Indicator 4.1e: Management of the risks to water quality in forests (2025)

This indicator measures the extent to which the risk to water quality has been explicitly identified and addressed in forest management. Water quality is important for forest ecosystem health and water supply for human use.

Context and definitions

Forests are vital to the protection and management of water resources, providing essential benefits for people and the environment. In general, forested catchments provide higher quality water supplies with a lower risk of variation in water quantity and quality than do catchments with other (non-forest) land uses.

Catchment: A drainage basin: an area of land bounded by natural topographic features such as ridges (watersheds), through which water flows in watercourses such as creeks, streams, and rivers.

Legally binding instrument: An instrument, law, regulation, act or process that has associated legal rights, duties and/or requirements.

Non-legally binding instrument: A policy, recommendation or guideline, or a system of policies, recommendations and/or guidelines, with a defined intention that they be abided by to achieve a desired outcome, but without legal penalties for non-compliance.

See Australia's forests and forestry glossary for definitions of other terms.

Key points

- Protection of water sources, particularly water quality, is among the major focuses of ecologically sustainable forest management.
- All states and territories have legislation, licences, codes of forest practice or best management practice manuals that mandate or guide practices to be carried out to maintain water quality.
- Knowledge of how forest management affects water quality is strong across jurisdictions, especially regarding soil erosion and mitigation.

Minimising the impacts of forest management activities on water quality

Large areas of forested land provide water for human consumption, irrigated agriculture, industrial uses and downstream environmental and cultural values. In general, forested catchments maintain water quality better than do catchments with other (non-forest) land uses, with the forest soil and litter acting as a water store and filter that improves water quality. However, forest management activities and other disturbances such as bushfires can affect water quality unless planned, managed or mitigated appropriately.

The main types of activities that can affect water quality in forested areas are fire, roading (road and track construction, maintenance and use), wood harvesting, and recreation. The most common impact associated with these activities is the generation and movement of sediment into drainage lines and water bodies (Hancock et al. 2017, Smith et al. 2010). Other potential impacts include pollution from application of fertilisers, herbicides and pesticides (FWPRDC 2006), and elevated water temperatures where streamside vegetation is removed (Shah et al. 2022).

Planned and unplanned fires have the potential to affect water quality through increased erosion risk coupled with more intense run-off after rain, which increases flows of sediment, ash, and nutrients potentially leading to hypoxic 'blackwater' events. On the other hand, reforestation can reduce the adverse impacts of erosion, dryland salinity and waterlogging, by stabilising soils, lowering groundwater levels and decreasing the volume of saline groundwater entering streams or drainage lines.

Careful planning and implementation of best practices during forest management activities is essential to minimise potential risks to water quality. Activities such as the following are commonly applied in the management of Australia's forests available for wood production:

- identifying vulnerable areas, such as wetlands, waterbodies, streambeds, streambanks, major water storages, and avoiding disturbance (such as log extraction) in these high-risk areas
- establishing riparian exclusion and buffer zones and maintaining vegetated buffer strips along waterways
- limiting soil disturbance during harvesting, by applying low-impact harvesting systems and rigorous implementation of wet-weather shutdowns (stopping operations during periods of wet weather)
- appropriate road and track planning, construction, maintenance and use, including drainage and stream crossings, to minimise sediment input into drainage lines
- implementing walk-over extraction, selecting suitable locations for log dumps and landings, and arranging log extraction tracks appropriately during wood harvesting, for example by contouring
- planting trees along the contour of slopes during plantation establishment
- carefully managing and minimising fertiliser, herbicide and pesticide application, particularly near riparian areas
- undertaking prescribed burning during milder seasonal conditions to encourage a mosaic of burnt and unburnt area, particularly in sensitive areas such as riparian zones
- rehabilitating disturbed areas upon completion of an activity (such as by using firebreaks, log landings, extraction tracks)
- conducting regular audits of all forest management operations to ensure compliance with licences, codes of practice and operational procedures.

Instruments in place that address risks to water quality

Various legally binding and non-legally binding instruments address water quality protection requirements and measures. Instruments also provide benchmarks against which the management of water quality can be assessed. Legally binding instruments include legislation, regulations and licences, and non-legally binding instruments include some codes of practice, guidelines and forest management plans.

A list of instruments relating to the protection of water quality is provided in Table 4.1e-1 of the Supporting Information for Indicator 4.1e.

Australian Capital Territory

Instruments in the Australian Capital Territory (ACT) relating to the protection of water quality include the *Water Resources Act 2007*, *Environment Protection Act 1997*, the *ACT Code of Forest Practices 2005* (updated in 2022) and the *ACT Strategic Bushfire Management Plan 2019–2024* (under the *Emergencies Act 2004*). These instruments require risk assessments to be performed when planning management activities in plantation operations and nature conservation reserves.

