

Forest Audit Program: 2011-12reporting period  
Module 7 audit of coupe regeneration and finalisation

Final report: August 03, 2012

Department of Sustainability and Environment

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# Executive summary

## Audit scope

The Department of Sustainability and Environment (DSE) commissioned Sinclair Knight Merz (SKM) to conduct an audit of coupe regeneration and finalisation as part of its Forest Audit Program (FAP) activities for the 2011-12 financial year. The audit was conducted as a statutory environmental audit under the auspices of the *Environment Protection Act 1970* and considered the risk of harm to the environment resulting from coupe regeneration and finalisation activities and thinning operations conducted by VicForests in State forests in eastern Victoria.

The segment of the environment that was audited comprised 315 regeneration coupes and 40 thinning coupes located across seven Victorian Forest Management Areas (FMAs); Benalla-Mansfield, Central, Central Gippsland, Dandenong, East Gippsland, North East and Tambo. VicForests proposes to transfer or “hand back” management responsibility for these coupes to DSE. The audit directly considered the vegetation and land or soils of regeneration and thinning coupes and the multiple beneficial uses of State forests, including: timber production, biodiversity or nature conservation, recreation, provision of visual amenity, protection of cultural heritage values and generation of water for environmental and consumptive uses.

Criteria for the audit are established by:

* *Code of Practice for Timber Production* (2007);
* Native Forest Silviculture Guidelines (NFSGs) relating to logging coupe regeneration and the management of thinning operations in native forests ( #10, 13 and 14)

They relate to the rehabilitation of coupe infrastructure (landings, snig tracks etc), the development and application of guidelines for coupe finalisation and regeneration, the adequacy of regeneration and post-thinning stocking, site disturbance, source of seed for regeneration and pest animal controls. An audit manual for coupe regeneration and finalisation had previously been developed for the FAP. This was revised prior to the commencement of the formal audit.

Risk of harm to the environment of non-compliance with key audit criteria was assessed using standard risk assessment processes (AS/NZS ISO 31000:2009), based on DSE’s (2007) *Risk management framework* (Appendix B). The scope of the assessment was confined to 32 regeneration coupes and five thinning coupes proposed by VicForests for hand back which were included in the detailed field component of this audit.

Direct stakeholder involvement in the audit was limited to DSE’s Regulation and Compliance Unit and VicForests staff involved in environmental systems management and logging coupe regeneration.

The audit team was lead by Craig Clifton, an environmental auditor (natural resources) appointed pursuant to the *Environment Protection Act 1970*. The support team included Mark Poynter, Anthony Brinkley, Shelly Ada and Chloe Hanson-Boyd. The audit did not require support from Craig Clifton’s formal environmental audit support team.

## Revision of FAP Module 7

DSE commissioned the development of various “modules” to guide the conduct of statutory environmental audits undertaken as part of its FAP, including Module 7 for coupe regeneration and finalisation. This module was extensively revised prior to the formal audit being undertaken, although the work formed part of DSE’s overall terms of reference. The revised FAP Module 7 for coupe regeneration and finalisation includes three main components:

* **Module 7 overview:** which provides an overview of the module, introduces the compliance elements and workbooks and outlines the approach to the desk-top and field audit components that is described in detail in Workbooks 7A and 7B.
* **Module 7 Workbook 7A:** this component is a completely new addition to Module 7. It describes a process by which VicForests reporting on coupe regeneration and finalisation is verified and compared against standards specified in the Code and relevant NFSGs. Its scope extends to all regeneration and thinning coupes nominated by VicForests for hand back to DSE and is based on a desk-top assessment of data provided by VicForests.
* **Module 7 Workbook 7B:** this component is substantially revised from the original Module 7 and includes detailed assessments of compliance of regeneration and thinning coupes with relevant audit criteria derived from the Code and NFSGs. It is based on an analysis of information from coupe files, VicForests Coupe Information System (CIS), DSE’s FireWeb and data gathered in field surveys in a selection of regeneration and thinning coupes.

Module 7 and its workbooks were reviewed again following their use in this audit and several further changes made. The final, revised version of FAP Module 7 is provided with this report.

## Review of VicForests assessments of suitability for finalisation

At the time of the audit, VicForests reported to DSE on the outcomes of its surveys of regeneration and thinning coupes. This information is intended to confirm that coupes have been regenerated according to standards set in NFSG #10, that thinning has been conducted to the standards set in NFSG #13 (for ash eucalypt forests) or #14 (for mixed species forests) and that coupes may be handed back to DSE for on-going management. VicForests’ finalisation reporting was audited using the revised FAP Module 7 and its Workbook 7A.

In their 2011-12 finalisation list, VicForests proposed 315 even-aged regeneration coupes and 40 thinning coupes for hand back. Details of coupe regeneration and thinning coupe surveys were provided in a spreadsheet (VicForests 2011 coupe handback.xlsx) which was intended to enable DSE to verify that regeneration and thinning activities comply with the relevant NFSGs.

Of the 315 regeneration coupes nominated by VicForests for hand back, this assessment has identified just three that do not meet NFSG #10 standards for coupe stocking levels. Standards were not met as a result of: stocking being below the standard for the survey intensity; an unstocked area greater than 1 ha being observed; or all of the species present in the coupe prior to harvest not being identified in the survey. The two coupes with below standard stocking and unstocked areas greater than 1 ha were part of a joint DSE-VicForests trial and were not required to meet NFSG stocking standards.

The main area of non-compliance with NFSG #10 was not in relation to the level of stocking, but in the timing of stocking surveys. A total of 51 of 315 coupes were identified as not having stocking surveys undertaken within three years of coupe treatment[[1]](#footnote-1). This was assessed to pose no material risk for hand back.

VicForests thinning operations frequently did not comply with the relevant NFSGs. Only six of 40 thinning coupes proposed for hand back fully complied with NFSG standards for basal area retention, thinning damage and bay and outrow width.

Regeneration and thinning coupe finalisation reporting by VicForests to DSE was found to generally be consistent with the underpinning coupe file or other records. Variances between coupe records and finalisation reports to DSE were detected for 10 of the 32 regeneration coupes and one of the four thinning coupes included in this part of the audit. In only two cases for regeneration coupes did mistranslation of information result in coupes being incorrectly reported as having stocking that was compliant with NFSG #10. The translation error for the thinning coupe resulted in it being incorrectly labelled as non-compliant in relation to the percentage of live basal area (BA) retained after thinning.

## Field assessments of regeneration and thinning coupes

Field assessments were conducted to confirm the data being reported to DSE as part of the finalisation process using the revised FAP Module 7 and its Workbook 7B. These assessments audited regeneration and finalisation operations against Code and NFSG requirements and sought to confirm, in the field, the results of VicForests’ regeneration and post-thinning surveys.

Information reported to DSE in VicForests’ finalisation list was found to be completely consistent with the results reported in stocking surveys for 28 of the 32 audited coupes. The four exceptions were all coupes that included areas where stocking was reassessed using intensive survey methods. The results included in the finalisation report to DSE were either not equal to the overall plot stocking rate or represented the results of just one of the two or more stocking surveys. In each case, the coupes were found to be acceptably stocked and differences were no more than a few percent. The pre-thinning BA reported in the finalisation list for one coupe was incorrect and as a result, the coupe was wrongly assessed to have exceeded the NFSG target for the percentage of live BA removed.

Regeneration coupes were assessed to satisfy the requirements of approximately 97% of applicable mandatory criteria and 84% of applicable guidance criteria. Thinning coupes were assessed to satisfy the requirements of approximately 84% of applicable mandatory criteria and 100% of the applicable guidance criteria.

No material (or high) risks of harm to the environment were identified as a result of these incidences of non-compliance. Based on DSE’s 2007 risk management framework, all but two of the risks from non or partial compliance with audit criteria based on the Code and NFSGs were assessed to be low. The two medium risks related to single incidences of stocking standards not having been met and a regeneration burn escaping from control lines.

## Audit findings

The audit made the following key findings:

* **Risk of harm to the environment:** no material risk of harm to the environment was identified. A small number of instances of partial or non-compliance with audit criteria based on the Code and NFSGs were identified, however these were assessed to pose a low or, at most, medium risk to the environment, based on DSE’s risk management framework. The greatest risk of harm to the environment identified was where a regeneration burn escaped (assessed as medium risk).
* **Acceptability of regeneration coupes for hand back:** all 315 regeneration coupes proposed for hand back are considered to be acceptable in that they either comply with NFSG standards, do not comply, but were part of an accepted trial conducted with DSE and were not required to be regenerated to NFSG standards or are understocked in one confined location that is no longer accessible for treatment.
* **Acceptability of thinning coupes for hand back:** frequent instances of non-compliance of VicForests’ thinning operations with NFSG standards were detected. These were in relation to damage to retained trees, retained BA and bay and outrow width. As none of the material issues can be remediated it is recommended that all coupes be accepted for hand back and that VicForests and DSE work to improve compliance with NFSGs. VicForests report that the contractors responsible for the majority of poor results have been dismissed.
* **VicForests finalisation and hand back reporting:** VicForests reporting meets DSE requirements and guidelines for finalisation reporting, however it not sufficiently comprehensive to fully assess compliance with NFSG standards. VicForests records had all of the required information and, once provided to the auditors, it was used to identify that most coupes proposed for hand back met NFSG standards.

A small number of errors and omissions were identified in VicForests finalisation reporting to DSE (7% of the total number of audit criteria), although these omissions and errors had no material impact on the acceptability of coupes for hand back.

* **Harvest coupe regeneration and finalisation:** activities that were assessed during detailed field audits complied with 97% of applicable audit criteria. Only one instance was detected among 32 coupes and over 340 applicable audit criteria where non-compliance was assessed to pose more than a low risk of harm to the environment.

## Recommendations

Recommendations arising from this audit include the following.

| **#** | | **Recommendation** |
| --- | --- | --- |
| 4.1 | | It is recommended that future requests for information on finalisation of VicForests coupes include all of the information needed to assess compliance with NFSG standards. |
| 4.2 | | Differences in species composition between the gross coupe area and the area actually harvested may legitimately result in species found to be present in coupe planning not being detected in stocking surveys. It is recommended that for coupes in which stocking surveys do not detect all of the species identified in planning, an annotation explaining any legitimate reasons for this (e.g. species uncommon in coupe area, species only present in unharvested area) be provided in VicForests finalisation reporting. |
| 6.1 | | It is recommended that Part A of Workbook 7A be adopted for use in future audits without further modification. |
| 6.2 | | It is recommended that Part B of Workbook 7A be removed and not be included in future audit programs. |
| 6.3 | | It is recommended that Part A of Workbook 7B be modified for use in future audit programs as follows:   * Provision is made to separately capture information from multiple regeneration coupe stocking surveys. For several of the audited coupes, a standard survey was followed up by one or more intensive surveys to either check stocking in lightly or unstocked areas or to follow up on remedial work to improve regeneration. * The tables require cells that confirm the results of the assessment. * For thinning coupes, Table 3 requires cells into which NFSG standard values for BA retention, bay and outrow width applicable to the stand age, type and slope can be entered, so that an assessment of compliance can also be made and included in the reporting |
| 6.4 | | It is recommended that any future review of the *Code* *of Practice for Timber Production* consider introducing prescriptions that at least support compliance with commercial thinning standards and specifications in the relevant NFSGs. |
| 6.5 | | It is recommended that Part B of Workbook 7B be modified to include more explicit guidance on how to treat “partial” and non compliance with audit criteria in completing Tables 4 and 5. |
| 6.6 | | As unambiguous assessments of the effectiveness of particular environmental impact control measures cannot be made during audits that occur several years after regeneration it is recommended that criteria 14, 18 and 21) be deleted from Table 4 (for regeneration coupes). For similar reasons, criterion 10 in Table 4 and criterion 3 in Table 5 of Workbook 7B, relating to the spatial distribution and composition of regeneration and thinning coupe should be removed. |
| 6.7 | | Formal, detailed field assessments of coupes with reported stocking above approximately 75% add little value to the audit. It is recommended that in future audits:   * For coupes with reported stocking of 75% and above, an initial reconnaissance survey should be undertaken to confirm that the coupe is adequately stocked. This could be based on an on-ground survey along snig tracks and other access points, or, where high resolution aerial photography is available, it could be based in interpretation of such images; * Formal surveys (using the method described in Workbook 7B) are only used to assess stocking in those coupes with reported stocking of less than 75% and in coupes where the initial reconnaissance survey identifies that they may not be as well stocked as suggested by VicForests’ surveys.   Coupes to be included in the detailed field assessments would be selected (largely) at random, as was the case in the current audit. |
| 6.8 | | It is recommended that DSE accept all of the regeneration and thinning coupes proposed by VicForests for hand back. |
| 6.9 | | It is recommended that the revised version of FAP Module 7 that was prepared on the basis of the 2011-12 audit is used in any future Coupe Regeneration and Finalisation audits. |
| 6.10 | | It is recommended that the Department of Primary Industries (DPI) work with VicForests to strengthen the planning and implementation of forest thinning operations to achieve better compliance with relevant NFSGs. |
| 6.11 | It is recommended that DSE and DPI develop protocols for the reporting of coupe stocking in instances where multiple surveys, potentially of differing intensities, have been undertaken to assess coupe stocking. |
| 6.12 | Relatively poor compliance with the requirement to assess regeneration coupe stocking within three years of coupe treatment may reflect VicForests reporting of the latest rather than earliest established seedling survey. In future finalisation reporting, VicForests should ensure that the earliest such survey date be reported. VicForests should also ensure it complies with the Code requirement to conduct stocking surveys within three years of coupe treatment for regeneration. It should also ensure that such surveys are conducted within the timeframe required by the Code. |
| 6.13 | It is recommended that VicForests and DSE review the comments on perceived procedural shortcomings with coupe records and FireWeb entries and amend their practices as appropriate. |
| 6.14 | It is recommended that DPI review NFSG standards for thinning to appropriately allow for sampling and measurement uncertainty. |

