Economic values

Victoria’s forests provide economic benefits across a range of values, from timber harvesting and associated industries, recreation and tourism, water purification, support to non-timber forest industries such as honey, and many others. Sustainable forest management defines the principles by which forests are appropriately utilised to maintain their full range of environmental, social and economic values. This chapter presents information about the management and outcomes of forest management that contribute economics benefits to the state.

At the national level, Australia uses the international Montréal Process criteria and indicators as the basis framework for monitoring and measuring how well our forests are being managed.

Criteria 2 and 6 of the Montréal Process are concerned with economic values. Specifically, these criteria address ‘Maintenance of productive capacity of forest ecosystems’ (Criterion 2) and ‘Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies’ (Criterion 6).

This section includes the following Montréal Process indicators:

* Indicator 2.1a – Native forest available for wood production, area harvested, and growing stock of merchantable and non-merchantable tree species
* Indicator 2.1b – Age class and growing stock of plantations
* Indicator 2.1c – Annual removal of wood products compared to the volume determined to be sustainable for native forests and the future yields for plantations
* Indicator 2.1d – Annual removal of non-wood forest products compared to the level determined to be sustainable
* Indicator 2.1e – The area of native forest harvested and the proportion of that effectively regenerated, and the area of plantation harvested and the proportion of that effectively re-established
* Indicator 6.1a – Value and volume of wood and wood products
* Indicator 6.1b – Values, quantities and use of non-wood forest products
* Indicator 6.1c – Value of forest-based services
* Indicator 6.1d – Production and consumption and import/export of wood, wood products and non-wood products
* Indicator 6.1e – Degree of recycling of forest products
* Indicator 6.2a – Investment and expenditure in forest management
* Indicator 6.2b – Investment in research, development, extension and use of new and improved technologies.

**Overview of regulatory setting for sustainable forest management**

In Victoria, DELWP, among its other land management responsibilities, acts as the environmental regulator for native forests on public land, with the responsibility of monitoring timber harvesting and other primary industry operations to ensure they are compliant with regulatory requirements. This is achieved through a mixture of investigations, field inspections and field and forest audits.

Further detail on Victoria’s forest management system, including policy and regulatory settings, is available in the *Overview of Victoria's Forest Management System* (DELWP 2020).

**Commercial regulation and governance of timber harvesting**

VicForests is a state-owned enterprise established in 2003 by Order in Council under the *State-Owned Enterprises Act 1992* (Vic.). In accordance with the Order in Council, the functions of VicForests are to ‘operate in a framework consistent with Victorian Government policies and priorities’, with a commercial focus that aims to maximise the long-term economic returns to Victoria. VicForests is responsible for the sustainable harvest, regrowing and commercial sale of timber from Victoria’s State forests, on behalf of the Victorian Government. Sustainable harvest involves harvesting of forest products in accordance with the *Code of Practice for Timber Production 2014*, which includes compliance with the Forest Management Zoning Scheme and other prescriptions, based on the capacity of the forest to produce timber volume while maintaining the functioning of the forest. VicForests’ board reports to the Victoria’s Minister for Agriculture, as the responsible minister.

The Department of Jobs, Precincts and Regions (DJPR) has oversight of VicForests to ensure it is meeting its corporate obligations. DJPR is also responsible for advising the Minister for Agriculture on the timber industry, timber industry policy and the management of timber resources. The Minister for Agriculture makes the Allocation Order, which in effect is the licence for VicForests to harvest timber, and sets the overall forest area potentially available for harvesting.

The Department of Treasury and Finance (DTF) undertakes functions on behalf of the Treasurer, as the sole shareholder of VicForests. DTF monitors VicForests’ corporate governance, in cooperation with DJPR.

**Indicator 2.1a: Native forest available for wood production, area harvested, and growing stock of merchantable and non-merchantable tree species**

This indicator reports the capacity of forests to sustainably produce wood to meet society’s needs into the future. The area of native forest available for wood production, the nature of the growing stock, and the area harvested over time provide means to demonstrate the sustainability of forest management.

*Statewide overview of resource availability*

State forest accounts for 3.2 million hectares (or 40 per cent) of Victoria’s 7.89 million hectares of public land. These forests are managed according to Victoria’s forest management system and the forest management zones that define the activities that are permitted within them. Principally, this includes the application of the General Management Zone, Special Management Zone and Special Protection Zone, with the latter forming the informal component of the CAR reserve. Exclusions under the *Code of Forest Practice for Timber production 2014* are also considered as informal protection areas according to the JANIS criteria. These are areas such as steep (>30o) or stream-side buffers.

Broadly, the three primary forests zones are defined as:

* **Special Protection Zone** (SPZ) – managed for conservation with no timber harvesting permitted; this zone is designed to link and complement established conservation reserves
* **Special Management Zone** (SMZ) – managed to conserve specific features where timber production is permitted under certain conditions
* **General Management Zone** (GMZ) – managed for multiple uses including timber production.

2.75 million hectares of forest is zoned under GMZ, SMZ and SPZ, with the remaining area listed as No Zone (see Table 58). While timber harvesting could technically be allocated (under an Allocation Order) within nearly 2 million hectares of GMZ and SMZ, only a fraction of this area is commercially suitable for timber harvesting.

Table 58: Total area (gross hectares) of State forest (as a land tenure) per zone in each RFA region in 2018

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Forest management zone | Central Highlands | East Gippsland | Gippsland | North East | West | Total RFA areas |
| General Management Zone | 274,000 | 409,000 | 539,000 | 491,000 | 101,000 | 1,814,000 |
| Special Management Zone | 21,000 | 64,000 | 13,000 | 25,000 | 38,000 | 161,000 |
| Special Protection Zone | 95,000 | 111,000 | 254,000 | 173,000 | 142,000 | 775,000 |
| Total all zones | 390,000 | 584,000 | 806,000 | 689,000 | 281,000 | 2,750,000 |

Data source: Data derived from DELWP corporate library FMZ100. Area of ‘No Zone’ not recorded.

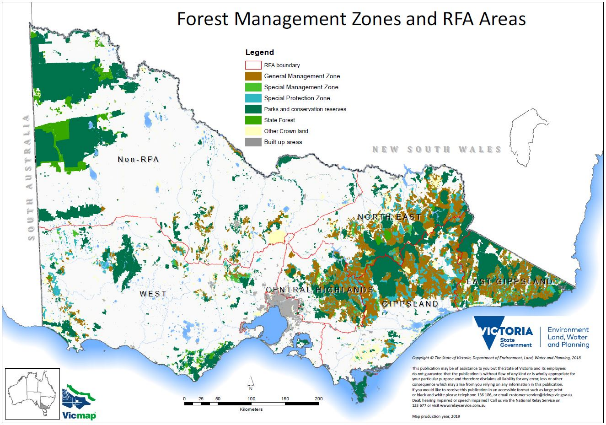


Figure 32: Forest management zones across Victoria

*Net harvestable area*

In 2019, VicForests reported the area suitable for timber production (of D+ sawlog) in the east of the state at 462,000 hectares (Table 59).

Table 59: Area (‘000 ha) of State forest in eastern Victoria available and suitable for timber production by RFA in 2019

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RFA region | Ash | | | Mixed species | | | Total | Total suitable |
| Suitable | Potentially Suitable | Not Suitable | Suitable | Potentially Suitable | Not Suitable |
| Central Highlands | 67 | 1 | 4 | 59 | 48 | 25 | 204 | 115 |
| East Gippsland | 4 | 0 | 0 | 222 | 61 | 84 | 371 | 226 |
| Gippsland | 34 | 3 | 3 | 38 | 99 | 158 | 335 | 72 |
| North East | 21 | 3 | 4 | 17 | 96 | 131 | 272 | 38 |
| **Total** | **126** | **7** | **11** | **336** | **304** | **401** | **1,182** | **462** |

Data source: VicForests (2019).

In 1999, the area suitable for timber production for the east of the state was over 820,000 hectares (Table 60). The impact of successive mega-fires in productive forest areas since 2003 has decreased the area available for timber harvesting. Similarly, the reservation of productive forest areas for species conservation has reduced the total available area. The VicForests Resource Outlook cites the following factors as to why there has been a reduction in the Resource Outlook 2016–17 from the previous level predicted:

* increased protection for the Leadbeater’s Possum and other threatened species
* the decrease in available forest due to resource fragmentation as a result of the proximity and density of Leadbeater’s Possum populations
* increased protection of old-growth forest; and
* the removal of forest from the model that VicForests considers unlikely to be able to be accessed due to community and/or market concerns.

The potential impact from bushfires has obvious implications for the timber supply; however, this has not been modelled within the Resource Outlook 2016-17 and is therefore not noted in the above points.

In addition to increased protections for threatened species, effect of bushfire, increased protections for different forest types and the cessation of commercial harvesting in the Otways area of the West RFA in 2008, Victoria’s total area available and suitable for harvesting timber has more than halved since the commencement of the RFAs 20 years ago.

Table 60: Net productive area for commercial forest types across RFA regions (1999 CRA)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| RFA | Central Highlands | East Gippsland | Gippsland | North East | West | Total |
| Net Productive Area (ha) for Commercial Forest Types | 225,216 | 225,548 | 253,810 | 120,050 | 174,600 | 999,224 |

Note: The net productive area for commercial forest types was based on information in the NRE Hardwood Area Resource Information System (HARIS) database. HARIS provided a standing volume for sawlog and residual roundwood for the Mature and Over-mature (M/OM)2 forests, within areas of GMZ and SMZ.

Source: Information derived from the CRAs accessed via the ABARES website.

*Change in productive area across RFA regions*

While the data presented in the tables above reflect a net productive area for commercial forest types, the methods used to calculate these areas are likely to be different, and consequently, only broad assumptions can be made regarding the variation between the data presented in Table 59 and Table 60.

Available areas in Central Highlands, Gippsland and the North East have all decreased by more than half, while East Gippsland has remained relatively stable.

Commercial timber production in native forest in the West RFA region is now limited to minor products, such as fenceposts and firewood, and a limited volume of sawlogs. This process is managed through VicForests’ Timber Utilisation Plan, as it is not subject to the Allocation Order (VicForests 2017). This harvesting is often limited to local demand, and may be coordinated with other forest management activities, such as roading or removal of dangerous trees. The silvicultural systems used are varied; calculating net harvested area and available area is challenging due to these variations.

*Public native forest harvest area and by silviculture regime*

Averaging the five years following 2004–05 (6,398 hectares), and the five years preceding 2016–17 (3,399 hectares), the average total harvest area has reduced by almost 50 per cent (Table 61). In the years preceding 2004–05, harvest areas were recorded based on their gross area figures and therefore were not comparable.

Table 61: Harvest area (net hectares) 2004–05 to 2016–17, by RFA area

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Season | Central Highlands | East Gippsland | Gippsland | North East | West | Total |
| 2004–05 | 1,447 | 3,456 | 848 | 518 | 0 | 6,269 |
| 2005–06 | 1,459 | 3,157 | 898 | 540 | 504 | 6,558 |
| 2006–07 | 1,151 | 2,920 | 1,116 | 397 | 383 | 5,967 |
| 2007–08 | 1,810 | 2,735 | 1,774 | 486 | 492 | 7,297 |
| 2008–09 | 1,423 | 2,732 | 1,318 | 128 | 296 | 5,897 |
| 2009–10 | 2,486 | 2,387 | 138 | 47 | 141 | 5,199 |
| 2010–11 | 1,712 | 2,521 | 662 | 64 | 4,596 | 9,555 |
| 2011–12 | 1,530 | 2,085 | 617 | 35 | 132 | 4,399 |
| 2012–13 | 1,431 | 1,328 | 473 | 99 | 234 | 3,565 |
| 2013–14 | 1,378 | 1,150 | 471 | 168 | 88 | 3,255 |
| 2014–15 | 1,538 | 995 | 433 | 65 | 136 | 3,167 |
| 2015–16 | 1,657 | 658 | 490 | 114 | 641 | 3,560 |
| 2016–17 | 1,446 | 724 | 680 | 136 | 461 | 3,447 |
| Total | 20,467 | 26,846 | 9,917 | 2,797 | 8,105 | 68,132 |

Data source: DELWP corporate library Lastlog100 layer

Table 62 to Table 66 show net area harvested by regime type for each of the five RFA areas. The harvesting regimes have been consolidated from wider-range harvesting categories – for example, Clearfelling includes the Regrowth Retention Harvesting (RRH) method (VicForests n.d.). Salvage regimes involve the recovery of wood products from forest that has been severely affected by a natural event, usually a large fire. Selection regimes involve the harvest of individual or small clumps of trees from a much broader area, so net harvested areas may not accurately reflect the amount of wood products harvested in these systems. Other harvesting includes firewood cutting, road construction and other seldom-used techniques. As described elsewhere, there has been a general decrease in harvesting area in the data period, reflecting changing resource availability.

*Central Highlands RFA*

The Central Highlands RFA has shown a relatively stable level of harvesting area over the reporting period, with notable increases in 2007–08, and 2009–10, mostly attributable to increased salvage logging following landscape-level bush fires in the previous fire season.

Table 62: Net area harvested by regime, Central Highlands RFA, 2004–05 to 2016–17 (area ha)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Season | Clearfelling | Salvage | Seed Tree | Selection | Thinning | Other/ unknown | Total |
| 2004–05 | 1,085 | 0 | 241 | 0 | 85 | 37 | 1,447 |
| 2005–06 | 933 | 0 | 272 | 0 | 247 | 7 | 1,459 |
| 2006–07 | 742 | 4 | 206 | 0 | 190 | 8 | 1,151 |
| 2007–08 | 761 | 164 | 178 | 247 | 449 | 10 | 1,810 |
| 2008–09 | 718 | 376 | 137 | 0 | 192 | 0 | 1,423 |
| 2009–10 | 663 | 1,569 | 145 | 0 | 108 | 1 | 2,486 |
| 2010–11 | 577 | 839 | 272 | 0 | 23 | 2 | 1,712 |
| 2011–12 | 988 | 81 | 389 | 0 | 70 | 2 | 1,530 |
| 2012–13 | 1,027 | 0 | 274 | 0 | 129 | 0 | 1,431 |
| 2013–14 | 980 | 0 | 331 | 0 | 50 | 17 | 1,378 |
| 2014–15 | 1,179 | 6 | 345 | 8 | 0 | 0 | 1,538 |
| 2015–16 | 1,184 | 0 | 473 | 0 | 0 | 0 | 1,657 |
| 2016–17 | 860 | 12 | 552 | 21 | 1 | 0 | 1,446 |
| Total | 11,696 | 3,051 | 3,815 | 276 | 1,544 | 85 | 20,467 |

Notes:

Clear fall = Clearfelling, Regrowth Retention Harvesting. Salvage = Clearfelling salvage. Selection = Group (or Gap) Selection, Single Tree Selection. Seed tree = Seed Tree (includes retained overwood). Thinning = Thinning from Above, Thinning from Below. Other = Reforestation harvesting, Road Alignment - Construction, Road Alignment - Improvement, dangerous tree removal, firewood fallen, unknown, blanks.

Data source: DELWP corporate library Lastlog100 layer

*East Gippsland RFA*

Data from East Gippsland shows a progressive decline in harvested area. The reduction in available markets, particularly for pulp logs, has contributed to this decline, affecting the viability of several sawmills and precipitating their closure in some cases. This was reflected in the revision of VicForests’ Resource Outlook, which has reduced the amount of timber available for harvesting in East Gippsland.

Table 63: Net area harvested by regime, East Gippsland RFA, 2004–05 to 2016–17 (area ha)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Season | Clearfelling | Salvage | Selection | Seed Tree | Thinning | Other/ unknown | Total |
| 2004–05 | 101 | 0 | 0 | 2,311 | 1,021 | 23 | 3,456 |
| 2005–06 | 62 | 0 | 0 | 2,084 | 1,011 | 1 | 3,157 |
| 2006–07 | 86 | 0 | 0 | 1,964 | 863 | 7 | 2,920 |
| 2007–08 | 3 | 20 | 27 | 1,828 | 842 | 14 | 2,735 |
| 2008–09 | 9 | 23 | 26 | 1,993 | 674 | 8 | 2,732 |
| 2009–10 | 0 | 0 | 0 | 1,711 | 676 | 0 | 2,387 |
| 2010–11 | 0 | 326 | 0 | 1,952 | 152 | 91 | 2,521 |
| 2011–12 | 33 | 66 | 1 | 1,576 | 409 | 0 | 2,085 |
| 2012–13 | 235 | 0 | 0 | 876 | 215 | 2 | 1,328 |
| 2013–14 | 164 | 0 | 0 | 824 | 161 | 0 | 1,150 |
| 2014–15 | 18 | 3 | 0 | 908 | 65 | 0 | 995 |
| 2015–16 | 0 | 7 | 0 | 629 | 21 | 1 | 658 |
| 2016–17 | 0 | 0 | 1 | 658 | 65 | 0 | 724 |
| Total | 711 | 444 | 56 | 19,314 | 6,175 | 147 | 26,846 |

Data source: DELWP corporate library Lastlog100 layer.

*Gippsland RFA*

The Gippsland RFA area has seen an overall decline in harvesting area, with the exception of increases due to salvage logging in the period 2006–09. This reflects the review of VicForests’ Resource Outlook, following the large bushfires of the 2000s.

Table 64: Net area harvested by regime, Gippsland RFA, 2004–05 to 2016–17 (area ha)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Season | Clearfelling | Salvage | Selection | Seed Tree | Thinning | Other/ unknown | Total |
| 2004–05 | 590 | 0 | 0 | 245 | 9 | 4 | 848 |
| 2005–06 | 392 | 0 | 0 | 451 | 38 | 17 | 898 |
| 2006–07 | 513 | 258 | 0 | 268 | 45 | 33 | 1,116 |
| 2007–08 | 342 | 959 | 0 | 214 | 244 | 14 | 1,774 |
| 2008–09 | 240 | 577 | 13 | 333 | 151 | 5 | 1,318 |
| 2009–10 | 14 | 17 | 27 | 80 | 0 | 0 | 138 |
| 2010–11 | 299 | 39 | 0 | 324 | 0 | 0 | 662 |
| 2011–12 | 344 | 0 | 0 | 215 | 58 | 0 | 617 |
| 2012–13 | 194 | 0 | 0 | 204 | 76 | 0 | 473 |
| 2013–14 | 209 | 0 | 0 | 141 | 121 | 0 | 471 |
| 2014–15 | 232 | 0 | 0 | 201 | 0 | 0 | 433 |
| 2015–16 | 268 | 0 | 0 | 198 | 20 | 3 | 490 |
| 2016–17 | 339 | 0 | 0 | 182 | 159 | 0 | 680 |
| **Total** | 3,974 | 1,850 | 40 | 3,054 | 922 | 76 | 9,917 |

Data source: DELWP corporate library Lastlog100 layer.

*North East RFA*

The North East RFA has also shown a general decline over the reporting period, again due to a decline in areas suitable for timber production following large fires in the 2003, 2007 and 2009 seasons and a reduction in demand from the closure of several sawmills.

Table 65: Net area harvested by regime, North East RFA, 2004–05 to 2016–17 (area ha)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Season | Clearfelling | Salvage | Selection | Thinning | Seed Tree | Other/ unknown | Total |
| 2004–05 | 515 | 0 | 0 | 0 | 0 | 3 | 518 |
| 2005–06 | 469 | 0 | 36 | 0 | 33 | 2 | 540 |
| 2006–07 | 220 | 0 | 177 | 0 | 0 | 0 | 397 |
| 2007–08 | 90 | 201 | 117 | 0 | 78 | 0 | 486 |
| 2008–09 | 74 | 12 | 24 | 0 | 16 | 2 | 128 |
| 2009–10 | 38 | 0 | 7 | 0 | 0 | 2 | 47 |
| 2010–11 | 20 | 0 | 0 | 44 | 0 | 0 | 64 |
| 2011–12 | 35 | 0 | 0 | 0 | 0 | 0 | 35 |
| 2012–13 | 72 | 0 | 0 | 0 | 27 | 0 | 99 |
| 2013–14 | 116 | 0 | 0 | 0 | 52 | 0 | 168 |
| 2014–15 | 65 | 0 | 0 | 0 | 0 | 0 | 65 |
| 2015–16 | 78 | 0 | 33 | 0 | 3 | 0 | 114 |
| 2016–17 | 58 | 0 | 66 | 0 | 13 | 0 | 136 |
| Total | 1,851 | 213 | 459 | 44 | 221 | 9 | 2,797 |

Data source: DELWP corporate library Lastlog100 layer.