Wood harvesting in the ACT is limited to plantation forests. The protection of water quality in plantation forests is addressed by the *ACT Code of Forest Practices 2005* and *Strategic Plantation Management Plan 2017-2022* (updated 2025). The Code specifies protection of waterways and riparian zones through establishment of

streamside management zones and water quality monitoring. The conduct of logging operations requires an Environmental Authorisation (EA) from the Environment Protection Authority (EPA), which includes conditions relating to the protection of water resources and the monitoring of water quality. Non-compliance with these EA conditions can trigger enforcement actions by the ACT EPA.

The *ACT Strategic Bushfire Management Plan 2019–2024* specifies fuel reduction using planned fire as a key measure to minimise the impacts of unplanned bushfires on water supplies (yield and quality) by reducing the size and intensity of bushfires in water catchment areas when they occur.

New South Wales

New South Wales has legally binding instruments that address risks to water quality for forest management activities in both the native forest and plantation estates.

Integrated Forestry Operations Approvals set out detailed environmental protection protocols and conditions to minimise the impact of native forest management activities on water quality and aquatic habitats. This includes requirements to ensure that wood harvesting activities, road, track and crossing construction, maintenance and use have minimum negative impacts on water quality. These measures are supported by ongoing water quality monitoring.

The *Private Native Forestry Codes of Practice* (2022) contains provisions for protecting water quality. Mitigation measures include establishing riparian exclusion and buffer zones, extraction track specifications, appropriate road and track drainage systems and stream crossings, and complying with wet-weather restrictions.

Plantation forestry in New South Wales is regulated under the *Plantations and Reafforestation Act 1999* and the *Plantations and Reafforestation (Code) Regulation 2001*. These instruments include specific provisions to protect water quality, such as riparian buffer zones to reduce sedimentation and limit nutrient runoff.

The Ecological Health Performance Scorecards Program measure ecological health across eight national parks in New South Wales including those with forest ecosystems. The program includes measurement of the quality of habitat and ecological processes, including vegetation structure, water quality and soil chemistry.

The *Bush Fire Environmental Assessment Code 2021* includes standards to prevent soil erosion and instability for bushfire hazard reduction activities that have been authorised under the *Rural Fires Act 1997* across all tenures. These measures reduce the transport of sediment, organic matter, and other contaminants into waterways and helps maintain water quality and aquatic ecosystem health.

Northern Territory

The *Water Act 1992* and *Water Regulations 1992* are the primary legal instruments that address water resources in the Northern Territory, however, they do not specifically cover forestry management activities. The *Water Act 1992* requires licenses for water extraction for development activities and the monitoring of surface water.

The *Sustainable Forestry Practices: Guidelines for the Northern Territory* (2021) is a non-legally binding instrument developed by the Territory Natural Resource Management working group that provides practical guidance for plantation operations, including site-specific water quality protection measures.

Queensland

The *Environmental Protection Act 1994*, the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* and the *Water Act 2000* are the main pieces of legislation in Queensland under which water quality is protected. These pieces of legislation support ecologically sustainable development without being specific to forest management activities. The *Forestry Act 1959* requires state-owned forests and timber reserves to be used and managed in a manner that protects water quality.

Several codes of practice are in place to protect water quality in Queensland, and are applied when planning and carrying out forest management activities. The legally binding *Code of practice for native forest timber production on Queensland's State forest estate 2020* prescribes operational standards for wood harvesting and associated activities on public land, to achieve a high level of protection of environmental values, including water quality. For freehold land, the legally binding *Managing native forest practice: A self-assessable vegetation clearing code* (2014) applies. This self-assessable code specifies buffer and filter zone requirements for wetlands and streams. For plantations, the *Timber Plantation Operations Code of Practice for Queensland* (2015) is a non-legally binding instrument that provides best practice guidelines for the protection of water quality values.

South Australia

The *Environment Protection (Water Quality) Policy 2015*, established under the *Environment Protection Act 1993*, requires commercial plantation establishment and harvesting operations to be conducted in ways that minimise or prevent water contamination. The Policy also sets out provisions to protect water quality related to prescribed burning activities.

The *Forestry Regulations 2013* made under the *Forestry Act 1950* empower ForestrySA to protect water resources in State forest reserves. Specifically, Regulation 16 of the *Forestry Regulations 2013* prohibits unauthorized activities that may harm water resources within forest reserves, such as pollution or interference with watercourses.

The non-legally binding best management practices described in the *Guidelines for Plantation Forestry in South Australia 2009* seek to minimise the risk to water quality by considering streams, drainage lines, water bodies and slope, to apply appropriate management practices and streamside buffers.

