Australian Native Plants Society (Australia) Inc.

President: Dr Margaret Matthews***Secretary***: Ms Christine Curry
Email: s3mmatthews@hotmail.com***Email:*** secretary@anpsa.org.au
Post: 5 Penryn Avenue City Beach WA 6015 ***Web: anpsa.org.au***
ABN: 56 654 053 676

The Australian Native Plants Society (Australia) (ANPSA) consists of eight member Societies in each of the States and the ACT and Northern Territory, representing more than 7000 individuals. The aims of the Society can be summed up as growing, conserving and appreciating the Australian flora, and include the following:

- Protect, conserve and enhance Australian indigenous plants in their natural habitats.
- Promote and support the study and cultivation of Australian indigenous plants for their intrinsic value and their ecosystem services.
- Communicate knowledge about Australian indigenous plants.
- Encourage the cultivation of endangered Australian indigenous plants in botanical gardens and other reserves.
- Encourage the growing and use of Australian indigenous plants in home gardens, public places and for revegetation projects and rural plantings.

ANPSA makes this submission to the National Royal Commission on the Black Summer Bushfires, particularly addressing the following matters in the Terms of Reference:

(b) Australia's arrangements for improving resilience and adapting to changing climatic conditions, what actions should be taken to mitigate the impacts of natural disasters, and whether accountability for natural disaster risk management, preparedness, resilience and recovery should be enhanced, including through a nationally consistent accountability and reporting framework and national standards;

(f) ways in which Australia could achieve greater national coordination and accountability – through common national standards, rule-making, reporting and data-sharing – with respect to key preparedness and resilience responsibilities, including for the following:

(i) land management, including hazard reduction measures;

(ii) wildlife management and species conservation, including biodiversity, habitat protection and restoration;

(iii) land-use planning, zoning and development approval (including building standards), urban safety, construction of public infrastructure, and the incorporation of natural disaster considerations;

(g) any ways in which the traditional land and fire management practices of Indigenous Australians could improve Australia's resilience to natural disasters.

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ANPSA has a Policy on Bush Fires (adopted 1997, re-endorsed 2015) which has the following Objectives:

- To protect life and property from bush fires in an ecologically sustainable manner;
- To enact environmentally responsible bush fire legislation, regulations and procedures;
- To conserve biological diversity and ecological processes by advocating appropriate fire management and risk reduction measures;
- To promote research into bush fires and the effect of fire on the Australian flora;
- To educate the community in fire safety and ecological considerations of bush fire management.

The ANPSA Policy also includes a number of strategies and procedures which are relevant to, and assist in, achieving the Policy Objectives.

This submission is made in accordance with the ANPSA Bush Fire Policy in order to achieve environmentally responsible bush fire legislation, regulations, procedures and responses, and is consolidated in the following sections.

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Conserve Biological Diversity

Bush Fire, Emergency or Disaster Control or Management Organisations, when carrying out any activity that affects the environment, whilst giving preference to the protection of life and property, must have regard to:

- the precautionary principle - if there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- inter-generational equity - the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;
- conservation of biological diversity and ecological integrity.

ANPSA advocates that areas of native vegetation subject to bush fires be managed in accordance with written Bush Fire Management Plans, which ideally will be components of regional land management plans, and will be prepared and reviewed with community input and be publicly available.

ANPSA strongly believes one of the aims of fire management must be to protect and enhance biodiversity. Australia has seen a huge increase in the numbers of flora and fauna species on threatened species lists, even before the recent summer of bushfires, which has reportedly put many species at increased risk of extinction. Use or incidence of fire, whether excessive, inadequate or inappropriate, contributes significantly to that risk.

While there are potential benefits of planned or prescribed (hereafter called planned) burning, it also creates challenges for maintaining biodiversity. Repetition of inappropriate fire regimes, such as those that are either too frequent or too infrequent, too severe or too moderate, too large or at the wrong time of year, can lead to local extinctions. Diversity of fire regimes, including occasional fierce (but small scale) fires in the hot, dry season, is essential to maintaining diversity of plants and animals.