## Audit summary information for EPA

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| **EPA File reference** | **68515-5** |
| **Auditor** | Craig Clifton |
| **Auditor term of appointment** | 02/10/2008-25/07/2014 |
| **Name of person requesting audit** | Duncan Pendrigh Executive Director, Forests and Parks, DSE |
| **Relationship to premises/location** | DSE is the management authority for State forest in Victoria and State government regulator of timber production operations in State forests. |
| **Date of request** | 14/12/2011 |
| **Date EPA notified of audit** | 14/12/2011 |
| **Completion date of the audit** | 30/06/2012 |
| **Reason for audit** | The audit forms part of DSE’s annual Forest Audit Program to assess compliance with Code of Practice for Timber Production and related regulations. |
| **Description of activity** | Logging coupe regeneration and finalisation. |
| **Current land use zoning** | State forest |
| **EPA region** | Various: Gippsland, Metro, North-East |
| **Municipality** | Various local government areas in eastern Victoria |
| **Lot and site details** | Not applicable, various logging coupes in State forests in eastern Victoria |
| **GIS coordinates of site centroid** | Not applicable, various sites |
| **Site area (ha)** | Not applicable, various sites |
| **Members and categories of support team utilised** | Support team not required. |
| **Outcome of the audit** | Audit report with recommendations |
| **Further work or requirements** | Sixteen recommendations made regarding methodology for future audits, a consideration for future reviews of the *Code of Practice for Timber Production* and *Native Forest Silviculture Guidelines*, VicForests finalisation reporting processes, recording of coupe management information, management of thinning operations and DSE acceptance of thinning and regeneration coupes proposed for hand back |

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# Glossary

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| Ash eucalypt forests | Forests dominated by “ash” eucalypt species, including Mountain Ash (*Eucalyptus regnans*), Alpine Ash (*E.delegatensis*), Shining Gum (*E.nitens*) and Erinunderra Shining Gum (*E.denticulata*). |
| Audit criteria | Criteria used to assess whether coupe regeneration and thinning activities are consistent with mandatory and guidance prescriptions of the Code and NFSG’s. |
| BA | Basal area, the total cross sectional area of tree stems (m2) at breast height (1.3 m) per hectare of the stand. |
| Bay width | The width of a bay, which in thinning coupes are the strips of retained trees located between outrows. Bays are thinned on a selective basis. |
| CIS | Coupe Information System, the information system used by VicForests to maintain digital records of harvest coupe planning, operations, monitoring etc. |
| Code | The *Code of Practice for Timber Production* 2007, which outlines mandatory prescriptions and guidelines for how timber production activities in native forests and plantations should be conducted. |
| Coupe | An individual management unit within forests and plantations where timber harvesting or thinning activities are planned and conducted. |
| DBH | Diameter of a tree (over bark) at breast height (1.3 m above ground on upslope side of tree) |
| Dominant/co-dominant trees | The main and more vigorous trees that form the canopy of a forest stand |
| FAP | Forest Audit Program – an annual program of statutory environmental audits coordinated by DSE to ensure that timber production operations in State forests provide for sustainable forest management. |
| Finalisation | The process of ensuring regeneration and thinning coupes are successfully regenerated and otherwise in a suitable condition for hand back to DSE. |
| FireWeb | DSE managed information system for maintaining digital records of prescribed burning activities undertaken in State forests. |
| Gross coupe area | The coupe area or boundary originally defined in the Timber Release Plan. This area is used as the starting point for harvest planning. The actual harvested area may be significantly less than this, due to the application of forest management zoning rules or prescriptions on harvesting buffers or exclusions relating to the protection of sensitive environmental features. |
| Hand back | The process whereby VicForests returns harvested and successfully regenerated coupes to DSE for on-going management. |
| Mixed species forests | Forests that generally comprising a mix of commercially desirable, non-ash eucalypt species. |
| Outrow width | The width of outrows, which are the strips created in thinned coupes by harvesting all trees in line at a specified spacing. They also allow access for harvest machinery to selectively thing the bays of retained trees. |
| Productive plots | In regeneration or stocking surveys, these are sampling points that are considered to be potentially suitable for regenerating trees to grow on. |
| Regeneration coupes | Regenerated even-aged and uneven-aged harvest coupes proposed by VicForests for finalisation and hand back to DSE. |
| Statutory environmental audit | An environmental audit conducted under the *Environment Protection Act* 1970. |
| Stocking | Relates to measures of the density and species composition of regrowth and thinned forests and coupes.  Regeneration coupe stocking relates specifically to the percentage of sampling points in which an “acceptable seedling” (according to NFSG #10) has been identified. For thinning coupes, stocking considers the retained BA and width of bays and outrows. |
| Thinning coupes | Coupes that have undergone commercial thinning operations and have been proposed by VicForests for hand back to DSE. |

# Introduction

Sinclair Knight Merz (SKM) was commissioned by the Department of Sustainability and Environment (DSE) to conduct an audit of logging coupe regeneration and finalisation as part of its Forest Audit Program (FAP). The FAP’s overall objective is to assess the risk of harm to the environment resulting from timber production activities in State forests. This particular audit considers the risk of harm to the environment resulting from coupe regeneration and finalisation activities and thinning operations managed by VicForests in State forests in eastern Victoria. It applies audit tools from the FAP’s Module 7 for coupe regeneration and finalisation.

The objective of the audit is to assess whether forest regeneration, thinning and coupe finalisation processes are appropriately conducted to achieve sustainable forest management and are managed in accordance with relevant legislation, regulations, policies and practice guidance, particularly the *Code of Practice for Timber Production* 2007 (the Code [1]) and *Native Forest Silviculture Guidelines* (NFSGs; numbers 10, 13 and 14 [2-4]). The audit is being conducted as a statutory environmental audit under the auspices of the *Environment Protection Act 1970* (EP Act)*.*

This is the final report on the audit project. It reports on both the statutory audit components of the project and preliminary work to review and revise FAP Module 7 and its workbooks. Its contents include:

* Section 2 Audit approach – which outlines the formal scope of the statutory audit and broader audit project and outlines the approach undertaken
* Section 3 Revision of FAP Module 7 – which describes the review of FAP Module 7 and the revisions made to the workbooks. The revised Module 7 document and workbooks, which were used to conduct this audit have been included in Appendix A.
* Section 4 Review of VicForests assessments of suitability for finalisation – which describes an assessment of VicForests reporting of its stocking surveys to determine whether regeneration and thinning coupes meet NFSG standards and are suitable for finalisation and hand back to DSE. The assessment also considers the consistency between information reported by VicForests to DSE and the underpinning regeneration coupe stocking surveys and post-thinning surveys.
* Section 5 Field assessments of regeneration and thinning coupes – 32 regeneration and five thinning coupes that were proposed by VicForests for hand back were reviewed in detail to assess: whether post-regeneration stocking and thinning operations meet relevant NFSG standards, the consistency of VicForests reporting of this with the underpinning data and the compliance of coupe regeneration and finalisation activities with audit criteria based on the Code and NFSGs. This section also includes an assessment of the risk of harm to the environment resulting from non or partial compliance with audit criteria.
* Section 6 Discussion – in which the audit methodology, based on the revised FAP Module 7 and its workbooks, is reviewed and recommendations made on further modifications. The final revised methodology is provided in Appendix C. This section also describes the major audit findings in the context of its initial objectives.
* Section 7 Conclusions and recommendations – the audit project’s conclusions are presented and recommendations from previous sections collated.

The analysis and discussion in this report refers, at times, to specific VicForests regeneration or thinning coupes. To maintain confidentiality regarding audit details, coupe identifiers have not been used here. An alternative coupe numbering scheme has been used for public reporting.

# Audit approach

## Audit scope

The intended scope of the statutory environment audit was documented in a work plan which was provided to EPA on 14th December 2011. The following text updates this scope to reflect the actual work undertaken.

### Activity undertaken

The audit is concerned with aspects of timber production operations conducted by VicForests in State forest areas located in eastern Victoria, specifically:

* Regeneration and finalisation of harvest coupes (hereafter “regeneration” coupes);
* Residual stocking and damage in thinning coupes;
* VicForests’ processes to assess and report on compliance with the Code and relevant NFSGs.

### Segments of the environment

The segment of the environment that has been audited comprises 315 regeneration coupes and 40 thinning coupes located across seven Victorian Forest Management Areas (FMAs); Benalla-Mansfield, Central, Central Gippsland, Dandenong, East Gippsland, North East and Tambo. VicForests proposes to transfer or “hand back” management responsibility for these coupes to DSE.

### Elements of the environment

The audit directly considers the vegetation and land or soils of regeneration and thinning coupes and, to a limited extent, the native fauna associated with logging and thinning coupes.

### Beneficial uses

State forest in which timber production activities occur are managed for multiple beneficial uses and values, including: timber production, biodiversity or nature conservation, recreation, provision of visual amenity, protection of cultural heritage values and generation of water for environmental and consumptive uses.

### Audit criteria

Criteria for the audit are established by the following documents:

* *Code of Practice for Timber Production* (2007) [1];
* Native Forest Silviculture Guidelines, #10, 13 and 14 [2-4]

Criteria relate to the rehabilitation of coupe infrastructure (landings, snig tracks etc), the development and application of guidelines for coupe finalisation and regeneration, the adequacy of regeneration and post-thinning stocking, site disturbance, source of seed for regeneration and pest animal controls.

An audit manual for Coupe regeneration and finalisation had previously been developed for the FAP [5]. This was revised as part of the overall audit project commissioned by DSE. This revised document [6] and its associated worksheets specify the audit criteria.

### Stakeholder participation

Direct stakeholder engagement in the audit was limited to DSE’s Regulation and Compliance Unit and a small group of VicForests staff involved in environmental systems management and logging coupe regeneration.

### Timing of audit

The audit commenced December 2011. The field and data gathering component of the audit was completed in March 2012.

## Audit methodology

The overall audit project commissioned by DSE included four main components:

1. Revision of the FAP Toolbox, *Coupe regeneration and finalisation module* (Module 7) and its associated work books [6].
2. Review of VicForests own assessments of regeneration in logging coupes and residual stocking and damage in thinning coupes and its finalisation reporting to DSE. This assessment considers evidence of coupe regeneration and stocking adequacy in all thinning and regeneration coupes that were proposed for hand back to DSE[[2]](#footnote-2).
3. Field assessments of selected regeneration and thinning coupes to confirm their stocking and suitability for hand back from VicForests to DSE. These assessments were conducted in Central and East Gippsland FMAs.
4. A trial in the use of high resolution aerial photography in assessments of stocking adequacy in regeneration coupes. The trial is intended to determine whether at least some elements of the field assessment of regeneration coupes may be replaced by analysis of remotely sensed images.

The second and third components form the scope of the statutory environmental audit component of the overall audit project. The aerial stocking survey trial has been reported separately [10], although some of its findings have been incorporated into the discussion in section 6.1.

## Audit team

The audit team was lead by Craig Clifton, an environmental auditor (natural resources) appointed pursuant to the EP Act. The support team for the statutory component of the audit included Mark Poynter (TreePoynt Pty Ltd), Anthony Brinkley, Shelly Ada and Chloe Hanson-Boyd (SKM). The audit did not require support from Craig Clifton’s formal environmental audit support team.

## Risk assessment approach

Risk of harm to the environment of non-compliance with key audit criteria was assessed using standard risk assessment processes (AS/NZS ISO 31000:2009 [8]), based on DSE’s (2007) *Risk management framework* ([9]; Appendix B). The assessment is confined to the 32 regeneration coupes and five thinning coupes proposed by VicForests for hand back that were included in the detailed field component of this audit (section 5). Risk of harm was assessed in relation to instances of non-compliance with audit criteria derived from the Code and NFSG standards.

# Revision of FAP Module 7

## Overview

DSE’s terms of reference for the overall audit project included reviewing and revising, as necessary, the original FAP Module 7 [5]. The review considered the compliance elements documented in the workbooks and opportunities to improve the efficiency and comprehensiveness of coupe regeneration and finalisation audits. The latter included incorporating data from VicForests’ own post-thinning and regeneration coupe stocking surveys into evidence gathering components of the audits.

The revised FAP Module 7 for coupe regeneration and finalisation [6] includes three main components, as outlined below and trialled during the audit.