Tasmania

The *Water Management Act 1999*, *Water Management Regulations 2019*, *Environmental Management and Pollution Control Act 1994*, *Forest Practices Act 1985, Forest Practices Code*, and the *Forest Practices Regulations 2017* specify how water resources should be managed and protected in forests, including during forestry operations.

The *Forest Practices Code* applies to forest management activities on all tenures and requires that forest practices are planned and conducted in a manner that does not cause significant deviations from natural ranges objectives for water management and water quality standards by minimising the risk of sedimentation and pollution arising from forest practices. Practical measures to achieve Code standards are published as additional guideline documents and in training courses for foresters.

Victoria

Instruments to protect water quality include the *Water Act 1989*, *Catchment and Land Protection Act 1994*, *National Parks Act 1975*, Sustainable Water Strategies, *Code of Practice for Timber Production 2014* (as amended 2022), and the *Code of Practice for Bushfire Management on Public Land 2025*.

The *Water Act 1989* provides a legal framework that protects rights to water and entitlements for all Victorians. It provides for the integrated management of all elements of the terrestrial phase of the water cycle and to promote the orderly, equitable and efficient use of water resources.

The *Catchment and Land Protection Act 1994* includes provisions to declare a catchment as a special area classified as a 'Special Water Supply Catchment Area'. While it does not explicitly address forest management activities, the Act provides the legislative framework within which activities must be considered as part of broader catchment management.

The *Water Act 1989* and the *Catchment and Land Protection Act 1994* were amended in 2019 to align with the Victorian Government's long-term water strategy, *Water for Victoria*; and to recognise Traditional Owners and

Aboriginal Victorians in water and catchment management. *Water for Victoria* outlines commitments to periodically assess risks to water availability, including those linked to land use change activities.

The *National Parks Act 1975* makes special provision for designated water supply catchment areas in Kinglake, Yarra Ranges and Great Otway National Parks for the protection of the catchment areas and the maintenance of the water quality, protection of the water resources and restriction of human activity in those areas.

The *Environment Protection Act 2017* includes a general environmental duty for everyone to reduce risk to human health and the environment from pollution and waste as a result of their activities. Businesses and individuals involved in forest management need to take reasonably practicable steps to reduce risks to water quality.

The *Victorian Waterway Management Strategy 2013* sets regional planning arrangements for water quality management and objectives for water quality monitoring in relation to forestry, catchment development, recreational activities, and extreme events such as bushfire and flood.

Sustainable Water Strategies secure the water future of Victoria's regions. There are three current regional Sustainable Water Strategies across Victoria. Each Sustainable Water Strategy sets policy directions and outlines actions to better manage and respond to threats to water availability and water quality for the region.

The *Code of Practice for Timber Production 2014* (amended 2022) includes explicit prescriptions and environmental safeguards for commercial timber harvesting in Victoria, including requirements related to water quality. It mandates the use of buffers and filter strips in high-risk areas and Special Water Supply Catchment Areas to maintain water quality and waterway health.

The *Code of Practice for Bushfire Management on Public Land 2025* outlines strategies to reduce the impact of bushfire management activities on key assets including water catchments.

Western Australia

Water resource protection and management in Western Australia is regulated under the *Rights in Water and Irrigation Act 1914*, *Environmental Protection Act 1986*, *Conservation and Land Management Act 1984* and *Biodiversity Conservation Act 2016*. The implementation of these legislative frameworks is supported by the *Forest Management Plan 2024-2033* in the south-west forest region, which recognises the importance of forests in protecting water quality.

The *Forest Management Plan 2024-2033* discusses measures to manage the risk of stream salinity due to rising groundwater tables, and measures to manage the risk of water pollution resulting from erosion or contamination with bacteria, hydrocarbons or pesticides. The *Forest Management Plan 2024-2033* is supported by various manuals such as the *Guidelines for Protection of the Values of Informal Reserves and Fauna Habitat Zones* (2009), which excludes wood harvesting from informal reserves along streams and rivers to protect water quality.

The *Code of Practice for Fire Management* (2008) applies to State-managed land and guides land managers to balance the impacts of fire management activities on water quality.

Water quality knowledge base

The knowledge base relating to forest management activities and water quality is reasonably strong in all jurisdictions and is particularly strong regarding soil erosion and related mitigation measures.

Foundational research from the 1990s and early 2000s, especially by the Cooperative Research Centre for Catchment Hydrology, provided critical insights into sediment sources, transport mechanisms, and mitigation strategies. These studies identified forest roads, snig tracks, and road-to-stream connectivity as dominant contributors to sediment delivery, and demonstrated that sediment loads typically decline within one to two years post-harvest when best management practices are applied.