*West RFA*

The West RFA has low levels of timber production harvested in low-intensity selection and thinning regime coupes. It includes silvicultural treatments to improve the health of the forest as well as providing a source of high-value durable timbers in addition to fencing, firewood and other residual forest products. The anomalous increase in area in 2010–11 is due to a change in recording procedures that saw a backlog of previously unrecorded data recorded in that year. In this way, the anomaly does not reflect a significant increase in harvesting area. Clearfelling in the 2005–08 seasons represents production in the Otway Ranges, prior to cessation of logging and declaration of the Great Otways National Park and Otways Forest Parks. No salvage harvesting has carried out in the West RFA over this time.

Table 66: Net area harvested by regime, West RFA, 2005–06 to 2016–17

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Season | Clearfelling | Selection | Thinning | Seed Tree | Other/  unknown | Total |
| 2005–06 | 152 | 5 | 347 | 0 | 1 | 504 |
| 2006–07 | 140 | 100 | 127 | 16 | 0 | 383 |
| 2007–08 | 247 | 13 | 215 | 16 | 0 | 492 |
| 2008–09 | 0 | 173 | 123 | 0 | 0 | 296 |
| 2009–10 | 0 | 62 | 79 | 0 | 0 | 141 |
| 2010–11a | 0 | 658 | 3,938 | 0 | 0 | 4,596 |
| 2011–12 | 0 | 0 | 27 | 0 | 105 | 132 |
| 2012–13 | 0 | 111 | 123 | 0 | 0 | 234 |
| 2013–14 | 9 | 0 | 80 | 0 | 0 | 88 |
| 2014–15 | 7 | 71 | 55 | 0 | 4 | 136 |
| 2015–16 | 6 | 37 | 476 | 0 | 123 | 641 |
| 2016–17 | 5 | 158 | 292 | 0 | 6 | 461 |
| Total | 565 | 1,388 | 5,881 | 32 | 239 | 8,105 |

a High values due to a change in recording procedures.

Data source: DELWP corporate library Lastlog100 layer.

**Indicator 2.1b: Age class and growing stock of plantations**

This indicator collates the area and growing stock of native and exotic species plantations to assess the volume of timber that Australia’s plantation forests can supply now and into the future. It also looks back at what occurred in the past. Age class information was not available at the time of reporting.

Data derived from initial RFAs in the CRA datasheets, specific to plantations, was generally unavailable, with only the West RFA classified by plantation type (Table 67). Plantation data for the Central Highlands and the North East RFA regions was sourced from the EVC representation. No further details were provided on the lack of plantation data in the CRAs; however, the absence of data leads to the assumption that the data did not exist or was not available at the time the CRAs were published.

Table 67: Plantation area for softwood and hardwoods across RFA regions as reported in the CRA documents (1996–99)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | RFA | | | | |  |
| East Gippsland | Gippsland | Central Highlands | North East | West | Total |
| Plantation Area (ha) | | NA | 85,700 | 10,320 | 65,400 | 64,352 | 225,772 |
| Plantation Type | Softwood | NA | NA | NA | 59,310 | 54,888 | 114,198 |
| Hardwood | NA | NA | NA | NA | 14 | 14 |
| Undefined | NA | NA | NA | NA | 9,450 | 9,450 |

Data source: Information derived from the CRAs accessed via the ABARES website.

*Statewide overview*

Current data on Australia’s commercial plantation estate is collated in the National Plantation Inventory (NPI) and reported in the ABARES *Australian plantation statistics* publication series as well as the ASOFR series. The *Australian plantation statistics* series comprises a five-yearly comprehensive update based on spatial data and an annual update based on tabular data. The reports in the series, including the latest five-yearly update *Australian plantations statistics 2016*[[1]](#footnote-1)and *Australian plantations statistics update 2019*[[2]](#footnote-2) support strategic forest industry planning and decision-making by presenting information on total plantation area, new planting and plantation ownership.

Information derived from the NPI showed in 2015 there was 421,000 hectares of plantations in the five Victorian RFA regions, representing the largest area of commercial hardwood and softwood plantations in Australia’s states and territories. This comprises 222,000 hectares of softwood plantation, 199,000 hectares of hardwood plantation and 1,000 hectares of unknown or mixed species plantation.

Figure 33 outlines the trends over the past 18 years related to Victoria’s plantation estate. The area of land identified as commercial softwood plantation remains fairly stable at around 220,000 hectares from 1999 to 2017. This contrasts with commercial hardwood plantation which saw a significant increase due to managed investment schemes (MIS) in the early 2000s. Over this period, hardwood (predominantly *Eucalyptus globulus*) plantations doubled in the 10 years from the 1999–2000 financial year, from 101,500 to 203,000 hectares. Following the demise of the MIS in 2010–11, this trend began to ease and by 2014–15 the estate began to retract, most prominently in areas where marginal plantation projects established through the MIS were not replanted. This equated to a net retraction of approximately 11,000 hectares compared to the maximum, with declines expected to continue in some MIS regions.

Figure 33: Plantation areas in Victoria, 1999–2000 to 2016–17

Source: ABARES (2007); ABARES (2018a).

Over the same time that Victoria’s plantation area plateaued, the annual establishment of new plantations reduced sharply from a peak of approximately 38,000 hectares in 1999–2000, while limited new plantation area has been established since the 2012–13 financial year.

In response, the Victorian Budget 2017–18 included $110 million to be invested in growing Victoria’s plantation supply through the establishment of plantations in the Latrobe Valley. As a first step towards delivering this initiative, planting of native blue gum seedlings was undertaken in August 2019 at three Crown land sites near Maryvale in the Latrobe Valley. Work is under way to identify further appropriate sites for new plantations, and planting at additional sites will continue in 2020. These plantings are just a first step, and the government is developing a broader Plantations Investment Strategy to provide a long-term approach for its work with industry to leverage plantation investment and establishment.

*Area of plantations in Victorian RFA regions*

Data from 2015 shows the area of plantations across the Victorian RFA regions. West Victoria has the largest plantation extent, with 257,000 hectares. Of the remaining plantation extent, 89,000 hectares is in Gippsland; 56,000 hectares, the North East; 12,000 hectares, the Central Highlands; and 6 thousand hectares, East Gippsland. Information from previous years in the NPI showed a total of 300,000 hectares of plantations were in the Victorian RFA regions in 2001, 380,000 hectares in 2005 and 428,000 hectares in 2011 (Table 68).

Also of note, the proportion of hardwood to softwood has significantly increased, most markedly since the MIS stimulated investment in blue gum plantations. In 2015, around 47 per cent of Victoria’s plantations were hardwood. Almost all plantations (over 99 per cent– both hardwood and softwood – are within RFA regions, with the greatest area in the West RFA region (61 per cent per cent) followed by Gippsland (21 per cent per cent) and the North East (13 per cent per cent). Plantation types in the West are 38 per cent softwood, whereas Gippsland plantations are around two-thirds softwood, and North East plantations are almost all softwood.

Table 68: Area of plantations in Victoria, by RFA region (2001, 2005, 2011, 2015)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RFA region | Plantation type | | |  |
| Hardwood  (‘000 ha) | Softwood  (‘000 ha) | Unknown  or mixed  (‘000 ha) | Total plantation  (‘000 ha) |
| 2001 | | | | |
| Central Highlands | 0 | 10 | 0 | 10 |
| East Gippsland | 1 | 3 | 0 | 4 |
| Gippsland | 26 | 53 | 0 | 80 |
| North East | 0 | 49 | 0 | 49 |
| West Victoria | 71 | 85 | 1 | 157 |
| **Total 2001** | **99** | **199** | **2** | **300** |
| 2005 | | | | |
| Central Highlands | 1 | 11 | 0 | 13 |
| East Gippsland | 0 | 2 | 0 | 3 |
| Gippsland | 32 | 56 | 1 | 90 |
| North East | 3 | 53 | 1 | 57 |
| West Victoria | 126 | 91 | 1 | 218 |
| **Total 2005** | **163** | **213** | **4** | **380** |
| 2011 | | | | |
| Central Highlands | 3 | 9 | 0 | 12 |
| East Gippsland | 3 | 2 | 0 | 6 |
| Gippsland | 36 | 60 | 1 | 96 |
| North East | 3 | 54 | 0 | 58 |
| West Victoria | 160 | 95 | 1 | 256 |
| **Total 2011** | **205** | **221** | **2** | **428** |
| 2015 | | | | |
| Central Highlands | 4 | 9 | 0 | 12 |
| East Gippsland | 4 | 2 | 0 | 6 |
| Gippsland | 29 | 59 | 1 | 89 |
| North East | 3 | 53 | 0 | 56 |
| West Victoria | 159 | 99 | 0 | 257 |
| **Total 2015** | **199** | **222** | **1** | **421** |

Note: Area figures reported may differ slightly from those reported in ASOFR 2018 due to the conversion of the vector format used in the NPI to the raster format used in ASOFR 2018. Totals may not tally due to rounding.

Source: NPI Dataset, ABARES 2016.

**Indicator 2.1c: Annual removal of wood products compared to the volume determined to be sustainable for native forests and future yields for plantations**

This indicator measures the harvest levels of wood products in relation to sustainable and predicted yields. These yields are outlined for both native and plantation timber.

*Native timber*

Timber harvesting in State forest is regulated under a management framework, which at its highest level is informed by the *Sustainable Forests (Timber) Act 2004*. The Act prescribes the process whereby timber resources on Crown land are allocated to VicForests via an Allocation Order. VicForests is required to comply with any conditions in the Allocation Order and Timber Release Plans, as well as complying with the *Code of Practice for Timber Production 2014*, which limits harvesting operations to a defined sustainable harvest level. Figure 34 illustrates the regulatory framework.

On 7 November 2019, the Victorian Government announced a Victoria’s forest industry will transition fully from native timber to plantation feedstock by 1 July 2030. The announcement represented the largest area of native forest protected from timber harvesting in more than 20 years with the immediate protection of all remaining old growth forest and more than 96,000 hectares of State forest inhabited by Greater Gliders, Leadbeater’s Possum and other threatened species.

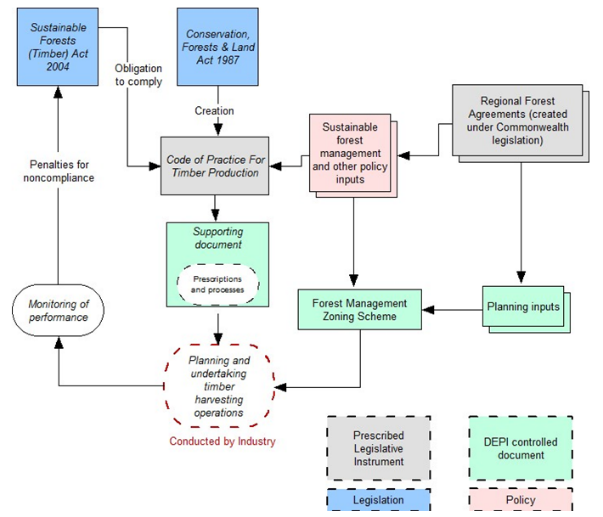


Figure 34: Framework for sustainable forest management and sustainable timber production (Source: DEPI now administered as DELWP).

*Sustainable yield, wood supply modelling and harvest limits*

Determining the sustainable yield in native forests requires complex modelling. It is underpinned by diverse data inputs (such as species mix, topography, aspect, etc.), sub-models, constraints, and adjustment factors (such as changes in the area and resource available through bushfires, increases in SPZs or SMZs or land tenure). More subtle influences, such as climate and other disturbances to the forest system, can also affect the sustainable yield that can be applied to native forests at local, regional or statewide scale.

*Australia’s State of the Forests Report 2018*defines sustainable yield as the:

annual yield of high-quality sawlogs from multiple-use public native forests … that can be removed each year while ensuring maintenance of the functioning of the native forest system as a whole and the supply of wood products in perpetuity.

(Montréal Process Implementation Group for Australia and NFI Steering Committee 2018, p. 17)

Put simply, it is a measure of how much wood can be harvested from a forest over a long period of time, while maintaining wood supply levels and meeting sustainable use objectives for the forest (NSW Department of Primary Industries 2018). It is not static and requires regular updating through reconciliation with actual timber yields to ensure accuracy, currency and to account for changes in the level of timber resource available for harvesting.

Forests Act 1958 *and references to sustainable yield in Regional Forest Agreements*

From the commencement of the RFAs until 2004, the *Forests Act 1958* (Vic), required a review of the sustainable yield every five years, or other such time within that five years as was considered appropriate, at a Forest Management Area (FMA) level. In the event of there being changes (or not) to the sustainable yield, the Governor in Council would be advised, and a revised sustainable yield level set.

Sections 52A–C of the Actspecified that, over the longer term, for each timber supply period the level of timber harvested from an FMA should not exceed the sustainable yield specific to that area, with any changes to be applied gradually and in line with the *Code of Practice for Timber Production 2014*.

All RFAs (via clause 45(e) of the Central Highlands RFA, clause 46(c) of the Gippsland and West RFAs, clause 45(c) of the North East RFA and clause 34 of the East Gippsland RFA), committed Victoria to ‘implement the Integrated Forest Planning System and Statewide Forest Resource Inventory (SFRI) in time for the next review of sustainable yield due in 2001’. Through clause 71 of the Central Highlands RFA, the Parties acknowledged that the Agreement was expected to provide as a minimum the current legislated sustainable yield of D+ sawlogs (415,000 m3 per annum) from the Dandenong, Central and Central Gippsland Forest Management Areas (FMAs) for the next twenty years, but recognised that sustainable yield levels in Victoria are subject to periodic review.

In the CRA documents, the total legislated sustainable yield determined for the whole of the state (where RFAs were in place, but excluding East Gippsland where data was not available) was 801,314 cubic metres/year, of which about half was from the Central Highlands. It should be noted that legislated sustainable yield volumes were recalculated when the initial RFAs were signed and have been regularly remodelled to account for fire and other disturbances to wood supply.

Table 69: Legislated Sustainable yield of D+ logs across RFA regions (CRA)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| RFA | Central Highlands | East Gippsland | Gippsland | North East | West | Total |
| Sustainable Yields of Sawlogs (D+ Logs m3/year) | 415,000 | NO DATA | 319,000 | 66,500 | 814 | 801,314 |

Note: D+ Log grade information: http://www.vicforests.com.au/static/uploads/files/vicforests-instructions-code-of-procedure-log-buyer-log-specifications-v2-5-wfrf.pdf

Data source: Information derived from the CRAs accessed via the ABARES website.

It should be noted, that all references to sustainable yield, or the requirements for it to be calculated within the Act, specifically sections 52A–E, were repealed in 2004. The specific requirement for a sustainable yield as provided for under the *Forests Act 1958* was replaced by sustainability requirements under the *Sustainable Forests (Timber) Act 2004*.

*The* Sustainable Forests (Timber) Act 2004

The *Sustainable Forests (Timber) Act 2004* (SFT Act) was introduced as part of a broad program of reforms for Victoria’s forest and timber industry, including the creation of VicForests in 2003. VicForests is a state-owned enterprise responsible for the sustainable harvest, regeneration and commercial sale of timber from Victoria’s public forests on behalf of the Victorian Government.

The SFT Act provides a legislative framework for sustainable forest management and sustainable timber harvesting in State forests. Among other things, it permits the allocation of timber to VicForests from areas of State forest available for timber harvesting. Part 2 section 5 of the SFT Act outlines the principles for ecologically sustainable forest development, underpinned by section 11, which enables the Minister to establish a sustainability charter, and section 12, which specifies VicForests’ is required to respond to such a charter.

Since 2004, VicForests has operated under the SFT Act (and other relevant legal requirements) and has worked with government agencies and other stakeholders to achieve its corporate objectives within this framework.

*Eastern Victoria*

*The Allocation Order*

The allocation and vesting of timber resources to VicForests, for the purpose of harvesting and selling of the resources, is authorised through an Allocation Order (AO) issued by the Minister for Agriculture under Part 3, s. 13 of the SFT Act. The Allocation Order 2013 was last amended in April 2019 and applies only to State forest east of the Hume Highway where timber harvesting is a permitted forest use in all areas identified as GMZ or SMZ according to the Forest Management Zoning Scheme.

*Harvest area limits*

The AO specifies the area limits that VicForests may harvest in a defined time period. The first AO was released in August 2004 with subsequent amendments made in 2007 and 2010 to allow for salvage harvesting of major fire affected areas.

The first AO specified the maximum area able to be harvested for each forest type for each five-year period over the following 15 years. The maximum harvest areas listed in the order were calculated based on meeting the timber supply schedule at that time and based on nett harvest area, that is, the actual footprint of the harvest area.

From May 2010, changes were made to the method for defining harvest area limits. The AO outlines the five-year harvest area limit. This is calculated as the gross total area divided by the notional rotation age (83 years for ash and 112.6 years for mixed species) multiplied by five to convert to a five-year forest area limit. In this instance, gross harvest area is the total allocated area of the coupe and includes areas that can, and cannot or will not, be harvested – that is, areas protected under the *Code of Practice for Timber Production 2014* and those where the timber available is not commercially suitable or commercially viable.

Table 70 and Table 71 show the annual total areas harvested in eastern Victoria compared with the five-yearly harvest limits defined by the AOs applicable for the corresponding periods. It is important to note that the actual area harvested has always been less than the five-year harvest area limits would allow.

Table 70: Harvest vs maximum Allocation Order area, 2004–05 to 2008–09

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Actual harvested area (nett ha) | | | | | | AO maximum area for period (ha) | per cent of Allocation |
| Forest type | 2004–05 | 2005–06 | 2006–07 | 2007–08 | 2008–09 | Total |
| Ash | 1,271 | 1,078 | 850 | 1,022 | 933 | 5,154 | 7,810 | 66 |
| Mixed species | 2,520 | 2,701 | 2,325 | 2,366 | 2,424 | 12,336 | 21,660 | 57 |

Note: Additional 6, 110 ha (of an approved allocation order of 56,540 ha) harvested to salvage timber from on fire affected stands.

Source: DSE (2010).

Table 71: Harvest vs maximum Allocation Order area, 2009–10 to 2012–13

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Actual harvested area (gross ha) | | | | | AO Maximum harvest area for period (hectares) (5 yrs) | per cent of Allocation |
| Forest type | 2009–10 | 2010–11 | 2011–12 | 2012–13 | Total  (4 yrs) |
| Ash | 3,712 | 2,776 | 3,238 | 2,594 | 12,629 | 17,400 | 71 |
| Mixed species | 5,880 | 5,032 | 3,525 | 2,724 | 9,332 | 71,800 | 24 |

Notes: The coupe area listed above includes forest stands impacted by fire.

A gross area harvest figure retrospectively applied for 2009-10.

Four years only due to new AO being issued on 1 October 2013.

Source: Department of Economic Development, Jobs, Transport and Resources (DEDJTR) (2017). Internal

Table 72: Harvest vs maximum Allocation Order area, 2013–14 to 2016–17

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Actual harvested area (gross hectares) | | | | | | AO Maximum harvest area for period (ha) | per cent of Allocation |
| Forest type | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 | Total |
| Ash | 2,090 | 2,273 | 2,583 | 2,386 | 1,988 | 11,319 | 14,200 | 80 |
| Mixed species | 2,034 | 2,820 | 2,847 | 3,003 | 3,638 | 14,344 | 70,000 | 20 |

Source: VicForests (2018a).