* Module 7 overview – this component provides an overview of the module, introduces the compliance elements and workbooks and outlines the approach to the desk-top and field audit components that is described in detail in Workbooks 7A and 7B.
* Module 7 Workbook 7A - this component is a completely new addition to Module 7. It describes a process by which VicForests reporting on coupe regeneration and finalisation is verified and compared against standards specified in the Code and relevant NFSGs. Its scope extends to all regeneration and thinning coupes nominated by VicForests for hand back to DSE and is based on a desk-top assessment of data provided by VicForests.
* Module 7 Workbook 7B – this component is substantially revised from the original Module 7 and includes detailed assessments of compliance of regeneration and thinning coupes with relevant audit criteria derived from the Code and NFSGs. It is based on an analysis of information from coupe files, VicForests Coupe Information System (CIS), DSE’s FireWeb and data gathered during field surveys in a selection of regeneration and thinning coupes.

A copy of this version of Module 7 is provided in Appendix A. An overview of methodology for the two components of the audit, based on Workbooks 7A and 7B are provided in the following sections.

Module 7 and its workbooks were reviewed again following their use in this audit (section 6.1) and several further changes were made. The final, revised version of FAP Module 7, which is recommended for use in any future audit of coupe regeneration and finalisation, is given in Appendix C.

## Assessment of the suitability of coupes nominated for finalisation

As part of the finalisation and hand back process, VicForests reports on the outcomes of its regeneration stocking and post-thinning surveys. This information is intended to confirm that logging coupes have been successfully regenerated (according to standards set in NFSG #10 [2]) and that thinning has been conducted to the standards set in NFSG #13 (for Ash forests [3]) or #14 (for mixed species forests [4]). At the time of the audit, VicForests reported on coupe regeneration and finalisation to DSE. The Department of Primary Industries (DPI) are now the State government custodians of the coupe finalisation process and will be the recipients of any future VicForests reporting in relation to these matters.

This component of the audit comprised a review of the information provided to DSE by VicForests and an assessment of its consistency with records stocking and post-thinning surveys held in coupe files and the CIS. It used Workbook 7A and was an entirely desk-based analysis of data provided by VicForests.

### Part A: Review of coupe data

VicForests provided DSE with a consolidated spreadsheet report on outcomes of its regeneration stocking and post-thinning surveys as part of the finalisation and hand back process. The spreadsheet was intended to demonstrate that relevant NFSG compliance requirements were met for all coupes or that there were extenuating circumstances for specific coupes such that the requirements could be waived or delayed.

Part A of Workbook 7A (Appendix A) documents how the review was undertaken. The data required to assess compliance with relevant NFSG requirements is specified in Table 1 (of the workbook). For the 2011-12 hand back coupes, VicForests’ reporting spreadsheet contained most, but not all of the information required. Any additional information that was required was supplied on request.

Compliance requirements of the relevant NFSGs include:

|  |  |
| --- | --- |
| **Regeneration coupes:**   * Coupe stocking assessed within three years of treatment[[3]](#footnote-3); * Stocking of productive plots meets standard (based on intensity of sampling grid): typically 65% of stocked plots for standard 80×20 m survey; * No unstocked areas >1 ha (even-aged coupes) or 2 ha (uneven-aged coupes); * At least 10 individual trees of all eucalypt species present on coupe prior to harvesting are present in regenerating coupe. * Non-merchantable basal area (BA) does not exceed target (for uneven-aged stands only) of 5-7% of reference BA. | **Thinning coupes:**   * Retained BA is not less than 50% of initial live BA; * Retained BA of regrowth trees exceeds target for age class and forest type (see Annex 1 of Workbook 7A); * Average coupe outrow width does not exceed 7 m for 1939 Ash forests or 4.5 m for all other forest types; * Average coupe bay width equals or exceeds target for slope and forest type (12, 14 or 20 m; see Annex 1 of Workbook 7A * Dominant and co-dominant trees retained, except on access tracks and outrows; * No more than 15% of retained trees sustain damage to their crowns or boles during thinning. |

In addition to the above, information was also gathered on the incidence of weed and browsing damage in regeneration coupes. This information was gathered to support assessments of whether pest management was consistent with Code and other relevant requirements during the detailed field assessment component of the audit.

Summaries for each FMA and forest type were collated using Tables 2 (regeneration coupes) and 3 (thinning coupes) of Workbook 7A. A list of any or all coupes in each FMA that did not fully meet NFSG requirements and the relevant compliance issues was compiled using Table 4 of Workbook 7A.

### Part B: Review of regeneration and post-thinning survey results

The second main element of this component of the audit involved comparing the finalisation data reported by VicForests with the original stocking and post-thinning survey information held in coupe files or CIS. This assessment was carried out on 10% of regeneration and thinning coupes proposed for hand back. Stocking and post-thinning survey results were requested from VicForests to support this element of the audit. Individual comparisons of data from coupe files or CIS with VicForests hand back data were reported using Tables 5-7 of Workbook 7A (for even-aged, uneven-aged and thinning coupes, respectively).

## Field assessments of Code and NFSG compliance

The original Workbooks 7A and 7B were to be used in field-based audits of compliance of coupe regeneration and finalisation with the Code, NFSGs and DSE’s *Coupe Finalisation Procedures* [7]. Audit criteria were to be assessed using material held in the coupe file and CIS, as well as field surveys of regeneration and thinning coupes. The latter were to be undertaken using the methods described in NFSGs #10, 13 and 14 [2-4].

The workbooks and audit methodology were reviewed and restructured and a new Workbook (7B) was developed as part of the current audit project. Compliance criteria were restricted to the Code and NFSGs[[4]](#footnote-4) and the field assessment method simplified to improve the efficiency of the field audit component.

The number of coupes included in the field component of the audit is likely to be limited by available resources. A minimum of 10% of coupes in a selection of FMAs will be audited in any one year. For the 2011-12 audit program, two FMAs were selected for audit (East Gippsland FMA, which had the majority of coupes nominated for hand back; Central FMA, with the second largest number of coupes) and 10% of East Gippsland FMA coupes (17 regeneration coupes and four thinning coupes) and over 20% of Central FMA coupes (15 regeneration coupes and the single thinning coupe) were included.

### Part A: Assessment of stocking and post-thinning surveys

This activity corresponds with Part B of Workbook 7A and was undertaken for all of the coupes included in the field component of the audit. Data from stocking surveys in regeneration coupes and post-thinning surveys were assessed against the data reported by VicForests to DSE as part of the coupe finalisation and hand-back process.

Individual comparisons of data from coupe files or CIS with VicForests hand-back data were reported using Tables 1-3 of Workbook 7B (for even-aged, uneven-aged and thinning coupes, respectively).

### Part B: Assessment against Code requirements

Relevant audit criteria included in the original Workbooks were substantially revised and collated in Tables 4 and 5 (Workbook 7B) for regeneration and thinning coupes, respectively. Audit criteria for regeneration coupes are derived directly from the Code, which in sections 2.1.3 (Forest Coupe Plans), 2.3.1 (Regeneration) and 2.3.2 (Stocking assessment) provides explicit mandatory prescriptions and guidance. Section 2.5.2 also provides mandatory prescriptions on rehabilitation of coupe infrastructure, which is best assessed at coupe finalisation. A total of 39 audit criteria were identified, based on both mandatory (34 criteria) and guidance prescriptions (5 criteria). Depending on the circumstances of an individual coupe, some of the criteria may not be applicable.

The Code includes few explicit references to thinning operations. Audit criteria for thinning coupes were almost exclusively derived from Code prescriptions relating to regeneration that were also considered to be relevant to the finalisation and hand-back of thinning coupes. Just 15 mandatory criteria and one guidance criterion were developed.

Tables 4 and 5 were completed for each of the coupes selected for field audit on the basis of data and information either held in the coupe files, CIS, and FireWeb or obtained from the field audits.

### Part C: Field assessment of regeneration and coupe stocking

The original Module 7 proposed that regeneration and thinning coupe surveys be conducted using the procedures used by VicForests (and prescribed in NFSGs #10, 13 and 14). Since the intent of this component was to *audit* stocking adequacy (and thinning damage etc.) rather than replicate detailed surveys already undertaken by VicForests, a simplified and more efficient survey method was developed for the revised Module 7.

Using the new audit method for regeneration coupes, stocking assessments (following standard NFSG #10 procedures) were conducted at up to 50 randomly located sampling points in each coupe (depending on its size), with the results reported and summarised in Tables 6 and 7 for even-aged coupes and Tables 8 and 9 for uneven-aged coupes, respectively. The recording sheet notes details of sampling point location, whether the plot is stocked with a suitable seedling, the species of any seedlings present in the plot and, if the plot is unstocked, the condition of the seedbed. The existence of any large unstocked areas (>1 ha for even-aged coupes and >2 ha for uneven-aged coupes) is also noted. For uneven-aged coupes, the BA of retained stems is also assessed.

Sampling procedures for thinning coupes followed NFSGs #13 (Ash-type forests) and 14 (mixed species forests), except that a total of 12 plots are assessed per coupe rather than three per 6 ha as prescribed. Field records were taken using Table 10 and then summarised for the coupe as a whole. The assessments considered species composition, stocking rate, residual BA, bay and outrow width and the extent of damage to retained trees resulting from thinning.

# Review of VicForests assessments of suitability for finalisation

At the time of the audit, VicForests reported to DSE on the outcomes of their surveys of regeneration and thinning coupes. As discussed in section 3.2, this information was intended to confirm that coupes have been regenerated according to standards set in NFSG #10 or that thinning has been conducted to the standards set in NFSG #13 (for ash eucalypt forests) or #14 (for mixed species forests).

This component of the audit reviewed the information reported to DSE and its consistency with both the standards set in the relevant NFSGs and the original information held in coupe files or on CIS. It was conducted using Workbook 7A.

## Part A: Review of VicForests coupe finalisation data set

In their 2011-12 finalisation list, VicForests proposed that 315 even-aged regeneration coupes and 40 thinning coupes be finalised and handed back to DSE. Details of coupe regeneration and thinning coupe surveys were provided in a spreadsheet (VicForests 2011 coupe handback.xlsx) which is intended to enable DSE to verify that regeneration and thinning activities comply with the relevant NFSGs.

### Regeneration coupes

The NFSG compliance criteria covered in VicForests’ finalisation report were:

* Stocking rate and associated survey intensity;
* Presence or absence of >1ha unstocked areas in the coupe;
* Presence of all required eucalypt species (i.e. those identified in the pre-logging assessments) in the regenerated stand.

Further information was requested of VicForests to determine whether the final compliance requirement, that stocking surveys were undertaken within 3 years of coupe regeneration, was met. A summary of the assessment of this information against NFSG #10 requirements is given in Table 1.

Table Assessment of VicForests’ finalisation reporting for regeneration coupes against NFSG #10 requirements

|  | **Coupes complying with NFSG requirement** | | **Coupes not complying with NFSG requirement** | |
| --- | --- | --- | --- | --- |
| **Compliance criteria:** | **#** | **%** | **#** | **%** |
| **Stocking rate meets or exceeds the target for the relevant survey intensity (75% for extensive, 65% for standard, 55% for intensive)** | 313 | 99% | 2 | 1% |
| **No unstocked areas >1 ha for even-aged coupes** | 312 | 99% | 3 | 1% |
| **All required eucalypt species present in regenerating coupe** | 315 | 100% | 0 | 0% |
| **Stocking surveys completed within 3 years of coupe treatment** | 270 | 86% | 50 | 16% |

The two coupes not meeting the stocking rate standard (376 and 377; Table 2) were reportedly part of a trial that was undertaken with DSE and were excused from the NFSG stocking requirement. These two coupes and one other (085) were found to have unstocked areas greater than 1 ha. The unstocked area in non-trial coupe was estimated to be 1.2ha. VicForests commented that correcting this would most likely damage surrounding good quality regrowth and proposed that no further action was undertaken. This coupe was assessed in the field survey (section 5.4) and the auditors agreed with VicForests’ recommendation.

Data provided to the auditors indicates that for 45 of 315 coupes the latest stocking survey was not completed within 3 years the coupe being treated for regeneration. For a further five coupes, information on the timing of the stocking survey was not provided and the coupe was assessed to be non compliant in this respect. Half of the four coupes in Dandenong FMA and over a quarter of the 19 coupes in North East FMA did not comply with the requirement to undertake an initial established seedling stocking survey within three years of coupe treatment.

The field audits (section 5) and review of actual stocking survey data (section 4.2) found several instances where multiple stocking surveys were undertaken on an individual coupe. This typically occurred when either: the observed stocking was marginal in part of the coupe and an intensive survey was subsequently undertaken in those areas to confirm stocking; or where poor initial stocking led to further action to promote regeneration and was followed up by a another full or partial survey. The initial stocking survey may or may not have been within the three year window and, in some cases, the latest survey was not.

