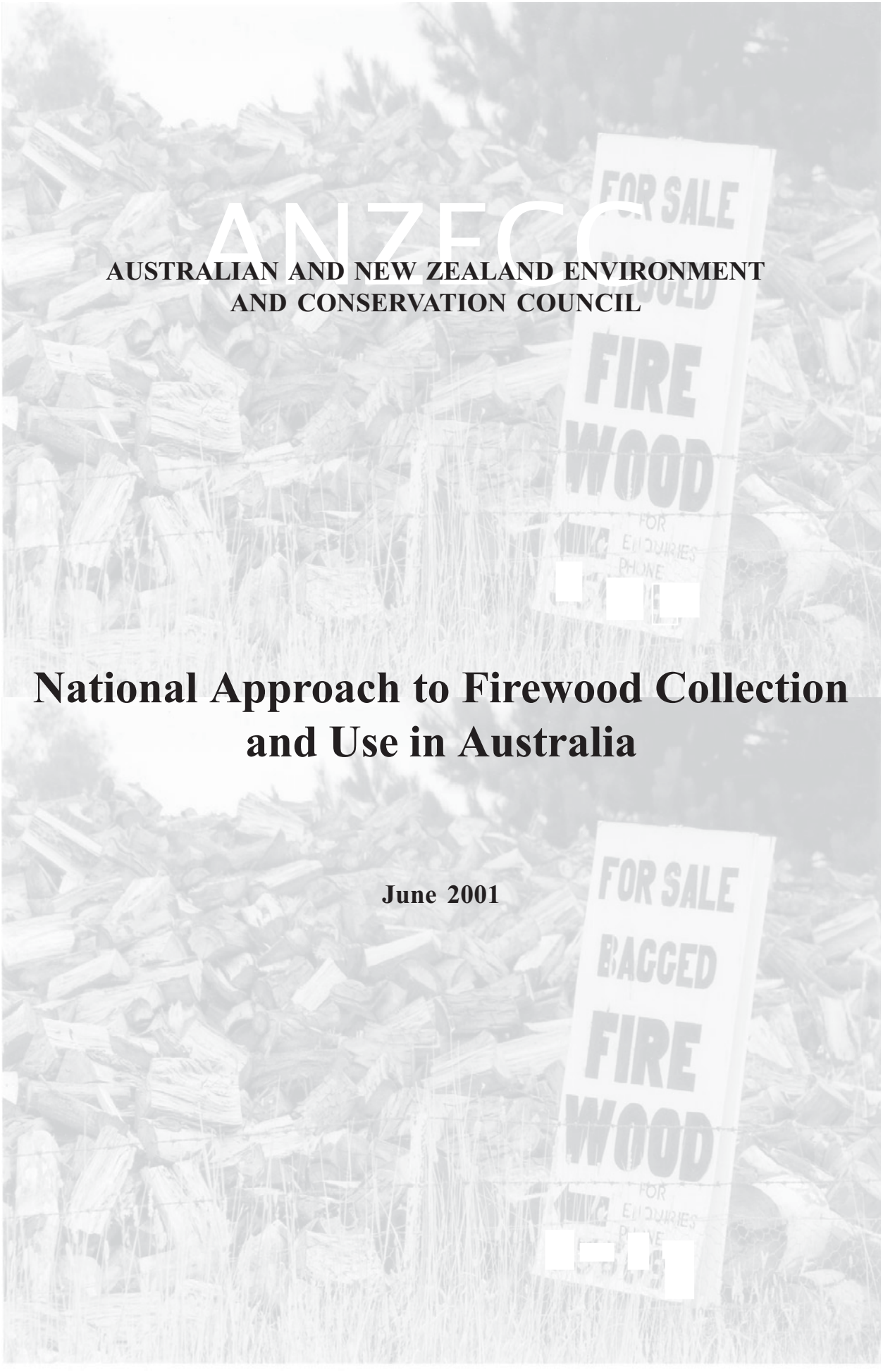


ANZECC

AUSTRALIAN AND NEW ZEALAND ENVIRONMENT AND CONSERVATION COUNCIL

National Approach to Firewood Collection and Use in Australia

June 2001

Contents

Introduction

Context

This national approach to firewood collection and use in Australia has been developed by a Firewood Taskforce established under the auspices of the Australian and New Zealand Environment and Conservation Council (ANZECC). It aims to ensure all firewood collection, including commercial cutting, is ecologically sustainable and not a major cause of loss and degradation of remnant and woodland ecosystems or the habitats of threatened species. It does not seek to stop firewood collection. Rather, it seeks to reduce its impact in areas of concern and to ensure firewood is obtained from sustainable sources over the long term.

Not all elements of this strategy will be appropriate or necessary in all jurisdictions. But it will provide a national framework that each jurisdiction may draw upon to develop appropriate management strategies for their firewood industry.

Why do we need a national approach to firewood collection?

There is now a recognised need to address some impacts of Australia's firewood industry, especially collection of firewood from private land in drier regions where there has already been extensive clearing for agriculture and related biodiversity losses. The loss of woodland birds in south eastern Australia has been linked to collection of firewood (Reid, 1999). In some regions, more than 85 per cent of Australia's woodland communities have been cleared for traditional agriculture, particularly the box-ironbark woodlands in the wheat-sheep belt of Victoria and New South Wales. Clearance of this native vegetation has also been a major cause of dryland salinity and water quality problems in Australia's agricultural landscapes.

Revegetation of these areas is considered essential to control dryland salinity and restore landscape biodiversity. Revegetation could provide a useful carbon sink and the basis for sustainable regional firewood industries.

Sometimes, old and dead trees (often with hollows) and fallen timber are preferred sources of firewood, as they tend to burn well and produce less smoke. However, these same trees also provide crucial habitat and food, nesting hollows, perching places and forage substrate for birds and arboreal mammals, including some of Australia's most threatened ecological communities and wildlife species, for example birds like the red-tailed black cockatoo. It is often not appreciated that old standing trees with hollows, and dead wood on the ground, are an important source of food and habitat for many species of birds, mammals, reptiles and invertebrates as well as being essential for maintaining forest and woodland nutrient cycles. In fact, deadwood is at least as important as the living overstorey, leaf litter and soil components for conserving biodiversity and maintaining ecological processes.

Many firewood users and suppliers are unaware of the ecological consequences of its collection. They often see it as just 'cleaning up' the forest or keeping the farm tidy, and a part of good land management (e.g. to control feral pests, manage stock and reduce fire risk). Dead wood is perceived as expendable.

Data on the precise amount of firewood collected in Australia each year is variable and scarce. Estimates range from 3 million to 6 million tonnes (Driscoll et al, 2000; Todd, 2000; FTSUT 1989). Further research is needed to review these estimates but if 6 million tonnes is correct, it is double Australia's current export of 3 million tonnes of eucalypt woodchips (ABARE, 2000). Regardless of the precise figure, the firewood industry is substantial, both in terms of the contribution it makes to employment and rural economies and its ecological impact.

Firewood is collected from both public and private land. The firewood industry includes commercial, semi-commercial, private and own-use collectors and suppliers, public suppliers, and consumers. Firewood collection from native forest on public land is recognised as a legitimate and regulated use. Approximately half of the firewood supply in Australia is collected privately from local forest and woodland on private property, roadsides and travelling stock routes. Much of this firewood comes from remnant vegetation in inland agricultural areas of the south eastern States and is transported across State borders. Concern is growing about the effects of firewood collection from some privately owned woodlands in drier regions on populations of fauna including several threatened species.

Many Australians, particularly in rural areas, rely heavily on firewood as a low cost source of heating. In evaluating options to enhance the sustainability of firewood collection, it will be critical to ensure socio-economic impacts are fully considered.

A strong case exists to encourage a more sustainable firewood industry in regional Australia because it could deliver several benefits as well as the conservation of biodiversity. Compared with other traditional fuel options (e.g. oil, gas, electricity) firewood can be managed as a renewable resource with greenhouse and dryland salinity benefits. It also provides regional economic and job opportunities. A well-managed industry could provide real market-based incentives for landholders to retain native forest and woodland, which might otherwise be degraded or cleared. It could also help promote multi-purpose plantations, thus reducing pressure on native vegetation and wildlife habitat.

Domestic burning of firewood can be harmful to human health and well-being. To reduce particle emissions and improve air quality, it is important to educate the community to burn only well-seasoned timber and encourage adoption of cleaner, more energy efficient wood heaters.

Who has developed the national approach?

At the 19th meeting of the Australian and New Zealand Environment Conservation Council (ANZECC) Resolution 422 directed the Standing Committees on Environment Protection and on Conservation to jointly establish a task force to 'develop a national approach to commercial and private firewood collection'. All States and Territories (except the Northern Territory) and the Standing Committee on Forestry were represented on the task force. It circulated a discussion paper for public consultation and all comments received have been considered in finalising the national approach.

At their meeting on 29 June 2001, ANZECC endorsed the final version of the National Approach in Resolution 472.

What happens next?

Each State, Territory and the Commonwealth will develop its own action plan to implement relevant parts of the agreed national approach to firewood collection and use. The Australian and New Zealand Environment and Conservation Council will monitor the action plans.

A National Approach

This national approach sets out six strategies to target ecosystems at most risk without unnecessarily regulating or imposing additional costs on those parts of the industry already operating in a largely satisfactory and sustainable way.

Firewood collection must be seen within the broader context of sustainable land management and nature conservation. The national approach does not present a new or separate strategy as such; rather, it draws on and integrates existing policies, programs, institutions and regulatory arrangements as much as possible, especially those applying to native vegetation management. These include the National Strategy for Ecologically Sustainable Development, the National Strategy for the Conservation of Australia's Biological Diversity, the National Forest Policy Statement, the National Framework for the Management and Monitoring of Australia's Native Vegetation and the Natural Heritage Trust.

The impact and operation of the firewood industry differs in every State and across different regions. As firewood collection and use involves many collectors, suppliers and consumers operating in a variety of ways, different approaches need to be used to influence their respective behaviours. For example, private users are more likely to collect firewood near where they live, thus creating a 'regional firewood footprint' around major cities and towns. Commercial merchants, however, often obtain wood in large quantities from areas quite distant to the markets they supply. Consequently, this national approach does not provide a blanket solution to cover all jurisdictions or collectors equally, but sets out a framework in which tailored plans of action may be developed.