The current AO (revised April 2019) specifies a gross five-year harvest area limit of 14,200 hectares for ash forest type, and 70,000 hectares for mixed species forest type (Table 72).

*Timber resource planning*

A Timber Release Plan (TRP) is VicForests’ strategic plan that identifies the likely location and extent of timber harvest operations over the next three years.

Prior to October 2013, the process for allocating and vesting the timber resource in VicForests involved two-steps; requiring both an AO and subsequent approval of a TRP by the then Minister for Agriculture and Primary Industries. DPI reviewed the SFT Act in 2012, and it was amended in 2013 to enable a one-step allocation process, whereby once the Minister for Agriculture has issued and gazetted the AO vesting the timber resource to VicForests, VicForests develops and publishes a TRP. The TRP no longer forms part of the approval, issue or gazettal process.

Using the location and extent of the timber resources and the harvest area limits set by the AO, VicForests is then develops wood supply models and Resource Outlooks.

*VicForests’ strategic wood supply models*

To meet the requirements of the SFT Act, in addition to supporting its own operational, commercial and forest management activities, VicForests has developed, and now maintains, a strategic wood supply model. This model is critical to providing VicForests, industry and government with Resource Outlooks.



Figure 35: Strategic wood supply model and Resource Outlook process

Source: VicForests (<http://www.vicforests.com.au/planning-1/resource-outlook-2017>).

The strategic wood supply model is used to evaluate timber supply over a 100-year period and is updated regularly. The results inform future sales contracts and guide harvesting in the landscape.[[3]](#footnote-3)

VicForests’ strategic wood supply model relies upon a range of systems and processes to develop forecasts of the volumes of timber able to be sustainably supplied from the available forest in the medium and long term.

In simple terms, the process considers how much forest is available, how much timber is currently contained in these forests, how much it is predicted to grow over time and how much timber is likely to be produced by the time of expected harvest.

The strategic wood supply model is updated regularly to account for changes in the resource base (as was formerly the case when calculating sustainable yield) and includes market conditions in the short to medium term. It includes:

* changes to the forest description (what the forest looks like)
* harvesting, bushfires and other events that can alter the age and structure of the forest
* data about the forest structure and mix of tree species (derived from remote sensing)
* information about the amount of timber that may be produced by monitoring current timber harvesting activity
* changes to the available area due to regulatory and policy decisions.

Various scenarios are tested to determine likely impacts on the quantity of timber that can be harvested, future timber supply and long-term sustainability. Risk factors that have the potential to impact on timber resource availability are also included and built into the model.

The overall trajectory of harvest volumes in more recent times has been decreasing, with harvest volumes in 2018 approximately 800, 000 cubic metres less than those in 2005. A significant reduction in harvest volumes is apparent after the 2009 Black Saturday bushfires. However, in 2010 there was a spike in volume from salvage harvesting in the Central Highlands and East Gippsland. Since 2013, overall volumes have remained largely stable as a requirement to honour existing supply commitments. The volume data is supplied in full in appendix 8.

*VicForests’ Resource Outlook*

VicForests’ Resource Outlook is a forecast that indicates how much sawlog timber is able to be commercially supplied from the State forests in eastern Victoria in the medium term on a sustainable basis. It is used by VicForests to guide the volume of timber that is made available to the market based on species group – ash and mixed species.

VicForests updates the Resource Outlook before releasing timber in a significant timber sales event. Similarly, the Resource Outlook is normally updated after significant events that could change the resource base (such as bushfires) and which may have resulted in changes to the assumptions used to that underpin the strategic model. VicForests’ most recent Resource Outlook was published in 2017.

*Independent reviews of VicForests’ sustainable wood supply model and Resource Outlook process*

Since 2010, when the Victorian Government delegated responsibility for determining harvest volumes to VicForests, the outlined process has been reviewed for its reliability, durability and accountability by both the Victorian Auditor-General’s Office (December 2013) and the Victorian Environmental Assessment Council (VEAC) (April 2017). On each occasion, the methodology, processes, assumptions, interpretation and reporting has been analysed in significant detail to determine both general compliance with the SFT Act and associated legislation, codes and prescriptions, but also to identify and provide advice on areas for improvement.

In its assessment report, VEAC identified that the modelling approach used by VicForests is widely used for modelling estimated sustainable fibre and wood supply levels and applies industry-standard modelling tools, makes appropriate assumptions and produces reasonable estimates resulting in a wood supply modelling process that is rigorous and repeatable. VEAC’s views were consistent with the Auditor-General’s review of Victoria’s strategic wood supply modelling process that found that the modelling approach is sound, the assumptions that underpin the approach are appropriate, and the sustainable harvest levels are reasonable.

*Harvest volumes*

The volume of D+ sawlogs harvested from eastern Victoria RFA regions has decreased from 532, 300 cubic metres in 2004–05 to 230, 800 cubic metres in 2018–19, as outlined in Figure 36. The calculated sustainable yield over the corresponding period has also declined from 517, 400 cubic metres in 2004–05 to 253, 000 cubic metres. This apparent decline is in part because the 2008 JoSHL forecast included all timber that could be environmentally sustainably harvested, whereas subsequent sustainable harvest level determinations were only for the merchantable portion of that timber. Declines in the resource outlook are also due to changes in resource availability as harvestable areas have been reduced through the impacts of fire and zoning changes for the protection of Baw Baw Frog and Leadbeater’s Possum (including the ongoing reservation of Leadbeater’s Possum colonies and including an allowance for future detections).

When compared across the total period (harvest years 2004–05 to 2018–19), cumulative harvest volumes have not exceeded the cumulative sustainable yield for the period. Only two seasons, 2004–05 and 2017–18, recorded harvest levels that exceeded the sustainable yield applicable to that year, but these were balanced by lower harvest levels in other years. These overcuts, each equivalent to less than 5 per cent of the corresponding sustainable yield, enabled VicForests to balance contracted commitments over the life of sales agreements.

Figure 36: Harvest volume and sustainable yield 2005–19

Source: VicForests Resource Outlooks from 2011, 2012, 2013, 2014, 2016–17, pre-2011: Joint sustainable Harvest Levels (JoSHL). (NB 2008 JoSHL figures were calculated on a different basis from subsequent sustainable yield levels.)

*Western Victoria*

*Context*

The AO does not cover the western areas of Victoria. The allocation of timber resources is instead subject to a different method of determination, allocation and approval process to that undertaken in eastern Victoria. In the west, the Timber Utilisation Plan (as outlined below on page 202) applies to State forest covered by the West Victoria RFA but also areas in the north-west where there is no RFA in place (Figure 37).

The products derived from harvested areas in western Victoria are often specialised in nature and cannot be readily sourced elsewhere. The operations are small in scale and are driven by local demand.

The West Victoria RFA was signed in March 2000, encompassing the Portland, Otways and Midlands FMAs, the southern half of the Horsham FMA and a small section of the Central FMA. Since then, harvesting has ceased in the Portland (2003) and Otways (2008) FMAs, is limited in the Horsham FMA and is restricted only to a small area within the Midlands FMA.

As outlined previously, all references to sustainable yield, or the requirements for it to be calculated, within the *Forests Act 1958* were repealed in 2004 and replaced by the *Sustainable Forests (Timber) Act 2004*.

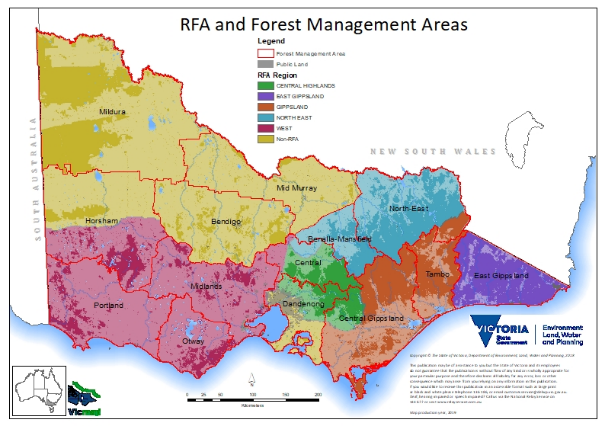


Figure 37: Forest Management Areas and RFA areas

Source: DELWP Corporate spatial data library.

*Sustainable yield estimates*

Section 72 of the West Victoria RFA (March 2000) outlined that 77,900 cubic metres of D+ sawlogs could be expected to be provided annually made up of 40,000 cubic metres (Midlands), 27,000 cubic metres (Otways), 10,000 cubic metres (Portland) and 900 cubic metres (Horsham).

In 2002, revised D+ sawlog estimated sustainable resource for all western Victoria (including those areas not covered by the RFA) were determined as outlined in Table 73 below. Timber resource information by FMA – including forest area available for timber production, eucalypt species (Red Gum/Box-Ironbark/Sugar Gum/mixed species), growth stage and standing volume estimates – was used as the basis for determining the estimated sustainable resource.

Table 73: 2002 estimate of sawlog sustainable yield – western Victoria

|  |  |  |
| --- | --- | --- |
| FMAa | State forest area | Estimated D+ sawlog sustainable resource (m3/year) |
| Otways |  | 27,100 |
| Portland |  | 7,600 |
| Horsham |  | 900 |
| Midlands | Wombat | 7,000 |
|  | Mt Cole | 800 |
|  | Other | 800 |
| TOTAL |  | 44,200 |

a Mid-Murray FMA is not covered by the western Victoria RFA.

Source: Review of Commercial Forestry Management in Western Victoria, DEPI, August 2013.

As a result of the cessation of forest harvesting in the Otways and Portland FMAs and in advance of delegating responsibility for forest utilisation in western Victoria to VicForests, a revised estimate of sustainable harvest levels was made in 2013, as outlined in Table 74. This was based on a desktop assessment that accounted for updated data availability and changes in area available for harvesting from the identification and allocation of new environmental conservation areas and amendments to forest management plans.

Table 74: 2013 estimate of sawlog sustainable yield – western Victoria

|  |  |  |
| --- | --- | --- |
| FMAa | State forest area | Estimated D+ sawlog sustainable resource (m3/year) |
| Otways |  | 0 |
| Portlandb |  | 6,600 |
| Horsham |  | 400 |
| Midlandsc | Wombat | 0 |
|  | Mt Cole | 1,500 |
|  | Other | 1,000 |
| TOTAL |  | 9,500 |

Notes:

a Mid-Murray FMA is not covered by the western Victoria RFA  
b Minimal harvesting only  
c Sawlog no longer harvested

Source: Review of Commercial Forestry Management in Western Victoria, DEPI, August 2013

*Wood and Timber Utilisation Plans*

Since November 2014, VicForests has been responsible for Community Forestry Operations, specifically managing the harvesting, regeneration and sale of wood from public land in western Victoria. Community Forestry Operations provide the opportunity for local products to be sourced and utilised locally under forest produce licences issued by VicForests under delegation from the Minister for Agriculture and in accordance with the *Forests Act 1958* (Vic).

Prior to that time, timber harvesting was the responsibility of DEPI (now DELWP), whereby coupes identified and planned for harvesting were placed on a three-year Wood Utilisation Plan (WUP) based on the sustainable yield outlined in the RFA and the licence commitments of processors in the region.

To make a clear distinction between areas approved under the former arrangements and those approved by VicForests, the WUP has been replaced by the Timber Utilisation Plan (TUP). The TUP, like the WUP, lists VicForests’ planned harvesting and regeneration activities for a period of up to five years. It is updated annually to maintain VicForests’ ability to meet supply commitments in the short and medium term.

*Harvest volumes*

Harvesting operations under TUP are generally applied for small-scale forestry operations and service the community need. Table 75 provides information on the harvest volumes in the West RFA.

Table 75: Harvest volumes in the West RFA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Fencing (each) | Firewood (m3) | Sawlog (m3) | Residuals (m3) | Residual log (lineal m) |
| 2008 | 2,164 | 1,782 | 496 | 96 | 442 |
| 2009 | 1,718 | 3,109 | 308 | 109 | 329 |
| 2010 | 392 | 3,064 | 585 |  | 226 |
| 2011 | 2,923 | 3,540 | 838 | 290 | 506 |
| 2012 | 1,084 | 4,846 | 382 | 147 | 740 |
| 2013 | 1,176 | 6,379 | 922 | 100 | 893 |
| 2014 | 259 | 8,067 | 1,417 | 81 | 1,770 |
| 2015 | 1,257 | 7,307 | 1,040 | 34 | 1,641 |
| 2016 | 1,135 | 8,632 | 1,285 | 85 | 848 |
| 2017 | 704 | 6,282 | 1,247 | 839 | 1,009 |
| 2018 | 274 | 7,797 | 1,430 | 1,155 | 658 |

Note: Data from Mildura, Bendigo and Mid-Murray FMA not included as they are outside the WEST RFA area.

Source: VicForests (2019).

*Plantation timber*

In 2017–18, approximately 7.8 million cubic metres of plantation timber was harvested in Victoria. Approximately 46 per cent of this was hardwood and 54 per cent, softwood (ABARES 2019). This generally aligns with the proportion of plantations that are hardwood (47 per cent per cent) and softwood (53 per cent). Almost all hardwood logs are used for pulp (over 99 per cent per cent) and 51 per cent of softwood harvest volume is processed as sawlog. As a proportion of Victoria’s total plantation harvest, 45 per cent is hardwood pulplogs, 28 per cent is softwood sawlogs and 26 per cent is softwood pulplogs (Table 76).

The volume of plantation logs harvested from each RFA region is unknown as these figures are calculated through ABARES plantation statistics, which do not disaggregate into RFA regions. In the absence of volume estimate, we may consider the proportional area based on volume, where around 60 per cent comes from the West RFA region, around 20 per cent from Gippsland, and around 15 per cent from the North East. However, without information on the maturity of plantations and expected harvest date it is difficult to accurately attribute an annual harvest volume to each region.

Table 76: Plantation timber harvest volume, 2017–18

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Plantation type | Grade | Harvest volume (m3) | per cent of total plantation type harvest volume | per cent of total harvest volume |
| Hardwood | Sawlog | 32,982 | 1 | <1 |
|  | Pulplog | 3,544,230 | 99 | 45 |
|  | Other | 0 | 0 | 0 |
| Softwood | Sawlog | 2,168,339 | 51 | 28 |
|  | Pulplog | 2,014,549 | 47 | 26 |
|  | Other | 79,028 | 2 | 1 |
| Total |  | 7,839,128 |  |  |

Source: ABARES 2018a Forest and wood product statistics

**Indicator 2.1d: Annual removal of non-wood forest products compared to the level determined to be sustainable**

This indicator assesses the sustainability of harvesting of non-wood forest products. This includes herbaceous plants and tree ferns, tree components (such as seed, leaves or bark), mineral extraction and honey.

*Plant material (non-timber)*

The handling of protected flora[[4]](#footnote-4) is regulated by DELWP to ensure that any harvesting or loss is ecologically sustainable. Under the FFG Act, a Protected Flora Licence or Permit from one of the regional offices of DELWP is required in order to collect protected native plants or undertake activities on public landwhich might kill, injure or disturb protected native plants.

In most cases, licence or permit applications are successful. However, DELWP may place conditions on the licence or permit, such as restricting the amount of protected flora that can be taken, the area from which it can be taken or the collection methods that can be used. In the case of works, DELWP may place conditions on a licence or permit which serve to avoid or minimise the loss of protected flora or to make good any disturbance caused.

*Other forest products*

For other forest produce, a Forest Produce Licence is required and DELWP is responsible for licensing relevant items. While the Minister for Energy, Environment and Climate Change and the Minister for Agriculture both have the delegation to issue Forest Produce Licences for forest produce (mentioned above) in the GMZ/SMZ, the collection of forest produce in SPZ areas is not permitted. DELWP, on behalf of the Minister for Energy, Environment and Climate Change, issues Forest Produce Licences for non-wood forest products in areas where such activities are permitted, generally in mixed-use forest outside SPZ.

A non-exhaustive list of licences granted for non-wood forest products is provided in Table 77; however, information on ceiling levels for licence provision is not recorded.

Table 77: Register of Forest Produce Licences issued by RFA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Forest Produce Type | Commercial or Minor | Application Date | Quantity | Units | Royalty ($/unit) | RFA |
| Grass Tree Fronds | Commercial | 2016 | 1,000 | Bunches | 2.1 | West |
| 2017 | 1,000 | 2.2 |
| 2018 | 1,000 | 2.24 |
| Seed Capsules - *E. nitens* | Commercial | 2016 | 200 | kg | 11.09 | Gippsland, Central Highlands |
| 2017 | 200 | 11.09 |
| 2018 |  | 11.56 |
| Seed Capsules - *E. bosistoana* | Commercial | 2016 | 100 | kg | 2.46 | East Gippsland |
| 2018 | 50 | 2.46 |
| Firewood Salvage - VicRoads | Commercial | 2017 | Salvage | tonnes | 11.8 | East Gippsland |
| 2019 | 300 | 14.3 |
| Seed Capsules - *E. cypellocarpa* | Commercial | 2017 | 20 | kg | 11.09 | East Gippsland |
| Seed Extracted | Commercial | 2018 | 150 | kg | 40.05 | Central Highlands |
| Seed Capsules *- E. globoidea* | Commercial | 2018 | 50 | kg | 2.46 | East Gippsland |
| Leaf material - *E. radiata* | Minor | 2019 | 2 | kg | Waived | Central Highlands |

Source: Office of Deputy Secretary – Regional Services – Fire and Land State-wide Coordination (Contact: Judy L Alexander)

*Earth resources*

Earth Resources Regulation is Victoria’s regulator of exploration, mining, quarrying, petroleum, recreational prospecting and other earth resource activities. It operates within DJPR and undertakes the assessment and authorisation of earth resource projects in close collaboration with other regulators and agencies within the Victorian Government. Regulation protects local communities and the environment, thus facilitating the safe provision of business and job opportunities across the five RFA regions.

There are a range of tenement types that require licensing across Victoria (Table 78). The number of both exploration and mining licences have decreased since 2011–12, while prospecting and retention licensing has increased.

Table 78: Mineral tenement licences current as at 30 June 2018 for Victoria

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tenement type | 2007–08 | 2008–09 | 2009–10 | 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 |
| Exploration licences | 280 | 326 | 298 | 285 | 326 | 311 | 271 | 247 | 211 | 180 | 200 |
| Mining licences | 240 | 236 | 211 | 216 | 208 | 212 | 191 | 171 | 170 | 162 | 156 |
| Prospecting Licences | n/a | n/a | n/a | n/a | 1 | 13 | 31 | 41 | 51 | 54 | 59 |
| Retention Licences | n/a | n/a | n/a | n/a | n/a | 1 | 1 | 8 | 11 | 15 | 20 |
| Totals | 520 | 562 | 509 | 501 | 535 | 537 | 494 | 467 | 443 | 411 | 435 |
| per cent Change year on year |  |  |  |  | +2.9 | +0.4 | -8.0 | -5.5 | -6.0 | -6.4 | +5.8 |

Source:, DJPR 2018

Between 2011–12 and 2017–18, the total area of Victoria covered by mineral exploration licences has steadily decreased (Figure 38).



Figure 38: Total area of Victoria covered by mineral exploration licences

Source: DJPR 2018

The total mineral, extractive and petroleum revenue payable has increased substantially from $57.2 million in 2012–13 to $103.1 million in 2017–18 (Table 79) This has been due to the near doubling of royalties to be paid in the same time period, from $51.9 million to $99.1 million.