Table Breakdown of hand back coupe compliance with NFSG #10 standards by FMA

| **FMA (# coupes)** | **Stocking rate < NFSG standard** | **Unstocked areas >1 ha** | **Required species missing** | **Stocking survey time** | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Average months** | **# coupes >3y** | **% coupes >3y** |
| **Benalla-Mansfield (1)** | 0 | 0 | 0 | 20 | 0 |  |
| **Central (56)** | 0 | 1 | 0 | 24 | 3 | 5% |
| **Central Gippsland (18)** | 0 | 0 | 0 | 30 | 3 | 17% |
| **Dandenong (4)** | 0 | 0 | 0 | 35 | 2 | 50% |
| **East Gippsland (166)** | 2 | 2 | 0 | 30 | 31 | 19% |
| **North East (19)** | 0 | 0 | 0 | 32 | 5 | 26% |
| **Tambo (49)** | 0 | 0 | 0 | 27 | 6 | 12% |

The supplementary data on the timing of stocking surveys provided by VicForests only indicated if the latest established seedling survey was conducted within the three year window and not the date of the earliest survey. Some of the 45 coupes reported as being surveyed over 3 years from coupe treatment may actually have complied if the earliest stocking survey was considered. While such coupes are not strictly compliant with NFSG #10, this has no bearing on the success of regeneration or their suitability for finalisation.

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Rehabilitated log landing and successfully regenerated harvesting coupes

### Thinning coupe operations

The NFSG compliance criteria covered in the finalisation report for thinning coupes included:

* Retained basal area (BA) of regrowth;
* Percentage live BA removed;
* Width of bays and outrows;
* Percentage of stems damaged during thinning.

The spreadsheet provides the information previously required by DSE for the hand back process. However, it does not report the age of the thinned stand or its slope and so does not, on its own, provide sufficient information to assess compliance with NFSG #13 or 14 standards. Supplementary information was provided for some coupes to enable this assessment. A summary of the assessment for each compliance criterion is given in Table 3. As 35 of 40 thinning coupes were located in East Gippsland FMA, results from the analysis of thinning coupes have not been broken down into FMAs.

VicForests’ reporting shows significant non-compliance of thinning operations with NFSG standards. This is particularly true for the requirement that no more than 50% of live BA is removed. Half of the coupes proposed for finalisation were assessed to have been thinned to a greater extent than the standard, three of them with less than 40% of the original live BA retained (Figure 1). The reported target retained BA in VicForests coupe finalisation reporting was actually less than the 50% standard for 13 of 40 coupes.

|  |  |
| --- | --- |
|  |  |

VicForests thinning coupe and an example of damage sustained during thinning

Retained regrowth BA standards for ash and mixed species forests is age dependent [3,4]. As a result of the stand age not being reported, it was only possible to assess compliance for this criterion on 23 of the 40 coupes. On only 10 of these did the retained BA meet or exceed the NFSG standard. In one case (coupe 354) retained BA was just 59% of the target BA for the age and forest type.

Table Assessment of VicForests’ finalisation reporting for even and uneven-aged logging coupes against NFSG #10 requirements

|  | **Coupes complying with NFSG requirement** | | **Coupes not complying with NFSG requirement** | |
| --- | --- | --- | --- | --- |
| **Compliance criteria:** | **#** | **%** | **#** | **%** |
| **Not more than 50% of live BA is removed** | 20 | 50% | 20 | 50% |
| **Retained BA of regrowth exceeds NFSG standard for age of stand and forest type** | 101 | 43% | 131 | 57% |
| **Outrow width does not exceed maximum specified in NFSG for forest type** | 31 | 78% | 9 | 22% |
| **Bay width exceeds NFSG specified minimum for slope2 and forest type** | 28 | 70% | 12 | 30% |
| **% stems damaged <15%** | 34 | 85% | 6 | 15% |

Note:

1. Coupe age information available for only 23 of 40 thinning coupes
2. Slope assumed to be <15°



Figure Graph of reported % live basal area removed during thinning operations in VicForests coupes

Average outrow width was within the NFSG standard range in 31 of the coupes and the average bay width exceeded the minimum for 28 coupes. The auditors’ observation during the field assessments was that outrow and bay width were difficult to determine precisely, particularly where some years had elapsed between thinning and the survey or there had been further disturbance (e.g. due to firewood harvesting) after thinning had been completed. Our assessment was that measurement uncertainty for outrow and bay width was at least 0.5 m.

Differences between actual and NFSG standard outrow widths were within the interpreted 0.5 m measurement uncertainty for all but one of the 40 thinning coupes (coupe 405). However, in only four of the 12 coupes in which average bay width was less than that required by the NFSG standard, was the difference within the interpreted 0.5 m measurement uncertainty.

In six of the 40 coupes, more than 15% of stems in post-thinning assessment plots were reported to have bole or crown damage as the result of thinning.

## Part B: Review of data supporting VicForests’ finalisation reporting

The second element of this component of the audit involved comparing the finalisation data reported by VicForests with the original regeneration and thinning coupe survey data. This assessment was carried out on a random selection of 10% of regeneration coupes (32 coupes) and the 10% of thinning coupes (5 coupes) included in the field assessment.

### Regeneration coupes

The review of data on regeneration coupe stocking considered the same audit criteria as the review of the finalisation list (section 4.1). This assessment (Table 4) focuses on two points:

* Whether there is a variance between the data (relating to audit criteria) reported to DSE in VicForests’ finalisation list and that held on coupe files;
* Whether any such difference would affect the level of compliance with NFSG #10 standards.

Four coupes were identified in which the stocking rate reported in the VicForests’ finalisation spreadsheet could not be reconciled with the stocking survey data. In all four cases, two or more partial, intensity stocking surveys had been undertaken and the differences were within a few percent. The stocking surveys indicated that all four coupes met NFSG #10 standards.

Required eucalypt species were not identified in stocking surveys on one coupe (coupe 328) and this was not recorded in VicForests finalisation list. The auditors’ experience during the field assessments suggests several reasons why “required” species may not be detected in the regenerating coupe, including:

* They did not regenerate successfully within the harvested area of the coupe;
* The species was uncommon in the coupe prior to logging and remains uncommon and was not detected during the survey;
* The species was present in the (gross) coupe area identified at planning stage, but not in the (net) areas actually harvested and regenerated. The species would not be expected to have been found in the stocking survey.

Gross coupe area for coupe 328 was 30 ha, but only 1.6 ha were actually harvested. Information provided by VicForests indicates that the two missing species comprised just 5% of the original species mix. While they were not detected in the stocking survey, they were almost certainly present in the unharvested area.

Table Summary of comparison of VicForests’ finalisation reporting for regeneration coupes with stocking survey data in 10% of finalisation coupes (32 coupes). Reporting only considers NFSG #10 compliance requirements

| **Compliance criteria** | **# coupes with variance in reporting** | **# coupes with variance that affects compliance assessment** | **Comment** |
| --- | --- | --- | --- |
| **Stocking rate exceeds the NFSG standard for the relevant survey intensity** | 4 | 0 | In all cases parts of the coupe were resurveyed using an intensive survey. All coupes adequately stocked. |
| **No unstocked areas >1 ha** | 0 | 0 |  |
| **All required eucalypt species present in regenerating coupe** | 1 | 1 | The assessment of coupe 328 found 4 of 6 species present – which was not reported to DSE. |
| **Stocking surveys completed within 3 years of regeneration** | 5 | 1 |  |

Five instances were identified in which there was variance in the timing of the stocking survey after regeneration between the supplementary information provided by VicForests and that recorded in coupe files. In one case this indicated that the stocking had not actually been assessed within 3 years of regeneration, making non-compliance on this issue a feature of 51 of 315 regeneration coupes.

### Thinning coupe operations

The review of data on thinning coupes considered the same compliance criteria as the review of the finalisation spreadsheet. As above, the assessment focused on whether there was a variance between the data reported to DSE and that held on coupe files and whether any difference affect the level of compliance with NFSG standards reported.

For one of the four coupes (coupe 428; East Gippsland FMA), the pre-thinning BA reported in the finalisation spreadsheet was 42 m2/ha, whereas the coupe file reported only 27 m2/ha. As a result, the coupe was incorrectly reported to have exceeded the NFSG target for the percentage of live BA removed. In all other cases the data were consistent between the coupe records and VicForests’ finalisation report to DSE.

While it was intended that this review would consider the 5 of 40 thinning coupes proposed for hand-back, the coupe file and stocking survey record for one of these (coupe 397; Central FMA) was reported to have been lost in the February 2009 bushfires.

## Summary and discussion

Of the 315 regeneration coupes nominated by VicForests for hand back, this assessment has identified just four that do not meet NFSG #10 standards for coupe stocking. Standards were not met as a result of: stocking being below the standard for the survey intensity; an unstocked area greater than 1 ha being observed; or all of the species present in the coupe prior to harvest not being identified in the survey. Two of these coupes were part of a joint DSE-VicForests trial and were not required to meet NFSG stocking standards.

One was reported to DSE as having met NFSG stocking standards, when it did not appear to do so on the basis of the direct evidence presented. Two of the six species found to be present in the gross coupe area prior to harvesting were not detected in the stocking survey. However, as these species comprised just 5% of the original stocking and only 1.6 ha of the 30 ha gross coupe was harvested, it is likely that these species have been retained in the harvest area.

The main area of non-compliance with NFSG #10 was not in relation to stocking rate, but in the timing of stocking surveys. A total of 51 of 315 coupes were identified as not having stocking surveys undertaken within the required[[5]](#footnote-5) three years of coupe treatment. Surveys were delayed six years or more after treatment in several coupes. Delays in the timing of the regeneration surveys have no impact on the success of regeneration or the suitability of coupes for finalisation.

VicForests thinning operations frequently did not comply with the relevant NFSGs. Only six of the 40 thinning coupes proposed for hand back fully complied with NFSG standards for basal area retention, thinning damage and bay and outrow width. The most common area of non-compliance identified was removing more than 50% of live BA during thinning. This was identified on 20 of 40 coupes. On 13 of the 23 coupes for which stand age data was obtained, the retained BA of regrowth trees was lower than required by the relevant NFSG standard (for the particular stand age).

Outrow widths frequently exceeded the NFSG standards (nine coupes), although in most cases the differences were within the measurement uncertainty. Bay widths were frequently narrower than the NFSG standards (12 of 40 coupes), generally by a greater amount than the measurement uncertainty. Damage to the bole or crown of retained trees exceeded the maximum of 15% of trees in six of the 40 coupes.

Regeneration and thinning coupe finalisation reporting by VicForests to DSE was found to generally be consistent with the underpinning coupe file or other records. Variances between coupe records and finalisation reports to DSE were detected for 10 of 32 regeneration coupes and one of four thinning coupes (7% of compliance criteria). In only two cases for regeneration coupes did mistranslation of information result in coupes being incorrectly reported as having stocking that was compliant with NFSG #10. The translation error for the thinning coupe resulted in it being incorrectly labelled as non-compliant in relation to the percentage of live BA retained after thinning.

Data provided by VicForests in their finalisation list to DSE does not, on its own, provide all of the details required to assess compliance with relevant NFSGs. While most of the required data was subsequently provided by VicForests, it is recommended that future reporting address all of the information required. Key gaps identified in the 2011-12 finalisation reporting were:

* Regeneration coupes
* Report date of first stocking survey to enable an assessment of compliance with the requirement to undertake stocking surveys within 3 years of coupe treatment for regeneration
* Thinning coupes
* Provide details of stand age to enable the NFSG standard for retained BA to be determined
* Provide details of average coupe slope to determine the outrow width and bay width (ash forests only)
* Provide information to confirm that the coupes’ post-thinning species composition match those prior to thinning
* Provide information on the retention of dominant or co-dominant trees.

|  |  |
| --- | --- |
| **Recommendation 4.1** |  |
| VicForests reporting met DSE requirements and guidelines for finalisation reporting, however it did not have all of the details required to enable compliance against NFSGs to be fully assessed. It is recommended that future requests for information on finalisation of VicForests coupes include all of the information needed to assess compliance with NFSG standards. | |
| **Recommendation 4.2** |  |
| Differences in species composition between the gross coupe area and the area actually harvested may legitimately result in species found to be present in coupe planning not being detected in stocking surveys. It is recommended that for coupes in which stocking surveys do not detect all of the species identified in planning, an annotation explaining any legitimate reasons for this (e.g. species uncommon in coupe area, species only present in unharvested area) be provided in VicForests finalisation reporting. | |

# Field assessments of regeneration and thinning coupes

As described in section 3.3, field assessments were conducted using Workbook 7B and included three main elements:

1. Review of VicForests stocking and post-thinning surveys – to confirm the data being reported to DSE as part of the finalisation process and to familiarise the audit team with the status of the coupes they would be assessing;
2. Assessment of regeneration and finalisation operations against Code requirements;
3. Field surveys of regeneration and thinning coupes to assess compliance with NFSG standards for coupe stocking and thinning operations.

The first and second elements of the field assessment were largely desk top exercises and were mostly conducted in VicForests offices in Healesville and Orbost. They were based on information held in coupe files or on the CIS or FireWeb information systems.

## Selection of field audit coupes

The field component of the audit was consolidated into the two FMAs with the largest number of coupes nominated for hand back, East Gippsland and Central. Ten percent of regeneration and thinning coupes (17 and four, respectively) were selected in East Gippsland FMA (of 168 and 35 coupes, respectively) and approximately 20% of coupes in Central FMA (15 regeneration coupes and the single thinning coupe) were selected for the audit. Overall, 10% of regeneration and thinning coupes proposed for hand back were included in this component of the audit. Coupes were mostly selected at random, although a small number of marginally stocked regeneration coupes and coupes with relatively high thinning damage were also selected.