The national approach to firewood collection and use recognises:

- the need to direct most effort to firewood collection on privately owned woodland in drier regions in an equitable manner;
- the need to better understand the location and characteristics of public and private forest and woodland ecosystems most affected by firewood collection so that areas of concern may be effectively targeted;
- that ecologically sustainable firewood collection is a legitimate use of forests and woodlands (i.e. where remnant vegetation is managed in a way that conserves biodiversity and threatened species);
- that firewood collection is a traditional and cultural pursuit for many Australians;
- that firewood is a major source of fuel for heating and cooking for many rural Australians, some of whom have few alternative sources of energy, and the need for Governments to take into account socio-economic impacts arising from any proposed changes;
- that the regulation of firewood collection varies across Australia, as does the regulation of native vegetation clearing and management;
- the costs and difficulties of enforcing regulations on private land and activities of small scale itinerant firewood suppliers;

- the merits of adopting a nationally consistent, voluntary code of practice for the firewood industry, based on the ACT model, to set out best practice standards;
- the need to work in partnership with the industry, local government and the community;
- the need to educate the community, consumers and collectors about the impact of unsustainable firewood collection on biodiversity;
- the potential to develop an industry based on multi-purpose plantations and making greater use of waste wood;
- the links between wood heater use, air quality and remnant vegetation conservation; and
- that consumers traditionally prefer firewood from box ironbark and other slow growing woodland species.

The Vision

Firewood collection and use across Australia is managed on an ecologically sustainable basis and in a manner that does not threaten the conservation of flora and fauna of forest and woodland ecosystems or cause threats to human health and well-being.

The Objectives

1. Protect remnant native vegetation, threatened ecosystems and habitat for threatened and declining wildlife species.

2. Encourage ecologically sustainable firewood collection from native forest, woodland and plantations.

3. Contribute to broader environmental objectives, including improved air quality, ameliorating dryland salinity, and sequestering carbon.

The Strategies

Six broad, interrelated strategies form the basis of the national approach:

1. Improve the information base.

2. Educate the community.

3. Implement market mechanisms.

4. Increase effectiveness of regulations.

5. Develop a sustainable firewood industry, encouraging plantations, sustainable management of native forest and use of residues.

6. Improve efficiency of firewood use and encourage alternatives.

Principles

Underpinning the objectives and strategies outlined here are a set of principles that should encourage actions to achieve ecologically sustainable collection and use of firewood. These include:

- recognition that the firewood industry should be based on the overall goal of Ecologically Sustainable Development which recognises environmental, economic and social values;

- improved valuation, pricing and incentive mechanisms should be promoted;

- recognition that protecting existing remnant vegetation is the most efficient way of conserving biodiversity;

- recognition that native and plantation vegetation have a positive impact on the broader environmental concerns of air quality, dryland salinity and carbon sequestration.

- recognition of the ecological importance of dead wood, standing or fallen;

- recognition that where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of the precautionary principle, public and private decisions should be guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment.

Strategy 1
Improve the information base

Objective

To determine how much firewood is collected from various forest and woodland ecosystems, and ascertain the impacts of firewood collection on the biodiversity of remnant forests and woodlands to inform development of better policies and improved management guidelines.

Summary of Actions

Action	Appropriate Jurisdiction	Suggested Timeframe	Expected outcomes
Determine where and how much firewood is being collected.	All States, Territories, CSIRO and Commonwealth.	2001 - 2002	Better targeting of education and on-ground conservation efforts.
Determine the impacts of different firewood collection practices in regional forest and woodland ecosystems.	All States, Territories, CSIRO, universities, firewood industry and Commonwealth.	2001 and ongoing	Improved ability to maintain the firewood industry without over harvesting the resource.
Determine the impact of firewood collection on biodiversity in particular regional ecosystems, and develop management guidelines.	All States, Territories, CSIRO, universities, and Commonwealth.	Ongoing	Identification of species at risk from firewood collection. Ecosystem specific management prescriptions to prevent species' decline and extinctions of dead wood dependent species.

Rationale

Firewood collection is increasingly considered to have deleterious effects on the native flora and fauna in most of southern Australia. This impact is most pronounced on species that depend on standing or fallen dead wood and older trees with hollows as habitat for some stage of their life cycle. This includes bird species, reptiles, amphibians, mammals and invertebrates, some of which are listed as endangered, such as the swift parrot *Lathamus discolor* (e.g. Er *et al.* 1998, MacNally *et al.* 2000, Bennett *et al.* 1998, Robinson 1991, Traill 1993, Andrew *et al.* 2000, Ford & Barrett 1995, Lindenmayer 1993).

Recent research on the status of woodland birds in the wheat-sheep zone of New South Wales identified firewood harvesting as a major cause of decline in population size (Reid 1999). However, information about the effect of firewood collection on particular ecosystems and habitat is inadequate to inform effective management. Much information currently available is either too old or anecdotal. Up-to-date information is essential to effectively address the effects of firewood collection on biodiversity and develop realistic guidelines for landholders and collectors.

The following recommendations cover a comprehensive research strategy to answer the question, "What impact does firewood harvest have on biodiversity?" Driscoll *et al*. (2000) have identified

knowledge gaps that need to be addressed. However, to provide a full range of answers requires a lot of resources and a long time. Given the many calls on the budget for conservation programs and the need for policy guidance now, an efficient research strategy that provides timely results is needed. To do this the problem must be defined succinctly, and the minimum amount of data needed to answer the questions this problem raises determined.

The following represent broad information needs, including specific knowledge gaps identified by Driscoll et al. (2000).

Determine where, how much, by whom, firewood is collected, and its destination

Estimates of the national firewood harvest vary from 4.5 to 5.5 million tonnes consumed domestically (Driscoll *et al.* 2000), to Todd's (2000) estimate of 3 million tonnes. A broad description of the nature of the firewood industry is fundamental to understanding its ecological (and socio-economic) impact . Driscoll *et al*. (2000) have identified regions firewood comes from and roughly how much is collected. This has substantially improved the information base for making decisions about the management of firewood harvest. However, these authors identified the following knowledge gaps.

The regional variation in firewood consumption

While broad patterns of firewood consumption on a Statewide basis are available (Driscoll *et al.* 2000) to adequately manage firewood harvest, individual regional land management agencies need to know how much is being harvested from their regions, who is harvesting it, and its destination. This only needs to be done when there is some certainty that firewood harvest is a substantial conservation issue.

The nature of unregulated firewood businesses, especially small commercial suppliers

This knowledge gap is a major hurdle to the management of firewood collection in Australia as an estimated 60 per cent of the commercial firewood market is supplied by small-time operators and 84 per cent of the firewood collected is collected from private land (Driscoll *et al.* 2000). To better understand this unregulated industry requires a well-designed sociological study. This study should determine the extent, nature, economic drivers and economic profile of this industry.

Determine the amount, availability, and economics of alternative firewood sources

There are many potential sources of firewood likely to be less environmentally damaging than firewood harvested from remnant woodlands. These include thinnings from plantations, residues from logging operations, off cuts from timber yards, environmental weeds such as willow and camphor laurel, and loppings from council tree maintenance activities. A desktop study could evaluate the quantity, availability and likely cost of these firewood sources. Particular attention should be paid to the availability of these alternative sources of firewood in economically depressed regions where restrictions on harvesting firewood may stress some communities.

Determine the impacts of different firewood collection practices in regional forest and woodland ecosystems

More quantitative data on the extent of firewood harvesting in threatened communities will assist better targeting of education and conservation efforts. In determining the impacts of different firewood collection practices, the actual quantity harvested is of little relevance, rather it is a parameter derived from these figures, the rate at which firewood is harvested from individual ecosystems and how this

relates to the abundance of particular species, that is important.

Rates of accumulation of fallen timber, and sustainable rates at which to harvest it

If firewood is harvested at a rate greater than it is produced then it will not be sustainable. Fundamental questions for each ecosystem or vegetation community are:

- what level of firewood collection is sustainable;
- how much woodland firewood is produced as a by-product of clearing for other purposes; and
- what are the impacts of different levels of collection on biodiversity?

Such information is generally the basis for calculating sustainable yields in managed wood production forests, where firewood is generally a residue or by-product. This information is currently not available for most vegetation communities outside production forests. A guideline for calculating a sustained yield of firewood should be a research priority. This guideline will contain instructions on how to collect and analyse the data to calculate a sustained yield of firewood, not actual estimates of sustained yield.

The level of firewood collection is only one of the parameters influencing whether firewood collection will be sustainable (Figures 1 and 2). The ecological parameters governing sustainability will differ depending on whether living wood or dead wood is being harvested. If dead wood is harvested then species dependent on dead wood and species dependent on those species will be affected. If living wood is harvested then habitat for species dependent on living trees is lost and the timber is also forgone as habitat for dead wood dependent species. Living wood for firewood tends to be harvested from forest in higher rainfall areas with adequate regeneration while dead wood is harvested from woodlands in lower rainfall areas with poor regeneration, under current landuse practices.

Sustainability needs to be determined in the context of the overall primary productivity of the native forest and woodland ecosystem concerned, which depends on the growth rate of individual tree species, largely a product of temperature, soil fertility and rainfall. Data therefore needs to be gathered on the dead and livewood component of vegetation communities used for firewood collection and reconciled with firewood collection levels. Some data may already be available from existing sources, for example, data from tree (forest) growth and carbon sequestration research trials.

Assessing the rate of natural regeneration and tree mortality in vegetation communities subject to firewood collection is also critical for determining the sustainability of future wood supply. For example, in many woodland communities, regeneration has effectively ceased because of intensive grazing or other agricultural practices, so no new trees are entering an ecosystem that is constantly subject to slow degradation.