Table 79: Mineral, extractive and petroleum revenue payable ($A Millions), 2012–13 to 2017–18

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Fees and charges | Rent | Royalty | Mine stability levy | Total |
| 2012–13 | 1.0 | 3.0 | 51.9 | 1.3 | 57.2 |
| 2013–14 | 1.1 | 2.6 | 45.1 | 1.3 | 50.1 |
| 2015–16 | 0.7 | 2.0 | 47.7 | 1.4 | 51.8 |
| 2016–17 | 0.7 | 1.4 | 83.1 | 1.4 | 86.6 |
| 2017–18 | 0.8 | 1.7 | 99.1 | 1.5 | 103.1 |

Source: DJPR 2018

The royalty revenue component is further explored in Table 80, showing that the total mineral extractive and petroleum sector royalties payable have also nearly doubled over the same period. Of all the sectors, coal mining royalties were the highest and demonstrated the largest increase, from $36.6 million in 2012–13 to $84 million in 2017–18.

Table 80: Mineral, extractive and petroleum sector royalties payable in the financial year ($A Millions) for Victoria, 2012–13 to 2017–18

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Coal | Minerals | Extractive | Petroleum | Total |
| 2012–13 |  | 43.5 | 8.3 | 0.1 | 51.9 |
| 2013–14 |  | 40.6 | 4.4 | 0.1 | 45.1 |
| 2015–16 | 36.6 | 5.7 | 6.2 | 0.1 | 47.7 |
| 2016–17 | 66.9 | 6.1 | 5.9 | 4.2 | 83.1 |
| 2017–18 | 84 | 5.6 | 6.2 | 3.2 | 99.1 |

Source: DJPR 2018

**Indicator 2.1e: The area of native forest harvested and the proportion of that effectively regenerated, and the area of plantation harvested and the proportion of that effectively re-established**

This indicator reports on the extent of native forest harvested and the success of regeneration on harvested sites. The government’s forest management framework provides the basis under which these operations occur.

VicForests is responsible for ensuring native forest coupes are successfully regenerated post-harvest, as defined under the *Code of* Practice *for* Timber Production *2014*.

The *Management Standards and Procedures for timber harvesting operations in Victoria’s State forests 2014*, incorporated in the Code*,* lists the minimum regeneration standards required. The standards outline three regeneration features:

1. minimum 65 per cent of plots stocked (standard intensity)
2. no discrete unstocked areas greater than one hectare in even aged stands, or greater than 2 hectares in uneven aged stands
3. at least 10 acceptable seedlings/coppice of those eucalypt species present on the site prior to harvesting must be present on the regenerated site.

The Code also lists the survey techniques that must be followed by the harvest manager to confirm regeneration success. The surveys are to be undertaken 15 to 30 months after seedfall and/or sowing in even aged stands, and 15 to 36 months after seedfall in uneven aged stands.

Where stocking health or early growth is inadequate, remedial work must be conducted as soon as practicable and within five years of the previous regeneration attempt to obtain adequate regeneration. Further assessment must be undertaken following remedial treatment to ensure that it has been successfully regenerated. Figure 39 indicates that for most years’ regeneration is largely achieved but for a small proportion that requires a final regeneration survey. Those areas that still require a regeneration survey are carried over to the next year. This means that, as defined by legislation, 100 per cent of coupe area will be surveyed and regeneration will be achieved on those coupes as per the specifications outlined in the Code.

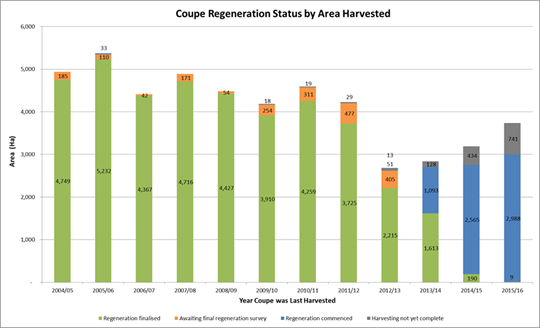


Figure 39: VicForests managed coupes – regeneration status of area harvested

Source: VicForests corporate data

*Re-establishment of the plantation estate*

Following from the expansion of the hardwood plantation estate after the MIS scheme, many areas have not been replanted and have returned to their previous land uses. Jenkin (2018) estimates that, nationally, over 100,000 hectares have not been replanted in the period between 2005–06 and 2015–16, generally in areas where plantations were established on marginal sites. The area of softwood plantation in Australia, however, expanded by 35,648 hectares over the same period, but this has been limited since 2015–16. The ABARES plantation statistics for Victoria (Table 68 and Figure 40) illustrates the decline in plantation establishment.



Figure 40: Additions to Victoria’s plantation estate, 1999–2000 to 2016–17, against the average area of all other states

Source: Australian Department of Agriculture and Water Resources ABARES (2018a).

**Indicator 6.1a: Value and volume of wood and wood products**

This indicator presents information on the value and volume of wood and wood products that are directly generated by the forest and wood products industries.

VicForests manages its resource to achieve maximum utilisation from harvest to deliver maximum economic return. In this way, its operations provide three types of timber: sawlog, pulplog and other wood (VEAC 2017, p. 20) where a single log may yield multiple products. Sawlog is high-quality timber from the lower to middle part of the tree trunk. Depending on its quality, sawlog can be used in products from pallets and roofing battens to furniture and flooring. Pulpwood can be from the branches and upper trunk, in addition to lower trunk sections that are not of sawlog quality. Pulpwood is primarily used to make paper and cardboard. A small amount of wood may be used for other purposes such as firewood, posts and poles.

Log and pulp prices have been relatively stable since 2007-08. The spike in “hardwood plantation saw and veneer logs” may be due to the limited size of this market, accounting for only 4 per cent of total harvested hardwood plantations logs (ABARES 2018b). The average increase in log price index between 2007-08 and 2016-17 was 20 per cent with the highest increase being for softwood pulplogs at 46 per cent.

Figure 41: Index of nominal prices paid per cubic metre at mill door

Note: Base year 1999–00 = 100. Excludes other log types such as posts, poles, fencing and firewood removals.

Sources: ABARES 2019

*Native timber*

In 2018, the Central Highlands accounted for approximately 75 per cent of all native forest harvested volume (Table 81). The volume of native logs harvested across four RFA regions (West RFA excluded) has decreased over time. Since 2005, total harvest volume has decreased by an average of 3 per cent per year, with the most significant decrease in East Gippsland (Figure 42). Harvest volumes for the West RFA have not been included as levels of commercial harvesting in that region have been relatively low and largely for community purposes since 2008.

Table 81: Native forest harvest volume and sales stumpage revenue, 2018

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RFA region | Harvest volumea  (m3) | Per cent of total harvest volume (per cent) | Sales stumpage revenuea  ($) | Per cent of total sales stumpage revenue  (per cent) |
| Central Highlands | 867,488 | 75 | 21,043,987 | 75 |
| East Gippsland | 141,163 | 12 | 3,037,723 | 11 |
| Gippsland | 112,700 | 10 | 3,084,502 | 11 |
| North East | 33,114 | 3 | 1,046,897 | 4 |
| Total | 1,154,465 | 100 | 28,213,109 | 100 |

a Gross timber harvest volume and sales stumpage revenue across all species and grades.

Source: VicForests corporate data

Figure 42: Native forest log timber harvest volumes (m3), by Victorian RFA region, 2005–18

Note: Data represents gross timber harvest volumes across all species and grades.

Spikes in volume caused by salvage operations after bushfires in 2006 and 2009.

Source: VicForests corporate data

In 2018, stumpage revenue for native timber sales was $28 million across four RFA regions (Central Highlands, East Gippsland, Gippsland and North East) (Table 81). Of this, $22.3 million is sales stumpage revenue from sawlog ($16 million from ash and $6.3 from mixed species) and $5.7 million from pulplog ($3.1 million from ash and $2.6 million from mixed species). The Central Highlands RFA region contributes around three-quarters of total stumpage revenue, followed by East Gippsland and Gippsland (both 11 per cent per cent). This broadly aligns with the average volume of timber harvested from each RFA region.[[5]](#footnote-5)

In 2018, almost 70 per cent of stumpage revenue was from ash, with the remainder from mixed species. The proportion of total stumpage revenue produced by ash is higher than the proportion of total harvest volume that is ash. This is because ash logs have a higher market value than those of mixed species. Over 55 per cent of stumpage revenue is contributed by ash in the Central Highlands and this is predominantly from sawlog grade timber.

Figure 43: Native forest timber sales stumpage revenue ($), by Victorian RFA region,   
2005–18

Note: Gross sales stumpage revenue across all species and grades.

Spikes in revenue caused by salvage operations after bushfires in 2006 and 2009.

Source: VicForests corporate data

*Plantation*

The volume of plantation logs harvested from each RFA region is unknown as these figures are calculated through ABARES plantation statistics, which do not disaggregate into RFA regions. The vast majority of plantations in Victoria are privately managed.; HVP Plantations is the major operator, with over 170 thousand hectares of softwood and hardwood plantation across the state, or approximately 40 per cent of the state’s total plantation area. Softwood operators OneFortyOne and Australian Bluegum Plantations have significant assets in the Green Triangle in far west Victoria and south eastern South Australia, while Midway is the primary hardwood grower and processer in the Colac–Otway region, with facilities in Portland and Geelong.

The volume of plantation timber harvested across Victoria has increased significantly over the past decade. Since 2007–08 total plantation harvest volume has grown by an average of 6 per cent per year. This has been driven predominantly by an increase in the volume of hardwood pulplog harvested (Figure 44).

Table 82: Plantation timber harvest volume, Victoria, 2017–18

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Plantation type | Grade | Harvest volume (m3) | per cent of total plantation type harvest volume | per cent of total harvest volume |
| Hardwood | Sawlog | 32,982 | 1 | <1 |
|  | Pulplog | 3,544,230 | 99 | 45 |
|  | Other | 0 | 0 | 0 |
| Softwood | Sawlog | 2,168,339 | 51 | 28 |
|  | Pulplog | 2,014,549 | 47 | 26 |
|  | Other | 79,028 | 2 | 1 |

Source: ABARES 2019

Figure 44: Plantation timber harvest volumes (m3), Victoria, 2007–08 to 2017–18

Source: ABARES 2019

*Firewood*

In Victoria, firewood is provided from forests directly to the public for domestic use (known as domestic firewood). This occurs in designated collection areas managed by DELWP and Parks Victoria, and does not form part of the AO. There is an autumn collection season (1 April to 30 June) and a spring collection season (1 September to 30 November). A household is not allowed to collect more than 16 cubic metres a financial year, and a person is not allowed to collect more than 2 cubic metres in a day. It is illegal to sell wood from public collection areas or to use wood in a commercial business. Firewood is also collected for direct domestic use from forests on private land.

Firewood is also harvested from forests by businesses who then sell it on to households and businesses (this is known as commercial firewood). Although not a primary purpose of its operations, firewood is extracted from public forests by VicForests as a by-product of timber harvesting in the east of the state, or under community forestry harvesting operations in the West RFA.[[6]](#footnote-6) Firewood is also produced from plantations and farm forestry on private land. Table 83 outlines the different sources of domestic and commercial firewood from public and private land in Victoria. The sources that are available in a particular area vary across the state.

Table 83: Sources of domestic and commercial firewood from public and private forests in Victoria

|  |  |  |
| --- | --- | --- |
| Forest type | Domestic firewood | Commercial firewood |
| Public forests | Natural falls  By-product from DELWP and Parks Victoria forest and fire management operations  By-product from VicForests harvesting operations  Collection alongside local municipal roads where permitted by councils | VicForests harvesting operations |
| Private forests | Natural falls or tree cutting on private properties | Primary or by-product of plantations and farm forestry |

*Firewood consumption in Victoria*

Wood is the main source of heating for around 10 per cent of all Victorian households and around 25 per cent of regional households (Table 84) (ABS 2014). In 2008, around 4,700 regional households used wood for ovens and for heating water (ABS 2008). For some Victorians, free firewood is the only source of affordable fuel. In this way, domestic firewood plays an important role in supporting vulnerable households in parts of Victoria.

In 2010, it was estimated that Victorians use about 600,000 cubic metres of firewood each year, with around 13 per cent coming from public land (DSE 2010, pp. 1–3). A typical household in Victoria that uses firewood for heating was estimated to consume between 1 and 9 cubic metres per year (ibid., p. 3). Durable, slow-burning and charcoal-producing wood is preferred for firewood (such as red gum, ironbark, box and some mixed species) over faster-burning, ash-producing wood (such as ash species).

Table 84: Victorian households that use wood as main source of heating, 2014

|  |  |  |
| --- | --- | --- |
| Household type | Total number | per cent of households |
| Regional | 159,900 | 24.9 |
| Melbourne | 65,300 | 4.1 |
| Total | 228,100 | 10.2 |

Source: ABS 2016

*Domestic firewood*

It is estimated around 40,000 cubic metres of firewood is provided to the public from State forests across Victoria’s RFA regions each year (DELWP 2018). The volume provided to the public includes firewood from natural falls, and by-product from DELWP forest and fire management operations or VicForests harvesting operations in some parts of the state.

Since the permit system for firewood collection was abolished in 2011, volume estimation is derived from estimating natural falls and historic firewood collection data. The figures presented are based on intelligence and estimations from the district level and represents the best available information on firewood volumes.

The quantity of firewood collected for domestic use from forests on private land is unknown, though it may be significant. A survey of firewood use in northern Victoria found that only 25per cent of firewood-dependent households collected firewood exclusively on public land (DELWP 2018). It was estimated that around 14,000 cubic metres of firewood is provided annually from private property along the Murray River in Victoria and New South Wales.

*Illegal removal of firewood*

In Victoria, there are restrictions on the volume, location and type of wood that can be collected. Firewood is illegally removed from public land each year, with DELWP and Parks Victoria undertaking compliance activity. In an environmental-economic accounting framework, illegal take would conceptually be included in the flow of ecosystem services, as it represents a flow from the environment to people. Strictly, the framework does not consider whether society deems an ecosystem service flow legal or illegal. However, the unsustainable removal of firewood results in degradation of the underlying ecosystem asset (the forest).

Reducing unsustainable take (e.g. through enforcement) would reduce the flow of firewood from forests to the community, but it would improve the condition of forests (the ecosystem asset). This may result in increased flows of other ecosystem services and benefits such as habitat for species, climate regulation or opportunities for recreation. It may also help maintain a flow of firewood into the future, rather than exhausting supply and encouraging the felling of standing timber. Consequently, in some cases, reducing the flow of firewood (by reducing illegal/unsustainable take) may increase the overall benefit to the community from a forest.

*Commercial firewood*

Some of the timber harvested by VicForests from State forests is commercially purchased and used for firewood, and the quantity and value of this is captured in the assessed native timber harvest volume. Across the state, VicForests sold around 50,000 cubic metres of ‘other’ wood products in 2017–18, which is predominantly firewood (VicForests 2018b, p. 13). To avoid double counting, these figures are not analysed again here.

The quantity of commercial firewood produced from plantations and farm forestry is unknown, though it is expected to be significant.

A valuation of firewood can be estimated using market prices, while acknowledging this method is simple and does not account for the potential of alternative fuel sources. Market prices for firewood can vary widely depending on the type of wood and the sale location. Using northern Victoria as an example, firewood retails for around $100–160 per cubic metre plus delivery.[[7]](#footnote-7) This suggests that if households were to purchase firewood equivalent to the volume collected from public land, it would cost at least $4.5–-7.3 million. This figure is likely to be conservative as firewood prices in Melbourne are significantly higher, in the order of $340 per tonne + delivery) for Redgum, and $310 per tonne + delivery for mixed species.

Inputs to domestic firewood provision from public land should be subtracted from the market price to isolate the value contributed by forest ecosystems. Domestic firewood collection is subsidised by the Victorian Government, which funds planning and administration of firewood collection areas. Costs have been estimated at around $12 per cubic metre for State forests (DELWP 2018). Subtracting this from the market price gives a value of around $90-150 per cubic metre, or around $4–6.8 million in total. This represents the value of the ecosystem service of firewood provision. Note that this is a lower bound estimate as it does not include firewood collection from private forests or commercial firewood.

**Indicator 6.1b: Values, quantities and use of non-wood forest products**

This indicator enables socio-economic benefits to be monitored by ascertaining trends in quantities, values and usage of non-wood forest products against management objectives.

Non-wood products provide a range of economic benefits for Victorian communities. They support livelihoods, particularly in rural and regional areas, and provide government revenues for public services including forest management, profits to businesses and income to forest owners. The value of non-wood products reflects the scale of these benefits. This measure enables socio-economic benefits to be monitored and to ascertain trends for comparison with management objectives.

The Victorian Government seeks royalties from revenue-generating activities carried out on public land. A register of Forest Produce Licences issued by DELWP is maintained by DELWP’s Environmental Compliance Unit. The produce outlined in Table 85 provides an example of some of the types of produce and their quantities taken across the RFA regions between 2016 and 2019. However, this is not an exhaustive list, and data on sustainable rates of harvest is not available. DELWP regulates the number of licences provided to ensure they are not over-allocated, with respect to historic allocation; it also seeks advice from regional staff on the impact of activities associated with the leases. Royalty rates per unit have marginally increased each year for the period 2015–16 to 2018–19 (as shown in the tables below).

Further reporting on non-timber forest products is collated under Indicator 6.c below.