Desk-top components of the audit were conducted for all coupes from VicForests’ offices in Healesville (Central FMA) and Orbost (East Gippsland FMA). Field elements of the audit were assessed on all coupes that could be accessed within a two week field program. A total of 25 regeneration coupes (12 in Central FMA and 13 in East Gippsland FMA) and all five thinning coupes were assessed. The remaining coupes were either inaccessible, unsafe to work on at the time or could not be assessed within the time available.

## Part A: Assessments of VicForests stocking and post-thinning surveys

These assessments followed the methods developed for Part B of Workbook 7A and used the relevant reporting tables (see section 4.2). Results were collated using Tables 1 and 3, for regeneration and thinning coupes, respectively.

### Regeneration coupes

Stocking survey results held in coupe files were reviewed for all 32 of the selected regeneration coupes. The compliance elements were based on NFSG #10 and included:

* Coupe stocking: stocking rate and associated survey intensity, presence or absence of >1 ha unstocked areas in the coupe and presence of all required eucalypt species (i.e. those identified in the pre-logging assessments) in the regenerated stand.
* Timing of stocking survey: following treatment of the coupe for regeneration.

Information reported to DSE in VicForests’ finalisation list was found to be completely consistent with the results reported in stocking surveys for 28 of the 32 coupes. The four exceptions were all in East Gippsland FMA (221, 292, 352 and 358) and were coupes that included areas where stocking was reassessed using intensive survey methods. The results included in the finalisation report to DSE were either not equal to the overall plot stocking rate or represented the results of just one of the two or more stocking surveys. In each case, the coupes were found to be acceptably stocked and differences were no more than a few percent.

### Thinning coupe post-thinning stocking and damage surveys

The coupe file for one thinning coupe in Central Highlands FMA (316) was reported to have been lost during the February 2009 bushfires and so it was not possible to compare VicForests’ post-thinning survey records with the data reported to DSE.

As noted in section 4.2, for one of the four coupes (428), the pre-thinning BA reported in the finalisation spreadsheet was 42 m2/ha, whereas the coupe file reported only 27 m2/ha. As a result, the coupe was wrongly reported to have exceeded the NFSG target for the percentage of live BA removed. The data were consistent between the coupe records and VicForests’ finalisation list for remaining coupes.

## Part B: Assessment against Code requirements

The assessment against Code requirements included significantly more elements for regeneration coupes than thinning coupes due to the limited number of compliance elements for the latter. Assessments of each type of coupe were recorded using Tables 4 and 5 of Workbook 7B.

### Regeneration coupes

A total of 34 mandatory and five guidance audit criteria were identified in the Code and incorporated into Table 4 of Workbook 7B. Most criteria were assessed from information contained in coupe files or the CIS or FireWeb information systems. Several were based on the field assessments of coupe stocking and other conditions. Summaries of the results of the assessment are given in Figure 2 and Table 5.



Note: Unknown - no assessment against the criterion was possible; No – coupe was assessed as not complying with the criterion; n/a – criterion was assessed as not applicable to coupe; Partial – coupe partly satisfied criterion; Yes – coupe satisfied criterion. The assessment was made against a total of 1088 mandatory criteria (34 criteria × 32 coupes) and 160 guidance criteria (5 criteria × 32 coupes).

Figure Summary of assessments for compliance against mandatory and guidance audit criteria based largely on the *Code of Practice for Timber Production 2007* forselected regeneration coupes in Central and East Gippsland FMAs.

The audit criteria included in Table 4 of Workbook 7B covered a broad range of activities connected to coupe regeneration and finalisation, but which are not necessarily relevant to any individual coupe. For the 32 coupes included in this component of the audit, approximately 43% of mandatory criteria and 41% of guidance criteria were assessed as not applicable. Examples included sets of criteria relating to management of erosion resulting from mechanical disturbance during regeneration, protection of indigenous heritage and use of pesticides or other measures in managing weed or browsing damage during coupe regeneration.

Coupes were assessed as satisfying the requirements of approximately 97% of applicable mandatory criteria and 84% of applicable guidance criteria. Non or partial compliance was assessed for only 2% of applicable mandatory criteria and 16 % of applicable guidance criteria. In a small number of cases, the lack of a site inspection for the coupe or other factors meant that there was insufficient information to make an assessment against individual criteria.

A summary of the main partial or non-compliance issues for this component of the audit is given in Table 5. Compliance issues were identified for a total of eight mandatory and two guidance criteria. A brief analysis for each criterion is provided below. The risk of harm to the environment resulting from non or partial compliance with audit criteria is assessed in section 5.5.

Table Audit criteria for regeneration coupes assessed not to have or to only partly have complied with audit criteria.

|  | **# coupes with non or partial compliance** | |
| --- | --- | --- |
| **Audit criteria:** | **Non-compliance** | **Partial compliance** |
| **Mandatory** |  |  |
| 6. Coupe has been regenerated to standard consistent with Native Forest Silviculture Guidelines (NFSG) #10. |  | 1 |
| 13. Impact of regeneration burning on areas excluded from harvesting was assessed. | 1 |  |
| 14. Protection of areas excluded from harvesting has been effective. |  | 3 |
| 19. Measures were taken to protect Indigenous cultural heritage sites or places located within harvested areas during regeneration. |  | 1 |
| 27. Coupe regeneration was assessed within three years of treatment. | 5 |  |
| 30. Remedial work has been undertaken to achieve acceptable regeneration where stocking, spatial distribution, health or early growth was initially found to be below the applicable standard. |  | 2 |
| 33. Rehabilitation of coupe infrastructure has been assessed within three years of initial treatment. |  | 1 |
| **Guidance** |  |  |
| 37. A survey of seedbed quality was undertaken prior to use of natural seed fall or sowing to regenerate the coupe. | 1 | 1 |
| 38. Seed and planting stock are screened for weeds, pathogens or pests prior to coupe regeneration. |  | 13 |

#### Compliance issues with mandatory criteria

**#6 Coupe regeneration**: two of the 32 coupes (085, 110) did not fully satisfy stocking requirements specified in NFSG #10. VicForests stocking survey and the field assessment identified that coupe 085 (Central FMA) included an area greater than 1 ha that was understocked with eucalypt regrowth. This contributed to the low stocking reported in the audit field assessment. As the remainder of the coupe was generally well stocked and this area could not be accessed by machinery to encourage regeneration, VicForests recommended that the coupe be considered to be adequately regenerated and handed back to DSE. The auditors concur with these observations and conclusion.

The VicForests stocking assessment identified an unstocked area exceeding 1 ha in the vicinity of a landing on coupe 110. This was identified on the stocking survey, but not reported to DSE as part of the finalisation reporting. Following the field audit, VicForests undertook a further intensive stocking assessment and found that the actual unstocked area was no more than 0.6 ha.

**#13 Assessment of impact regeneration burning:** the file for coupe 085 records that the regeneration burn escaped from control lines. No record was found of any assessment of the impact of this on areas excluded from harvesting.

**#14 Protection of unharvested areas from regeneration burns:** threeinstances were recorded (coupes 085, 221, 246) of regeneration burns escaping control lines and burning relatively small areas of adjacent forest. On this basis, it has been assessed that these coupes only partly comply with the requirement to protect unharvested areas from impacts of regeneration burning.

**#19 Protection of Indigenous cultural heritage sites:** no record could be found in the coupe file or on CIS of the presence of Indigenous cultural heritage sites having been assessed as being present or not being present on or near coupe 318. Partial compliance with this criterion was assessed as a result.

**#27 Timing of regeneration surveys:** five coupes were identified for which the earliest recorded established seedling survey was not conducted within the 3 years required by the Code and NFSG #10.

**#30 Remedial work where coupe stocking below acceptable standard:** coupe 085 was assessed to have a 1.2 ha unstocked area within the coupe (see note on criterion #6, above). No actual remedial work was undertaken to redress this (as required by the Code), however any such work was assessed to be counterproductive. As a result partial compliance rather than non-compliance was assessed. An initial stocking survey found coupe 318 to be understocked. No remedial work was undertaken to address this. However, as coupe stocking was subsequently assessed to have become acceptable, partial rather than non-compliance was recorded.

**#33 Assessment of rehabilitation of coupe infrastructure:** the file for coupe 106 identifies that snig tracks were assessed and successfully rehabilitated, however there is no record of similar assessments for landings. The coupe was assessed to partly comply with this criterion as a result. The lack of evidence of such an assessment and rehabilitation meant that the following criterion (#34 Remedial action where infrastructure rehabilitation was inadequate)was assessed as “unknown”.

#### Compliance with guidance criteria

**#37 Seedbed quality survey:**  two coupes were identified for which there was either no evidence of a seedbed survey (292, non-compliance) or only evidence of an informal survey (300, partial compliance).

**#38** **Seed screening and treatment prior to coupe regeneration:** VicForests have established practices to ensure the quality and condition of seed used in coupe regeneration where natural seed fall needs to be supplemented. However, while these may be considered to be good practice, as these processes do not specifically involve “screening” for pathogens, they cannot be considered to fully comply with this guidance element.

### Thinning coupes

A total of 14 mandatory and one guidance audit criteria were identified in the Code and incorporated into Workbook 7B for this element of the audit. The prescriptions from which the criteria were derived mostly do not explicitly refer to thinning, but have been adapted for this audit.

As with regeneration coupes, the audits were based on evidence contained in coupe files, VicForests CIS or the field assessment of thinning coupes. Summaries of the results of the assessment are given in Figure 3 and Table 6.



Note: Unknown - no assessment against the criterion was possible; No – coupe was assessed as not complying with the criterion; n/a – criterion was assessed as not applicable to coupe; Partial – coupe partly satisfied criterion; Yes – coupe satisfied criterion. The assessment was made against a total of 70 mandatory criteria (14 criteria × 5 coupes) and 5 guidance criteria (1 criterion × 5 coupes).

Figure Preliminary summary of assessments for compliance against mandatory and guidance audit criteria based on the *Code of Practice for Timber Production 2007* forselected thinning coupes in Central and East Gippsland FMAs.

As was the case for the audit criteria included in Table 4 of Workbook 7B, those in Table 5 relating to thinning coupes covered a broad range of activities, some of which may not necessarily be relevant to an individual coupe. For the five coupes included in this component of the audit, approximately 36% of mandatory criteria were assessed as not being applicable. The main examples were sets of criteria relating to the use of pesticides or other measures in managing weed or browsing damage following thinning.

Coupes were assessed as satisfying the requirements of approximately 84% of applicable mandatory criteria and all of the applicable guidance criteria. Non or partial compliance was assessed for 15% of applicable mandatory criteria. A summary of the main partial or non-compliance issues is given in Table 6. Compliance issues were identified for three mandatory criteria. A brief analysis for each criterion is provided below. The risk of harm to the environment resulting from non or partial compliance with audit criteria is assessed in section 5.5.

#### Compliance issues with mandatory criteria

**#3 Retention of original species:** on three of the five thinning coupes included in this component of the audit, minor discrepancies were recorded in the species composition of the coupes post thinning. Small numbers of Shining Gum regrowth were identified in coupe 397, however no retained stems of this species were observed. Mountain Grey Gum was assessed to comprise about 27% of the stand in coupe 402, but was uncommon following thinning. In both cases, partial compliance with the criterion (which also reflects NFSG requirements) was recorded.

**#8 Timing of post-thinning surveys:** the post-thinning survey for coupe 421 was undertaken six years after thinning took place. Non-compliance with this criterion was recorded.

**#14 Thinning operations meet standards from NFSGs #13 and 14:** partial compliance was assessed for four of the five coupes. Based on VicForests post-thinning surveys and audit field assessments, only in coupe 397 did BA retention, thinning damage, bay and outrow width satisfy the NFSG standards[[6]](#footnote-6). In the remaining coupes one or two elements of these standards were not met according to the VicForests surveys. The surveys conducted as part of this audit confirmed this partial compliance, although in some cases NFSG standard values were within the 90% confidence interval of the coupe average.

Table Audit criteria for thinning coupes assessed not to have or to only partly have complied with mandatory audit criteria

|  | **# coupes with non or partial compliance** | |
| --- | --- | --- |
| **Audit criteria:** | **Non-compliance** | **Partial compliance** |
| 3. All tree species originally present on the coupe have been retained following thinning with a similar density and distribution. |  | 2 |
| 8. Coupe stocking and thinning damage was assessed within three years of treatment. | 1 |  |
| 14. Assessments show that thinning operations meet the specifications for basal area, damage, outrow and bay width, species composition and tree retention in NFSG #13 or #14. |  | 4 |

## Part C: Field assessments of regeneration and thinning coupes

Regeneration and thinning coupes included in the field component of the audit were assessed using modified versions of the survey techniques described in NFSGs #10, 13 and 14 (see Appendix A for details). Results of the assessments were captured in Workbook 7B Tables 7 and 10 for regeneration and thinning coupes, respectively.