More recent research has built on this foundation, refining our understanding of sediment dynamics under contemporary forest management regimes. A 2020 report commissioned by the New South Wales Natural Resources Commission concluded that sediment delivery from timber harvesting can be effectively managed with BMPs, particularly through the use of buffers and careful road design (Alluvium, 2020). However, it also highlighted emerging risks from more frequent and intense rainfall and wildfire events, which may interact with harvesting activities to amplify sediment transport.

Ongoing research continues to explore suspended sediment export and the implications of bushfires for downstream water quality.

Wood harvesting impacts on water quality

More recent studies in native forests and plantations have investigated the potential impacts of forest management activities on sediment movement and downstream water quality. These studies span a range of harvesting intensities, road activities, and soil types, and build on earlier research by incorporating updated best management practices and monitoring techniques. A replicated catchment experiment in native eucalypt forest in Kangaroo River State Forest, near Coffs Harbour in New South Wales, showed that selective harvesting using best management practices did not affect suspended sediment yields in two of three treated catchments. In the third catchment, an increase in sediment loads and concentration at the time of harvesting subsided within 12 months (Webb et al. 2012). Hancock et al. (2017) also found no difference in sediment loads between harvested and control catchments in Chichester State Forest, also in New South Wales.

Walsh (2017) assessed the impact of wood harvesting in small head-water catchments and in 10-metre-wide buffer strips on water turbidity and sediments in Brooman State Forest, near Batemans Bay, New South Wales. Harvesting increased runoff and sediment levels but did not increase turbidity or sediment concentration, and sediment levels dissipated over 18 months where there was no harvesting in the buffers. Webb and Hanson (2013), working in coastal catchments on the mid-north coast of New South Wales, showed that preventing or reducing road-to-stream drainage connectivity is essential for reducing the impacts of forest roads on water quality.

A 2020 report commissioned by the New South Wales Natural Resources Commission concluded that there is strong evidence that with best management practices, the effect of wood harvesting activities on sediment delivery to streams can be effectively managed (Alluvium 2020).

Prescribed burning impacts on water quality

In Australia's fire-adapted forests, prescribed burning is a widely used management tool to reduce understorey fuel loads, particularly in dry eucalypt forests (Klimas et al. 2020). Smith et al. (2010) found that prescribed burning in forested catchments led to increased suspended sediment and phosphorous concentrations, but that water quality recovered within 12–18 months with the recovery of vegetation cover. In many cases, forest management practices have achieved an optimal balance of wood production and water provision through a combination of carefully scheduled harvesting and fire management (Bren et al. 2013).

Bushfires

High severity bushfires can impact on water quality through increased sedimentation and eutrophication (Jackson et al. 2024). Flow of organic matter, debris and sediment from burnt forests into streams during rainfall events that follow fires can lead to drastic changes in water chemistry and a decrease in dissolved oxygen (Isaza et al. 2022). This has led to aquatic fauna mortality events and local extinction (Shelley et al. 2021; Whiterod et al. 2023).

The mass movement of materials from the landscape, termed 'debris flow', can occur if an intense rainfall event follows a bushfire. This debris flow can cause physical damage to water infrastructure and affect water quality in streams and storages (Nyman et al. 2019). Since 2010 the Victorian Department of Energy, Environment and

Climate Action and the University of Melbourne have collaborated through the Integrated Forest Ecosystem Research agreement to enhance the evidence base for managing the impacts of fire, climate and management regimes on multiple forest values in Victoria's forest ecosystems now and into the future. This includes research to develop risk assessment tools to better predict post-fire water issues such as water contamination and debris flows (Nyman et al. 2020). Engineering structures and hillslope treatments are also being trialled in multiple water supply catchments to help risk mitigation and management.

Climate change

Climate change is altering water quality and overall forest hydrology, with cascading effects on aquatic and riparian ecosystems. Rising temperatures and more frequent extreme events, such as bushfires, can lead to increased sedimentation, and nutrient runoff into rivers and reservoirs. In the 2019–20 bushfires, extensive forest loss followed by the excessive release of organic matters into waterways led to hypoxic 'blackwater' events. Blackwater events pose a significant threat to threatened species such as the Murray Cod (*Maccullochella peelii*) and Trout Cod (*M. macquariensis*), which rely on clean, oxygen-rich water for spawning and survival (Shelley et al. 2021; Silva et al. 2020). Changing rainfall patterns and prolonged drought reduces streamflow, concentrating pollutants and increasing water temperatures, which intensifies stress on aquatic fauna and deteriorates the ecological integrity of forested waterways.

Monitoring

Various water monitoring programs are in place across Australia to track the impacts of forest management activities on water quality.