Table 85: Minor forest produce (non-wood), licensed by DELWP

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Product | East Gippsland | | | | Gippsland | | | | Central Highlands | | | | North East | | | | West | | | |
| Royalty ($ per Unit/year) | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2015/16 | 2016/17 | 2017/18 | 2018/19 |
| Dead tree fern trunks (each) | 48.02 | 49.22 | 50.25 | 51.31 | 48.02 | 49.22 | 50.25 | 51.31 | 48.02 | 49.22 | 50.25 | 51.31 | 48.02 | 49.22 | 50.25 | 51.31 | 48.02 | 49.22 | 50.25 | 51.31 |
| Dodder-laurel Vine (kg) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.69 | 0.71 | 0.72 | 0.74 |
| Dogwood and native cherry (bunch) | 0.35 | 0.36 | 0.367 | 0.37 | 0.35 | 0.36 | 0.367 | 0.37 | 0.35 | 0.36 | 0.367 | 0.37 | 0.35 | 0.36 | 0.367 | 0.37 | 0.35 | 0.36 | 0.367 | 0.37 |
| Eucalypt branches for floral arrangements (bunch) | 10.54 | 10.8 | 11.03 | 11.26 | 10.54 | 10.8 | 11.03 | 11.26 | 10.54 | 10.8 | 11.03 | 11.26 | 10.54 | 0.36 | 0.367 | 0.37 | 10.54 | 0.36 | 0.367 | 0.37 |
| Everlasting (1 cm bunch) | 8.92 | 9.14 | 9.34 | 9.53 | 8.92 | 9.14 | 9.34 | 9.53 | 8.92 | 9.14 | 9.34 | 9.53 | 8.92 | 10.8 | 11.03 | 11.26 | 8.92 | 10.8 | 11.03 | 11.26 |
| Grass Tree Fronds (bunch) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 2.1 | 2.15 | 2.2 | 2.24 |
| Grasses (bunch) | 5.21 | 5.34 | 5.45 | 5.57 | 5.21 | 5.34 | 5.45 | 5.57 | 5.21 | 5.34 | 5.45 | 5.57 | 5.21 | 5.34 | 5.45 | 5.57 | 5.21 | 5.34 | 5.45 | 5.57 |
| Gum Leaf residue from eucalypt oil distillation (m3) | 1.87 | 1.92 | 1.962 | 2 | 1.87 | 1.92 | 1.962 | 2 | 1.87 | 1.92 | 1.962 | 2 | 1.87 | 1.92 | 1.962 | 2 | 1.87 | 1.92 | 1.962 | 2 |
| Gum Leaves (bunch) | 8.92 | 9.14 | 9.34 | 9.53 | 8.92 | 9.14 | 9.34 | 9.53 | 8.92 | 9.14 | 9.34 | 9.53 | 8.92 | 9.14 | 9.34 | 9.53 | 8.92 | 9.14 | 9.34 | 9.53 |
| Gum Tips (kg) | 10.35 | 10.61 | 10.83 | 11.06 | 10.35 | 10.61 | 10.83 | 11.06 | 10.35 | 10.61 | 10.83 | 11.06 | 10.35 | 10.61 | 10.83 | 11.06 | 10.35 | 10.61 | 10.83 | 11.06 |
| Heath Flowers (bunch) | 8.6 | 8.82 | 9 | 9.19 | 8.6 | 8.82 | 9 | 9.19 | 8.6 | 8.82 | 9 | 9.19 | 8.6 | 8.82 | 9 | 9.19 | 8.6 | 8.82 | 9 | 9.19 |
| Live tree ferns (each) | 4.48 | 4.59 | 4.69 | 4.79 | 4.48 | 4.59 | 4.69 | 4.79 | 4.48 | 4.59 | 4.69 | 4.79 | 4.48 | 4.59 | 4.69 | 4.79 | 4.48 | 4.59 | 4.69 | 4.79 |
| Morels (kg) | 9.75 | 10 | 10.2 | 10.429 | 9.75 | 10 | 10.2 | 10.429 | 9.75 | 10 | 10.2 | 10.429 | 9.75 | 10 | 10.2 | 10.429 | 9.75 | 10 | 10.2 | 10.429 |
| Myrtle Beech fronds (bunch) | 17.48 | 17.92 | 18.29 | 18.68 | 17.48 | 17.92 | 18.29 | 18.68 | 17.48 | 17.92 | 18.29 | 18.68 | 17.48 | 17.92 | 18.29 | 18.68 | 17.48 | 17.92 | 18.29 | 18.68 |
| Red Stringybark Leaf (bunch) | 172.26 | 176.57 | 180.27 | 184.06 | 172.26 | 176.57 | 180.27 | 184.06 | 172.26 | 176.57 | 180.27 | 184.06 | 172.26 | 176.57 | 180.27 | 184.06 | 172.26 | 176.57 | 180.27 | 184.06 |
| Salt (kg) | 4.73 | 4.85 | 4.95 | 5.05 | 4.73 | 4.85 | 4.95 | 5.05 | 4.73 | 4.85 | 4.95 | 5.05 | 4.73 | 4.85 | 4.95 | 5.05 | 4.73 | 4.85 | 4.95 | 5.05 |
| Seed - Capsules for Pot Purri (kg) | 58.5 | 59.96 | 61.22 | 62.51 | 58.5 | 59.96 | 61.22 | 62.51 | 58.5 | 59.96 | 61.22 | 62.51 | 58.5 | 59.96 | 61.22 | 62.51 | 58.5 | 59.96 | 61.22 | 62.51 |
| Seed Extracted (kg) | 38.27 | 39.23 | 40.05 | 40.9 | 38.27 | 39.23 | 40.05 | 40.9 | 38.27 | 39.23 | 40.05 | 40.9 | 38.27 | 39.23 | 40.05 | 40.9 | 38.27 | 39.23 | 40.05 | 40.9 |
| Seed-E. nitens/E. denticulata | 10.82 | 11.09 | 11.32 | 11.56 | 10.82 | 11.09 | 11.32 | 11.56 | 10.82 | 11.09 | 11.32 | 11.56 | 10.82 | 11.09 | 11.32 | 11.56 | 10.82 | 11.09 | 11.32 | 11.56 |
| Seed-Green Caps-Other (kg) | 2.4 | 2.46 | 2.51 | 2.565 | 2.4 | 2.46 | 2.51 | 2.565 | 2.4 | 2.46 | 2.51 | 2.565 | 2.4 | 2.46 | 2.51 | 2.565 | 2.4 | 2.46 | 2.51 | 2.565 |
| Thrypotomene cuttings for propagation (bunch) | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |

Source: Office of the Deputy Secretary – Regional Services – Fire and Land Statewide Coordination (Judy Alexander, Regional Manager, Environmental Compliance)

Table 86: Minor forest produce (Extractives), licensed by DELWP

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Product (m3) | East Gippsland | | |  | Gippsland | |  |  | Central Highlands | | | | North East | |  |  | West |  |  |  |
| Royalty in $ per Unit | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2015/16 | 2016/17 | 2017/18 | 2018/19 |
| Basalt - Crushed, Broken Stone | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 |  | 1.7 | 1.73 |
| Basalt - Dimension Stone/Slab | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 |
| Basalt - Uncrushed, Low Grade | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Clay - Fine, Kaolin/Bentonite | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Clay - Used for Common Purpose | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Granite - Crushed, Broken Stone | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Granite - Dimension, Stone/Slab | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 |
| Granite - Uncrushed, Low Grade | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Gravel, Low Grade Pit | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Gravel, Low Grade River | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Hornfels - Crushed, Broken Stone | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Hornfels - Uncrushed, Low Grade | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Limestone - Crushed, Broken | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Limestone - Dimension Stone | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 |
| Limestone - Uncrushed, Low Grade | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Marble - Dimension Stone/Slab | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 |
| Quartz - Crushed, Broken | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Quartz - Dimension Stone/Slab | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 |
| Rhyodacite - Crushed, Broken | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Rhyodacite, Uncrushed, Low Grade | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Sand - High Grade, Processing | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Sand - Low Grade | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Sandstone - Crushed, Broken | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Sandstone - Dimension Stone | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 | 9.13 | 9.36 | 9.55 | 9.76 |
| Sandstone, Uncrushed, Low Grade | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Schist - Crushed, Broken Stone | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Scoria - Crushed, Broken Stone | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Scoria - Uncrushed, Low Grade | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Sediments - Low Grade | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Shale - Crushed, Broken Stone | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Shale - Uncrushed, Low Grade | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Shell grit | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Slate - Dimensional Stone | 9.13 | 9.35 | 9.55 | 9.76 | 9.13 | 9.35 | 9.55 | 9.76 | 9.13 | 9.35 | 9.55 | 9.76 | 9.13 | 9.35 | 9.55 | 9.76 | 9.13 | 9.35 | 9.55 | 9.76 |
| Soil - Incl. Loam/Filling | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |
| Tuff - Low Grade | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 | 1.62 | 1.66 | 1.7 | 1.73 |

Source: Office of the Deputy Secretary – Regional Services – Fire and Land Statewide Coordination

Table 87: Minor forest produce (Wood), licensed by DELWP

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Product (m3) | East Gippsland | | | | Gippsland | | | | Central Highlands | | | | North East | | | | West | | | |
| Royalty in $ per Unit | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2015/16 | 2016/17 | 2017/18 | 2018/19 |
| Bark or Bark-Soil Mixture (excluding Wattle bark) | 4.18 | 4.28 | 4.37 | 4.45 | 4.18 | 4.28 | 4.37 | 4.45 | 4.18 | 4.28 | 4.37 | 4.45 | 4.18 | 4.28 | 4.37 | 4.45 | 4.18 | 4.28 | 4.37 | 4.45 |
| Burls (fallen trees only - tonnes) | 262.6 | 269.1 | 274.8 | 280.6 | 262.6 | 269.1 | 274.8 | 280.6 | 262.6 | 269.1 | 274.8 | 280.6 | 262.6 | 269.1 | 274.8 | 280.6 | 262.6 | 269.1 | 274.8 | 280.6 |
| Bush Sawn and Split (Fencing) Timbers - Common Species 0.6m-3.6m (Heavy Grade 211-320cm2)\* | 0.48 - 4.98 | 0.49 - 5.10 | 0.50-5.21 | 0.51-5.32 | 0.48 - 4.98 | 0.49 - 5.10 | 0.50-5.21 | 0.51-5.32 | 0.48 - 4.98 | 0.49 - 5.10 | 0.50-5.21 | 0.51-5.32 | 0.48 - 4.98 | 0.49 - 5.10 | 0.50-5.21 | 0.51-5.32 | 0.48 - 4.98 | 0.49 - 5.10 | 0.50-5.21 | 0.51-5.32 |
| Bush Sawn and Split (Fencing) Timbers - Durable Species 0.6m-3.6m (Heavy Grade 211-320cm2)\* | 0.87-12.71 | 0.89-13.028 | 0.91-13.30 | 0.93-13.58 | 0.87-12.71 | 0.89-13.028 | 0.91-13.30 | 0.93-13.58 | 0.87-12.71 | 0.89-13.028 | 0.91-13.30 | 0.93-13.58 | 0.87-12.71 | 0.89-13.028 | 0.91-13.30 | 0.93-13.58 | 0.87-12.71 | 0.89-13.028 | 0.91-13.30 | 0.93-13.58 |
| Charcoal (tonnes) | 12.8 | 13.12 | 13.4 | 13.68 | 12.8 | 13.12 | 13.4 | 13.68 | 12.8 | 13.12 | 13.4 | 13.68 | 12.8 | 13.12 | 13.4 | 13.68 | 12.8 | 13.12 | 13.4 | 13.68 |
| Craftwood (<45cm ->=45cm CDUB) | 45.4-77.99 | 46.54-79.94 | 47.51-81.62 | 48.51-83.33 | 45.4-77.99 | 46.54-79.94 | 47.51-81.62 | 48.51-83.33 | 45.4-77.99 | 46.54-79.94 | 47.51-81.62 | 48.51-83.33 | 45.4-77.99 | 46.54-79.94 | 47.51-81.62 | 48.51-83.33 | 45.4-77.99 | 46.54-79.94 | 47.51-81.62 | 48.51-83.33 |
| Didgeridoo Timber | 10.59 | 10.85 | 11.08 | 11.32 | 10.59 | 10.85 | 11.08 | 11.32 | 10.59 | 10.85 | 11.08 | 11.32 | 10.59 | 10.85 | 11.08 | 11.32 | 10.59 | 10.85 | 11.08 | 11.32 |
| Tea tree/wattle for fencing stakes | 5.73 | 5.87 | 6 | 6.12 | 5.73 | 5.87 | 6 | 6.12 | 5.73 | 5.87 | 6 | 6.12 | 5.73 | 5.87 | 6 | 6.12 | 5.73 | 5.87 | 6 | 6.12 |
| Fruit Tree Props (Common-Durable) | 6.05-7.35 | 6.20-7.53 | 6.33-7.69 | 6.46-7.85 | 6.05-7.35 | 6.20-7.53 | 6.33-7.69 | 6.46-7.85 | 6.05-7.35 | 6.20-7.53 | 6.33-7.69 | 6.46-7.85 | 6.05-7.35 | 6.20-7.53 | 6.33-7.69 | 6.46-7.85 | 6.05-7.35 | 6.20-7.53 | 6.33-7.69 | 6.46-7.85 |
| Hewn Timber - Durable Species (0-9m) | 102-145.19 | 104.55-148.82 | 106.75-151.95 | 108.99-155.14 | 102-145.19 | 104.55-148.82 | 106.75-151.95 | 108.99-155.14 | 102-145.19 | 104.55-148.82 | 106.75-151.95 | 108.99-155.14 | 102-145.19 | 104.55-148.82 | 106.75-151.95 | 108.99-155.14 | 102-145.19 | 104.55-148.82 | 106.75-151.95 | 108.99-155.14 |
| Hewn Timber - Common Species (0-10.5m) | 67.74-101.61 | 69.43-104.15 | 70.89-106.34 | 72.38-108.57 | 67.74-101.61 | 69.43-104.15 | 70.89-106.34 | 72.38-108.57 | 67.74-101.61 | 69.43-104.15 | 70.89-106.34 | 72.38-108.57 | 67.74-101.61 | 69.43-104.15 | 70.89-106.34 | 72.38-108.57 | 67.74-101.61 | 69.43-104.15 | 70.89-106.34 | 72.38-108.57 |
| Hewn Timber - Common Species (Yellow Stringybark) (0-18m) | 84.69-198.43 | 86.81-203.39 | 88.63-207.66 | 90.49-212.02 | 84.69-198.43 | 86.81-203.39 | 88.63-207.66 | 90.49-212.02 | 84.69-198.43 | 86.81-203.39 | 88.63-207.66 | 90.49-212.02 | 84.69-198.43 | 86.81-203.39 | 88.63-207.66 | 90.49-212.02 | 84.69-198.43 | 86.81-203.39 | 88.63-207.66 | 90.49-212.02 |
| Round (Fencing) Timbers - Common Species (375-399mm diameter\*) (1m-6m) | 9.69-66.25 | 9.93225-67.91 | 10.14-69.33 | 10.35-70.79 | 9.69-66.25 | 9.93225-67.91 | 10.14-69.33 | 10.35-70.79 | 9.69-66.25 | 9.93225-67.91 | 10.14-69.33 | 10.35-70.79 | 9.69-66.25 | 9.93225-67.91 | 10.14-69.33 | 10.35-70.79 | 9.69-66.25 | 9.93225-67.91 | 10.14-69.33 | 10.35-70.79 |
| Round (Fencing) Timbers - Durable Species (1m-6m) 375-399mm diameter\* | 10.83-134.09 | 11.10-137.44 | 11.33-140.33 | 11.57-143.28 | 10.83-134.09 | 11.10-137.44 | 11.33-140.33 | 11.57-143.28 | 10.83-134.09 | 11.10-137.44 | 11.33-140.33 | 11.57-143.28 | 10.83-134.09 | 11.10-137.44 | 11.33-140.33 | 11.57-143.28 | 10.83-134.09 | 11.10-137.44 | 11.33-140.33 | 11.57-143.28 |
| Roundwood for Stepping Blocks | 0.55 | 0.56 | 0.58 | 0.59 | 0.55 | 0.56 | 0.58 | 0.59 | 0.55 | 0.56 | 0.58 | 0.59 | 0.55 | 0.56 | 0.58 | 0.59 | 0.55 | 0.56 | 0.58 | 0.59 |
| Tea tree/wattle for rustic furniture | 11.3 | 11.58 | 11.83 | 12.07 | 11.3 | 11.58 | 11.83 | 12.07 | 11.3 | 11.58 | 11.83 | 12.07 | 11.3 | 11.58 | 11.83 | 12.07 | 11.3 | 11.58 | 11.83 | 12.07 |
| Sawdust (rotted) | 11.36 | 11.64 | 11.89 | 12.14 | 11.36 | 11.64 | 11.89 | 12.14 | 11.36 | 11.64 | 11.89 | 12.14 | 11.36 | 11.64 | 11.89 | 12.14 | 11.36 | 11.64 | 11.89 | 12.14 |
| Shingles (Cut and prepared per 100 pieces) | 6.88 | 7.05 | 7.2 | 7.35 | 6.88 | 7.05 | 7.2 | 7.35 | 6.88 | 7.05 | 7.2 | 7.35 | 6.88 | 7.05 | 7.2 | 7.35 | 6.88 | 7.05 | 7.2 | 7.35 |
| Sleeper Offcuts | 1.51 | 1.55 | 1.58 | 1.61 | 1.51 | 1.55 | 1.58 | 1.61 | 1.51 | 1.55 | 1.58 | 1.61 | 1.51 | 1.55 | 1.58 | 1.61 | 1.51 | 1.55 | 1.58 | 1.61 |
| Wattle Bark | 125.6 | 128.8 | 131.5 | 134.2 | 125.6 | 128.8 | 131.5 | 134.2 | 125.6 | 128.8 | 131.5 | 134.2 | 125.6 | 128.8 | 131.5 | 134.2 | 125.6 | 128.8 | 131.5 | 134.2 |
| Wood Chop Logs | 3.05 | 3.13 | 3.19 | 3.26 | 3.05 | 3.13 | 3.19 | 3.26 | 3.05 | 3.13 | 3.19 | 3.26 | 3.05 | 3.13 | 3.19 | 3.26 | 3.05 | 3.13 | 3.19 | 3.26 |

Source: Office of the Deputy Secretary – Regional Services – Fire and Land Statewide Coordination

**Indicator 6.1c: Value of forest-based services**

This indicator measures a range of forest-based services, which have been classified as provisioning, regulating or cultural. Forest-based services provide economic values and contribute to the sustainability of forests by providing significant social and environmental benefits.

Understanding trends in the economic value of benefits associated with the full range of ecosystem services provided by forests will assist decision-makers to prioritise investment and consider competing interests in the management of forests. An environmental-economic accounting framework has been employed by DELWP to classify and measure the extent of Victoria’s forest assets and flows of ecosystem services which provide benefits (market and non-market) to people.

For this report, an economic accounting process was undertaken for a range of forest values, and the results of these studies are outlined in Table 88. As these studies provide only an assessment of current annual benefits, they do not indicate how ecosystem services and benefits may change over time and the potential trade-offs under different forest management scenarios. However, study findings could be used to inform scenario analysis and decision-making on the management of Victoria’s forests into the future.

Table 88: Monetary flows of ecosystem services from forests in RFA regions (2018 estimate unless otherwise stated)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Central Highlands | East Gippsland | Gippsland | North East | West | Total | Confidence in valuation |
| **Ecosystem services** |  |  |  |  |  |  |  |
| ***Provisioning services*** |  |  |  |  |  |  |  |
| Water ($ million) | 311-806 | 11 | 95-96 | 261 | 96 | 774-1,270 | Medium |
| Native timber ($ million) | 21 | 3 | 3 | 1 | - | 28 | High |
| Plantation timber ($ million) (a) | n.a. | n.a. | n.a. | n.a. | n.a. | 54 | Medium |
| Firewood ($ million) (b) | n.a. | n.a. | n.a. | n.a. | n.a. | 43,650 | Low |
| Honey ($ million) | n.a. | n.a. | n.a. | n.a. | n.a. | 3-4.5 | Low |
| Fodder | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |  |
| ***Regulating services*** |  |  |  |  |  |  |  |
| Water flow regulation ($ million) | n.a. | n.a. | n.a. | n.a. | n.a. | 97 | Low |
| Soil retention ($ million) | 655-1,216 | 0-1,736 | 460-1,668 | 1,759-2,834 | 179-568 | 3,054-8,021 | Low |
| Carbon sequestration ($ million) (a) | 356 | 399 | 1,019 | 704 | 528 | 3,006 | Medium |
| Carbon storage | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |  |
| Pollination ($ million) | n.a. | n.a. | n.a. | n.a. | n.a. | 0.8-1 | Low |
| ***Cultural services*** |  |  |  |  |  |  |  |
| Recreation ($ million) (a) | n.a. | n.a.. | n.a. | n.a. | n.a. | 905 | Medium |
| **Abiotic services** |  |  |  |  |  |  |  |
| Minerals | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |  |

n.a. indicates data not available at the RFA region level

(a) Plantation timber data is for 2017-18, carbon data is for 2017, tourism data is aggregated from 2016-17 data (parks) and 2019 data (State forests)

(b) Firewood collected by households from State forests

*Water services*

Forests ecosystems provide a number of key water services:

* water provision
* water quality regulation (erosion prevention)
* water flow regulation (flood mitigation).

For the purposes of this study, the service is deemed to be provided when water yield from forests enters a water distribution system, not when it is supplied to customers. The total quantity and value of water provision from Victoria’s forests is assessed, rather than the difference in water provision compared to a counterfactual land use or disturbance scenario. Further water yield information is provided in 4.1d.

*Quantification of service*

Water yield from forests is dynamically modelled from 2008 to 2018 and used to derive annual water yield for each RFA region. Figure 45 shows average annual water yield (for the modelled time period of 2008 to 2018) across Victoria’s RFA regions for both forest and non-forest areas. Yield ranges from less than 1 megalitre per hectare per year (in large areas of the West and Gippsland regions), to more than 10 megalitres per hectare per year (in small areas of the North East RFA region).