### Regeneration coupes

Stocking assessments were conducted in 25 of the 32 selected regeneration coupes. Access issues and limits on the time available for field work meant that seven of the coupes (three in Central FMA and four in East Gippsland FMA) could not be assessed. The exceptional density of eucalypt and wattle regrowth or of dodder laurel or vine undergrowth in some coupes meant that sampling procedures were sometimes modified from those described in Workbook 7A. Specifically, the distances between sampling points were sometimes reduced to enable coupes to be surveyed within a reasonable time.

A summary of the results of the stocking surveys is given in Figure 4. The graph shows both the stocking survey results reported by VicForests to DSE in their finalisation reporting and those obtained from this audit. In most cases there is good agreement between the two surveys. In 10 of the 32 coupes, stocking was assessed to be significantly higher than found in VicForests’ stocking surveys. This could, in part, reflect continued regeneration following the VicForests surveys (which had taken place up to three years previously).

The stocking rate in two of the audited coupes fell short of the 65% standard from NFSG #10. However, in only one of these (coupe 085) was the 65% stocking standard outside the 90% confidence interval for coupe stocking. This coupe in Central FMA was difficult to access (due to safety issues associated with retained stags and extremely dense wattle regrowth) and as a result, sampling tended to be concentrated in a large patch of wattle-dominated regrowth, with poor eucalypt stocking. While the audit stocking survey results suggest below target regeneration, this is most likely an artefact of sampling. VicForests survey identified that an area of over 1 ha in this coupe was unstocked, but that over 65% of stocking survey plots were stocked.

|  |  |
| --- | --- |
|  |  |

Dense eucalypt, wattle and understorey regrowth, which in some coupes was interspersed with dodder laurel and vines resulted in sampling procedures being modified from that outlined in the revised Module 7 and Workbook 7A

No other instances of unstocked areas of 1 ha or more were identified in any of the coupes. Eucalypt and wattle regrowth was so advanced in the majority of coupes that it was not possible to identify large unstocked areas that were not directly traversed during the stocking assessment.

The main required species were observed in all coupes. There were several instances where required species that were originally uncommon in coupes were not identified in the audit stocking survey. This is not taken to indicate that the species were not present, only that they were uncommon. In a few instances, species that were not reported in VicForests’ stocking surveys were identified during the audit survey.



Figure Comparison of regeneration coupe stocking between data reported by VicForests to DSE as part of their finalisation and hand back reporting (VF stocking) and results of field stocking surveys undertaken as part of this audit (Audit stocking). The graph shows the acceptable stocking rate of 65% for standard stocking assessments. Audit CI upr and lwr are the upper and lower 90% confidence intervals for the audit stocking survey, respectively. VicForests stocking survey results for coupes 120, 292, 299 and 352 were intensive surveys, whose acceptable stocking standard is 55%. Coupes with only VF stocking results were those that were unable to be included in the field assessment program.

### Thinning coupes

The assessments conducted in thinning coupes found that none of the five coupes fully met the relevant standards specified in NFSG #13 (ash forests) or #14 (mixed species forests), based on coupe average values (Table 7). When sampling uncertainties were taken into account (90% confidence interval of coupe mean), two coupes (397 and 427) were found to meet all relevant NFSG standards.

The most common issues observed were bay widths being narrower than standards for slope and forest type and outrow widths being wider that standards based on forest type. Outrow and bay width are difficult to determine accurately in the field, particularly for coupes where a significant time had elapsed since thinning operations took place or there had been other disturbances on the coupe (e.g. firewood harvesting). With the exception of one coupe each, bay and outrow width complied with NFSG standards when the 90% confidence interval of the coupe mean was taken into account (Table 7).

The assessed frequency of thinning damage to retained stems exceeded the 15% standard for one coupe (427), although the standard was complied with when the 90% confidence interval of the coupe mean was taken into account.

All of the species identified on the coupes prior to thinning were found to be present during the surveys. Small numbers of individuals of additional species were identified on two coupes (397, 402). In coupe 397, these were advanced seedlings of Shining Gum rather than regrowth trees that had been thinned. The source of seed was not apparent as no regrowth Shining Gum trees were observed on the coupe.

Table Summary of results of field assessments of thinning coupes against targets from NFSGs #13 and #14. Pale green shading highlights instances where 90% confidence interval around coupe average did not meet NFSG standards.

|  | **Central** | | **East Gippsland** | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Criteria** | **397** | **402** | | **421** | **427** | **428** |
| **% live BA removed** | 40% | 39% | | 29% | 34% | 49% |
| **Target** | 50% | 50% | | 50% | 50% | 50% |
| **Retained BA (90% confidence interval)** | 37.6 (35.4-40.6) | 22.7 (21.6-24.9) | | 30.3 (28.5-33.0) | 26.4 (24.9-28.0) | 21.6 (19.2-23.9) |
| **Target for age and forest type** | 32 | 25 | | 25 | 21 | 21 |
| **Average bay width (90% confidence interval)** | 19.5 (17.4-20.8) | 13.9 (12.3-14.6) | | 11.3 (9.7-12.0) | 11.2 (9.9-12.1) | 11.1 (10.3-11.7) |
| **Target for slope and forest type** | 20 | 12 | | 12 | 12 | 12 |
| **Average out row width (90% confidence interval)** | 6.6 (6.1-7.0) | 4.7 (4.4-5.0) | | 5.2 (5.0-5.5) | 4.4 (4.1-4.6) | 4.5 (4.3-4.7) |
| **Target for slope and forest type** | 7 | 4.5 | | 4.5 | 4.5 | 4.5 |
| **% Trees damaged (90% confidence interval)** | 4.5% (0.7-8.8%) | 0.0% (0) | | 7.5% (3.2-11.4% | 15.4% (11.6-21.7%) | 9.7% (5.0-14.4%) |
| **Target** | 15% | 15% | | 15% | 15% | 15% |

NFSGs require that, with the exception of outrows and extraction tracks, dominant and co-dominant trees are retained. This is difficult to assess post-thinning. However, it appeared that the thinned stands comprised such trees. A few individual suppressed trees, comprising no more than a few percent of the retained BA, were observed on some coupes.

## Risk of harm to the environment

Risk of harm to the environment from activities associated with coupe regeneration and finalisation is assessed in the context of the field component of the audit, specifically the 32 regeneration coupes and five thinning coupes selected. Risk to the environment is assessed in relation issues of non or partial compliance with audit criteria derived from the Code and relevant NFSGs. This scope captures the main compliance issues from the desk top component of the audit – which relates to consistency of coupe stocking with NFSG standards.

DSE’s strategic *Risk management framework* 2007 (Appendix B) provides the consequence and likelihood descriptors for the assessment, as well as the overall risk rating table. Results of the risk assessment are presented in Table 8.

All but one of the risks were assessed to be in the “low” category. The one risk in the medium category (failure to protect unharvested areas from regeneration burns [criterion #14]) was one whose impacts were assessed to potentially extend over several years. None of the non or partial compliance issues were considered to pose a material risk of harm to the environment (“high” category).

Table Assessment of risk of harm to the environment associated with non or partial compliance with audit criteria derived from the Code and NFSGs (and reported in Table 5 and Table 6.

| **Audit criteria** | **Coupe** | **Consequence** | **Likelihood** | **Risk** | **Comment** |
| --- | --- | --- | --- | --- | --- |
| **Mandatory: Regeneration coupes** |  |  |  |  |  |
| 6. Coupe has been regenerated to standard consistent with Native Forest Silviculture Guidelines (NFSG) #10. | 085 | 1 | 2 | Low | Highly localised, no lasting effect |
| 13. Impact of regeneration burning on areas excluded from harvesting was assessed. | 085 | 1 | 1 | Low | Compliance issue related to assessment of burning impact and not impact of burning. |
| 14. Protection of areas excluded from harvesting has been effective. | All | 3 | 3 | Medium | Localised scale, but medium term impact on burnt areas. |
| 19. Measures were taken to protect Indigenous cultural heritage sites or places located within harvested areas during regeneration. | 318 | 3 | 1 | Low | Legal and reputation risk rather than environmental. |
| 27. Coupe regeneration was assessed within three years of treatment. | All | 1 | 1 | Low | No direct environmental impact of delay in stocking surveys |
| 30. Remedial work has been undertaken to achieve acceptable regeneration where stocking, spatial distribution, health or early growth was initially found to be below the applicable standard. | 085 | 1 | 2 | Low | Highly localised, no lasting effect: same risk as for this coupe under criterion #6 |
| 33. Rehabilitation of coupe infrastructure has been assessed within three years of initial treatment. | 106 | 1 | 2 | Low | No direct environmental impact of failure to assess rehabilitation. Risk of failure to rehabilitate assessed to be Medium (moderate-50/50)on basis of duration of any impact) |
| **Guidance: Regeneration coupes** |  |  |  |  |  |
| 37. A survey of seedbed quality was undertaken prior to use of natural seed fall or sowing to regenerate the coupe. | 299  300 | 1 | 2 | Low | Minimal direct environmental impact of seedbed not being formally assessed |
| 38. Seed and planting stock are screened for weeds, pathogens or pests prior to coupe regeneration. | All | 3 | 2 | Low | Potential for medium scale impact, although low likelihood |
| **Mandatory: Thinning coupes** |  |  |  |  |  |
| 3. All tree species originally present on the coupe have been retained following thinning with a similar density and distribution. | 397  402 | 2 | 1 | Low | No long term effect on plant populations |
| 8. Coupe stocking and thinning damage was assessed within three years of treatment. | 421 | 1 | 1 | Low | No direct environmental impact of delay in surveys |
| 14. Assessments show that thinning operations meet the specifications for basal area, damage, outrow and bay width, species composition and tree retention in NFSG #13 or #14. | All | 3 | 2 | Low | Potential medium term impacts on productivity |

# Discussion

## Audit methodology

This was the first audit of coupe regeneration and finalisation undertaken as part of the FAP and as such it was the first trial of the relevant FAP Module. As previously discussed, that module was extensively revised as part of the initial phase of the audit. It is appropriate then to provide an assessment of the Workbooks and field methodology.

### Desktop analysis

The desk top analysis (using Workbook 7A) provided a comprehensive review of the key data reported by VicForests to DSE as part of the finalisation and hand back process. The methodology enables an assessment of whether the regeneration and thinning coupes proposed for hand back meet the standards set in relevant NFSGs (Part A). It also seeks to confirm whether all coupes proposed for hand back are reported to meet NFSG standards and whether VicForests reporting is consistent with the underpinning data from stocking and post-thinning surveys (Part B).

The main limitation of Part A related to the spreadsheet VicForests used to report to DSE on coupe finalisation and hand back rather than the audit methodology itself. While the spreadsheet met DSE’s reporting requirements, it did not have all of the information needed to fully assess compliance with the NFSGs relating to both regeneration and thinning coupes. While VicForests readily provided the additional information required, it would be preferable in any future finalisation and hand back reporting for DSE to request (and VicForests provide) all of the information required to assess compliance with NFSGs. It is recommended that Part A be adopted in future audits without amendment.

Workbook 7A Part B provided a useful check on the consistency of coupe finalisation and hand back reporting with the underpinning data. However, Part A of the field component of the audit (using Workbook 7B) used the same procedures and worksheets to assess data consistency on a similar number of coupes. The doubling up involved in this process is considered to be unnecessary and it is recommended that Part B of the desk top of the audit be removed from Workbook 7A and not used in any future audit.

Similar work undertaken in Part A of Workbook 7B should continue. While it may not sample all of the FMAs, it provides an auditor-driven sampling of the data underpinning VicForests reporting to DSE. Undertaking the assessment of this information while reviewing the coupe file helps to ensure that all of the underpinning information is assessed at one time and that the auditors are appropriately familiarised with coupe conditions.

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| --- | --- |
| **Recommendation 6.1** |  |
| It is recommended that Part A of Workbook 7A be adopted for use in future audits without further modification. | |
| **Recommendation 6.2** |  |
| Part B of the desktop analysis unnecessarily replicates Part A of the field component of the audit. It is recommended that Part B of Workbook 7A be removed and not be included in future audit programs. | |

### Field audit

The field component of the audit included both office (largely regional VicForests offices) and field components. It used Workbook 7B and included an assessment of stocking and post-thinning survey information (Part A), compliance with audit criteria derived from the Code and NFSGs (Part B) and field surveys of coupe stocking and thinning activities (Part C). All of the elements provided useful information and remain important components of the audit.

As discussed above, Part A of the field audit was essentially a doubling up of Part B of the desk top analysis based on Workbook 7A. Experience suggests that the worksheets (Tables 1-3) require some modification to improve useability, as follows:

* Provision should be made to separately capture information from multiple regeneration coupe stocking surveys. For several of the audited coupes, a standard survey was followed up by one or more intensive surveys to either check stocking in lightly or unstocked areas or to follow up on remedial work to improve regeneration.
* The tables require cells that confirm the results of the assessment.
* For thinning coupes, Table 3 requires cells that enable the entry of NFSG standard values for BA retention, bay and outrow width applicable to the stand age, type and slope, so that an assessment of compliance can also be made and included in the reporting.

Part B of the field audit involves assessing compliance of regeneration and coupe finalisation activities with relevant Code prescriptions and NFSG standards. While there is explicit authority from the Code for the audit criteria derived for regeneration coupes, with the exception of compliance with NFSG standards, this is largely lacking for thinning coupes. Audit criteria were developed for a significantly reduced set of Code prescriptions where there is an implicit application to thinning coupes. It is recommended that this issue be addressed in the next update of the Code.