Models usually guide sustainable harvest of wild resources such as fish or timber. It should not be difficult to adapt or generate a simple model of firewood harvest for a range of ecosystems. The parameters described in the preceding paragraphs and in Figure 1 should form the basis of this model. The model will provide a guide to whether firewood harvest is sustainable or not. Emphasis should also be placed on reliable and easy techniques for the community and managers of private land to measure parameters such as regeneration, production of dead wood etc. (see Figures 1 and 2).

The extent to which specific plant communities have been depleted of firewood

Certain rare or endangered plant communities are likely to have been depleted of large amounts of dead wood. This dead wood is crucial for biodiversity maintenance and for ecosystem functioning. To be relevant this information needs to focus on a few particular ecosystems subject to firewood harvest, especially where endangered species are known to be present.

Determine the impact of firewood collection on biodiversity in particular regional ecosystems and develop management guidelines

Of fundamental importance is whether firewood collection is likely to cause a decline in biodiversity in particular ecosystems through the loss of species dependent on dead standing trees, trees with hollows and fallen timber. Landholders and commercial firewood collectors lack information on the conservation status of this resource and how to manage it sustainably.

The amount of wood required to retain particular wildlife species

First we need to know which species are dependent on dead wood and old trees with hollows and therefore potentially susceptible to firewood collection. This has already been partially done for bird species affected by firewood collection in some regions (Reid, 1999) but Driscoll *et al.* (2000) showed that there is little information on the impact of firewood harvest on Australian fauna. Therefore, more information is needed on the species of mammals, reptiles and invertebrates likely to be affected by firewood collection, particularly vulnerable and endangered species.

Once this information is available, the relationship between the quantity of dead wood or tree hollows and the abundance of dependent species must be determined. Establishing this relationship between rate of wood collection, quantity of dead wood and abundance of dead wood dependent species (and hence threat of biodiversity loss) requires a major investment in detailed ecological studies. As a starting point, several bird species have been identified as potentially vulnerable to firewood harvest and could form the key species around which a study is based. For endangered species, any decline in abundance from firewood collection may be unacceptable. Once these relationships have been determined, scientists can prepare detailed management guidelines for firewood collectors in conjunction with landholders and other stakeholders.

How invertebrates and fungi are affected by firewood removal, and how ecosystem processes are affected.

Most of the dead wood-dependent organisms are invertebrates and fungi of which we know very little in Australia. Overseas studies have shown that they are important in the functioning of woodland and forest ecosystems—they process dead wood and make the nutrients contained in that wood available for other organisms. Their importance is commonly overlooked and requires a subsidiary study to the impact on biodiversity study outlined above but with a focus on processes rather than impacts. This study should include an inventory of dead wood dependent species in areas subject to firewood harvest, as these are the largest fraction of biodiversity likely to be affected by firewood harvest.

Figure 1. Factors influencing the sustainability of firewood harvest and impact on biodiversity through harvesting of dead timber.

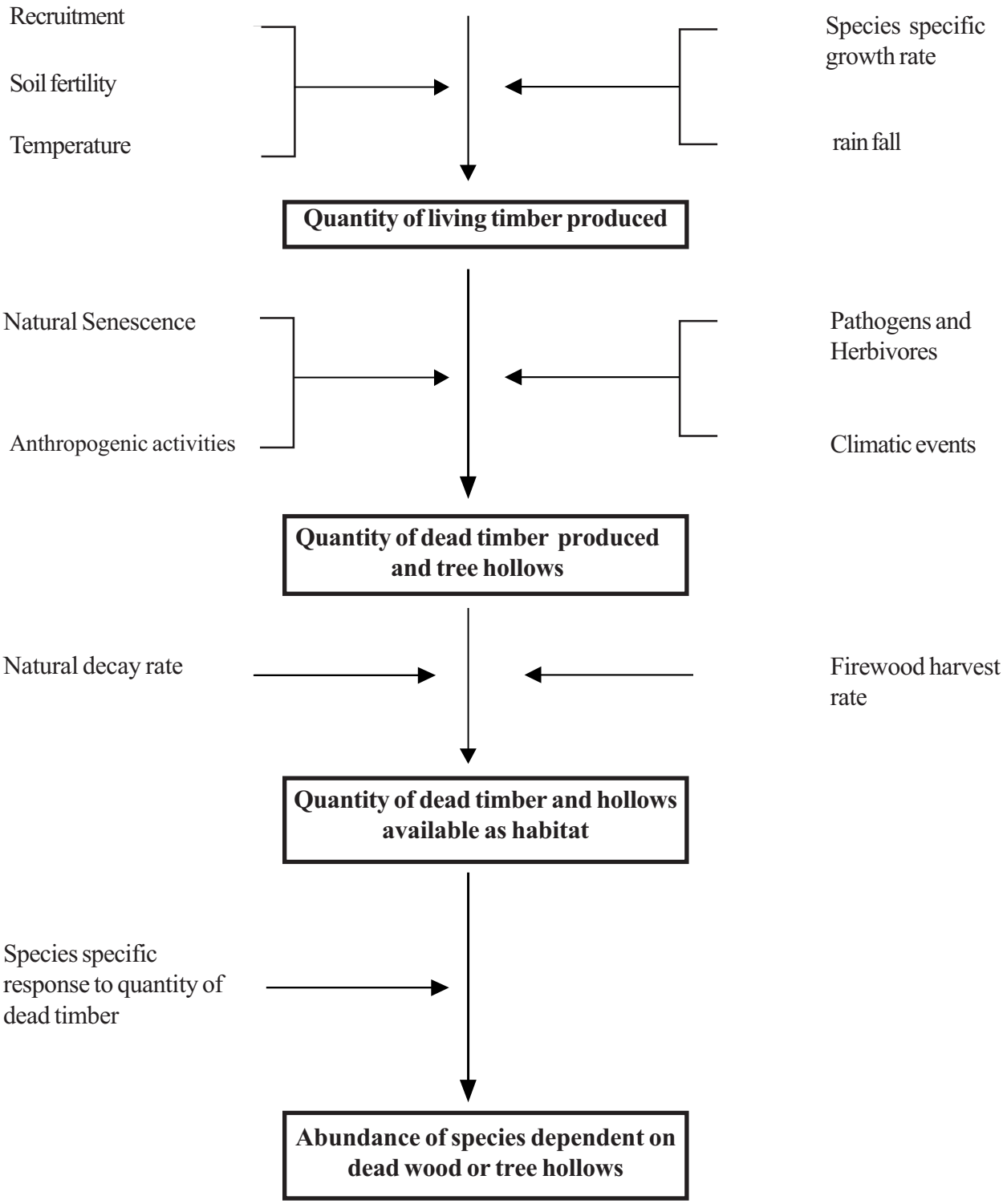
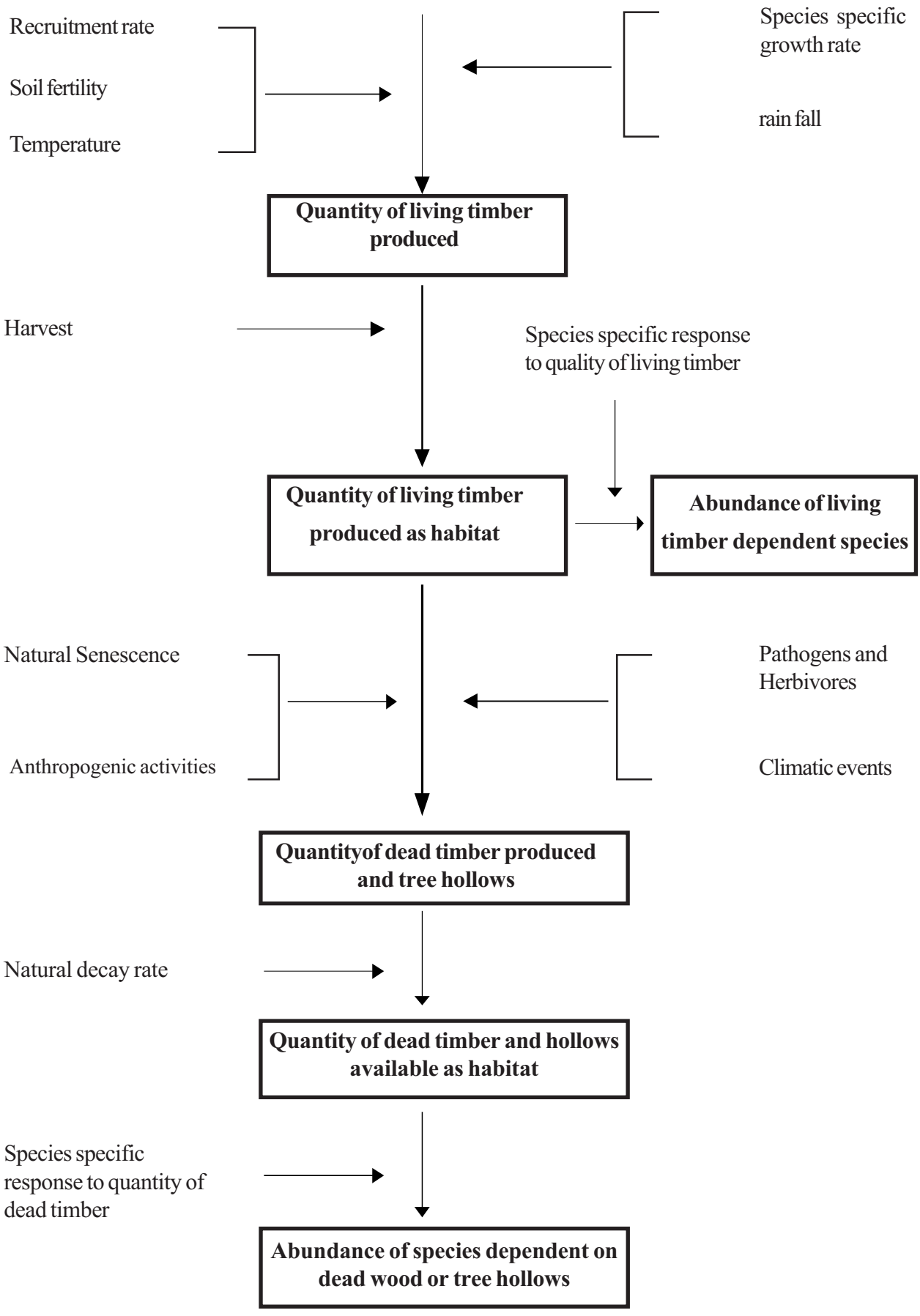


Figure 2. Factors influencing the sustainability of firewood harvest and impact on biodiversity through harvesting of living timber.