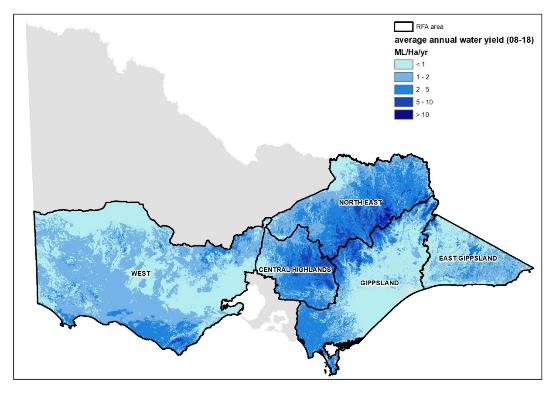


Figure 45: Average annual water yield across Victoria’s RFA regions, 2008–18

Source: DELWP internal Ensym modelling

Figure 46 shows the annual water yield from forests across Victoria’s RFA regions from 2008 to 2018, and the underlying data is presented in Table 90. Yield from non-forest areas is not included. High rainfall years in 2010, 2012 and 2016 are clearly visible in the data. Water yield is most significant in the North East RFA region, which accounts for almost 40 per cent% of total water yield over the decade. This is followed by the Gippsland and Central Highlands RFA regions, although in terms of average yield per hectare the Central Highlands is comparable with the North East.

Figure 46: Annual volume of water yield from forests across Victoria’s RFA regions, 2008–18

Source: DELWP internal Ensym modelling

RFA regions have different profiles in terms of the destination of water yield from forests – Table 89 provides a snapshot of 2018. The Central Highlands is the only RFA region which provides significant volumes of water to Melbourne’s reservoirs. It also provides significant volumes to the northern Victoria system, which supplies Goulburn-Murray irrigation areas.

Around two-thirds of water yield from the North East RFA region goes to the northern Victoria system, and the remainder goes to unregulated systems.[[8]](#footnote-8) Around a quarter of water yield from the Gippsland RFA also goes to the northern Victoria system, and around a third goes to the Thompson/Macalister irrigation area.

Table 89: Destination of water yield from forests in 2018

|  |  |
| --- | --- |
| RFA region | Destination of water yield |
| Central Highlands | 23 per cent to Melbourne system  27 per cent to northern Victoria declared system  10 per cent to other regulated systems  40 per cent to unregulated systems |
| East Gippsland | 100 per cent to unregulated systems |
| Gippsland | 31 per cent to Thompson/Macalister declared system  26 per cent to northern Victoria declared system  43 per cent to unregulated systems |
| North East | 66 per cent to northern Victoria declared system  34 per cent to unregulated systems |
| West | 4 per cent to northern Victoria declared system  2 per cent to Werribee declared system  16 per cent to other regulated systems  77 per cent to unregulated systems |

*Valuation of benefit*

Figure 47 shows the annual value of water yield from forests across Victoria’s RFA regions from 2008 to 2018, and the underlying data is presented in Table 90. The value of water fluctuates from year to year, driven by changes in the volume of water yield and changes in water prices. On average, the value of water yield is greatest for the North East RFA region, averaging $487 million per year from 2008 to 2018. This is largely due to the significant volume of water yield in this region. Total water yield from the Central Highlands also has a high value, averaging $390 million per year over the decade. This reflects the significant volume of water yield from forests in this region, but also that around a quarter of yield from the Central Highlands goes to Melbourne’s reservoirs and has a high value.

Figure 47: Annual value of water yield from forests across Victoria’s RFA regions, 2008–18

Source: DELWP internal Ensym modelling

Table 90: Volume of water yield from forest areas by RFA region (‘000 megalitres)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RFA region | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| Central Highlands | 413 | 1,358 | 3,544 | 3,825 | 3,451 | 2,459 | 2,239 | 1,512 | 2,998 | 2,262 | 1,748 |
| East Gippsland | 16,500 | 186 | 599 | 1,942 | 2,517 | 1,554 | 2,069 | 2,238 | 1,971 | 83 | 145 |
| Gippsland | 446 | 1,416 | 3,289 | 3,326 | 4,327 | 3,149 | 2,356 | 1,808 | 4,477 | 1,735 | 1,116 |
| North East | 947 | 3,667 | 8,627 | 5,125 | 5,442 | 4,744 | 3,870 | 2,597 | 9,425 | 4,113 | 2,414 |
| West | 126 | 656 | 1,576 | 1,321 | 1,187 | 1,582 | 901 | 434 | 2,475 | 1,255 | 1,010 |
| Total | 2,096 | 7,284 | 17,636 | 15,540 | 16,924 | 13,488 | 11,434 | 8,589 | 21,346 | 9,449 | 64,32 |

Source: DELWP internal Ensym modelling

Table 91: Value of water yield from forest areas by RFA region ($ ‘000’000)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RFA region | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| Central Highlands | 114 | 390 | 645 | 508 | 450 | 330 | 317 | 277 | 685 | 264 | 311 |
| East Gippsland | 10 | 12 | 37 | 120 | 156 | 116 | 76 | 123 | 158 | 4 | 11 |
| Gippsland | 59 | 214 | 358 | 216 | 262 | 258 | 168 | 144 | 604 | 113 | 95 |
| North East | 212 | 837 | 1,060 | 205 | 196 | 265 | 234 | 249 | 1,636 | 201 | 261 |
| West | 13 | 63 | 156 | 119 | 102 | 127 | 57 | 33 | 346 | 69 | 96 |
| Total | 408 | 1,515 | 2,256 | 1,168 | 1,165 | 1,096 | 852 | 826 | 3,429 | 651 | 774 |

Source: DELWP internal Ensym modelling

*Water quality regulation (erosion prevention)*

Forests improve water quality by naturally filtering and purifying it, reducing the amount of soil sediment, pollutants and organic matter that would otherwise reach waterways. In this study, the service forests provide in preventing erosion is assessed. To do this, a counterfactual scenario is constructed where forests do not exist and landcover is pasture. This allows assessment of how much sediment is eroded under the forest scenario compared to the no-forest counterfactual.

*Quantification of service*

Figure 48 shows average annual erosion (for the modelled time period of 2008 to 2018) across Victoria’s RFA regions for both forest and non-forest areas. Yield ranges from less than 0.1 tonne of sediment per hectare per year in large parts of the state to more than 5 tonnes per hectare per year in some small areas of the North East.

Figure 49 shows the increase in average annual erosion that occurs under a counterfactual scenario where forests do not exist and landcover is pasture. The modelled increase in erosion ranges from 0 to more than 5 tonnes of sediment per hectare per year. There are significant increases in erosion in parts of the North East and Gippsland RFA regions (alpine area and Wilsons Promontory) as well as the Central Highlands and East Gippsland RFA regions. This illustrates the significant role forests play in preventing sediment erosion.

Compared to a no-forest scenario, forests across the five RFA regions prevent, on average, 9.6 million cubic metres of gross sediment erosion per year. Forests prevent a portion of this, 1.6 million cubic metres of sediment, from discharging into major river systems each year. Table 92 presents the results of this modelling – the annual volume of sediment erosion to major waterways avoided under a forest scenario by RFA region.

The volume of avoided sediment erosion varies significantly from year to year, depending on the severity and timing of rainfall events. On average, erosion prevented by forests is greatest in the North East RFA region, both in terms of total quantity of sediment avoided and quantity avoided per hectare. This is followed by East Gippsland and Gippsland. The total quantity of erosion prevented by forests in the Central Highlands is lower but is comparable with Gippsland and East Gippsland in per hectare terms. The quantity of erosion prevented in the West RFA region is low in total quantity and per hectare terms; this is largely due to low relief terrain and less rainfall resulting in lower erosion rates.

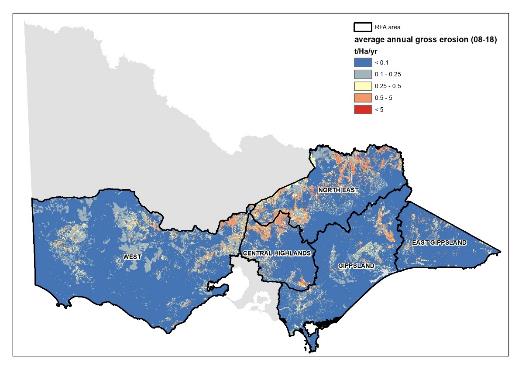


Figure 48: Average annual erosion across Victoria’s RFA regions, 2008–18

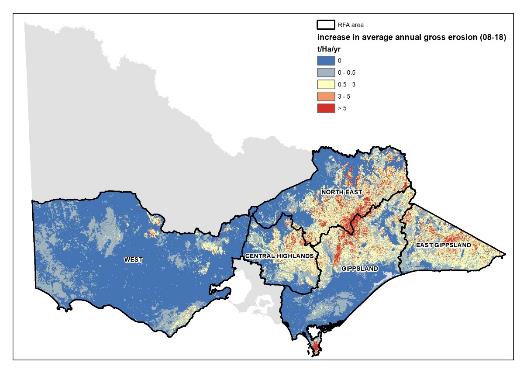
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Figure 49: Increase in average annual erosion under a no-forest scenario (compared to the forest scenario), 2008–18

Source: DELWP internal Ensym modelling

*Valuation of benefit*

The service of water quality regulation (erosion prevention to major waterways) is valued based on an avoided-cost approach; that is, the cost of supplying an equivalent volume of water to replace water storage that is lost due to sediment accumulation.

Table 93 presents the valuation results. On average, the value of erosion prevention by forests is greatest in the North East RFA region. This is driven by the significant volumes of sediment avoided, and also by the value of water in the northern Victorian declared system. Erosion prevention also has a high value in the Central Highlands, reflecting the high value of avoided sediment accumulation in reservoirs that supply Melbourne’s water. Erosion prevention has a very low value in East Gippsland, which is due to sediment being avoided in unregulated systems, rather than regulated systems with infrastructure such as dams. This low value should be treated with caution because, as discussed above, sediment in these systems may still have impacts on producers, households and the environment.

Table 92: Volume of sediment erosion to major waterways avoided under a forest scenario by RFA region (cubic metres)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RFA region | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| Central Highlands | 394,783 | 18,309 | 242,503 | 501,377 | 337,796 | 116,137 | 49,163 | 15,062 | 133,281 | 151,123 | 26,054 |
| East Gippsland | 187,526 | 13,820 | 534,232 | 489,422 | 952,098 | 416,830 | 244,520 | 323,830 | 293,780 | 20,569 | 53,293 |
| Gippsland | 781,261 | 32,265 | 681,310 | 740,824 | 1,102,519 | 459,301 | 133,621 | 96,164 | 503,904 | 187,023 | 56,413 |
| North East | 854,099 | 31,591 | 872,244 | 1,297,452 | 1,641,543 | 528,678 | 163,447 | 102,727 | 433,192 | 237,893 | 105,715 |
| West | 24,439 | 3,971 | 59,582 | 239,486 | 63,409 | 11,123 | 3,697 | 76,000 | 25,063 | 43,343 | 16,672 |
| Total | 2,242,108 | 99,957 | 2,389,871 | 3,268,561 | 4,097,365 | 1,532,070 | 594,448 | 613,783 | 1,389,220 | 639,950 | 258,147 |

Source: DELWP internal Ensym modelling

Table 93: Value of sediment erosion to major waterways avoided under a forest scenario by RFA region ($)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RFA region | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| Central Highlands | 740,882 | 57,718 | 550,919 | 1,233,238 | 802,167 | 311,452 | 116,512 | 38,717 | 307,586 | 307,877 | 65,864 |
| East Gippsland | 147 | 4 | 492 | 306 | 602 | 183 | 191 | 44 | 175 | 37 | 37 |
| Gippsland | 365,355 | 14,980 | 364,968 | 468,239 | 648,536 | 140,275 | 65,400 | 45,327 | 170,333 | 88,343 | 27,597 |
| North East | 1,052,109 | 36,401 | 1,115,409 | 1,670,567 | 2,089,964 | 640,355 | 239,269 | 118,744 | 408,322 | 260,808 | 118,968 |
| West | 17,850 | 4,292 | 85,673 | 386,495 | 66,280 | 18,929 | 2,494 | 81,303 | 25,960 | 45,371 | 33,546 |
| Total | 2,176,343 | 113,394 | 2,117,461 | 3,758,845 | 3,607,549 | 1,111,194 | 423,865 | 284,135 | 912,376 | 702,434 | 246,012 |

Source: DELWP internal Ensym modelling

*Agriculture (grazing)*

Agricultural production from public forests is typically restricted by government policy for the use of public land. The Victorian Government issues leases and licences for exclusive and non-exclusive use of public land in areas where a particular land use is permitted and in accordance with the specific legislation applicable to the land.

Existing capacity for agricultural use of forest on public land has been mapped using spatial data on licences for private use of public land.[[9]](#footnote-9) Spatial analysis reveals types of licences that intersect with areas of forest extent and may support agricultural production (see Figure 50); these are:

* grazing licences – allowing grazing of livestock on public land;
* water frontage and riparian management licences – allowing access to waterways for agricultural use (such as stock access to water) or recreational use; riparian management licences ensure waterway access is managed to both protect and improve the riparian environment, and typically attract a reduced licence fee; and
* unused roads licences – allowing owner/occupiers of adjoining private land to access unused roads on public land for agricultural purposes.

There are around 14,100 licences covering forests within Victoria’s RFA regions (not including beekeeping licences) – see Table 93. These licences cover almost 500,000 hectares of forest, or 8per cent of total forest across Victoria’s RFA regions. Most of the forest area licensed is for grazing purposes (89 per cent of total forest area licensed), with smaller areas licensed for unused road access, water frontage access and riparian management and other uses.

The largest area of forest covered by licences is in the Gippsland RFA region (300,000 hectares). The West RFA region has the greatest number of licences containing forest (4,700), although the total area of forest licensed is quite low (11,000 hectares). This is likely due to the West RFA region having a large number of unused road licences which intersect with the mapped forest extent boundary.

Grazing licences represent large portions of the total forest areas licensed in the East Gippsland, Gippsland and North East RFA regions (Figure 50). It should be noted that the number of licences issued and area licensed is an indicator of *opportunity* for use of public forests. It is does not show whether forests are actually being used for grazing or other agricultural purposes. However, licences are a source of revenue to the state regardless of whether licensed areas are being occupied by stock or not.

Table 94: Licences covering forest areas

|  |  |  |
| --- | --- | --- |
| RFA region | Number of licences | Area of forest licensed (ha) |
| Central Highlands | 1,728 | 5,783 |
| East Gippsland | 630 | 44,354 |
| Gippsland | 2,756 | 301,147 |
| North East | 4,067 | 132,126 |
| West | 4,950 | 10,980 |
| Non-RFA | 4,695 | 44,000 |
| Total RFA | 14,131 | 494,391 |
| Total Victoria | 18,826 | 538,391 |

Notes: Includes grazing licences, water frontage and riparian management licences, unused road licences and miscellaneous licences that interest with forest extent mapping.

Figures exclude any non-forest area components of licences.

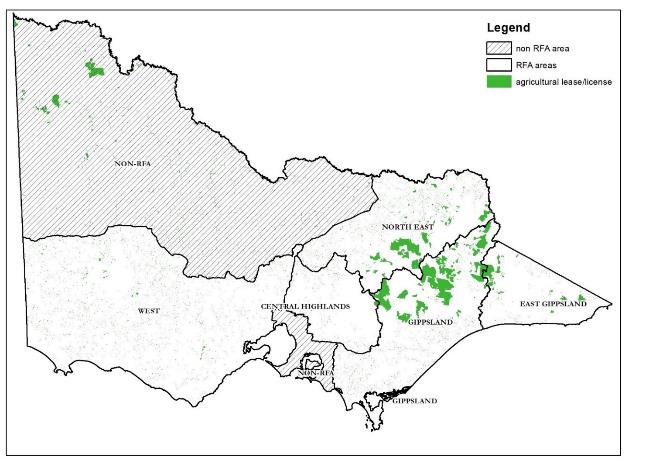


Figure 50: Victorian agricultural licences covering forest areas

Source: DELWP corporate data

*Honey provision*

Honey production is heavily dependent on forest ecosystems for floral resources that sustain bee populations. Nationally, native flora has been estimated to support 70 per cent to 80 per cent of honey production (Gibbs & Muirhead 1998, p. 37). Eucalypts are by far the most common source of nectar and pollen.

Forest ecosystem extent (Figure 51) provides a broad indicator of provision of habitat for bees. The maintenance of forest ecosystem extent and condition is crucial to supporting bee populations, without which the ecosystem service of honey provision would decline.

There are 4,485 licensed apiary sites on public land across Victoria.[[10]](#footnote-10) Fifty-five per cent of sites are in RFA regions, with the largest number in the West RFA region (22 per cent of total sites) followed by Gippsland (13 per cent).

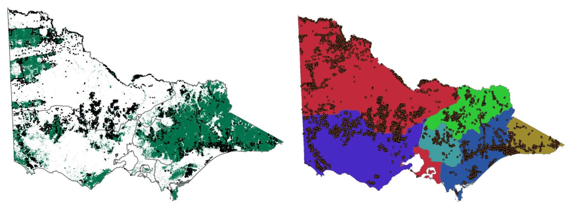
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Figure 51: Apiary sites and forest extent (left) and in RFA regions (right)

Source: DELWP corporate data

Although all apiary sites in this dataset are on public land, for a small number of these sites the nearest forest is on private land. Data on the number and location of hives on private land is not available; however, in 2001 it was estimated that 30 per cent of hives were located on private land (Centre for International Economics 2005, p. 141).

Apiary sites are not always licensed, and licensed sites may not always be occupied by hives. Occupation is dependent on nearby floral resources, which are seasonal and variable. Although occupation is sporadic, apiarists tend to retain sites to ensure access. A hive of bees may be moved several times a year.

Table 95: Apiary sites by RFA region and average distance of sites from forest

|  |  |  |  |
| --- | --- | --- | --- |
| RFA region | Sites | per cent of total ( per cent) | Average distance from forest (m)a |
| Central Highlands | 170 | 4 | 0 |
| East Gippsland | 349 | 8 | 5 |
| Gippsland | 586 | 13 | 26 |
| North East | 363 | 8 | 14 |
| West | 1,007 | 22 | 239 |
| Non-RFA | 2,010 | 45 | 287 |
| Total RFA | 2,475 | 55 | - |
| Total Victoria | 4,485 | 100 | - |

a A distance of 0 metres indicates that apiary sites are *within* forest areas.

Source: DELWP

A survey conducted by ABARES found that, in 2014–15, 58 per cent of honey produced in Victoria was derived from public land, with 40 per cent from State forests and 11 per cent from national parks (van Dijk, Gomboso & Levantis 2016). Eight per cent was derived from other public land, 19 per cent from crops and 23 per cent from other private land (Table 96). This suggests that, at a minimum, 50 per cent of Victorian honey is derived from forested areas (State forests and parks).

However, the proportion is likely higher because ‘other public land’ and ‘other private land’ could also include forested areas. For the purposes of this analysis, an upper bound of 70 per cent has been used. This assumes that all ‘other public land’ and half of ‘other private land’ is forested area.

The ABARES survey found that there were 68,200 registered hives in Victoria, and it estimates an average annual honey production of 59.4 kilograms per hive. This equates to total production of around 4,000 tonnes of honey per year. Earlier estimates of Victoria’s honey production are of a similar magnitude. In 2015 it was estimated that Victoria produces around 4,250 tonnes of honey per year, around 17 per cent of Australia’s honey production (DELWP & Parks Victoria 2015, p. 73; DSE 2012c). Applying the estimate that 50–70 per cent of Victorian honey is derived from forested areas suggests that 2,000 to 2,800 tonnes of honey can be attributed to forests. Based on the proportion of apiary sites in RFA regions (55 per cent), the volume derived from forests in RFA regions is around 1,000–1,500 tonnes per year.

Given the assumptions made around the use of apiary sites in RFA regions, confidence in the precision of this estimate is low, and it should be considered an indicative estimate only. For the same reason, the quantity of honey attributable to each RFA region cannot be estimated with confidence. However, the number of apiary sites in each RFA region is an indicator of access to floral resources and suggests that the West and Gippsland RFA regions are particularly important areas for beekeeping.