Blanket targets of areas to be burnt annually, or burning across large areas of landscape, do not allow for consideration of different habitats and vegetation types or the protection of biodiversity, and should not be implemented.

Fire management should aim to accommodate variability of ecosystems. Planned burning can and does cause significant ecological damage, in some cases worse than the damage caused by wildfire. For example, a number of planned burns in Western Australia (such as those at Margaret River, Northcliffe, and the Stirling Range) got out of control and resulted in very widespread loss of native vegetation and caused catastrophic damage to personal property and buildings as well as Threatened and other significant flora. Further, as is being increasingly recognised, under some circumstances planned burns can make the native vegetation more, not less, susceptible to wildfire.

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The size of planned burn patches should depend on the ability of flora and fauna to regenerate and allow for escape by animals, and should take account of the presence of Threatened species as well as the differing requirements of different ecosystems. There has been a shift to large scale fires, both unplanned and planned, in the last few years. Planned burns of contiguous areas of 10,000 ha are now not uncommon. Such large-scale planned fires are not mosaic burns. While agencies might find it cost effective to undertake planned burns in this way, it does not consider the health effects to people or animals, or the ecological effects, and should not be undertaken.

Spatial variability and control of both planned and unplanned burns can be achieved using firebreaks, natural barriers to fire, previous fires and natural weather events, including forecast rain. Temporal variability can be achieved through burning in different seasons so that particular species are not always burnt just at the critical time in their lifecycle, and by varying the interval between fires.

Fire regimes must be planned across all tenures. There are too many different agencies and levels of government involved in planned burning across Australia, leading to poor co-ordination and haphazard outcomes, both for safety and for conservation.

There should be a zoning of fire regimes as part of planned burn prescriptions, so that areas closer to homes and built assets might be burnt more frequently, and national parks and other large areas of natural vegetation much less frequently. This is also a better use of resources. Rainforests and granite outcrops can be protected by strategic burning outside their boundaries.

While there has been much recent discussion of the indigenous practice of mosaic burning, in most cases the scale and size of the mosaic patches burnt prior to European occupation is unknown. While mosaic burning according to Indigenous practices may have many benefits, undertaking them in the same way as prior to European occupation is likely to be difficult, given human occupation of the landscape and the fragmentation of native vegetation. Nevertheless, greater discussion around, consultation with and involvement of Indigenous peoples to understand, explore, trial and implement fire management practices in line with traditional practices are necessary in order better manage fire risk and benefits.

If the practice of small-scale mosaic burning is to be more incorporated into bushfire management, it is likely that a greater number of personnel would be required to initiate and control those small-scale fires. If these personnel were to include a greater proportion of indigenous personnel, and the outcomes were (as anticipated) reduced incidence of wildfires, this would have the following benefits:

- reduced loss of lives and damage to ecosystems and properties;
- reduced need for, and thus the cost of deploying, large, heavy, expensive equipment such as aircraft, tankers, front-end loaders and graders;
- employment of indigenous personnel on a regular basis, counterbalanced by the savings in use of heavy equipment;

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- reduced need for water for fire suppression in water-scarce environments;
- elimination of the need for use of brackish or salt-water if fresh water was not available (which use is considered environmentally unacceptable in any event).

It should also be recognised that, apart from its intrinsic values and its value as habitat for native animals, native vegetation provides direct economic benefits to society and its destruction or removal creates economic costs. The destruction of native vegetation by inappropriate, excessive, too-frequently repeated planned or unplanned fire thus incurs the following costs or removes the following benefits provided by healthy, intact native vegetation:

- direct loss of human life;
- destruction of personal and public property;
- tourist income for visitors to experience Australia's unique ecosystems, plants and animals;
- mental and physical health benefits through immersion in the natural world;
- improvement in rates of healing through the presence of native vegetation
- health costs associated with bushfire smoke impact on urban communities (which are increasingly being recognised, quantified and demonstrated to be very significant);
- nectar and pollen for bee products.