Overall the workbooks were considered to provide a relevant and comprehensive assessment of Code compliance. The worksheets (particularly Table 4 for regeneration coupes) have many criteria that while applicable to the Code are frequently not applicable to individual coupes. Given the requirements of the Code and diversity of coupes, this situation is considered to be unavoidable.

The workbook requires more explicit guidance on how to treat “partial” compliance with audit criteria and what to do when evidence to support an assessment is not available. The assessment “unknown” was introduced in some circumstances where findings would have been confirmed by field assessment, but was not because access or time limitations meant that the field assessment could not be undertaken. In the few instances where evidence could not be obtained, an assessment of “no” (non-compliance) was made.

Completion of the worksheets was sometimes hampered by poor or ambiguous records in the coupe files (discussed below).

Several audit criteria require field assessments of the effectiveness of particular environmental impact control measures (e.g. in relation to regeneration burning and mechanical disturbance). In this audit, regrowth on the coupes was generally too advanced to make meaningful assessments against these criteria. It is recommended that they (criteria #14, 18 and 21) be deleted from Table 4 (for regeneration coupes).

Similar difficulties associated with accessing or viewing the coupes were experienced in assessing whether the spatial distribution and composition of regeneration and thinning coupes (criterion 10 in Table 4 and criterion 3 in Table 5 of Workbook 7B) approximated that of the original stand. Since unambiguous observation evidence cannot be obtained, it would be better for the assessment of this prescription be confined to VicForests management actions and its surveys.

The main issue with the field audit was with the field assessments of regeneration coupe stocking. Access to many of the coupes was extremely difficult due to the very dense eucalypt, wattle and scrub regrowth. The sampling methodology was simplified from that proposed in the revised FAP Module 7 to help expedite the surveys. While 50 points were sampled (in coupes over 10 ha), the distances between sampling points were reduced to ensure an adequate number of coupes could be included in the sampling program within the time available.

The long delay between regeneration and proposal for hand back for some coupes (up to 7 years) contributed to the advanced development of regrowth (which exceeded 6-8 m in height in some cases) and understorey. It made coupe access difficult in some instances (exceptionally so at times). Some access roads had also become overgrown or otherwise unusable, thereby hampering or preventing coupe access.

|  |  |
| --- | --- |
|  |  |

Dense regrowth, difficult terrain and logging debris contribute to physical hazards and slow progress in stocking survey components of field audits

Dense regrowth, combined with sometimes difficult terrain, the presence of logs on the ground and dead stags through the stand also meant that the surveys were physically demanding and, at times, hazardous for the auditors. Tripping hazards, particularly, needed to be carefully managed by the auditors.

Formal assessments of coupes with reported stocking above about 75% were considered to add little value to the audit (which is confirmed by Figure 4). While such coupes should be included (via the largely random selection process described in Workbook 7B) in future audits, it is recommended that this be done by reconnaissance along access roads and snig tracks or confirmed using aerial photography (where recent, high resolution images area available; [10]).

Only in marginally stocked coupes (below 75% stocking) and those “failing” the reconnaissance survey, should formal audit surveys be undertaken. This would increase the number of coupes that could be inspected and provide better value for the resources invested in the audit process.

|  |  |
| --- | --- |
| **Recommendation 6.3** |  |
| It is recommended that Part A of Workbook 7B be modified for use in future audit programs as follows:   * Provision is made to separately capture information from multiple regeneration coupe stocking surveys. For several of the audited coupes, a standard survey was followed up by one or more intensive surveys to either check stocking in lightly or unstocked areas or to follow up on remedial work to improve regeneration. * The tables require cells that confirm the results of the assessment. * For thinning coupes, Table 3 requires cells into which NFSG standard values for BA retention, bay and outrow width applicable to the stand age, type and slope can be entered, so that an assessment of compliance can also be made and included in the reporting. | |
| **Recommendation 6.4** | |
| The *Code of Practice for Timber Production* includes few prescriptions relating specifically to the conduct of thinning operations in native forests. It is recommended that any future review of the Code consider introducing prescriptions that at least support compliance with commercial thinning standards and specifications in the relevant NFSGs. | |
| **Recommendation 6.5** | |
| It is recommended that Part B of Workbook 7B be modified to include more explicit guidance on how to treat “partial” and non compliance with audit criteria in completing Tables 4 and 5. | |
| **Recommendation 6.6** | |
| Several audit criteria require field assessments of the effectiveness of particular environmental impact control measures (e.g. in relation to regeneration burning and mechanical disturbance). Based on the experience of this audit, regrowth on the coupes will generally be too advanced to make meaningful assessments against these criteria in future audits. It is recommended that such criteria (#14, 18 and 21) be deleted from Table 4 (for regeneration coupes).  Further, unambiguous assessments of the spatial distribution and composition of regeneration and thinning coupes (criterion 10 in Table 4 and criterion 3 in Table 5 of Workbook 7B) cannot be obtained during audit and, as a result, it is proposed that these criteria also be removed from the respective tables in Workbook 7B. | |
| **Recommendation 6.7** | |
| Formal, detailed field assessments of coupes with reported stocking above approximately 75% add little value to the audit. It is recommended that in future audits:   * For coupes with reported stocking of 75% and above, an initial reconnaissance survey should be undertaken to confirm that the coupe is adequately stocked. This could be based on an on-ground survey along snig tracks and other access points, or, where high resolution aerial photography is available, it could be based in interpretation of such images; * Formal surveys (using the method described in Workbook 7B) are only used to assess stocking in coupes with reported stocking of less than 75% and in coupes where the initial reconnaissance survey identifies that they may not be as well stocked as suggested by VicForests’ surveys.   Coupes to be included in the detailed field assessments would be selected (largely) at random, as was the case in the current audit. | |

### Use of high resolution aerial imagery in assessing regeneration coupe stocking

A trial was undertaken to determine the potential role of aerial surveys using high resolution imagery to audit harvest coupe regeneration as part of an audit of logging coupe regeneration and finalisation under DSE’s Forest Audit Program. Aerial survey techniques were considered to offer the prospect of improving the cost-effectiveness and coverage of the FAP’s coupe regeneration and finalisation audit. The trial is reported in a companion document to this audit report [10].

Two sets of aerial imagery were acquired from VicMap’s Coordinated Imagery Program: 15 cm resolution imagery from parts of Central FMA (flown 2009) and 50 cm resolution imagery from much of East Gippsland FMA (flown 2010). GIS scripts were developed to set up a consistent sampling approach and support data capture analysis. Stocking of regrowth in 2.27 m radius plots on an 80 ×20 m grid was assessed on seven regeneration coupes, two using the 15 cm resolution imagery and five using the 50 cm imagery. Time elapsed between coupe regeneration and image acquisition ranged between 2 and 5 years.

The coupe harvest area, infrastructure (landings, snig tracks etc) and retained seed and habitat trees were clearly distinguishable in both sets of imagery. Regenerating trees could be readily distinguished in 15 cm resolution imagery only 2 years after regeneration. While regeneration could be detected in 50 cm resolution imagery, even at 5 years post-regeneration, it was sometime difficult to distinguish. In neither form of imagery was it possible to separate eucalypt from non-eucalypt regrowth or to distinguish between different eucalypt species.

Results from the assessment of regeneration coupe stocking were broadly similar to those obtained from VicForests’ ground-based surveys using the same grid size (but different directions and starting points). In four of the seven coupes included in this trial, results from the VicForests’ surveys were within the 90% confidence interval of the aerial survey results.

The aerial surveys typically (although not always) overestimated coupe stocking, compared with VicForests’ ground-based surveys. This most likely reflects the inability of the imagery to distinguish between sampling plots stocked with non-eucalypts only and those stocked with eucalypts. The aerial surveys proved to be effective in identifying areas with no eucalypt (or other) regrowth within the coupes.

Even with 15 cm resolution imagery, it is not possible for an aerial survey to replace ground-based surveys of stocking to assess whether coupes have meet the standards required by NFSG #10. Key criteria require eucalypt and non-eucalypt regrowth to be distinguished and each eucalypt species present in the coupe to be identified: 15 cm resolution imagery cannot do this.

As part of an overall audit approach that draws on multiple lines of evidence, including VicForests stocking survey results, aerial survey techniques could contribute to audit processes for coupe regeneration and finalisation. Where it can be demonstrated from a ground-based survey (such as VicForests stocking assessments) or rapid appraisal that a regenerating coupe is dominated by eucalypt rather than non-eucalypt regeneration, aerial survey could be used to provide a rapid, low-cost and safe means of auditing stocking (including the presence of large unstocked areas within the coupe). While both forms of imagery could be used for this task, 15 cm resolution imagery (or better) is recommended.

Use of high resolution aerial photography in regeneration and finalisation audits is likely to be opportunistic, in that it will not be cost-effective to acquire it solely for auditing purposes. If it is available, it could be used as a substitute for the ground-based rapid survey technique proposed in the revised coupe regeneration and finalisation audit methodology that was developed following the experience of the 2011-12 audit program (Appendix C).

### Updated FAP module 7

A revised version of Module 7 has been prepared on the basis of the above recommendations and is included as Appendix C. This version of FAP Module 7 should be used in any future audits of coupe regeneration and finalisation.

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| **Recommendation 6.8** |
| It is recommended that the revised version of FAP Module 7 that was prepared on the basis of the 2011-12 audit is used in any future Coupe Regeneration and Finalisation audits. |

## Audit findings

### Risk of harm to the environment

Risks of harm to the environment resulting from the coupe regeneration and finalisation activities included within the scope of this audit were assessed during the field (Workbook 7B) component of the audit. The assessment was made in circumstances where coupe regeneration and finalisation activities were not fully compliant with the Code. While individual instances of non compliance with audit criteria derived from the Code and NFSGs were identified, these were generally assessed to pose a low or at most moderate risk to the environment, based on DSE’s risk management framework. Their implications were generally assessed to be confined to the immediate environs surrounding the coupe and, at worst, *potentially* lasting for no more than a few years. No material (or “high”) risks to the environment identified through this audit.

The non-compliance issue assessed to pose the greatest risk was an instance where regeneration burns escaped control lines into adjacent unharvested forest.

### Acceptability of coupes for hand back

All 315 regeneration coupes proposed by VicForests for hand back to DSE are clearly acceptable in that they either: comply with NFSG standards (312 coupes); do not comply, but were part of an accepted trial conducted with DSE (coupes 376 and 377); or are understocked in one confined location that is no longer accessible for treatment (coupe 085).

Frequent instances of non-compliance with NFSG thinning standards were reported by VicForests and detected in this audit. As none of the material issues (i.e. instances excessive damage to retained stems, underwidth bays, overwidth outrows, insufficient retained BA) can be remediated, it is recommended that the 40 thinning coupes be accepted for hand back.

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| **Recommendation 6.9** |
| It is recommended that DSE accept all of the regeneration and thinning coupes proposed by VicForests for hand back. |
| **Recommendation 6.10** |
| It is recommended that DPI work with VicForests to strengthen the planning and implementation of forest thinning operations to achieve better compliance with relevant NFSGs. |

### VicForests finalisation and hand back reporting to DSE

VicForests finalisation reporting meets DSE requirements and guideline for finalisation reporting. It provides a generally accurate, but insufficiently comprehensive record with which to assess compliance with NFSG standards. It is recommended that future information requests for finalisation reporting seek all of the information that is required to assess compliance with NFSGs (see recommendation 4.1).

A small number of instances were identified where VicForests finalisation reporting to DSE was inconsistent with the underpinning data. While this is not unexpected in a large data set and had no material impact on acceptability of coupes for hand back, VicForests may consider instituting further checks of the consistency of information it reports to DSE with the basic, underpinning information.

The handling of data from coupes where stocking surveys were undertaken (particularly where standard surveys were followed up by intensive surveys of parts of coupes) needs to be codified to ensure it is an unambiguous statement of the overall coupe stocking and what types of survey the result is derived from.

VicForests reporting of dates of stocking surveys should be of the earliest rather than the latest surveys. Reporting of the latest survey may account for the poor compliance with the Code requirement that stocking be assessed within three years of coupe treatment for regeneration.

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| **Recommendation 6.11** |
| It is recommended that DSE and DPI develop protocols for the reporting of coupe stocking in instances where multiple surveys, potentially of differing intensities, have been undertaken to assess coupe stocking. |
| **Recommendation 6.12** |
| Relatively poor compliance with the requirement to assess regeneration coupe stocking within three years of coupe treatment may reflect VicForests reporting of the latest rather than earliest established seedling survey. In future finalisation reporting, VicForests should ensure that the earliest such survey date be reported. It should also ensure that such surveys are conducted within the timeframe required by the Code. |

### Harvest coupe regeneration and finalisation

Harvest coupe regeneration and finalisation activities that were assessed within this audit were assessed to generally comply with audit criteria derived from the Code and NFSGs. Full compliance was assessed against 97% of applicable criteria and partial compliance assessed for a further 1% of criteria. All but one instance of non or partial compliance was assessed to have low risk of harm to the environment.