Table 96: Proportion of honey produced, by land type, Victoria, 2014–15

|  |  |
| --- | --- |
| Land type | Proportion ( per cent) |
| Public land | |
| State forests | 40 |
| National parks | 11 |
| Other public land | 8 |
| **Total public land** | **58** |
| Private land | |
| Crops (without paid pollination) | 16 |
| Crops (with paid pollination) | 3 |
| Other private land | 23 |
| **Total private land** | **42** |

Source: ABARES 2016

*Valuation of service*

Honey provision can be valued using market information reported in the ABARES survey. Analysis of survey data suggests that average cash receipts per kilogram of honey were around $6.30 per kilogram and average cash costs were $3.40 per kilogram in 2014–-15. The difference is $2.90 per kilogram of honey, or $2,900 per tonne. Applying this to the volume of honey derived from forests in RFA regions suggests that the industry is valued at $3.0–4.5 million per year. This represents the value contributed by forest ecosystems.

*Pollination*

Native and introduced pollinators support agricultural activity which provides benefits to producers and consumers of agricultural products. Pollinators also support the maintenance of forests and other ecosystems.

Pollination of horticultural/agricultural crops is highly dependent on access to adequate seasonal floral resources from across the general landscape, including native forests. Providers of paid pollination services typically strengthen and/or rest bee colonies by placing hives in or near areas of native vegetation, including both state and private forests. Hives are then transported to agricultural areas to pollinate specific crops (such as Victoria’s almond orchards).

Almonds are the most common crop that uses paid pollination services in Victoria, with 94 per cent of pollination service providers supplying almond crops (Table 97). Around 20 per cent of pollination service providers supply oilseed crops (such as canola), and 10 per cent supply other fruit crops (apples, stone fruits, etc.).

Paid pollination services have increased over the past decade, with over 50 per cent of Victorian beekeepers providing paid pollination services in 2014–1; this is up from under 40 per cent in 2006–07. Around 14 per cent of Victorian beekeeping businesses not offering paid pollination services in 2014–15 planned to commence in the next five years, and over 55 per cent offering paid pollination services planned to expand.

Table 97: Types of crops pollinated by paid pollination service providers, Victoria, 2014–15

|  |  |
| --- | --- |
| Proportion of pollination service providers pollinating crop ( per cent) | |
| Almonds | 94 |
| Cherries | 4 |
| Pome fruits | 7 |
| Other fruit | 11 |
| Oilseeds | 18 |
| Vegetables | 4 |
| Other | 6 |

Note: Beekeeping businesses can pollinate multiple types of crops throughout a given year.

Source: ABARES. 2016

*Valuation of services*

The contribution of forests to paid pollination services can be valued using market information reported by ABARES. In 2014–15, Victorian beekeepers received an average of $27,000 for paid pollination services. This suggests an average payment of around $70 per hive (as beekeepers reported an average of 380 hives). Although, as not all beekeepers offer paid pollination services, the average payment per hive used for paid pollination services would be higher.

The average annual cash costs per beekeeping business in Victoria are $109,500 (van Dijk, Gomboso & Levantis 2016). Attributing a portion of these costs to pollination services, in line with the proportion of average cash receipts that are for pollination services (13 per cent), suggests average annual cash costs for pollination services of around $15,000 per business. This results in an average cash profit (cash receipts less cash costs) of $12,000 per business. Applying this to the number of commercial beekeeping businesses in Victoria (220)(van Dijk, Gomboso & Levantis 2016, p. 3), the reliance of beekeeping businesses on forested areas (50–70 per cent – see Table 96) and the proportion of apiary sites in RFA regions (55 per cent), the value contributed to paid pollination services by forests in RFA regions is estimated at around $750,000 to $1,050,000 per year. Given the extrapolation of data and assumptions made around the use of apiary sites in RFA regions, confidence in the precision of this estimate is low, and it should be considered an indicative estimate only.

This valuation method represents a lower bound estimate of the value of pollination services, as it is based on the market value of paid pollination services, rather than the benefit that pollination (both commercial and wild) provides to producers and consumers of agricultural products.

However, a 2018 study by Curtin University modelled the impact of a supply shock (due to the absence of pollination) on 53 honeybee pollination dependent agricultural crops, and estimated the economic value of pollination in Victoria as between $3.2 billion and $9.0 billion (Karasinski 2018). This is the highest estimate of all states and territories which likely represents the composition of agricultural crops grown in Victoria (such as almonds), and the volume and price of agricultural production. This is likely an upper bound estimate of the value of pollination, as it is based on the sudden loss of crops due to the absence of pollination.

*Avoiding double counting*

Note that there is likely to be substantial overlap between honey provision and pollination services. For example, incidental pollination by bees is a positive externality of honey production. To avoid double counting, benefits from honey provision and benefits from pollination should always be reported separately.

*Minerals*

Extraction of mineral resources on public land is regulated by the *Mineral Resources (Sustainable Development) Act 1990* (Vic.). Forest areas often contain mineral resource deposits and consequently are an important source of revenue for business and government.

Recreational prospecting and fossicking are permitted in State forests and in certain parks. Recreational prospectors and fossickers must purchase a Miner’s Right. This allows the holder of the right to remove and keep minerals discovered on Crown land or private land (where the landowner has given permission).

There are also 227 mining licences across Victoria,[[11]](#footnote-11) covering around 65,000 hectares (Table 98). Just under half (44 per cent) are within the five RFA regions and 37 per cent are within, or intersect with, forest areas in RFA regions. Gippsland has the highest number of licences that intersect with forests (35), covering over 6,600 hectares of forest. The West RFA region has 27 licences that intersect with forest, covering over 6,300 hectares of forest.

Table 98: Current mining licences

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| RFA region | Total number of licences | Total area licensed (ha) | Number of licences in forests | Area of forest licensed (ha) | per cent total licences in forests | per cent total area licensed that is in forests |
| Central Highlands | 10 | 1,031 | 9 | 1,009 | 90 | 98 |
| East Gippsland | 1 | 2 | 1 | 2 | 100 | 100 |
| Gippsland | 43 | 20,820 | 35 | 6,723 | 81 | 32 |
| North East | 14 | 720 | 13 | 642 | 93 | 89 |
| West | 33 | 15,177 | 27 | 6,364 | 82 | 42 |
| Non-RFA | 126 | 27,027 | 70 | 4,866 | 56 | 18 |
| Total RFA | 101 | 37,749 | 85 | 14,738 | 84 | 39 |
| Total Victoria | 227 | 64,776 | 155 | 19,604 | 68 | 30 |

Source: DJPR dataset: Current mining licences and leases

*Cultural connection and heritage*

Forests provide ecosystems, landscapes and sites of historical significance that Victorian, Australian and global communities value as part of their heritage. Forests provide immense cultural and spiritual connection to Traditional Owners and Aboriginal communities, as well as providing cultural and heritage value to non-Aboriginal Victorians.

The cultural value of forests to Traditional Owners and Aboriginal communities is not quantified in this study, though this value can conceptually sit within an ecosystem accounting framework. The RFA modernisation program is partnering with Traditional Owners, as the original custodians of Victoria’s land and waters, to support and facilitate Traditional Owners to capture information about their values (including tangible and intangible values). Ecosystem accounting is a developing field, and there is scope for cultural values to be meaningfully incorporated into ecosystem accounting frameworks in Victoria in the future.

*Quantification of service and valuation of benefit*

Non-Aboriginal heritage value has previously been estimated for Victoria’s parks (DELWP & Parks Victoria 2015, p. 119). For a significant number of visitors to Victoria’s parks, historic heritage is their primary reason for visiting. This is reflected in the activities undertaken by visitors to parks, including visiting historic places. In 2009, 55 per cent of the population had visited a heritage place managed by Parks Victoria within the previous 12 months.

A 2009 survey found that 60 per cent of Victorian households would support a yearly charge to maintain heritage places in parks. These survey results have been used to estimate a value range for themaintenance of park-related heritage of $6–23 million per year. These estimates are thought to be a lower bound of the value people place on park-related heritage and is indicative only.

*Recreation service: tourism, enjoyment and health and wellbeing*

There were over 42.33 million visits to state and national parks in 2016–17 (Parks Victoria 2018). This figure includes 25.52 million visits from Melbourne residents, 14.31 million from regional Victorians, 1.4 million from interstate travellers and 660,000 from international visitors. There is limited information available specific to State forests, where information is available on built assets but not on visitation. Consequently, this analysis draws on existing visitation data from parks and should not be considered representative of State forests and the whole of Victoria’s public forests.

*Quantification of service and valuation of benefit*

In 2015, a study estimated the economic contribution of tourism associated with Victorian parks added $1 billion to the Victorian economy and support 13,800 full-time equivalent (FTE) jobs. This study focused on parks, so would overestimate economic contribution of *forests* in parks, as forests are only part of the reason people visit parks. People are also motivated by attributes such as rivers, ocean and mountain landscapes. However, forests and other native vegetation in landscapes are a key reason people visit parks and State forests.

Contribution of park tourism to regional economies and employment was estimated based on Victorian tourism regions[[12]](#footnote-12) (Table 99). Although tourism regions do not align with RFA regions, a rough overlay gives an indication of park tourism associated with each RFA region – see Table 99. This suggests that the largest economic contribution of park tourism is in western Victoria – over $200 million. The Grampians (contributing over $100 million) and the Great Ocean Road area (contributing over $80 million) are significant drivers of this. The total economic contribution of park tourism in RFA regions is roughly around $450 million.

Indirect economic benefit of parks to the government can also be considered through health benefits. The *Valuing Victoria’s parks* report estimates that over 750,000 people visit state and national parks each year specifically to do physical exercise. Based on the avoided healthcare costs and productivity impacts associated with physical activity, the value of health and wellbeing benefits has been estimated at $118 million year (DELWP & Parks Victoria 2015, pp. 110–11).

Table 99: Economic contribution of park tourism, 2010–11

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RFA region | Nearest tourism regiona | Gross value added $ million | FTE employment | per cent of regional economy |
| Central Highlands | Yarra Valley and Dandenong Ranges | 85 | 1,103 | 0.3 |
| East Gippsland and Gippsland | Gippsland | 82 | 1,112 | 0.3 |
| North East | Victoria's High Country | 56 | 779 | 0.8 |
| West | Grampians | 102 | 1,164 | 0.4 |
| Great Ocean Road | 87 | 1,235 | 0.3 |
| Daylesford and the Macedon Ranges | 23 | 269 | 0.2 |
| Goldfields | 17 | 240 | 0.1 |
| Total | 229 | 2,908 |  |
| Non-RFA | Melbourne | 433 | 6,130 | 0.1 |
| Mornington Peninsula | 47 | 639 | 0.2 |
| Phillip Island | 20 | 219 | 0.5 |
| Murray | 71 | 894 | 0.2 |
| Total | 571 | 7,882 |  |
| Total RFA |  | 452 | 5,902 |  |
| Total Victoria |  | 1,021 | 13,783 |  |

a Note that tourism regions and RFA regions do not align exactly. Consequently, the economic contribution of park tourism in each RFA region should be considered a rough alignment only.

Source: DELWP analysis based on Deloitte 2014 (Unpublished).

*Habitat*

Forest ecosystems provide living spaces for plants and animals and support the maintenance of biodiversity. This provides benefits to people who simply value the existence of biodiversity and species. Habitat is also strongly linked to other services such as recreation and tourism, as people visit forest areas to experience a particular habitat or see a certain species.

Provision of habitat has not been valued in monetary terms for this study. Stated preference techniques could be used to derive Victorians’ willingness to pay for the existence of forests (conservation of habitat and species). For example, a 2007 study undertaken for VEAC found that households in Melbourne and Bairnsdale were willing to pay $1.45 and $3.29 respectively per year for 20 years for a 1,000 hectare increase in area of healthy Murray River Red Gum forest (URS 2007). The same study found that households in Melbourne and Bairnsdale were willing to pay $11.16 and $8.10 respectively per year for 20 years for a 1,000 hectare increase in area of protected rainforest, and 65 cents and 33 cents respectively for a 1,000 hectare increase in area of protected old-growth forest This does not mean that particular communities should bear financial responsibility for habitat conservation, but rather demonstrates that different communities (and people within communities) may place greater value on certain areas of forest.

Willingness to pay for environmental impacts (such as increased area or quality of habitat) can vary significantly depending on the impacts being surveyed, the location of impacts, and the demographics of survey respondents. The quality of results is also highly dependent on the rigour of survey design and implementation.

*Carbon sequestration and storage*

Forest ecosystems sequester (capture) carbon dioxide from the atmosphere and store it (known as a carbon sink) as organic carbon in plant biomass (trunks, branches, foliage and roots) and soil. Carbon stored in plant biomass and soils is a stock. The sequestration and emission of carbon from a forest ecosystem’s carbon balance is known as the carbon flow. The carbon balance, regardless of scale, will vary over time but, generally, will be equal to the sum of carbon both sequestered and emitted from a forest ecosystem. Forests sequester and store large amounts of carbon in biomass and soils over long time periods, which contributes to the overall carbon balance for the planet, regulating both local, regional and broadscale climate and mitigating climate change.

Carbon is emitted to the atmosphere from forest ecosystems due to disturbances such as fire, the senescence of trees and the natural breakdown of vegetation and soils. The carbon balance is also altered when timber is removed from forest ecosystems through harvesting, noting that carbon can be stored in solid wood products (such as building materials or furniture).

The beneficiary of climate regulation services is the Victorian community, as well as the global community more broadly, who experience reduced impacts of climate change.

*Quantification of carbon storage*

Biomass data has been used to calculate stock of above-ground carbon across Victoria’s forests. This includes living and dead above-ground biomass, but not below-ground biomass (root systems) or soil carbon, largely due to difficulties and expense in extracting and quantifying root biomass as well as the representativity of point sampling for soil carbon. Biomass data was supplied from the VFMP and was created by integrating Landsat satellite time series with Victoria’s forest monitoring and forecasting framework. A conversion factor of 0.47 is used to convert biomass to carbon (Gifford 2000).

In 2017, an estimated 1.1 billion tonnes of carbon was determined to be stored in above-ground biomass in State forests on public land across Victoria’s RFA regions; this is around 4 billion tonnes of carbon dioxide equivalent (CO2e).[[13]](#footnote-13) Carbon stocks fluctuate from year to year, driven by disturbance events such as bushfires or removal of carbon through timber harvesting. From 1988 carbon stocks have averaged 1.1 billion tonnes, with a high of 1,141 million tonnes in 1989 and a low of 937 million tonnes in 2007.[[14]](#footnote-14) There were significant bushfires in 2006–07 which contributed to this reduction in carbon stocks, particularly in the Gippsland RFA region and the North East RFA region, as can be seen in Figure 52. The impact of other major bushfire seasons can be seen in the data, such as the 2003 bushfires in Gippsland and the North East, the 2009 bushfires in the Central Highlands, and the 2014 bushfires in East Gippsland. There has been a steady increase in carbon stocks over the past decade, driven by increases in Gippsland and the North East. However, this trend may be impacted by the 2018–19 bushfire season which saw significant fires in Gippsland.

Figure 52: Above-ground carbon on public land by RFA region, 1988–2017

Note: Data is not available for 1999, 2000, 2001 and 2002.

Source: DELWP Ensym modelling (Unpublished)

Figure 53 shows the distribution of above-ground carbon stocks on public land across Victoria in 2017. It shows the significant density of carbon storage in forests in the east of the state, and in the Otway Ranges in the West RFA region. Figure 54 shows the change in above-ground carbon stocks in forest areas between 2006 and 2007, a period of significant bushfire activity and loss of forest carbon stocks. The 2007 fire extent is also mapped. The reduction in carbon stocks from the 2007 Alpine fires is clearly evident. The map also shows carbon stocks in the Grampians in the West RFA region recovering from the 2006 fires.

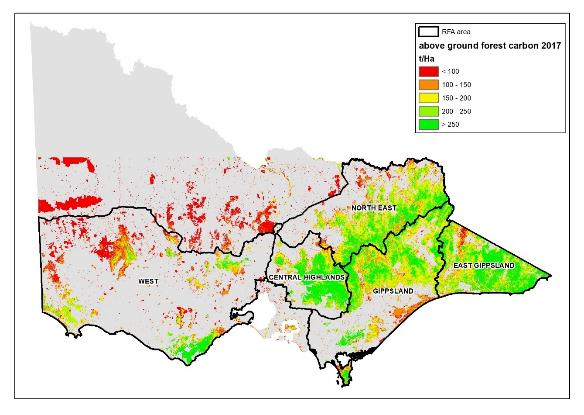


Figure 53: Above-ground carbon on public land, 2017

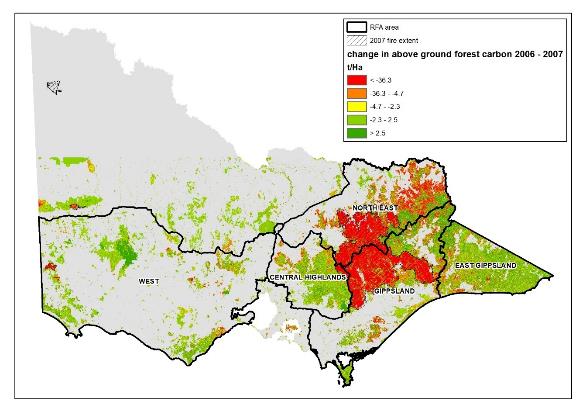


Figure 54: Change in above-ground carbon on public land between 2006 and 2007

Source: DELWP Ensym modelling (Unpublished)

Table 97 reports the quantity of above-ground biomass, carbon and carbon dioxide equivalent (CO2e) on public land across the five RFA regions in 2017, the most recent year of data available. Gippsland has the highest carbon stock on public land (around 300 million tonnes in 2017), followed by North East and East Gippsland (both around 250 million tonnes of carbon in 2017). However, Gippsland, East Gippsland and the North East RFA regions have larger areas of forest on public land than the Central Highlands and West RFA regions.

Central Highlands has the highest average above-ground carbon stock per hectare of forest on public land (250 tonnes per hectare in 2017), followed by East Gippsland (232 tonnes per hectare in 2017). This is likely driven by composition and age of species in these RFA regions.

Table 100: Above-ground biomass and carbon on public land 2017

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Region | Total biomass (tonnes) | Total carbon (tonnes) | CO2e (tonnes) | Carbon per hectare (tonnes) |
| Central Highlands | 332,262,052 | 156,163,164 | 572,181,835 | 250 |
| East Gippsland | 521,012,249 | 244,875,757 | 897,224,774 | 232 |
| Gippsland | 638,676,349 | 300,177,884 | 1,099,851,767 | 206 |
| North East | 531,181,572 | 249,655,339 | 914,737,162 | 199 |
| West | 319,645,024 | 150,233,161 | 550,454,303 | 145 |
| Total | 2,342,777,246 | 1,101,105,306 | 4,034,449,840 | 203 |

Source: DELWP Ensym modelling (Unpublished)

*Valuation of carbon storage*

Carbon stocks can be valued by applying a dollar value to each tonne of carbon dioxide equivalent (CO2e). One tonne of carbon is equal to 3.664 tonnes of CO2e (DoEE 2017). The values used in this analysis are:

* Lower bound –- $12 per tonne of CO2e
* Central –- $20 per tonne of CO2e
* Upper bound –- $59 per tonne of CO2e

In the absence of a clear carbon price in Australia, these values have been derived from a median of existing international carbon market values. Values were obtained from the World Bank Carbon Pricing Dashboard data, with a central value bounded by upper and lower values to support sensitivity testing. [[15]](#footnote-15)

The estimated total value of carbon stock in forests across Victoria’s RFA regions (for aboveground biomass) is around $81 billion, with a lower and upper bound of around $48 billion and $238 billion. These values represent the total value of carbon stock, rather than an annual value. That is, if all carbon stored in Victorian forests was released, the cost to offset emissions would be $81 billion. These values represent the total value of *above-ground* carbon stock *within the public forest boundary*. They do not account for carbon stocks in timber removed from forest areas. The value of carbon stock in each RFA region is outlined in Table 101. Note that the value of a set quantity of carbon stock is expected to increase over time, as CO2e market prices are projected to increase.