Strategy 2
Educate the community

Objective

To educate collectors and consumers of firewood about the impacts of unsustainable firewood collection.

Summary of Actions

Action	Appropriate Jurisdiction	Suggested Timeframe	Expected outcomes
Develop and promote general community education and awareness campaign materials on the impacts of unsustainable firewood collection on biodiversity.	Commonwealth	March 2001and ongoing	Whole community, including firewood suppliers and consumers, aware of the importance of dead trees and wood as habitat for native wildlife.
Implement a targeted education campaign in States and Territories on the impacts of unsustainable firewood collection on biodiversity for: • private collectors • consumers; and • firewood merchants.	NSW, Vic, Tas, ACT SA and WA - with support from Commonwealth.	2001 and ongoing	Firewood collectors, consumers and merchants informed about biodiversity impacts of unsustainable firewood collection.

Rationale

Central to the issue of firewood collection is ignorance of its impact on biodiversity. Firewood collection from native forest on some public land is recognised as a legitimate and regulated use. However, concern is increasing about the impact of firewood collection from some privately owned woodlands, especially in mid–low rainfall regions, on fauna including several threatened species.

Despite the large scale of the firewood industry, the link between collection of wood from roadsides and remnant woodlands, and the declining numbers of birds, invertebrates and animals in our temperate woodlands, is not widely understood. Temperate woodlands are some of Australia's most threatened ecological communities. It is not often appreciated that old standing trees with hollows and dead wood on the ground provide an important source of food and habitat for threatened species of birds and mammals. It takes about 120 years for a tree to grow large enough to have a parrot sized hollow. The removal of these trees and logs is often seen as just 'cleaning up the forest' when in fact they are a critical part of the ecosystem.

While dead standing and fallen timber may be unused for much of the year, they may provide essential habitat for tree-hollow nesting birds during the breeding season. Because there may be no sign of a resident nocturnal glider or possum during daylight, firewood harvesters may not realise they are destroying threatened species habitat. Individual collectors may think that they are only taking a small amount of potential habitat, but the cumulative effect of a large number of small collectors over time on the habitat of a threatened species can be substantial.

It is important to note the difference between regional and metropolitan firewood collection. Residents in some regional areas don't have easy access to other forms of heating and therefore have a greater reliance on firewood.

Lack of information is often the first problem encountered by landholders or firewood collectors on the conservation status of their resource, the species that depend on it and how to manage it sustainably. Education can raise the community's awareness of the importance of dead trees and fallen timber in our native ecosystems and provide guidance to collecting and using firewood in a sustainable way.

Develop a general community education and awareness campaign

The aims of the awareness raising campaign are as follows.

1. Educate people on how to make informed decisions about sourcing and using firewood.
2. Foster consumer preference for eco-friendly wood.
3. Increase awareness of the impacts on biodiversity by private collectors.
4. Provide information on good environmental practices for using firewood (collecting, buying, storing and burning).
5. Provide information regarding the suitability of non-woodland species as firewood alternatives.

This campaign will rely heavily on the use of free media and distribution options. Partnerships will be sought with a range of groups to assist in awareness raising activities. Where possible businesses linked to the firewood industry (e.g. chainsaw sellers, firewood merchants) will be provided with consumer information. The campaign will reach the broader community using radio, newspapers and magazines. A website and brochures outlining the basic message have been developed and are publically available and a community service announcement for television will air throughout the winter months of 2001. Firewood consumers will be specifically targeted through strategically placed advertisements, such as in the Yellow Pages, local newspapers and local newsletters. Schools will receive information and activities on this issue. Not only will this educate children, but parents often become aware of issues though their children.

The slogan to be used for this campaign is:

'Logs have life inside —Are you burning their homes to warm yours?'

This slogan aims to prompt consumers to think about the way they currently source their firewood and consider whether they are having an unnecessary impact on native flora and fauna.

Implement a targeted education campaign in States and Territories for private collectors, consumers and firewood merchants

This action logically follows a general awareness raising campaign and should be primarily implemented by State, Territory and Local Governments.

Regulating the private collection and use of firewood on private land is difficult and costly to enforce. A broad education and awareness program will reach some landholders and firewood collectors directly, but a targeted program is likely to reach a lot more.

Education and awareness need to be part of an integrated approach that includes a code of practice for firewood merchants, an accreditation system and enforcement provisions. This model forms the basis of the national approach to firewood.

Local government is well placed to effectively disseminate educational information to the community and will be approached to be a partner in this process. Local Government is also responsible for the management of roadsides and reserves, and therefore any salvage wood sourced from these areas as a result of maintenance and development activities.

Private collectors

People will continue to source wood privately because it is cheaper than alternatives and is often part of an established, traditional culture. Local government, regional media and established Landcare and Bushcare facilitator networks can be used to target the firewood campaign at local and regional levels.

Projects supported under Strategy 5 to promote a sustainable firewood industry will also be used to communicate with many stakeholders in key regions.

Consumers

Firewood consumers are a target of both the broad education campaign and the more focused approach. A variety of methods will be used to reach the various types of consumers—for example, people for whom firewood is the only source of heating, weekend users who generally rely on other forms of heating, people collecting their own wood, and people buying wood.

Firewood merchants

Because they buy large quantities of wood, firewood merchants are an important avenue through which to seek change to unsustainable practices and need to be targeted in their own right. Under Strategy 3, governments will certify merchants who agree to abide by a set of sustainability criteria outlined in the draft Code of Practice for Firewood Merchants.

Strategy 3

Implement market mechanisms

Objective

To introduce a national Code of Practice for Firewood Merchants and market mechanisms to encourage a more sustainable firewood industry.

Summary of Actions

Action	Appropriate Jurisdiction	Suggested Timeframe	Expected outcomes
Review the ACT firewood accreditation/certification system.	ACT and Commonwealth	2002 and Ongoing	The review will feed into the decision on whether the ACT system is an appropriate basis for a national approach.
Introduce a national Code of Practice for the Firewood Industry that incorporates an accreditation system for commercial suppliers.	NSW, Vic, WA, SA, ACT, Tas and Commonwealth	2001	Widespread adoption of a Code of Practice by firewood merchants.
Maintain crown land royalty charges at full recovery levels through frequent review of State forest royalty rates.	All States and Territories		Enhance the commercial viability of multi-purpose plantations on private land.

Rationale

Firewood prices are often considered to be too low to trigger significant private investment in plantations or sustainable management practices (Wall 2000). Ideally, to have a more sustainable industry, the price of firewood ought to better reflect the full costs of production and supply (including social and environmental costs). In theory, pricing systems should reflect the quality of the firewood produced from mid–low rainfall woodlands and take account of its critical habitat value. However, while the price of wood products from state forests are subject to royalty rates, there is no parallel pricing mechanism that targets wood from private land. In this respect a Code of Practice for Firewood Merchants will encourage the collection of firewood from private land to be conducted sustainably. In conjunction with the education program outlined in Strategy 2, the Code will provide a lever for market forces to reflect appropriate value in firewood pricing.

In some situations there could be significant social welfare issues related to firewood pricing, especially when low-income firewood users can reduce the cost of heating by collecting their own firewood. In these situations pricing mechanisms to encourage sustainable firewood collection may need to take account of social welfare issues. For example, State Forests of NSW currently offers half-price permits for firewood collectors who have health care cards.

There are two main sources of firewood:

- sourced from private land (for commercial, semi-commercial or own-use); and
- sourced from state forests and commercial plantations.

Market mechanisms are ineffective in targeting collectors who source wood from private land for their own use. But, provided that illegal collection can be limited, they do target State forests which are estimated to supply 9.5 per cent of firewood used in Australia (Driscoll et al 2000) and wood bought by firewood merchants.

The actions in this strategy will discourage commercial collectors from sourcing wood from forest and remnant woodland that is not sustainably managed. Such a management strategy will narrow the market for this product and increase the viability of sourcing wood from sustainable supplies, including plantations and forest logging waste.

For plantation production to be able to compete on a level playing field, firewood royalties (plus other product royalties) should ensure full cost recovery for forest production management. While market mechanisms associated with plantation firewood production may not always result in a commercially viable industry in its own right, the returns from firewood, either as a sole product or part of an integrated production system, could offset the costs of plantings needed for catchment management and other environmental purposes. Therefore, firewood can be promoted as one of several commercial products from landscape revegetation programs.

Review the ACT firewood accreditation/certification system for acceptance by industry and consumers

The ACT Firewood Industry Code of Practice was developed for the sale of firewood and firewood heaters and is accredited under the *Environment Protection Act 1997*. The code promotes fair trading practices and gives the consumer the necessary information to make an educated decision when buying firewood or a firewood heater. A mandatory licensing scheme, based on the previous code of practice, was implemented from 5 April 2001. The ACT firewood code of practice requires firewood vendors to:

- offer their customers mixed loads of firewood (a mixture of preferred box/ironbark firewood with common Eucalypt species and/or softwood);
- sell firewood by mass only;
- sell only well-seasoned timber (less than 20 per cent moisture); and
- provide customers with educational material on correct wood burning techniques and information on the source and type of firewood being sold.

Based on the voluntary ACT Code of Practice, the national Code of Practice for Firewood Merchants should:

- promote sustainable use of firewood;
- minimise environmental harm to habitat due to unsustainable harvesting of remnant woodlands and riverine forests for firewood by promoting firewood from sustainably managed woodlands and forests, plantations, forest logging residue and other waste timber;
- minimise environmental harm, particularly air pollution, which may be caused by the incorrect burning of firewood for home heating; and

- provide consumer protection to purchasers of firewood and enable them to make informed choices about the type of firewood they buy and its potential environmental impact.