Native vegetation also provides a large number of ecosystem services which, while difficult to quantitate, also provide economic value. These ecosystem services include the following:

- carbon sequestration;
- oxygen generation;
- rainfall initiation;
- erosion protection;
- temperature regulation;
- nutrient absorption;
- pest weed and insect control in agricultural ecosystems;
- habitat for pollinators useful in agricultural ecosystems.

The elimination of inappropriate, excessive, repeated planned or unplanned fire is imperative on even just an economic basis, and the cost of undertaking ecologically-appropriate fire management is offset by the economic benefit of doing so.

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Further, there is a strong economic argument to address, as quickly as possible, the adverse impacts of any and all excessive, intense and widespread fires, whether planned or unplanned. This includes the following actions that need to be taken in such burnt areas:

- removal of feral animal predators such as foxes and cats;
- removal of feral herbivores such as horses, deer, camels, pigs and cattle;
- removal of weeds;
- protection of threatened plants through, for example, fencing them off from native and feral herbivores;
- propagating and re-introducing threatened plants.

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Bush Fire Management

Bush Fire Management Plans should be prepared to implement planned burning and should have regard to the following:

- the need to manage fire regimes to minimise long term adverse effects on the biota;
- the need to protect rare or threatened flora and fauna and ecological communities, and sensitive vegetation communities such as wetlands, rainforest, mangroves and alpine areas;
- the requirement of many Australian plants for fire to reproduce and survive;
- the need for minimal interference in wilderness areas by fire trails (firebreaks and fire access tracks) and deliberate burning;
- the fact that hazard reduction does not necessarily entail burning;
- the need for planned burns to be varied with respect to intensity, season, frequency, scale and spatial pattern under all circumstances, bur particularly appropriate for the species present;
- the increasing aridity of parts of Australia, particularly the southern areas of Australia, as a consequence of climate change, which makes large scale planned burning in the narrow window of currently understood opportunity problematic;
- the need for fire regimes to be based on scientific research data;
- the possibility that interference with a stable ecosystem may lead to more difficult problems than previously existed;
- the preference for fire protection measures to be entirely contained within or around the property or sub-division being protected rather than by sacrificing large areas of adjacent bush land;
- the inclusion of ecologists and especially fire ecologists on fire management planning teams.

ANPSA supports a **tolerable fire interval approach** based on scientific knowledge of particular plant population's sensitivity to fire.

Fire is not good for all plant and animal communities. Not every vegetation type needs fire to regenerate and some areas were rarely burnt prior to European settlement. Mangroves, rainforests and rock communities are especially fire sensitive, with plants surviving in refugia/fire resistant places.

Indigenous priorities in burning were different to those of current society, and were mostly based on increasing/maintaining food resources, not maintaining biodiversity or reducing wildfire intensity. They were also often impromptu and very definitely small scale. While precisely identical Indigenous burning methods may no longer be applicable in many places because the vegetation has been modified and fragmented, there is still much that could be learnt from indigenous, and incorporated into contemporary, practices.

We need to base fire regimes on knowledge of plant populations' sensitivity to fire, which is probably changing with the effects of a drying, warming climate. This work has been done for some species, looking at the time to flowering and seed setting. One method is to estimate the juvenile period, which is the time taken for half the population to begin flowering, then multiply this time by 2 or 3. This should allow enough seed to replace the population (although the seed set can vary between years). This estimate must be based on plants that do not resprout after fire.

Burning at mandated frequencies of (say) 6 years or less (even on average) for every type of landscape is not appropriate given some species, including key Western Australian species such as Jarrah (*Eucalyptus marginata*) and Banksias, may take 10-15 years following fire to flower and set seed. Some ecosystems should remain unburnt for 30-100 years to protect vulnerable flora as well as fauna species.

The tolerable fire interval is changing with climate change so that whereas with the previous annual average rainfall it might have been 6 -10 years, it might now be 12-14 years. Plant populations are being pressured by both more frequent fires and less rainfall. This is a particularly threatening process for Banksia woodland.

Irrespective of the tolerable fire interval, some recent planned burns in various States have been very (and too) hot and have fully scorched tall trees, with consequent severe ecological impacts.