For New South Wales, the Coastal Integrated Forestry Operations Approvals includes requirements for a water quality monitoring program (NRC 2020). The Forestry Corporation of New South Wales has been monitoring water quality in native forests and plantations since the 1960s. The early aims of the program were to check if forestry activities had an identifiable impact on water quality and to quantify any impact. More recently, a macroinvertebrate sampling program has commenced and is being assessed for use in catchment scale monitoring. Results from the program have shown that water from native forest streams is of a higher quality than from streams close to softwood plantations (EPA 2024).

The Barmah–Millewa Forest Monitoring program, a core component of The Living Murray (TLM) project, is an initiative coordinated by the Murray–Darling Basin Authority that surveys key indicators of river health, including the regeneration of red gum forest, native fish, reptiles and birds (Durkin et al. 2024; Jones et al. 2025; Just et al. 2024; Raymond et al. 2024; Tzaros and Tzaros 2024), providing baseline data for assessing the forest ecosystem health and water-related functions.

The River Health Monitoring Program in Tasmania focuses on river health by monitoring macroinvertebrate communities, species diversity, algal cover, fine sediments, and dissolved oxygen (FPA 2022). The data are used to establish baseline environmental standards and to determine how forestry and other diffuse disturbances may influence river health (DPIPWE 2018, 2020). The Compliance program of the Forest Practices Authority checks that the *Forest Practices Code* has been effectively applied during forest operations and applies sanctions such as fines where a breach of the Code (including breaches affecting water quality and riparian zone integrity) has occurred. Photographic monitoring of streams is being conducted in high-risk areas and scientific studies have been conducted in plantation catchments where intense rainfall has induced landslides which in turn have affected stream quality (Slee and McIntosh 2022). As a result of such studies recommendations are made to enhance stream management provisions (e.g. by applying wider streamside reserves) in higher risk areas.

Not all river health monitoring programs specifically assess forestry impacts, but they still contribute valuable insights that support ecologically sustainable forest management. For example, the Australian Capital Territory has a comprehensive hydrometric monitoring network that allows for the continuous observation of streams including those within forest ecosystems.

Supporting information for Indicator 4.1e: Management of the risks to water quality in forests

Table 4.1e-1: Legally binding and non-legally binding instruments that address management and protection of water resources (water quantity and quality) Note: This table is identical to Table 4.1d-1.

State/territory	Instrument (full title)	Legally binding (Yes/No)	Tenure categories to which it applies	Explicitly addresses Water Quantity/Quality or Both
Australian Capital Territory	ACT Code of Forest Practice (updated 2022)	Yes	Multiple-use public forest and Private forest	Both
	ACT Water Resource Plan 2019	Yes	All tenures	Quantity
	The Australian and New Zealand Standard for Sustainable Forest Management (AS/NZS 4708:2021), Responsible Wood	No	Multiple-use public forest and Private forest	Indirectly*
	The FSC National Forest Stewardship Standard of Australia, Forest Stewardship Council	No	Multiple-use public forest and Private forest	Indirectly*
	Environment Protection Act 1997	Yes	All tenures	Both
	Environment Protection Regulation 2005	Yes	All tenures	Quality
	Nature Conservation Act 2014	Yes	All tenures	Indirectly*
	Planning Act 2023	Yes	All tenures	Quantity
	Public Unleased Land Act 2013	Yes	All tenures	Indirectly*
	Strategic Plantation Management Plan (updated 2025)	Yes	Multiple-use public forest and Private forest	Both
	Water quality environment protection policy 2008	No	All tenures	Quality
	Water Resources Act 2007	Yes	All tenures	Quantity
	Water Resources Environmental Flow Guidelines 2019	No	All tenures	Quantity
	Strategic Bushfire Management Plan 2019 – 2024	No	All tenures	Both
New South Wales	The Australian and New Zealand Standard for Sustainable Forest Management (AS/NZS 4708:2021), Responsible Wood	No	Multiple-use public forest and Private forest	Indirectly*
	The FSC National Forest Stewardship Standard of Australia, Forest Stewardship Council	No	Multiple-use public forest and Private forest	Indirectly*
	Bush Fire Environmental Assessment Code 2021	Yes	All tenures	Quality
	Environment protection licences (under the *Protection of the Environment Operations Act 1997*)	Yes	Multiple-use public forest	Quality
	Forestry Act 2012	Yes	Multiple-use public forest and Other Crown land	Quality
	Forest Practices Code Part 1 - Timber Harvesting in Forests NSW Plantations 2005	No	Multiple-use public forest	Both
	Forest Practices Code Part 2 - Timber Harvesting in Native Forests 1998	No	Multiple-use public forest	Both
	Forest Soil and Water Protection - A Manual for Forestry Operators 2000	No	Multiple-use public forest	Both
	Integrated Forestry Operations Approvals made under the *Forestry Act 2012*	Yes	Multiple-use public forest and Other Crown land	Both
	Pesticides Act 1999	Yes	All tenures	Quality
	Pesticides Regulation 2017	Yes	All tenures	Quality