A report on the ACT scheme shows that all eligible firewood merchants signed up to the voluntary accreditation scheme and promoted mixed firewood loads. The report also showed a positive consumer response to this scheme (Environment ACT, 2000). However, it is too early to evaluate the impact of the scheme on long term air pollution trends.

CASE STUDY: The ACT Firewood Strategy—experiences of a firewood merchant

Canberra firewood consumers have traditionally preferred box and ironbark firewood. This firewood comes from woodlands in central and western NSW. All other types of firewood were regarded as inferior.

The ACT voluntary code of practice for firewood merchants, introduced in 1999, aimed to bring about changes in consumer awareness and their preferences for firewood. Two local companies, Woodstock Firewood and Forge Firewood helped develop the ACT Firewood Code of Practice because they were worried about the future of the industry which relied so heavily on rapidly diminishing supplies of box and ironbark firewood.

Woodstock Firewood and Forge Firewood also sourced alternative types of firewood and marketed them to consumers.

Forge Firewood has concentrated on marketing a mix of firewood mainly box and coastal hardwood. Woodstock Firewood has concentrated on marketing 'Eco-loads'—so named because they are more economical and more environmentally friendly than the standard mixture of box and ironbark. Eco-loads—a mixture of box with plantation pine and redgum ¾ are cheaper for the consumer because of reduced transport costs. In their first year, Woodstocks' Eco-loads accounted for 1 per cent of sales. By winter 2000, Eco-loads accounted for an estimated 35 per cent of their total sales.

For more information on the ACT Firewood Strategy and new licensing system, contact Environment ACT on 02 6207 9777.

For more information on firewood mixed loads, contact Julie Hays-Woodstock Firewood on 02 6280 5118 or Henry Smeltink–Forge Firewood on 02 6299 1879.

Introduce a national Code of Practice for Firewood Merchants that incorporates an accreditation system for commercial suppliers

A Voluntary Code of Practice for Firewood Merchants would provide a basis for working constructively with firewood merchants. The Code could help educate merchants and consumers about how to establish a sustainable industry, and what measures are required to protect threatened fauna and woodlands. This approach is more likely to gain cooperation and result in more reliable information being provided than an imposed mandatory system. It will be necessary to assess the effectiveness of the voluntary Code after three years with the option of it becoming mandatory if it proves to be ineffective. The draft Code is outlined below and will be further refined with industry and other key stakeholders over the next three years.

An accreditation system can offer some market advantages by certifying that the product was obtained in a manner and from a source that met certain preconditions, such as contributing to the goal of sustainability. The success of accreditation systems relies on a procedure to assure compliance by suppliers and an informed public prepared to pay extra for sustainably produced products. The education campaign outlined in Strategy 2 addresses this issue.

Accreditation systems also encourage a voluntary positive response and best practice, in return for a commercial reward. They provide a means to approach the real cost of resource management and have it charged to the consumer. Because of this, and the need for administrative compliance, such systems also impose some additional costs. But they do provide a way to gather more reliable data on firewood collection. The data would comprise information on the source of wood, what species have been harvested and in what quantities.

Governments would certify merchants who meet the criteria outlined in the draft Voluntary Code of Practice for Firewood Merchants. This would require an agent to ensure suppliers are adhering to specified conditions and collect and analyse data. Coupled with an education campaign to enlighten consumers of the positive benefits of sustainably sourced wood, merchants would gain an 'eco label' for their product and thereby a marketing edge.

For a voluntary Code to elicit the necessary support of the firewood industry, consultation with the industry will be integral to its development. The following draft Voluntary Code of Practice addresses the sustainable collection and sale of firewood and will be subject to consultation with firewood merchants and other key stakeholders, prior to being finalised. Linking the Code to the Australia Forestry Standard, which is currently under development, could also be considered.

VOLUNTARY CODE OF PRACTICE FOR FIREWOOD MERCHANTS

The purpose of this code is to promote the sustainable use of firewood in Australia by ensuring that firewood merchants obtain firewood from sources that do not threaten the conservation of flora and fauna of forest and woodland ecosystems.

Firewood is potentially a sustainable and renewable resource. As such, the use of firewood can contribute to better land management, the conservation of native wildlife, and help reduce our reliance on greenhouse gas polluting fossil fuels.

This code aims to:

- regulate the type of wood used for firewood;
- promote improved burning practices and reduced woodsmoke; and
- inform consumers about the type of firewood they buy.

Under this code, as firewood merchants, we agree that:

1. Firewood will be collected in accordance with the letter and spirit of laws applying in each State or Territory.

2. Firewood will only be sourced from collectors who conform to the statutory codes of practice that control forest management practices on public and private land.

3. Collection and production of firewood will be undertaken according to sustainable management principles to protect biodiversity and ecosystem processes, including:
   - Firewood will not be collected from critical habitat of listed threatened species or threatened ecological communities; and
   - Firewood will be collected in a manner that conforms to regional vegetation and catchment management plans.

4. Information on the type and source of firewood will be clearly displayed and provided to consumers.

5. Information on correct storage and burning practices will be provided to consumers.

6. Only seasoned firewood that meets maximum moisture content standards will be sold.

7. Firewood will be sold in a way that ensures consumers receive what they pay for, preferably by weight, not volume.

8. Data on the type and species of firewood, the volumes, locality and land tenure the wood was obtained from, and the nature of the harvest operations should be collected and provided to the relevant government agency.

Information about this code will be freely disseminated to firewood merchants, supply contractors and consumers.

Strategy 4
Increase effectiveness of regulation

Objective

To increase the effectiveness of existing regulations and controls across Australia to protect threatened species and ecological communities from the impacts of firewood collection.

Summary of Actions

Action	Appropriate Jurisdiction	Suggested Timeframe	Expected outcomes
Consider listing firewood collection (or a related process) as a threatening process.	NSW, Tas, SA, Qld, WA and Commonwealth.	2001-2002	Raise awareness and commitment to reduce the threat from firewood collection in areas where impacts are likely.
Ensure commercial firewood collectors conform to existing statutory codes of forest practice on both public and private land.	NSW, Vic, WA, Qld, SA and Tas.	2002	Encourage more sustainable commercial firewood collection practices.
Prohibit firewood collection from affected 'critical habitat' areas.	NSW, Vic, SA, Tas, WA, Qld and Commonwealth.	2002	Preservation of the 'critical habitat' for endangered species.
Increase enforcement activities and monitoring of existing regulations in important habitat areas.	NSW, Vic, SA, Tas, Qld and WA.	2001-ongoing	Protection of important habitat.

Rationale

There is already a large body of statutory regulations that currently apply to firewood collection across Australia. A compilation of existing regulations including Commonwealth, State and Australian Capital Territory regulations is available from Environment Australia. This Strategy proposes methods to increase the effectiveness of existing regulations and controls especially to protect threatened species and communities from the impact of firewood collection.

Circumstances relating to the supply and demand for firewood vary considerably among the States and Territories. However the regulation of firewood collection across the various land tenures is reasonably consistent. Collection is generally not permitted in national parks and reserves although collection for use in fireplaces is allowed in some places. Collection in State Forests is regulated through systems of licences, permits and codes of practice. Firewood is often a by-product of other forest operations. Collection of firewood on private land, which accounts for 84 per cent of firewood used in Australia (Driscoll et al 2000) is more lightly controlled.

There is little systematic monitoring of the amounts of firewood collected, especially that taken from private land, roadside reserves and threatened woodlands. However, Driscoll et al (2000) estimate that 20 per cent of Australia's firewood, worth an estimated $260 million, is illegally collected from State Forests, roadsides and travelling stock routes (particularly in the NSW wheat belt) and comprises up to 70 per cent of the firewood sold by small merchants.

Listed threatened species and ecological communities are nominally protected under various threatened species' legislation. These laws generally operate on a case-by-case localised basis with little ability to address long-term cumulative impacts on a species' habitat or ecological community. Consequently, the cumulative results of multiple, minor impacts from many firewood collectors is not well captured by threatened species legislation.

Ensuring the effectiveness of existing controls on firewood collection could:

- enable the cumulative impacts to be monitored and controlled more systematically;
- be one of the best ways to protect the habitat of threatened species, by both educating and regulating firewood collectors; and
- contribute significantly to the conservation of remnant vegetation, particularly box-ironbark woodlands, and encourage the establishment of firewood plantations.

The situation of current regulatory controls include the following:

- Only NSW, Victoria, ACT and the Commonwealth have threatening process lists under legislation. In Victoria the loss of hollow-bearing trees in native forests is listed as a potentially threatening process. There are no comparable listings in other jurisdictions.
- Collection of firewood on private land is generally unregulated unless it reaches a scale that makes it subject to native vegetation clearance controls.
- Where vegetation clearing is controlled, the removal of dead or fallen timber may be exempt. Landholders collecting firewood for their own use are also generally exempt.
- Illegal collection of firewood occurs, particularly on public lands. This situation arises from the difficulty of enforcement, rather than from a lack of regulations applying to these types of land.

Consider listing firewood collection or a related process as a threatening process.

Listing of firewood collection (or a related process) as a key threatening process under relevant legislation will raise the public profile of this issue. It may also increase the commitment to address different aspects of the problem (e.g. education, collection, alternatives, plantations and research). Such listings should focus on those regions, ecosystems and threatened communities that are subject to significant ecological impact from firewood collection.

The plant communities most threatened by firewood collection are woodlands and dry forests, often with a grassy understorey, and especially in cleared agricultural landscapes. This is because they comprise popular firewood species such as river red gum, box and ironbark. The impact of firewood collection on other forest types such as the wet sclerophyll forests found in Tasmania and Victoria are of lesser concern in comparison to the woodlands and dry forests.

In Victoria, under the *Flora and Fauna Guarantee Act 1988*, the 'loss of hollow-bearing trees in Victorian native forests' is listed as a potentially threatening process with a draft action statement prepared.

Under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), any potential listing of firewood harvesting or a related process as a Key Threatening

Process would depend on meeting one of the following criteria:

- it adversely affects at least two listed threatened species or ecological communities;
- it could cause a listed threatened species or community to be listed in higher category of threat; or
- it could cause an unlisted species or ecological community to become listed as threatened.