While the coupe files, CIS and FireWeb provided a useful evidence base for the audits, several procedural shortcomings were identified, the more significant of which included:

* **Inconsistent coupe labelling of burns in FireWeb**: records of regeneration burn approvals were difficult to track through FireWeb due to inconsistent application of coupe naming conventions. DSE naming conventions should be applied consistently in all coupes.
* **Implementation of decision support systems (DSS)**: while the inclusion of the DSS on file demonstrated that an appropriate silvicultural system had been used for the coupe, it was rarely annotated to provide auditable evidence that the intended pathway or an alternative had been followed.
* **Notation of obsolete records**: several instances were detected where coupe files included burn plans that were never implemented (e.g. due to the 2009 bushfires intervening). This made it difficult for the auditors to track the regeneration process and assess some compliance elements. Obsolete plans or similar information in coupe files should be annotated as such to improve the clarity of coupe management practice for audit.
* **Assessment of impacts of regeneration burns or mechanical disturbance**: the Code requires that “where fire is used in regeneration, all practicable measures must be taken to protect all areas excluded from harvesting from the impacts of fire”. In this audit, the lack of reporting of escapes of regeneration burns from control lines was taken as evidence of compliance with this requirement. However this is an inadequate evidence base. A formal note should be made and retained in the coupe file of the outcome of the regeneration burn, including an assessment of any impact on unharvested areas.

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| **Recommendation 6.13** |
| It is recommended that VicForests and DSE review the above comments on perceived procedural shortcomings with coupe records and FireWeb entries and amend their practices as appropriate. |

### Thinning coupe operations

Thinning coupe operations were assessed to generally comply with NFSG standards for damage, retained BA and bay and outrow width. However, numerous instances were detected where operations did not comply, including where thinning targets (for retained BA) were not compliant with NFSG standards. Risk of harm to the environment from such non-compliance issues was considered to be low.

Recommendation 6.10 addresses issues relating to the compliance of VicForest’s thinning operations with NFSG standards.

### Native Forest Silviculture Guidelines

It is considered that NFSG standards for thinning require review. Standards for damage, retained BA and bay and outrow width do not appear to allow for sampling uncertainty, which for most of these variables is significant. Bay and outrow width cannot be defined precisely, due in part to the random nature of regeneration in native forests and the delay between thinning and post-thinning surveys. Specification of standard outrow widths to the nearest 0.5 m (without an allowance for sampling uncertainty) suggests a level of precision in determining the start and finish of outrows and bays that cannot be attained in the field.

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| **Recommendation 6.14** |
| It is recommended that DPI review NFSG standards for thinning to appropriately allow for sampling and measurement uncertainty. |

# Conclusions and recommendations

## Conclusions

An audit was undertaken of coupe regeneration and finalisation activities conducted on 315 regeneration coupes and 40 thinning coupes proposed by VicForests for hand back to DSE. The audit was undertaken as a statutory environmental audit under the *Environment Protection Act* 1970 and formed part of DSE’s 2011-12 Forest Audit Program (FAP). It considered:

* Regeneration and finalisation of harvest coupes;
* Residual stocking and damage in thinning coupes;
* VicForests’ processes to assess and report on compliance with the *Code of Practice for Timber Production* (2007) and relevant Native Forest Silviculture Guidelines.

The FAP module for coupe regeneration and finalisation was extensively modified prior to the commencement of the audit itself.

The audit made the following key findings:

* **Risk of harm to the environment:** no material risk of harm to the environment was identified. A small number of instances of partial or non-compliance with audit criteria based on the Code and NFSGs were identified, however these were assessed to pose a low or at most medium risk to the environment, based on DSE’s risk management framework. The greatest risks of harm to the environment identified were regeneration burn escapes and failure to successfully rehabilitate log landings (both assessed as medium risk).
* **Acceptability of regeneration coupes for hand back:** all of the315 regeneration coupes proposed for hand back are considered to be acceptable in that they either comply with NFSG standards, do not comply, but were part of an accepted trial conducted with DSE and were not required to be regenerated to NFSG standards or are understocked in one confined location that is no longer accessible for treatment.
* **Acceptability of thinning coupes for hand back:** frequent instances were detected where VicForests’ thinning operations did not comply with NFSG standards. These were in relation to damage to retained trees, retained BA and bay and outrow width. As none of the material issues can be remediated it is recommended that all coupes be accepted for hand back and that VicForests and DPI work to improve compliance of thinning operations with NFSGs.
* **VicForests finalisation and hand back reporting:** thefinalisation list provided by VicForests to DSE is a generally accurate, but insufficiently comprehensive record with which to assess compliance with NFSG standards. In its 2011-12 finalisation report, VicForests provided the information that has traditionally been required of it by DSE. However that information, in its own right, is not sufficient to assess compliance with NFSG standards. VicForests records had all of the required information and, once provided to the auditors, it was used to identify that most coupes proposed for hand back met NFSG standards.

A small number of errors and omissions were identified in VicForests finalisation reporting to DSE (7% of the total number of audit criteria), although these omissions and errors had no material impact on the acceptability of coupes for hand back.

* **Harvest coupe regeneration and finalisation:** activities that were assessed during detailed field audits complied with 97% of applicable audit criteria. Only one instance was detected among 32 coupes and over 340 applicable audit criteria where non-compliance was assessed to pose more than a low risk of harm to the environment.

## Recommendations

Recommendations arising from this report were identified in the body of the text, as follows.

| **#** | **Recommendation** |
| --- | --- |
| 4.1 | It is recommended that future requests for information on finalisation of VicForests coupes include all of the information needed to assess compliance with NFSG standards. |
| 4.2 | Differences in species composition between the gross coupe area and the area actually harvested may legitimately result in species found to be present in coupe planning not being detected in stocking surveys. It is recommended that for coupes in which stocking surveys do not detect all of the species identified in planning, an annotation explaining any legitimate reasons for this (e.g. species uncommon in coupe area, species only present in unharvested area) be provided in VicForests finalisation reporting. |
| 6.1 | It is recommended that Part A of Workbook 7A be adopted for use in future audits without further modification. |
| 6.2 | It is recommended that Part B of Workbook 7A be removed and not be included in future audit programs. |
| 6.3 | It is recommended that Part A of Workbook 7B be modified for use in future audit programs as follows:   * Provision is made to separately capture information from multiple regeneration coupe stocking surveys. For several of the audited coupes, a standard survey was followed up by one or more intensive surveys to either check stocking in lightly or unstocked areas or to follow up on remedial work to improve regeneration. * The tables require cells that confirm the results of the assessment. * For thinning coupes, Table 3 requires cells into which NFSG standard values for BA retention, bay and outrow width applicable to the stand age, type and slope can be entered, so that an assessment of compliance can also be made and included in the reporting |
| 6.4 | It is recommended that any future review of the *Code* *of Practice for Timber Production* consider introducing prescriptions that at least support compliance with commercial thinning standards and specifications in the relevant NFSGs. |
| 6.5 | It is recommended that Part B of Workbook 7B be modified to include more explicit guidance on how to treat “partial” and non compliance with audit criteria in completing Tables 4 and 5. |
| 6.6 | As unambiguous assessments of the effectiveness of particular environmental impact control measures cannot be made during audits that occur several years after regeneration it is recommended that criteria 14, 18 and 21) be deleted from Table 4 (for regeneration coupes). For similar reasons, criterion 10 in Table 4 and criterion 3 in Table 5 of Workbook 7B, relating to the spatial distribution and composition of regeneration and thinning coupe should be removed. |
| 6.7 | Formal, detailed field assessments of coupes with reported stocking above approximately 75% add little value to the audit. It is recommended that in future audits:   * For coupes with reported stocking of 75% and above, an initial reconnaissance survey should be undertaken to confirm that the coupe is adequately stocked. This could be based on an on-ground survey along snig tracks and other access points, or, where high resolution aerial photography is available, it could be based in interpretation of such images; * Formal surveys (using the method described in Workbook 7B) are only used to assess stocking in those coupes with reported stocking of less than 75% and in coupes where the initial reconnaissance survey identifies that they may not be as well stocked as suggested by VicForests’ surveys.   Coupes to be included in the detailed field assessments would be selected (largely) at random, as was the case in the current audit. |
| 6.8 | It is recommended that DSE accept all of the regeneration and thinning coupes proposed by VicForests for hand back. |
| 6.9 | It is recommended that the revised version of FAP Module 7 that was prepared on the basis of the 2011-12 audit is used in any future Coupe Regeneration and Finalisation audits. |
| 6.10 | It is recommended that the Department of Primary Industries (DPI) work with VicForests to strengthen the planning and implementation of forest thinning operations to achieve better compliance with relevant NFSGs. |
| 6.11 | It is recommended that DSE and DPI develop protocols for the reporting of coupe stocking in instances where multiple surveys, potentially of differing intensities, have been undertaken to assess coupe stocking. |
| 6.12 | Relatively poor compliance with the requirement to assess regeneration coupe stocking within three years of coupe treatment may reflect VicForests reporting of the latest rather than earliest established seedling survey. In future finalisation reporting, VicForests should ensure that the earliest such survey date be reported. VicForests should also ensure it complies with the Code requirement to conduct stocking surveys within three years of coupe treatment for regeneration. It should also ensure that such surveys are conducted within the timeframe required by the Code. |
| 6.13 | It is recommended that VicForests and DSE review the comments on perceived procedural shortcomings with coupe records and FireWeb entries and amend their practices as appropriate. |
| 6.14 | It is recommended that DPI review NFSG standards for thinning to appropriately allow for sampling and measurement uncertainty. |

# References

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# Appendix A: Forest Audit Program Module 7

This appendix contains the module and workbooks for Coupe regeneration and finalisation auditing that were used in this (2011-12) audit. Further modifications to the module and workbooks were made following this audit. The updated module and workbooks, which are proposed for use in any future Coupe regeneration and finalisation audits are given in Appendix E.

# Appendix B: DSE 2007 Risk management framework

DSE’s *Strategic Risk Management Framework* (2007) provides descriptors for consequence, likelihood and level of risk that may be used in assessing risk of harm to the environment from non-compliance with audit criteria derived from the Code and NFSGs. They are applied in a conventional risk assessment and management framework based on AS/NZS ISO 31000:2009.

### Consequence descriptors

Two consequence descriptor scales from the risk management framework are relevant to this assessment of risk of harm to the environment from activities associated with coupe regeneration and finalisation, as follows:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Very serious (5)** | **Serious (4)** | **Moderate (3)** | **Minor (2)** | **Insignificant (1)** |
| **Environmental** | Regional scale (>100 km2). Long term/permanent impact. Species extinction may occur | Large scale (10-100 km2). Long term (decades) impact. Serious reduction in animal/plant populations may occur | Medium scale (1-10km2). Medium term (years) impact. Some reduction in animal/plant populations may occur | Localised (<1km2). Short term (weeks) impact. No long-term reduction in animal/plant populations | Localised (immediate area). Temporary impact (days) |
| **Reputation** | Serious public or media outcry (International or national coverage) | Significant adverse attention by media, public, or NGO (State based) | Media attention of local concern | Minor, adverse local public or media attention or complaints |  |

### Likelihood descriptors

Likelihood is described on a five point scale, as follows:

5. Almost certain

4. Likely

3. 50/50

2. Unlikely

1. Rare

As per standard risk processes, likelihood pertains to the likelihood of the assessed level of consequence occurring.

### Overall risk rating

The overall risk rating reflects the combination of consequence and likelihood assessments, as per the following table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Consequence** | | | | |
| **Likelihood** | *Insignificant (1)* | *Minor (2)* | *Moderate (3)* | *Serious (4)* | *Very serious (5)* |
| *Almost certain (5)* | Low | Medium | High | High | High |
| *Likely (4)* | Low | Medium | High | High | High |
| *50/50 (3)* | Low | Low | Medium | High | High |
| *Unlikely (2)* | Low | Low | Medium | Medium | High |
| *Rare (1)* | Low | Low | Low | Low | Medium |

# Appendix C: Revised FAP Module 7 and workbooks

This appendix contains the final revised version of Module 7 and its workbooks. It is the version that is recommended for use in any future audits of Coupe regeneration and finalisation.

1. NSFG #10 actually specifies that stocking surveys are to be undertaken within 30 months of regeneration. However, as the Code species 3 years, this was adopted as the audit criterion. [↑](#footnote-ref-1)
2. The audit did not consider roadline coupes nor regeneration coupes that had been burnt by wildfire. [↑](#footnote-ref-2)
3. NFSG #10 actually specifies stocking surveys are to be undertaken within 30 months of coupe treatment for regeneration. The Code requirement for such surveys is three years post-treatment, which has been adopted here as the relevant audit criterion. [↑](#footnote-ref-3)
4. As DSE’s Coupe Finalisation Procedures [7] are now obsolete and have no particular status in the regulation of timber production operations. [↑](#footnote-ref-4)
5. As per previous comments, three years is required by the Code and has been adopted as the audit criterion. NFSG requires the stocking surveys be first conducted within 30 months of regeneration treatment. [↑](#footnote-ref-5)
6. When pre and post thinning BA were adjusted for reporting errors. For both variables, regrowth BA was also entered as overwood BA. [↑](#footnote-ref-6)