	Plantations and Reafforestation Act 1999	Yes	Multiple-use public forest and Private forest	Indirectly*
	Plantations and Reafforestation (Code) Regulation 2001	Yes	Multiple-use public forest and Private forest	Both
	Private Native Forestry Codes of Practice 2022	Yes	Private forest	Both
	Rural Fires Act 1997	Yes	All tenures	Indirectly*
	Rural Fires Regulation 2008	Yes	All tenures	Indirectly*
	State Environmental Planning Policy (Coastal Management) 2018	Yes	All tenures	Both
	Water Management Act 2000	Yes	All tenures	Both
	Water resource plans	Yes	All tenures	Quantity
	Water sharing plans	Yes	All tenures	Quantity
Northern Territory	The Australian and New Zealand Standard for Sustainable Forest Management (AS/NZS 4708:2021), Responsible Wood	No	Private forest	Indirectly*
	The FSC National Forest Stewardship Standard of Australia, Forest Stewardship Council	No	Private forest	Indirectly*
	Sustainable Forestry Practices: Guidelines for the Northern Territory 2021	No	Private forest	Quality
	Water Act 1992	Yes	All tenures	Both
	Water Allocation Plans declared by the Minister under section 22B of the *Water Act 1992*	No	All tenures	Both
	Water Regulations 1992	Yes	All tenures	Both
Queensland	The Australian and New Zealand Standard for Sustainable Forest Management (AS/NZS 4708:2021), Responsible Wood	No	Multiple-use public forest and Private forest	Indirectly*
	The FSC National Forest Stewardship Standard of Australia, Forest Stewardship Council	No	Multiple-use public forest and Private forest	Indirectly*
	Code of practice for native forest timber production on Queensland's State Forest estate 2020	Yes	Multiple-use public forest, Leasehold forest, and Other Crown land	Both
	Environmental Protection Act 1994	Yes	All tenures	Both
	Environmental Protection (Water and Wetland Biodiversity) Policy 2019	Yes	All tenures	Both
	Forestry Act 1959	Yes	Multiple-use public forest, Leasehold forest, Other Crown land and Private forest	Both
	Managing native forest practice: A self-assessable vegetation clearing code 2014	Yes	Leasehold forest and Private forest	Quality
	Timber Plantation Operations Code of Practice for Queensland 2015	No	Multiple-use public forest and Private forest	Quality
	Vegetation Management Act 1999	Yes	All tenures	Both
	Water Act 2000	Yes	All tenures	Both
South Australia	The Australian and New Zealand Standard for Sustainable Forest Management (AS/NZS 4708:2021), Responsible Wood	No	Multiple-use public forest and Private forest	Indirectly*
	The FSC National Forest Stewardship Standard of Australia, Forest Stewardship Council	No	Multiple-use public forest and Private forest	Indirectly*
	Environment Protection Act 1993	Yes	All tenures	Both

	Environment Protection (Water Quality) Policy 2015	No	All tenures	Both
	Forestry Act 1950	Yes	All tenures	Indirectly*
	Forestry Regulations 2013	Yes	All tenures	Both
	Guidelines for plantation forestry in South Australia 2009	No	Multiple-use public forest and Private forest	Both
	Guidelines for the Management of Roadside Native Vegetation and Regrowth Vegetation 2019 (amended 2020)	No	All tenures	Both
	Landscape South Australia Act 2019	Yes	All tenures	Both
	Native Vegetation Regulations 2017	Yes	All tenures	Both
	South Australian Firebreaks, Fire Access Track and Sign Standards Guidelines	No	All tenures	Both
Tasmania	The Australian and New Zealand Standard for Sustainable Forest Management (AS/NZS 4708:2021), Responsible Wood	No	Multiple-use public forest	Indirectly*
	The FSC National Forest Stewardship Standard of Australia, Forest Stewardship Council	No	Multiple-use public forest	Indirectly*
	Environmental Management and Pollution Control Act 1994	Yes	All tenures	Both
	Forest Practices Act 1985	Yes	All tenures	Both
	Forest Practices Code 2020	Yes	All tenures	Both
	Water Management Act 1999	Yes	All tenures	Both
	Water Management Regulations 2019	Yes	All tenures	Both
Victoria	The Australian and New Zealand Standard for Sustainable Forest Management (AS/NZS 4708:2021), Responsible Wood	No	Multiple-use public forest and Private forest	Indirectly*
	The FSC National Forest Stewardship Standard of Australia, Forest Stewardship Council	No	Multiple-use public forest and Private forest	Indirectly*
	Catchment and Land Protection Act 1994	Yes	All tenures	Quality
	Code of Practice for Bushfire Management on Public Land 2025	Yes	Multiple-use public forest	Both
	Code of Practice for Timber Production 2014 (amended in 2022)	Yes	All tenures	Both
	Conservation, Forests and Lands Act 1987	Yes	All tenures	Quality
	Environment Protection Act 2017	Yes	All tenures	Quality
	Management guidelines for private native forests and plantations Code of Practice for Timber Production 2014	No	Private forest	Both
	National Parks Act 1975	Yes	Multiple-use public forest	Quality
	State Emergency Management Plan Bushfire Sub-Plan	No	All tenures	Quality
	Sustainable Water Strategies	No	All tenures	Quantity
	Victorian Waterway Management Strategy	No	All tenures	Quality
	Water Act 1989	Yes	All tenures	Both
	Water for Victoria	No	All tenures	Both
Western Australia	The Australian and New Zealand Standard for Sustainable Forest Management (AS/NZS 4708:2021), Responsible Wood	No	Multiple-use public forest and Private forest	Indirectly*
	The FSC National Forest Stewardship Standard of Australia, Forest Stewardship Council	No	Multiple-use public forest and Private forest	Indirectly*
	Code of Practice for Fire Management 2008	No	Multiple-use public forest and Nature conservation reserve	Quality
	Code of Practice for Timber Plantations in Western Australia 2006	No	All tenures	Both