Table 101: Value of above-ground carbon stocks on public land 2017

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Region | Carbon dioxide equivalent (CO2e) (tonnes) | $ billion | | |
|  |  | *Lower* | *Central* | *Upper* |
| Central Highlands | 572,181,835 | 6.9 | 11.4 | 33.8 |
| East Gippsland | 897,224,774 | 10.8 | 17.9 | 52.9 |
| Gippsland | 1,099,851,767 | 13.2 | 22.0 | 64.9 |
| North East | 914,737,162 | 11.0 | 18.3 | 54.0 |
| West | 550,454,303 | 6.6 | 11.0 | 32.5 |
| Total Victoria | 4,034,449,840 | 48.4 | 80.7 | 238.0 |

*Air quality*

Forests provide the ecosystem service of air quality regulation, as trees and other native vegetation help filter a number of air pollutants. They intercept and trap airborne particles and absorb other pollutants such as carbon monoxide, sulphur dioxide and nitrogen dioxide.

This ecosystem service provides benefits to people through improved amenity and health outcomes. The links between human exposure to poor air quality and its effects on human health are an increasing focus for research and policy development. There is an increasing body of evidence demonstrating that air pollution is associated with adverse health effects, including impacts on premature mortality and effects on the cardiovascular and respiratory systems (Environment Protection Authority Victoria 2018).

The quantity of pollutants filtered by forest ecosystems and the value of benefits to people have not been estimated for this study due to the absence of data. While quantity estimates for some pollutants emitted to the atmosphere are available for Victoria,[[16]](#footnote-16) data on the quantity of pollutants removed from the atmosphere by forests is not available.

Benefits from air quality regulation could be valued based on avoided health impacts, such as the avoided cost of medical treatment. This would require information on the quantity of pollutants filtered by forests and the avoided health impacts associated with this.

**I****ndicator 6.1d: Production and consumption and import/export of wood, wood products and non-wood products**

This indicator measures the ratio of import to export consumption of forest-based products in Victoria and Australia. Consumption trends over time provide a measure of the ability of Australian forest and timber industries, through both domestic production and importation, to meet Australian society’s demand for forest-based products and the industries’ contribution to the economy. This includes a range of wood products, from structural-grade timbers to woodchips, pa per and pa per board.

In 2017–18, Australia imported $5.6 billion of wood and wood products – an increase of about 26 per cent compared to 2007–08 (Figure 55). In the same year, Australia exported $3.6 billion of wood and wood products – an increase of 45 per cent compared to 2007–08. On average, the trade deficit for wood and wood products has remained at just under 50 per cent over the last 10 years.

Figure 55: Import/export trend in wood products in Australia, 2007–08 to 2017–18

Data source: Australian Department of Agriculture and Water Resources ABARES (2019).

*Victorian breakdown*

For Victoria, ABARES provides a breakdown of import/export trade deficit data of secondary wood products (SWP) by value, which provides some indication of trends in trade deficit of wood products. SWP include wooden furniture, prefabricated buildings and printed articles. The printed articles include newspapers, printed books, magazines, journals and other printed paper products.

The value of SWP imported to Victoria has increased significantly, by about 46 per cent, from $0.676 billion to $1.001 billion between 2007–08 and 2017–18 (Figure 56).

By contrast, the value of SWP exported has decreased by 15 per cent, from $0.097 billion to $0.082 billion. The sharp rise in import value is mainly due to imports of wooden furniture (up by 200 per cent) and prefabricated buildings (up by 400 per cent). This has contributed to the widening of the Victorian trade deficit for SWP by about 57 per cent between 2007–08 and 2017–18.

Figure 56: Import/export trends in SWP in Victoria, 2007–08 to 2017–18

Data source: Australian Department of Agriculture and Water Resources ABARES (2019).

**Indicator 6.1e: Degree of recycling of forest products**

This indicator measures the extent to which recycling or reuse of forest products occurs. As global demand for forest products increase, there is a growing need to meet societal demands for recycling of forest products.

Figure 57 shows a 28 per cent increase in recycling of forest-derived products between 2008–09 and 2016–17, with the largest contributor being paper and paperboard. Timber product recycling specifically increased by 15 per cent over the same period (Sustainability Victoria 2017).



Figure 57: Recycling of various forest-derived products in Victoria, 2008–09 to 2016–17

Data source: Sustainability Victoria (2018).

Considering recycling rates as a proportion of total use, the waste recovery rate for forest-derived products has fluctuated, between 42 per cent and 54 per cent for wood and timber (average 49 per cent), and between 66 per cent and 78 per cent for paper and paperboard (average 73 per cent) between 2008–09 and 2016–17 (Figure 58). Victoria’s rate for paper and paperboard waste recovery is much higher than the national average of 60 per cent (DoEE 2016). Data for national waste recovery rates of wood and timber products were not found.

Sustainability Victoria forecasts that waste recovery rates for paper and paperboard, and organic materials (including wood and timber), will continue to increase, with potential fluctuations, in line with past trends (Sustainability Victoria 2018). It is therefore likely that Victoria will continue to have a high rate of waste recovery.



Figure 58: Waste recovery rates for forest-derived products in Victoria, 2008–09 to   
2015–16

Note: Waste recovery is defined as the use of waste as an input material to create new products.

Data source: Sustainability Victoria (2018)

**Indicator 6.2a: Investment and expenditure in forest management**

As described in the VSOFR 2018:

The agency responsible for managing natural resources, including State forests, in Victoria has changed several times during the reporting period. In April 2013, the Department of Sustainability and Environment merged with the Department of Primary Industries to form the Department of Environment and Primary Industries (DEPI). In January 2015, DELWP, which has broad responsibility for Victoria’s natural environments (including forest management, and fire and emergency management), was created following a government restructure. Together with Parks Victoria and VicForests, DELWP is responsible for managing Victoria’s parks and reserves, and State forests. VicForests is a separate government-owned business responsible for the harvest, commercial sale and regrowing of wood from Victoria’s State forests.

(Commissioner for Environmental Sustainability Victoria 2019, p. 164)

As can be seen in Table 102, Victorian Government expenditure on managing Victoria’s public land has increased over the five reported years. Fire management costs decreased slightly in 2016–17, due largely to a quieter fire season. Conservation and recreation spending have seen significant increases, reflecting increased government priorities in these areas.

Table 102: Victorian Government expenditure on forest management, 2012–13 to 2016–17

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Expenditure category | Expenditure ($ millions) | | | | |
| 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 |
| Forest and fire management | 383.5 | 382.3 | 347.8 | 396.5 | 372.3 |
| Conservation and recreation | 199.0 | 199.3 | 298.9 | 328.2 | 369.8 |
| **Total** | **582.5** | **581.6** | **646.7** | **724.7** | **742.1** |

Data source: Commissioner for Environmental Sustainability Victoria (2019, p. 164)

Table 103shows the forest management expenditure on general maintenance, capital roading and capital bridge works between 2012–13 and 2016–17, as delivered through the public land management authority (DELWP). Total expenditure decreased across the period, particularly on maintenance work. This was due in part to decreasing timber production and available production areas, which reduced the maintenance works required for State forests, and parks and reserves.

Table 103: Victorian Government forest management expenditure on maintenance, capital roading and capital bridges, 2012–13 to 2016–17

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Expenditure category | Expenditure ($ millions) | | | | |
| 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 |
| Maintenance | 16.0 | 16.8 | 12.6 | 9.0 | 7.9 |
| Capital roading | 0.2 | 0.7 | 0.4 | 0.3 | 0.2 |
| Capital bridges | 2.2 | 2.4 | 2.6 | 3.2 | 1.4 |
| **Total** | **18.3** | **19.9** | **15.5** | **12.5** | **9.5** |

Data source: Commissioner for Environmental Sustainability Victoria (2019, p. 164)

VicForests’ expenditure in production has decreased 28 per cent since 2011 (Table 104). Production expenses comprise costs primarily incurred with external contractors, contracted to harvest standing timber and haul the resultant logs to the point-of-sale, normally the buyer’s facility.

Conversely, however, employee benefits, primarily staff salaries and associated benefits and expenses, remained relatively stable at around $14–15 million per year.

VicForests’ roading expenses, which have remained relatively stable since 2012, relate to costs VicForests pays to use the network for the haulage of timber. ‘Other operating expenses’ generally represent day-to-day running costs incurred in normal operations and are recognised as an expense in the reporting period in which they are incurred.

Table 104: Summary of VicForests expenses incurred in the delivery of services

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Expense Type (‘000) | Year | | | | | | | |
| 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| Production | 101,985 | 90,917 | 73,682 | 73,171 | 73,683 | 75,500 | 74,413 | 73,041 |
| Employee benefits | 14,102 | 13,752 | 13,924 | 13,719 | 12,841 | 13,793 | 13,938 | 15,569 |
| Roading | 7,052 | 6,666 | 5,932 | 4,796 | 6,806 | 6,534 | 6,457 | 6,622 |
| Other operating expenses | 8,800 | No data | 6,373 | 6,506 | 8,333 | NA | 8,378 | 7,108 |

Source: VicForests annual reports available at <http://www.vicforests.com.au/about-vicforests/corporate-reporting-1/corporate-reports>

**Indicator 6.2b: Investment in research, development, extension and use of new and improved technologies**

Forests provide a wide range of opportunities for research, and the knowledge gained from forests contributes to the broader knowledge of the community about nature, culture and heritage. Land managers, such as DELWP and Parks Victoria, recognise the importance of research in forests to ensure that management is informed by good science and evidence.

Forests provide opportunities for schools, tertiary institutions and the community to gain a greater appreciation and understanding of nature, culture and heritage through formal and informal programs. For example, Parks Victoria’s Research Partners Program encourages research to be undertaken in parks through collaboration with universities and other research institutions.[[17]](#footnote-17)

Data on education and research is more prevalent for parks than for State forests. On average, 215 research permits are issued in parks each year and 183,000 people participate in parks-related education programs (DELWP & Parks Victoria 2015, p. 117).

In an assessment of Parks Victoria’s Research Partners Program, it was determined that each dollar of Parks Victoria research funding resulted in approximately six dollars of leveraged research funding from partners. Some of these benefits could include productivity or efficiency gains in the management of native species or development of genetic material for medical research.

*Government investment in research, development, and education*

Investment outlined in Table 105 is limited to annual investments in forest management research and development (R&D) and education. This equates to $39 million invested since 2010–11 (an average of about $5.6 million per year). The annual data includes research payments but does not split payments for multi-year research projects. This is reflected in 2013–14, when the University of Melbourne received a total payment against multiple multi-year projects.

Between 2010–11 and 2016–17, six agencies and research organisations received funding. Consistently, the largest investment – $25 million over seven years (64 per cent of the overall investment) – was provided to the University of Melbourne. The second-largest was to the VFMP, which received about $5.9 million over seven years (15 per cent of the overall investment).

The Victorian Government also contributed 20 per cent of overall investments ($7.8 million) to the ARI and the Bushfire and Natural Hazards Cooperative Research Centre (CRC). Investment in R&D by VicForests in 2015–16 was approximately $161,000. All states and territories that manage public production forests also contribute to R&D through a forest growers levy, which supports the delivery of programs by Forest and Wood Products Australia.

Table 105: Victorian Government investment in forest management R&D and education, 2010–11 to 2016–17

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Research provider | Expenditure ($) | | | | | | | |
| 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | Total |
| The Arthur Rylah Institute | 975,000 | 710,000 | 430,000 | 836,273 | 232,244 | 655,397 | 281,493 | 4,120,407 |
| The University of Melbourne | 3,200,000 | 3,100,000 | 2,920,000 | 5,890,000 | 3,235,000 | 3,665,000 | 3,025,000 | 25,035,000 |
| VFMP | 727,000 | 1,253,000 | 750,000 | 800,000 | 830,000 | 830,000 | 740,000 | 5,930,000 |
| CRC for Forestry | 50,000 | 50,000 |  |  |  |  |  | 100,000 |
| Bushfire and Natural Hazards CRC | 213,000 | 746,000 | 200,000 | 875,000 | 550,000 | 200,000 | 880,000 | 3,664,000 |
| Toolangi Forest Discovery Centre | 48,393 | 52,115 |  |  |  |  |  | 100,508 |
| VicForests |  |  |  |  |  | 161,000 |  | 161,000 |
| **Total** | **5,213,393** | **5,911,115** | **4,300,000** | **8,401,273** | **4,847,244** | **5,511,397** | **4,926,493** | **39,110,915** |

Data source: DELWP corporate data

**Summary and future management of economic values**

There has been significant change in the structure and management of timber harvesting in the Victorian productive forest estate over the life of the Victorian RFAs. Bushfires, protection of additional areas in response to new threatened species detections, and various policy changes have decreased the area of public forest available for production forestry.

The area available for timber harvest (net harvestable area) in eastern Victoria reduced from 820,000 hectares at the time of the CRAs to 460,000 hectares in 2017. The decrease in forest area available for harvest has been attributed to the effect of a number of large bushfires and the resulting competition for forest required for species conservation or to protect sensitive vegetation such as rainforests and old-growth forests. The VicForests Resource Outlook illustrates the reduction in resource availability over time.

With harvesting significantly reduced in the West Victorian RFA region following the cessation of commercial harvesting operations in the Otway Ranges in 2008, the total area available and suitable for timber harvesting has more than halved since the commencement of the RFAs.

The volume of timber from native forests has also decreased over the period of the Victorian RFAs. The volume of D+ sawlogs harvested from eastern Victoria RFA regions decreased from 532,300 cubic metres in 2004–05 to 230,800 cubic metres in 2018–19. Pulpwood production has decreased at a similar rate to sawlog production since 2004–05. However, the production of other products, such as low-grade logs, has increased. Since 2005 the Central Highlands RFA region has accounted for approximately 75 per cent of all harvested volume from State forests.

As of 2015 there were 421,000 hectares of plantation forest in the five Victorian RFA regions. This comprises 222,000 hectares of softwood, 199,000 hectares of hardwood and 1,000 hectares of unknown or mixed species plantations. The area of softwood plantation has remained fairly stable, rising from 212,000 hectares in 1999–2000 to 226,000 in 2016–17; however, the area of hardwood plantation has increased significantly over the period of the RFAs, largely due to MISs in the early 2000s when the hardwood plantation area grew from 101,500 hectares in 1999–2000 to its peak of 203,000 hectares in 2010–11. Hardwood plantation area has not increased since the demise of the MIS in 2010–11, and it has declined where plantations established as part of the MIS in marginal areas were not replanted. No new hardwood plantation areas have been established since 2012–13.

The volume of wood harvested from Victorian plantation forests has increased significantly over the last 10 years, largely driven by the maturation of hardwood plantations managed for pulp logs. The gross output value of Victoria’s plantation timber harvest was $604 million in 2017–18, derived from harvest of 7.8 million cubic metres of plantation timber, of which 46 per cent was hardwood and 54 per cent softwood. In support of the plantation industry, in 2017–18 the Victorian Government committed $110 million to develop 550 hectares of plantation forest in the Latrobe Valley.

The Victorian Government makes available approximately 45,000 cubic metres of firewood from State forests in the RFA regions each year. VicForests also produces firewood for sale, and together this provides the primary source of heating for 10 per cent of all Victorian households and 25 per cent of regional Victorian households.

Victoria’s publicly owned native forests are available for a range of uses, including recreation, non-wood forest products, provision of ecosystem services, sequestration of carbon and research. The tourism and recreation sector is estimated to contribute $450 million to the economy each year within national parks alone.

Forest contributions to other ecosystem services provide considerable value, particularly for Melbourne’s reservoirs and the broader effect on water quality regulation. Similarly, climate mitigation and carbon sequestration, along with pollination services, air quality regulation and pest and disease control, are all reliant on healthy forests. These will continue to be important components of the broader services provided by forests in Victoria. Forests, both those in reserves and those currently managed for timber production, are becoming increasingly important elements of the visitor economy.

Investment and expenditure on forest management in Victoria’s RFA regions is ongoing and is strongly influenced by market conditions. Investment in R&D is returned in improved understanding of forests and better forest management.

On 7 November 2019, the Victorian Government announced a $120 million Native Forest Transition Package to support Victoria’s forest industry to move away from native timber by 2030. The announcement represented the largest area of native forest protected from timber harvesting in more than 20 years with the immediate protection of all remaining old growth forest and more than 96,000 hectares of State forest inhabited by Greater Gliders, Leadbeater’s Possum and other threatened species.

Modernised and extended Victorian RFAs will provide regulatory certainty to the timber industry to 2030 while it makes this transition.

Over the coming years, it is expected that a number of new forest industries will emerge, including growth in markets for nature-based and cultural tourism, carbon sequestration, biomass, wood pellets and engineered products.

1. [data.daff.gov.au/data/warehouse/aplnsd9ablf002/aplnsd9ablf201608/AustPlantationStats\_2016\_v.1.0.0.pdf](http://data.daff.gov.au/data/warehouse/aplnsd9ablf002/aplnsd9ablf201608/AustPlantationStats_2016_v.1.0.0.pdf) [↑](#footnote-ref-1)
2. [agriculture.gov.au/SiteCollectionDocuments/abares/publications/AustPlantationStats\_2019\_v.1.0.0.pdf](http://agriculture.gov.au/SiteCollectionDocuments/abares/publications/AustPlantationStats_2019_v.1.0.0.pdf) [↑](#footnote-ref-2)
3. VicForests http://www.vicforests.com.au/planning-1/resource-outlook-2017, viewed 2 August 2019 [↑](#footnote-ref-3)
4. Protected Flora list <https://www.environment.vic.gov.au/__data/assets/pdf_file/0011/50420/201706-FFG-protected-flora-list.pdf> [↑](#footnote-ref-4)
5. Note that harvest volumes in a year do not align with sales volumes and therefore stumpage revenue in any year due to the influence of placing timber in storage for later sale. [↑](#footnote-ref-5)
6. VicForests ‘Fact sheet: Commercial firewood sales’, available at: <http://www.vicforests.com.au/static/uploads/files/vicforests-firewood-fact-sheet-wfjpybkftntp.pdf> [↑](#footnote-ref-6)
7. [↑](#footnote-ref-7)
8. Regulated systems are water systems where the flow of the river is regulated through the operation of major storages or weirs to secure water supplies. Unregulated systems are river systems where no major dams or weir structures have been built to regulate the supply, or extraction, of water for consumptive use. [↑](#footnote-ref-8)
9. Department of Environment, Land, Water and Planning dataset: Crown land tenure - general licences [↑](#footnote-ref-9)
10. Department of Environment, Land, Water and Planning dataset: Apiary rights and bee farm and range licences [↑](#footnote-ref-10)
11. The purpose of a mining licence is to undertake mining and activities leading to or ancillary to mining. While exploration can be undertaken on a mining licence, ‘‘exploration only’ will only be permitted in very limited circumstances. These circumstances include a temporary mine closure, during which further exploration is undertaken to identify mineral resources required to recommence mining. [↑](#footnote-ref-11)
12. Victoria has 12 tourism regions which form the bases of the National Visitor Survey and International Visitor Survey published by Tourism Research Australia. [↑](#footnote-ref-12)
13. 1 tonne of carbon = 3.664 tonnes of carbon dioxide equivalent. See Department of the Environment and Energy 2017. [↑](#footnote-ref-13)
14. Note that there is a gap in the dataset, with data unavailable for 1999, 2000, 2001 and 2002. [↑](#footnote-ref-14)
15. World BankBank Carbon Pricing Dashboard: <http://carbonpricingdashboard.worldbank.org/map_data> [↑](#footnote-ref-15)
16. The DoEEDoEE publishes National Pollution Inventory data which includes emissions to the atmosphere. [↑](#footnote-ref-16)
17. See <https://parkweb.vic.gov.au/park-management/environment/research-and-scientific-management/research/research-partners-program> [↑](#footnote-ref-17)