A listing under the EPBC Act would cover the whole of Australia, while listing in NSW would cover the whole state, not specific areas. A threat abatement plan, if required, would address where the impact was greatest and any controls or restrictions which should be undertaken. Merely listing firewood harvesting or a related process as a Key Threatening Process under the EPBC Act would not have any legal implications as far as restrictions on the industry or restriction of activities by individuals.

Ensure commercial firewood collectors conform to existing statutory codes of forest practice on both public and private land.

Existing codes of practice for commercial harvesting regulate and support sustainable forest management. Governments will have responsibility to ensure commercial firewood collectors, on both public and private land, conform to, and are educated about, these codes and their application.

Prohibit firewood collection from affected critical habitat areas.

Areas of threatened species' critical habitat can be identified under NSW, Queensland, Victorian, Tasmanian and the Commonwealth's legislation. The protection that these laws provide against the threat of firewood collection is generally inadequate, as they do not protect against cumulative minor impacts. Further targeted regulation which prohibits firewood collection in affected critical habitat areas (including habitat critical to the survival of threatened species and communities in Western Australia where there is no statutory provision for critical habitat) would benefit threatened species and communities. Such prohibition would not be necessary if it could be demonstrated that firewood harvesting would not adversely impact on the threatened species or community for which the critical habitat had been defined.

Increase enforcement activities and monitoring of existing regulations in important habitat areas.

Despite the potential benefits (which include increased revenue), a problem with a regulatory approach lies in the cost and difficulties of enforcement and monitoring compliance. Under this initiative, there will be scope to increase and target enforcement and monitoring of existing regulations in those regions and ecosystems known to provide important habitat for threatened species and where illegal collection activities are known to occur. Engaging local communities in reporting suspected illegal collection is one possible mechanism to reduce illegal activity.

Strategy 5

A sustainable firewood industry: encouraging plantations, sustainable management of native forest and use of residues.

Objective

To encourage a more sustainable firewood industry that is increasingly based on waste and salvage timber, forest residues, plantations and sustainably managed native forests.

Summary of Actions

Action	Appropriate Jurisdictions	Suggested Timeframe	Expected outcomes
Foster and support farm forestry planning, on-ground works and communication activities in targeted regions – e.g. the Murray Darling Basin.	WA, Tas, ACT, Qld, NSW, Vic, SA and Commonwealth	2001 and ongoing	Increased establishment of multipurpose plantations on cleared agricultural land in key regions. This will provide an alternative source of firewood, close to major use areas and contribute to broader environmental objectives – including combating salinity. Increased commercial viability of farm forestry. Providing a market for plantation thinnings as firewood will overcome a major impediment to farm forestry.
Target incentives for conservation and sustainable management of private native vegetation subject to firewood collection.	WA, ACT, Qld, NSW, Vic, Tas and Commonwealth	2001 and ongoing	Increased proportion of firewood sourced from sustainably managed private native forest and woodland. Education of landholders leading to increased income to landowners who sustainably manage private native forest and woodland. Increased retention of native forest and woodlands and improved biodiversity habitat.
Encourage use of residues of forestry operations in private and State forests as an alternative source of firewood.	WA, ACT, Vic, NSW, Tas, SA, and Qld	2001 and ongoing	Increased proportion of firewood sourced from thinnings from State and privately owned hardwood plantations. Increased proportion of firewood market sourced from residues from logging operations in State owned native forests.
Encourage greater use of waste wood from road widening, urban subdivisions, local council activities, building operations and environmental weeds as firewood.	WA, ACT, Vic, NSW, Tas, SA, Qld, and local government.	2001 and ongoing	Increased proportion of firewood sourced from waste wood from road widening, urban subdivisions, local council activities, building operations and environmental weeds.

Rationale

Making the firewood industry more sustainable is about taking pressure off preferred firewood species such as box, ironbark, redgum and mallee. In the short term, we can take some pressure off our remnant dry forests and woodlands by making better use of existing resources of residues from forestry operations, road widening, landscaping, tree surgery, building and local government activities. To ensure a more sustainable firewood industry in the longer term, we need to:

- invest in establishing farm forestry on cleared agricultural land;
- encourage sustainable management of private native forests; and
- modify consumer preferences for firewood to more common species.

Foster and support farm forestry planning, on-ground works and communication activities in targeted regions

Farm forestry is about incorporating commercial tree growing into conventional farming systems. This will enhance and diversify agricultural production and farm income and improve natural resource management. Farm forestry is also widely recognised for its potential to respond to the economic, environmental and social challenges that face rural and regional Australia. These include the increasing impacts of dryland salinity; declining water quality of our inland river systems; loss of native vegetation and biodiversity in our landscapes; and the steady fall in farm and rural sector incomes.

In Australia there is an imperative to develop farm forestry systems that contribute to conservation objectives and commercial timber production. However, farm forestry often requires substantial capital investment in the first few years with little or no cash flow until the trees are harvested often up to 25–50 years later. The long wait for a return on investment is seen as a major impediment to expanding farm forestry in Australia. Fostering a market for firewood from small-scale farm forestry plantations will help overcome this impediment by providing a market for plantation thinnings 10–15 years after plantation establishment.

Firewood is a commodity that can be produced from almost any forest type using simple, affordable technologies. It can be easily produced as a bi-product from forestry operations and can also be produced in a coppice rotation system. The firewood industry may also provide an opportunity to market excellent firewood species that have promise for farm forestry on the western slopes and plains of NSW.

Encouraging farm forestry on cleared land, particularly in those areas that are suffering the effects of dryland salinity, will provide significant community benefits through salinity control, improving groundwater control, providing habitat for wildlife, sequestering carbon, strengthening the regional industry base and improving economic opportunities in rural Australia. These significant public benefits justify a commensurate level of public investment, particularly in areas such as the Murray Darling Basin and South Western Australia that have been identified as regions in urgent need of revegetation.

Plantations established on cleared agricultural land may contribute to carbon sequestration, depending on the size and rate of expansion, species characteristics and management regimes. The Australian Greenhouse Office and the Murray-Darling Basin Commission have commissioned a report on opportunities for farm forestry in mid-low rainfall regions to deliver complementary greenhouse and natural resource management benefits. The report recognises the potential for sale of residues from commercial forestry operations as firewood and for firewood production to complement other wood-based production activities in those areas.

There are also potential benefits in establishing multipurpose plantations irrigated with appropriately treated municipal sewage effluent. These could improve timber production rates in mid-low rainfall areas, provide a source of low-cost firewood for rural townships and reduce nutrient loads in inland rivers. Erecting nestboxes in farm forestry plantations may also improve habitat value for native birds and arboreal mammals.

The viability of establishing plantations is already being investigated and trialed in the Murray Darling Basin and South Western Australia. The case studies below describe two multipurpose plantations where firewood is a proposed by-product.

CASE STUDY: City of Greater Bendigo's farm forestry plantation—Huntly, Victoria

Establishing a multi-purpose plantation provides opportunities to produce a range of environmental services and timber products, including firewood. An example of this can be found at Huntly in Victoria. The City of Greater Bendigo farm forestry plantation was originally a mixed grazing and cropping property that had been farmed over a long period leaving little remaining native vegetation, as well as compacted soils and soil erosion problems. The 265 ha property is located 15 km from Bendigo in the Bendigo/Myers Creek catchment and has an annual rainfall of approximately 500 mm.

The Greater City of Bendigo was interested in commercial tree growing for the property. With the help of the Victorian Department of Natural Resources and Environment (DNRE), the council established a dryland plantation to produce an array of forest products, including firewood. In the first 25 years of its lifetime, the plantation is expected to produce 54 000 m^3 of firewood, which will contribute substantially to the firewood supply for Bendigo and surrounding areas. The plantation also provides land protection benefits and acts as a demonstration site for farm forestry and farm diversification for low-medium rainfall areas.

Almost 170 ha of native species including sugar gum (*Eucalyptus cladocalyx*), red ironbark (*E. sideroxylon*), Swamp Yate (*E. occidentalis*), River she oak (*Casuarina cunninghamiana*) late black wattle (*Acacia mearnsii*), weeping myall (*A. pendula*) and lightwood (*A. implexa*) have been planted on the site, 60 ha of which forms part of the Victorian State Government's Plantations for Greenhouse project.

Apart from the commercial potential of the Huntly multi-purpose plantation, the council and NRE have great expectations about the numerous additional benefits in planting trees on cleared agricultural land. They include soil improvement, combating salinity, sequestering carbon, improving water quality, providing shelter for livestock as well as reducing pressure on remnant woodlands as a source of firewood.

CASE STUDY: The Oil Mallee Project—Western Australia

Mallee eucalypts are a new perennial crop being developed for the Western Australian wheat belt. This project has been driven by the need to re-establish deep-rooted perennial vegetation to combat dryland salinity and the need to demonstrate the commercial viability of perennial crops to private landholders.

So far, 6800 ha of oil mallee plantations have been established in Western Australia that are expected to achieve both environmental and commercial outcomes. A recent commercial feasibility study has shown that integrated processing of mallee feedstocks to concurrently produce eucalyptus oil, biomass energy and activated carbon , (20 per cent, 20 per cent and 60 per cent respectively of revenue) should be commercially viable. Additional products being considered as the planted area increases include firewood, panel boards and paper. The Department of Conservation and Land Management (CALM) estimates that with continued expansion, oil mallee crops could potentially produce 5 million tonnes of firewood per year (equivalent to Australia's current annual domestic usage of firewood) by the year 2020.

CALM is collaborating with the Oil Mallee Company, Enecon and the Western Power Corporation to demonstrate the commercial viability of integrated processing for oil mallee feedstocks. Western Power will construct a 20 per cent scale demonstration plant. If successful, up to nine integrated mallee processing plants could be built in the wheat belt of Western Australia.

Some marketing and economic considerations

The market for firewood in Australia is mainly in south-east Australia, in line with the location of population and region of cooler winters (Chudleigh and Zorzetto 1999). These areas occur predominantly in the mid–low rainfall zone, correspond with the southern Australian wheat belt where revegetation is urgently needed to combat dryland salinity.