Priorities and issues for planning fire:

- Key flora indicator species: we need to understand the lifecycle attributes of key flora species, for example the percentage of seedlings surviving to adulthood, the percentage of adults surviving, the peak flowering month, age to peak flowering, seed storage type, adult longevity/senescence and seedbank longevity as well as the fire response type. Some species regenerate after heavy rain and do not require fire. Some slow maturing species of eucalypt may need 12 years to reach flowering and set seed set.
- Threatened and priority flora: priority must be given to conserving and protecting Threatened Ecological Communities and species, and if scientific knowledge regarding fire sensitivity is unclear, the precautionary principle (eg avoiding planned burning or reducing its scale) must be applied until the research is available.
- Temporal sensitivity: many threatened orchid populations (geophytes) cannot recover from fire at flowering time as it prevents seed set. Planned burning in these populations needs to be undertaken at a different time to avoid the threat.
- Key fauna indicator species: birds can be important indicator species as they require food resources and protection from predators for successful breeding. Distances between suitable nesting/foraging habitat can be critical, especially for birds that are less mobile and fed mostly on the ground. Planned burns in spring destroy nests and kill eggs and chicks.
- The reliance of some species of flora and fauna on long un-burnt vegetation.

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- Fire sensitive communities: rainforests, alpine bogs and granite outcrops need particular care.
- Habitat: key indicator fauna species and structural flora species as well as poorly represented vegetation communities need to be considered when planning burns.
- Forests: the regrowth phase of forests is a dangerous time as the regrowth is very flammable and needs to be protected from fire until it reaches the old growth stage where the fuel load naturally reduces. Planned burning in forests every few (ie <6) years is not beneficial, and may indeed make the native vegetation more, not less, susceptible to wildfire.
- Weed control: weeds add considerably to the fuel load and in many places weeds are totally uncontrolled. Unfortunately, fire often encourages increased weed growth. It has been shown, for example, that Perennial Veldt Grass resprouts very quickly and sets seed after fire. Controlling weeds after fires can considerably reduce their impact on native plant growth and fuel load. This is particularly critical in remnant native vegetation bordering pasture land/urban areas.

More attention needs to be given to preventing wildfires and controlling wildfires when they start. Options that could be considered, besides planned burning and other fuel reduction measures, include the following:

- deploying wildfire detection officers or technology at strategic locations, including around residential areas, to detect bushfire ignition, including to discourage and detect arson and potential arsonists, as soon as possible after a wildfire is initiated;
- deploying rapid response teams and deploying response teams rapidly to areas where a wildfire breaks out. We are aware of reports of several instances in Western Australia where response to an actual fire front has been very tardy, almost negligently so, after the first indication of a wildfire having started being notified to authorities, resulting in the wildfire getting completely out of control and causing major damage, when a rapid response was possible and would have prevented the resulting catastrophe;
- placing lightning conductors at numerous, strategic locations in native vegetation known to be subject to lightning-initiated wildfires in the past, in order to bring lightning strikes safely to ground without initiating a fire.

While these measures may be considered to be difficult or expensive, such or more extreme measures and strategies were adopted and implemented in response to the COVID-19 pandemic. Since the economic, social and environmental impacts of fire on the lives and livelihood of people are, or may become (with increasing climate change), similar to that of COVID-19, as demonstrated by the Black Summer bushfires, it should be considered money well spent to prevent such catastrophic events from recurring.

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Scientific research to manage fires in an ecologically sound way

ANPSA calls for the establishment of a national body to co-ordinate fire research programs and research information, including a database on which fire managers can draw to develop their own ecologically based fire management programs.

ANPSA calls for and encourages the need, and resources, for further research, including fire ecology research. Although a plethora of research material is available, it is not consolidated, or readily available, and more is needed in certain areas. These areas include the following:

- responses to fire and the life cycles of a wide range of native plant species and communities, especially those in areas subject to more frequent burning for property protection;
- community attitudes;
- the identification, behaviour and management of arsonists;
- fuel and hazard evaluation;
- fire behaviour;
- fire suppression methods;
- the impact on soils;
- efficiency and effect on the environment of chemical fire retardants, foams and wetting agents;
- fire retarding plants and trees for gardens and screenings;
- strategies, mechanisms and investigations of the extent that fuel can be reduced and biodiversity can still be retained by non-burning methods.

