sandalwood has been used for medicine by Aboriginal people and Aboriginal people should have rights to use sandalwood. • Dividends need to flow back into communities. • Current regimes (as at 2015) make it difficult for Aboriginal people to be involved in the industry. The system favours bigger contractors in the industry and the current system (as at 2015) invites illegal activity to occur.
2019–2021	WA Sandalwood Taskforce • Established in late 2019, the purpose of the Taskforce was to: 1. Explore opportunities to use the Western Australian sandalwood resource to drive economic development opportunities for Aboriginal communities and to grow Aboriginal businesses. 2. Identify barriers to Aboriginal economic development in the wild sandalwood industry. 3. Ensure that the development of new business opportunities is ecologically and economically sustainable for both government and Aboriginal stakeholders. 4. Coordinate and align government agency actions and resources. 5. Provide recommendations to government to support these objectives. • The taskforce included representatives from State Government agencies and Aboriginal groups and businesses with interest in the wild sandalwood industry. • DPIRD's role was to chair the Taskforce and provide support through unlocking new opportunities for Aboriginal people, building Aboriginal business and governance, and increasing the impact of government investment. • Key issues raised by the Taskforce included: ○ Disparity between allocation of quantities through government production contracts and private licences. ○ Holistic Aboriginal economic development policy and funding programs to build capacity. ○ Sustainable harvest of sandalwood, which is vital to the industry and to Aboriginal economic development. ○ Market stability – needs to be consistent to support the other elements of the strategy. ○ Tenure – lack of transparency on ownership and access across Native Title determined lands. ○ A need for more Aboriginal business models outside of the FPC contractor model to develop the value chain. • A draft Taskforce Report was released in 2020 for a four-week public comment period. The report outlined eight recommendations to government to support increased economic opportunities for Aboriginal communities using WA's wild sandalwood. Twenty submissions were received, with some of these from Aboriginal groups or individuals. Submissions supported the need for greater Aboriginal participation in the sandalwood industry.

Year	Process/consultations
	- Final Taskforce Report recommendations included increased support for: - Entry: Develop materials/tools to provide education on sandalwood industry opportunities. - Licensing: Reduce barriers to Aboriginal participation through a streamlined process. - Building Capacity: Facilitate skills development and enterprise development. - Agency coordination through DBCA, FPC and DPIRD. - Opportunity expansion through developing market value and a 10 per cent removal limit increase allocated to Aboriginal licence holders. - Establishment of an industry advisory body – which became the WA Sandalwood Advisory Group.
2022–2024	WA Sandalwood Advisory Group (WASAG) - Established in 2022 by the Minister for Forestry in accordance with Schedule 1, Division 1, Clause 16 of the <i>Forest Products Act 2000</i>. - The WASAG was an industry advisory body, established under Recommendation 8 of the Taskforce Report, tasked with monitoring the implementation of the remaining recommendations from the Taskforce including eventual transition to an Aboriginal sandalwood industry body. - Members were ministerial appointments including: - Government representatives involved in the management of wild sandalwood from operational and compliance (DBCA), economic development (DPIRD) and industry development (FPC) perspectives; - Aboriginal interest holders involved in the sandalwood zone in WA (Dutjahn Custodians, Yilka Talintji and Tjiwarl), the Aboriginal Advisory Council of WA; and - individuals with extensive knowledge and involvement in the sandalwood industry. - DPIRD served as the independent secretariat for the WASAG, given interests from both FPC and DBCA, providing high-level coordination to the implementation of actions arising. The role also fits DPIRD's remit for broader Aboriginal economic empowerment. - The group was wound up in 2024 with the decision in line with Taskforce Report Recommendation 8 that there be an eventual transition to an Aboriginal sandalwood industry body for groups involved in wild sandalwood management. As an initial priority, the expert members agreed that forming an alliance/industry body for Indigenous interests in the species would create a cohesive mechanism for government to engage with throughout the Sandalwood Order review process. - All members acknowledged achievements made since the group was appointed in 2022, which included: - a change of one year licence term to three years for Indigenous sandalwood licence holders aligning to investment/capacity building needs; and - a commitment from both the WA and Australian government to partner with the K Farmer Dutjahn Foundation on the delivery of the <i>Aboriginal Sandalwood Capability Building Program</i> over three years. <i>Santalum spicatum</i> (Sandalwood) Biodiversity Management Programme (Sandalwood BMP) - A draft was released in 2022 for a two-month public comment period. - Forty-four submissions were received.