	Conservation and Land Management Act 1984	Yes	All tenures	Both
	Environmental Protection Act 1986	Yes	All tenures	Quality
	Environmental Protection (Clearing of Native Vegetation) Regulations 2004	Yes	All tenures	Both
	Forest Management Plan 2024-2033		Multiple-use public forest and Nature conservation reserve	Both
	Rights in Water and Irrigation Act 1914	Yes	All tenures	Both
	Waterways Conservation Act 1976	Yes	All tenures	Both

*The instrument addresses broader sustainable management goals but does not contain explicit dedicated clauses on managing water quantity and/or quality.

References

Alluvium (2020). *Review of the current state of knowledge for the monitoring of forestry impacts on waterway health in NSW coastal forests – Final report.* Report for the Natural Resources Commission, pp 1-33. December 2020.

Bren L, Jeyasingham J, Davey S (2013). Impacts of native forest harvesting on flows into the Murray–Darling Basin system. *Australian Forestry* 76:91–100.

DPIPWE (Department of Primary Industries, Parks, Water and Environment) (2018). *Water Assessment Aquatic Ecology Report Series. Review of the Tasmanian River Health Monitoring Program (1994-2016): Program Evaluation and Redirection*. Tasmania Department of Primary Industries, Parks, Water and Environment, Hobart.

DPIPWE (Department of Primary Industries, Parks, Water and Environment) (2020). *Temporal and Spatial Patterns in River Health across Tasmania, and the Influence of Environmental Factors*. Tasmania Department of Primary Industries, Parks, Water and Environment, Hobart.

Durkin L, Howard K, Ward KA (2024). *The Living Murray-Turtle and Frog Condition Monitoring in Barmah-Millewa Forest: Report for the 2023-24 Survey Season*. Arthur Rylah Institute for Environmental Research, Technical Report Series No. 383. Department of Energy, Environment and Climate Action, Melbourne.

EPA (Environment Protection Agency) (2024). *NSW forestry snapshot report 2021-2022: Implementation of NSW Forest Agreements and Integrated Forestry Operations Approvals.* New South Wales Environment Protection Agency, Sydney.

FPA (Forest Practices Authority) (2020). *Forest Practices Code*. Forest Practices Authority Tasmania, Hobart.

FPA (Forest Practices Authority) (2022). *State of the forests Tasmania 2022*. Forest Practices Authority Tasmania, Hobart.

FWPRDC (Forest and Wood Products Research and Development Corporation) (2006). *Pesticides in plantations: The use of chemical pesticides by the Australian plantation forest industry – Summary Report*. Forest and Wood Products Research and Development Corporation, Melbourne.

Hancock GR, Hugo J, Webb AA, Turner L (2017). Sediment transport in steep forested catchments – An assessment of scale and disturbance. *Journal of Hydrology* 547: 613–622.

Isaza DFG, Cramp RL, Franklin CE (2022). Fire and rain: A systematic review of the impacts of wildfire and associated runoff on aquatic fauna. *Global Change Biology* 28(8): 2578 – 2595.

Jackson R, Bal Khrishna KC, Li M, Sathasivan A, Senevirantha L (2024). The influence of recent bushfires on water quality and the operation of water purification systems in regional NSW. *Scientific Reports* 14:16222.