There is conflicting information on the economic viability of establishing firewood plantations. Analysis conducted by Chudleigh and Zorzetto (1999) indicates that plantations established purely for firewood production are not economically viable. But a recent report by Economist@Large and Associates (2000) concluded that reasonable economic returns are possible where landowners are eligible to receive some form of financial assistance, for example, for fencing. Wall (1999) shows managing a combination of plantation and native forest for firewood production can return greater profits than sheep grazing on the northern Tablelands of NSW.

Two key factors that determine the economic viability of firewood plantations are distance to markets and the retail price of wood. A third factor, which relates to sovereign risk, is the possibility of future restrictions on burning solid fuels in some urban areas to improve air quality. To improve economic viability, new plantations should be established close to larger urban or rural centres where firewood is consumed, for example Armidale, Bathurst, Canberra, Wagga, Bendigo, Ballarat, Adelaide and Melbourne. Once in production, these plantations would have considerably lower transport costs compared with firewood sourced from more distant remnant woodlands. Establishing multipurpose plantations rather than firewood only plantations could reduce risks associated with possible bans on burning solid fuels.

Certain types of firewood, such as box and ironbark and some acacia species have been traditionally preferred by consumers because of their inherent qualities, including ease of splitting, low moisture content, high density, slow burning and high heat output (Treweek 1997). However, firewood merchants are now successfully marketing alternative species as firewood. Where box and ironbark firewood is

available it can be sold at a premium price. This could be an advantage for prospective farm forestry because the areas where box, ironbark and mallee grow naturally are the mid–low rainfall zones of southern Australia. This is the same area where farm forestry needs to be targeted to help landowners diversify their agricultural production and farm income, and combat dryland salinity.

Farm forestry groups believe that to effectively encourage farm forestry in the mid-low rainfall areas, governments will need to remove disincentives and provide additional security to landowners who choose to establish plantations. Involvement of the firewood industry in farm forestry could help to address these issues.

A National Approach to Firewood Collection and Use will address many of the marketing and economic issues discussed above by providing resources to encourage specific, regionally integrated, strategies for firewood production around major regional cities and towns. These could be integrated with existing regional catchment plans and initiatives designed to conserve remnant native vegetation and foster revegetation. The infrastructure for doing this largely exists, for example through the Regional Plantation Committees and farm forestry networks, catchment management organisations, Landcare and Bushcare groups and networks. Additional resources could be coordinated through a range of other State and Commonwealth grant schemes.

Using existing programs to fund targeted projects in mid–low rainfall areas will create a momentum for change, demonstrating government commitment to partnering regional communities in addressing firewood issues, and providing ongoing education and communication.

Another way to encourage sustainable firewood harvesting on private land is through State and Territory property management planning programs, regional vegetation and plantation committees. These are generally supported by extension services and are designed to assist landholders plan for the sustainable management of their properties. These programs also encourage sustainable management of firewood collection from private native forests and farm forests. Developing property management plans can be linked to financial assistance for on-ground revegetation and plantation works.

Encourage conservation and sustainable management of private native vegetation subject to firewood collection.

Driscoll et al (2000) estimate that 84 per cent of Australia's firewood is sourced from private land, particularly from the inland forests and woodlands of NSW and Victoria. These areas are most affected by firewood collection because of the popularity of slow growing box, ironbark and redgum species as firewood, a history of extensive clearing, proximity of rural population centres and the significance of remnants as habitat for native wildlife. A study by MacNally *et al* (2000) has provided the clearest evidence to date that firewood harvesting in river red gum communities is unsustainable and is adversely affecting native fauna populations.

There is potential for more common types of privately owned and managed native forest to generate significant volumes of firewood through silvicultural management. Appropriate silvicultural techniques could enhance conservation and economic values, increase productivity and create diversity of forest structure and composition. Making landowners aware of the value of actively managing private native forests could help ensure their survival and that of their dependent native fauna.

The firewood market could also encourage sustainable silviculture of regrowth forest. Regeneration of native vegetation as a consequence of changing grazing management (for example, introducing long rest periods) and fencing can contribute to revegetation and firewood production objectives and is encouraged in this initiative.

Encouraging sustainable management of native forests and regeneration for firewood and other products will benefit rural communities through salinity control, strengthening the regional industry base and improving economic opportunities in rural Australia. Our native fauna would benefit from revegetation with local native species to provide buffer zones and wildlife corridors between areas of remnant vegetation.

Drawing on information to be collected under Strategy 1, which better identifies regions and ecosystems most affected by firewood collection, it will be possible to target incentives for native vegetation conservation and management to areas of most concern. Much of the infrastructure and many of the mechanisms required to support these initiatives are already in place—for both conservation and production. Through a national approach, it will be possible to coordinate these activities and deliver a more integrated result.

The case study below belies the general perception that there are limited commercial opportunities available for low rainfall native forestry. It demonstrates that firewood production can be economically sound in mid–low rainfall zones when combined with other income. Other products could include posts and poles, high value sawn timber, oils, burls, flowers and honey. Many of these products can be produced on site and thus boost regional development.

CASE STUDY: Managing native forest for firewood – Neikah, Colinton NSW

Neikah is 2522 ha property at Colinton, 70 km south of Canberra, owned by a family partnership of three brothers-Richard, David and Peter Davies. Peter and his wife Kerry manage the native forest on the property. The property has annual rainfall of 500–600 mm.

In the past the property was primarily managed for grazing, which left a legacy of noxious weeds, pests animals and soil erosion problems. Peter and Kerry found that managing their native forest addressed many of these problems, improving environmental values of the property and diversifying their income.

Today the property is largely timbered with regrowth dry sclerophyll forest and open woodland. The property is 60 per cent managed native forest, 16 per cent agriculture with the remaining 24 per cent maintained especially for conservation.

Firewood is the most important forest product from the property. Others include round fencing timber, mulch and other sawn timber products. Peter and Kerry are also experimenting with producing compressed sawdust briquettes.

The property is well situated to take advantage of the market for firewood in Canberra. Peter and Kerry have also been able to take advantage of the ACT Government's firewood strategy that requires firewood merchants to offer firewood sourced from a range of species to assist the transition away from box, ironbark and other vulnerable woodland species.

Based on research trials, Kerry and Peter believe the sustainable level of annual wood production to be in the order of 1.0–1.5 tonnes per ha providing a total of 1500 to 2700 dry tonnes per annum from their 1500 ha of managed native forest. At the wholesale firewood price in Canberra of $90 per tonne, this constitutes return of $90–$135 per ha.

Encourage use of residues of forestry operations in private and State forests as an alternative source of firewood.

Using wood residues from large-scale commercial timber harvesting operations would help to take the pressure off remnant woodlands and inland forests. Large quantities of residual wood from sawlog and pulpwood harvesting operations are available from State and private forests. This represents an alternative source of firewood that can be provided with no additional harvesting of forest than would currently occur for sawlog or pulpwood purposes. It is not intended that by providing a market for the residue that additional areas of forest, that would otherwise be uneconomic, are harvested.

Firewood is one of the few potential markets for defective timber and thinnings from industrial scale plantations such as the extensive blue gum (*E. globulus*) plantations in the 'green triangle' area of south west Victoria and south-east South Australia. These plantations have been established primarily for pulpwood. Parlane and Clarke (2000) estimate that residues from logging and pulpwood operations in Australia's existing hardwood plantations, about 389 000 ha, could already meet the current demand for domestic and industrial firewood.

Similarly, firewood is a potential market for the residues of logging operations in State-owned native forests. The relatively slower growth rates of native forest mean that timber has a higher content of dense heartwood with naturally low moisture content—ideal characteristics for firewood. There is currently an estimated 400 000 tonnes of native forest left in NSW State forests each year which is a readily available source of firewood.

Through Strategy 2 consumers are being encouraged to buy more environmentally friendly firewood, including wood sourced from the residues of current native forest harvesting operations. Firewood merchants will be encouraged to adopt the Code of Practice for the Firewood Industry proposed in Strategy 3 and provide consumers with more environmentally friendly firewood, such as the residues of forestry operations. State Forestry agencies will also be encouraged to make existing residues available for firewood and to market them to firewood merchants.

Encourage greater use of waste wood from road widening, urban subdivisions, local council activities, building operations and use of woody environmental weeds as firewood.

Encouraging more effective use of waste timber would not only reduce pressure on our native woodlands and inland forests, but could also potentially provide a source of free firewood to people who currently rely on collected firewood as their main source of heating. This is particularly relevant in some parts of rural Australia where there are few alternatives to firewood for heating. Even in our major cities, waste wood can be a source of firewood, as the next case study demonstrates.

Waste wood from road widening, urban subdivisions, local council activities, sawmilling, building and land clearing can be an important alternative source of firewood. Local governments and other government agencies could disseminate information about the availability of waste wood to commercial and private firewood collectors.

Briquettes that are manufactured using waste from the domestic furniture making, sawmilling and building industries are another alternative source of firewood that will reduce pressure on our native woodlands. The suitability of firewood sourced from woody weeds such as camphor laurel and willows needs to be investigated.

CASE STUDY: J.A. McArdle and Sons—Firewood Merchants, Sydney NSW

Jim McArdle has a long-standing firewood business based in Sydney, that has sold many thousands of tonnes of firewood over the last 50 years. Jim combines his firewood business with tree lopping, stump grinding and land clearing businesses, where he has access to significant quantities of waste wood. In fact, most firewood Jim sells is scrap timber and waste wood sourced from a great variety of sources, including:

- tree lopping;
- trees felled in road widening operations;
- trees felled in urban subdivisions;
- used fence posts;
- used telegraph poles;
- sawmill waste;
- logs from wood-chopping events at the Royal Easter Show; and
- old wharf timbers.

Jim believes that well seasoned waste wood is an excellent source of firewood that burns well and sells well. He says that there is often more waste wood available than he can handle.

Strategy 6

Firewood use efficiency and alternative fuels

Objective

To reduce demand for firewood from woodland species through improving the efficiency of firewood use in woodheaters and facilitating the use of alternative fuel sources, whilst ensuring that air quality is not compromised.