Year	Process/consultations
	• Key comments (relevant to harvest limits and/or the Sandalwood Order review) include (abridged): ○ FPC take needs to be reduced vs. sandalwood harvesting should remain with the FPC. ○ Current removal limit needs to be urgently reduced vs. the current limit is sustainable. ○ Regeneration programs are currently funded by the sale of harvested sandalwood, which would not occur otherwise. ○ Consultation with Aboriginal people has been insufficient and six weeks to comment on a draft is insufficient time for most groups. • In light of the feedback during the public consultation period the <i>Sandalwood BMP</i> was finalised and published in 2023. It specifies a number of strategies and management actions including a management action associated with the review of the Sandalwood Order.
2023–2026	• DPIRD and Australian Government’s Department of Agriculture, Fisheries and Forestry co-fund the establishment of the Aboriginal Sandalwood Industry Capability Program to be delivered in partnership with K Farmer Dutjahn Foundation (KFDF) over a three-year period. The project is now called, ‘<i>Aboriginal Leadership in Sandalwood: Education and Training Strategy to Support Conservation and Sustainable Harvesting in WA</i>’. • This partnership has been set up to deliver tailored tools, materials and capability training to increase supply chain involvement across the sandalwood zone. • The program has also been developed to explore alternative Aboriginal-led business models, sustainable resource management and economic opportunities on Country. • The initiative was designed to support the WA Aboriginal Sandalwood Advisory Group's mandate where DPIRD played an agency role. • Deliverables include: 1. Development of Setting up for Success Guide on sustainable management of wild sandalwood. 2. Production of case studies through various business models set out in the guide and interviews with sandalwood ambassadors. 3. Baseline of needs and current sector capability undertaken by IPS Consultants: Understand and map out the scope of capability need, strategies and support necessary for successful Aboriginal sustainable management of sandalwood in WA. 4. Development of a service delivery plan and workforce development strategy informed by baseline needs analysis. Program outcomes anticipated for June 2026: • Increased participation and inclusion of Aboriginal people in the sandalwood sector. • Increased information and awareness for communities, registered Native Title Body Corporates and Aboriginal people about the opportunities of the sandalwood industry and how to participate. • Increased capacity and skill development in resource level inventory, management and planning and principles of sustainable silviculture. • Increased mentoring and wrap around support for enterprise development and access to capital opportunities for Aboriginal businesses. • In 2025 the Aboriginal Sandalwood Alliance formed. For more information refer to aboriginalsandalwoodalliance.com.au

Year	Process/consultations
2024–2026	<i>Scope of works for the review of the Sandalwood (Limitation of Removal of Sandalwood) Order (No. 2) 2015 released in December 2024</i> • The process includes ongoing stakeholder consultation and a public consultation period in 2026 (the latter of which involves consultation on this report). • In addition to the above, ongoing consultation has included a series of face-to-face meetings and field trips in August 2025, to enable consultation with stakeholders and Aboriginal people with DBCA staff and the Independent Panel. DBCA has also received a number of submissions to be considered for the review of the Sandalwood Order. • For more information on the feedback DBCA has received to date since the release of the <i>Scope of works for the review of the Sandalwood (Limitation of Removal of Sandalwood) Order (No. 2) 2015</i>, refer to <i>Summary of feedback received since the release of the scope of works</i>, which will be made available on DBCA's website for the public comment period.

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