Jones MJ, Stuart IG, Sharpe C, Childs P, Cronin B, Smiles-Schmidt M, Tonkin Z, Raymond S, Duncan M, Ward K, Fanson B (2025). *Overwintering, recruitment and residency of native fish in the Barmah-Millewa Forest and associated waterways*. Arthur Rylah Institute for Environmental Research Published Report, Melbourne.

Just K, Bennetts K, Wright T (2024). *The Living Murray Barmah-Millewa Wetland Vegetation Condition Monitoring 2024 Annual Report*. Consultant Report to Goulburn Catchment Management Authority, Shepparton.

Klimas K, Hiesl P, Hagan D, Park D (2020). Prescribed fire effects on sediment and nutrient exports in forested environments: a review. *Journal of Environmental Quality* 49: 793 – 811.

NRC (Natural Resources Commission) (2020). *Coastal IFOA: Monitoring Plan – Waterway and wetland health.* New South Wales Natural Resources Commission, Sydney.

Nyman P, Rutherfurd ID, Lane PNJ, Sheridan GJ (2019). Debris flows in southeast Australia linked to drought, wildfire, and the El Niño–Southern Oscillation. *Geology*, 47(5). doi.org/10.1130/G45939.1

Nyman P, Yeates P, Langhans C, Noske PJ, Peleg N, Scharer C, Lane PNJ, Haydon S, Sheridan GJ (2020). Probability and consequence of postfire erosion for treatability of water in an unfiltered supply system. *Water Resources Research, 57*. doi.org/10.1029/2019WR026185

Raymond S, Duncan M, Tonkin Z, Hackett G, Robinson W (2024). *Barmah-Millewa Fish and Crayfish Condition Monitoring (2007-2024)*. Arthur Rylah Institute for Environmental Research Unpublished Report, Melbourne.

Shah NW, Baillie B, Bishop K, Ferraz S, Högbom L, Nettles J (2022). The effects of forest management on water quality. *Forest Ecology and Management* 522: 120397.

Shelley JJ, Raadik TA, Lintermans M (2021). *Summary of the 2019/20 bushfire impacts on freshwater fish and emergency conservation response in south-eastern Australia*. NESP Threatened Species Recovery Hub Project 8.3.6 update report, Brisbane.

Silva LGM, Doyle KE, Duffy D, Humphries P, Horta A, Baumgartner LJ (2020). Mortality events resulting from Australia's catastrophic fires threaten aquatic biota. *Global Change Biology* 26(10):5345-5350.

Slee A, McIntosh PD (2022). History of slope instability in the Oldina plantation, Tasmania. *New Zealand Journal of Forestry Science* 52:5. doi.org/10.33494/nzjfs522022x168x

Smith HG, Sheridan GJ, Lane PNJ, Shermin CB (2010). Paired *Eucalyptus* forest catchment study of prescribed fire effects on suspended sediment and nutrient exports in south-eastern Australia. *International Journal of Wildland Fire* 19(5):624-636.

Tzaros C, Tzaros J (2024). *Bush bird monitoring in the Barmah–Millewa Forest 2023–24*. Unpublished report to NSW National Parks and Wildlife Service, Department of Climate Change, Energy, the Environment and Water.

Walsh P (2017). *Sediment and Wood Dynamics in Ephemeral Headwater Channels in Forests Managed for Timber Production in NSW*. PhD Thesis. The Australian National University.

Webb AA, Hanson IL (2013). Road to stream connectivity: implications for forest water quality in a sub-tropical climate. *British Journal of Environment & Climate Change* 3:197–214.

Webb AA, Kathuria A, Turner L (2012). Longer-term changes in streamflow following logging and mixed species eucalypt forest regeneration: The Karuah experiment. *Journal of Hydrology* 464–465:412–422.

Whiterod NS, Lintermans M, Cramp RL, Franklin CE, Kennard MJ, McCormack R, Pearce L, Raadik TA, Ward M, Zukowski S (2023). The impact of the 2019–20 Australian wildfires on aquatic systems. In *Australia's Megafires: Biodiversity Impacts and Lessons from 2019–2020* (pp. 59-77). CSIRO Publishing, Melbourne.

More information

Learn more about the Criterion 4 of Australia's State of the Forests Report.

Web agriculture.gov.au/abares/forestsaustralia/sofr/

Email Info.ABARES@aff.gov.au

Acknowledgement of Country

We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.

Citation and cataloguing data

This publication (and any material sourced from it) should be attributed as: Montreal Process Implementation Group for Australia (MIG) and National Forest Inventory Steering Committee (NFISC) 2025, Indicator 4.1e: Management of the risks to water quality in forests, *Australia's State of the Forests Report*, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, December. CC BY 4.0.