Summary of Actions

Action	Appropriate Jurisdiction	Suggested Timeframe	Expected outcomes
Introduce a national 'star rating' labelling scheme for woodheaters.	All States, Territories, Commonwealth and Australian Home Heating Association.	2001 and ongoing	Consumers informed about power output, heating efficiency and emission rating of woodheaters.
Investigate the incorporation of an energy efficiency standard into the Australian Standards for Woodheaters	All States and Territories, Commonwealth and Australian Home Heating Association.	2001 and ongoing	Develop a case and process to incorporate an energy efficiency standard into the relevant Australian Standards (AS4012 & AS4013).
Assess scope and design elements of a woodheater replacement scheme	Commonwealth.	2000-01	Case for targeted, regionally-specific woodheater replacement program.
Support actions that improve the energy efficiency of domestic homes.	All States and Territories, and Commonwealth.	2001 and ongoing	An improvement in the energy efficiency of existing and new homes.
Consider further need to educate consumers about efficient operation of woodheaters.	All States, Territories.	Ongoing	More efficient operation of woodheaters producing less woodsmoke.
Adopt appropriate regulatory, education or other strategies for limiting moisture content of firewood.	All States and Territories	2001	Improve efficiency of firewood use by reducing amount of unseasoned wood being burnt.
Subject to air quality considerations, implement measures to promote the certification of woodheaters for use with softwoods and manufactured fuels.	NSW, Vic, Tasmania, WA, SA, ACT and Commonwealth, in conjunction with woodheater manufacturers.	2001 and ongoing	Expand the range of fuel sources to include softwoods, leading to reduced demand for wood from remnant vegetation.
Investigate air quality impacts of using softwoods and manufactured fuels in existing woodheaters.	Commonwealth.	2000-01	Inform possible development of an education campaign to expand range of fuel sources for existing woodheaters

Rationale

Demand for firewood, including from woodland species, can be reduced by increasing the efficiency of firewood use in woodheaters, as well as by increasing the use of alternative fuel sources, such as plantation timbers and manufactured fuels.

There are around 800 000 woodheaters and 700 000 fireplaces in Australia. All levels of government have policies and management measures to address woodheaters and their operation, primarily air quality concerns in urban areas. Woodheaters, including fireplaces, are the major source of particle emissions in southern cities in colder months (i.e. ahead of transport) and are responsible for cities regularly exceeding ambient air quality limits set under the Ambient Air National Environment Protection Measure. Human exposure to elevated particle levels is linked to serious health effects, including heart and lung disease. The key factors contributing to the inefficient use of firewood relate to incomplete combustion arising from:

- use of unseasoned firewood–excessive moisture contained in green or wet wood;
- less-efficient woodheater technology–slow combustion woodheater models vary greatly and open fireplaces are much less efficient; and
- poor operating behaviour–insufficient air intake can lead to insufficient oxygen or air mixing.

The above factors also correspond directly with increased woodsmoke. Therefore, increasing the efficiency of firewood use in woodheaters will achieve air quality objectives. This demonstrates the strong synergies between biodiversity protection and air quality management in firewood use. One key exception is in woodheater technology, where some more efficient woodheater models have higher emission factors. Governments will try to ensure that any new woodheater management measures to address biodiversity issues do not exacerbate air quality concerns.

Increasing the efficiency of firewood use is also likely to reduce the emission of greenhouse gases. While there are significant uncertainties about greenhouse gas emissions from woodheaters under various operating conditions, in general the more efficient use of firewood will have greenhouse benefits.

There is scope to encourage more informed decision-making by consumers about home heating choices, develop measures to replace old inefficient heaters, and, provided air quality is not compromised, expand the range of sustainable fuel options for consumers (i.e. softwood and manufactured fuels).

Note that the proposed actions are primarily targeted at achieving biodiversity outcomes. There are a number of other actions that can be taken in relation to air quality concerns of woodheaters, which are more appropriately addressed in separate processes.

Introduce a national ‘star rating’ labelling scheme for woodheaters

The heating efficiency of woodheaters of various sizes and models varies widely, from open fire places that are extremely inefficient, through older polluting woodheaters, to new efficient and cleaner burning technologies. The certification process for new woodheaters requires manufacturers to test the power output, heating efficiency and emissions rate of each model. However, while information on power output and heating efficiency are contained on a small compliance plate on the back of machines, there is no indication of the relative emissions performance. Information on all these factors could be made more readily available to consumers through a ‘star rating’ scheme, as used for gas and electrical appliances. Consumers are already familiar with such labelling schemes.

While the reasoning for a heating labelling scheme for biodiversity purposes is immediately obvious, labelling for power output and emissions performance is also important. The correct sizing of

woodheaters, that is their power output for the room dimensions of homes, is critical to efficiency and emissions. An over-sized woodheater being run at a low rate is generally operating inefficiently.

Although not directly linked to biodiversity outcomes, the emissions performance for heaters is of direct interest to all levels of Government in relation to air quality. If a labelling scheme did not incorporate emissions performance it could increase the uptake of more polluting woodheaters. This can be avoided by ensuring that any labelling scheme incorporates emissions performance information.

Investigate the incorporation of an energy efficiency standard into the Australian Standards for Woodheaters

As discussed above, the certification process for new woodheater models under Australian Standard AS4012, requires the energy efficiency of new woodheaters to be measured and identified on a compliance plate on the body of new woodheaters. The Australian Standard for Woodheater Emissions (AS4013) requires a minimum emissions performance from all new woodheaters, and regulations in most State and Territories restrict new installations to woodheaters that have been certified to this standard. A performance standard in relation to energy efficiency of woodheaters would complement the existing emissions standard, and help deliver biodiversity, as well as greenhouse and air quality, objectives.

Assess scope and design element of a woodheater replacement scheme

The long lifespan of woodheaters means that their rate of replacement by consumers is very slow. A significant barrier in some regions to adopting low impact heating is the economics of home heating. An economic analysis of comparative costs of heaters and fuel types will help inform the design features of a replacement scheme for possible application in specific regions. In the long term incentives for consumers to replace older inefficient woodheaters, move to alternative sources of heating and improve home insulation, will encourage accelerated adoption of more efficient technologies and thereby reduce firewood usage and smoke emissions.

Support initiatives that improve the energy efficiency of domestic homes

The demand for firewood is based on the level of heating required to warm homes. If the energy efficiency of homes was improved, there should be a corresponding decrease in the need for heating. In those situations where the heating source is woodheaters, there would be a reduction in firewood consumption.

All levels of Australian Governments have initiated actions to improve the energy efficiency of homes for a range of reasons, including reducing greenhouse gas emissions. These actions include incorporating energy efficiency measures into the Building Code of Australia and energy efficiency rating schemes, which provide requirements or incentives in relation to factors such as insulation and house orientation. Further actions are warranted to realise potential efficiency improvements in new dwellings, extensions and existing buildings.

Consider further need to educate consumers about efficient operation of woodheaters

Woodsmoke is the result of incomplete combustion resulting in unburnt fuel being emitted into the atmosphere. Excessive smoke production indicates inefficient use of firewood. The key operating factors responsible are:

- use of wet or unseasoned wood;
- incorrect loading of the firebox—over-filling or use of large pieces of wood; and
- insufficient air being allowed into the woodheater.

Targeted education campaigns to inform consumers about how to optimise the efficiency of their woodheaters are recommended to support an integrated response in specific regions.

Adopt appropriate regulatory, education or other strategies for limiting moisture content of firewood

Firewood quality can be improved by measures that reduce the moisture content of firewood. The maximum permissible moisture content of firewood can be regulated at the point of sale, distribution and use as currently occurs in Western Australia. A preliminary analysis on particle emissions from woodheaters conducted by the Tasmanian Department of Primary Industries, Water and Environment indicates that regulating the maximum moisture content of firewood is one of the most cost-effective ways to reduce smoke pollution with relatively small costs to industry (DPIWE internal working paper, 2000). Although moisture content of seasoned wood varies between species, it is nevertheless possible to set some conservative and indicative level for limiting moisture content of firewood through regulatory, education or other strategies.

Implement measures to promote the certification of woodheaters for use with softwoods and manufactured fuels

Hardwoods are the current firewood of choice in all cities, even where there are large softwood resources and almost no local hardwood supplies. Greater use of alternative fuel sources, such as softwoods or manufactured fuels, would help lessen the impact of firewood collection on biodiversity. However, at present, most woodheater models are certified to meet the Australian Standard (AS4013) for flue gas emissions on the basis of burning hardwoods only. Given the limited demand for 'softwood certified' heaters, there is currently no incentive for manufacturers to invest in extra tests, which cost about $5000 each, for other fuel types.

At present, the air quality implications of increased use of softwoods in the current stock of woodheaters (many of which are non-certified models) are not clear and further research is needed. Until this occurs, individual jurisdictions can only be assured of protecting air quality by limiting softwood use to those woodheaters that have been certified for the purpose.

Greater use of 'manufactured fuels' or cellulose briquettes as an alternative fuel is possible. Manufactured fuels can be produced under temperature and pressure from waste materials, including sawdust, shavings, fabrics, newspapers etc. Such fuels have the potential to provide significant air quality gains due to their low moisture content, as well as reducing biodiversity impact by displacing use of hardwoods (Oregon DoE, 1993). As with softwoods, woodheaters may need to be certified on the basis of such fuels before governments could encourage their greater use to ensure that air quality objectives are not compromised.

Investigate air quality impacts of using softwoods and manufactured fuels in woodheaters

A key factor in woodheater design is the burning characteristics of the preferred fuel source. For example, manufacturers tune the mix of primary and secondary air in woodheaters to suit these characteristics. Many existing woodheater models certified to meet Australian Standards on the basis of hardwood could, without modification, meet the standard when tested with softwood. While there is

some evidence that burning softwood in woodheaters at medium–low burn rates produces more particle emissions than hardwood, there is also evidence that burning softwood at high burn rates (e.g. as kindling) reduces particle emissions. A study recently commissioned by the Commonwealth will examine this further and should be considered in any decision by Governments to promote increased use of softwood as firewood. This study is also expected to investigate emissions from the burning of manufactured fuels.

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