Fire management guidelines should be developed for endangered and critically endangered flora and incorporated into the planned burning plans of the various responsible authorities.

There must be monitoring of populations of fauna and flora at the landscape level and over time, surveying key indicator species to ensure they are persisting. It may not always be the fire regime that is affecting a species, but the precautionary principle requires an assumption that it could be.

This monitoring should be based on mapping:

- vegetation types according to fire management units with boundaries;
- key indicator species
- weeds.

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Education

ANPSA suggests that public education programs be implemented to emphasise that planned burning does not necessarily eliminate the risk of unplanned wildfire, and that planned burning can be equally as hazardous and catastrophic as unplanned wildfire, especially if undertaken under inappropriate conditions and circumstances.

ANPSA encourages the introduction of public education programs emphasising.

ANPSA advocates that householders who live near bushland take action to reduce the risk of wildfire to their properties. This would include measures such as reduced shrubbery height and density near buildings and on slopes, appropriate selection of plant species in gardens, good access roads and paths, no brush fences, no branches overhanging roofs, clean gutters, elimination of rubbish heaps and no dumping over fences. These actions would also that allow fire fighters to safely protect life and property without being placed in a hazardous position themselves.

ANPSA recommends that governments mandate, and homeowners implement, construction of bushfire-safe housing that complies with or exceeds Building Standards in bushfire prone areas.

ANPSA strongly recommends that training for bushfire officers and firefighters includes elements of ecology, so that they understand the reasons for, and fundamentals of, biodiversity conservation.

ANPSA strongly recommends that school education programs be delivered to prevent, and procedures be developed to detect and discourage, potential arson and arsonists, including in the bushfire management community.

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Summary

ANPSA's major comments and recommendations are as follows:

- any actions related to fire, whether wildfire or planned fire, and whether prevention or control, must have regard for the impacts on the environment as well as on life and property;
- apart from its intrinsic values and its value as habitat for native animals, native vegetation provides direct economic benefits to society and its destruction or removal by inappropriate, excessive, too-frequently repeated planned or unplanned fire creates economic costs;
- one of the aims of fire management must be to protect and enhance flora and fauna biodiversity;
- diversity of fire regimes, such as frequency, scale, special pattern, season and intensity, including occasional fierce (but small scale) fires in the hot, dry season, is essential to maintaining diversity of plants and animals;
- planned burning can and does cause significant ecological damage, in some cases worse than the damage caused by wildfire, and may make native vegetation more, not less, susceptible to wildfire;
- fire regimes must be based on scientific data, particularly knowledge of plant populations' sensitivity to fire, which is probably changing with the effects of a drying, warming climate;
- blanket targets of areas to be burnt annually or at set frequencies are inappropriate;
- fire management must investigate and incorporate a greater degree of small-scale mosaic burning, and must include a greater degree of indigenous personnel involvement;
- the elimination of inappropriate, excessive, repeated planned or unplanned fire is imperative, and the cost of undertaking ecologically-appropriate fire management is offset by the economic benefit of doing so;
- fire regimes must be planned across all tenures, and must be better co-ordinated between agencies and volunteers to eliminate haphazard and ineffective outcomes, both for safety and for conservation;
- fire ecologists must be included in fire management planning teams;
- fire hazard reduction does not necessarily entail burning, so there should be further research and implementation of ecologically-sensitive fire-risk reduction procedures that do not depend on burning native flora;
- fire protection measures should be contained within or around the property or residential area being protected rather than by sacrificing large areas of adjacent bush land;
- actions to address the adverse impacts of fire, such as control of alien plants and animals, and recovery of threatened species, need to be taken as soon as it is safe to do so ;

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- sustained and increased actions, including social and environmental surveillance, fire initiation deflection and rapid response, need to be implemented to prevent and minimise the extent of unplanned fire;
- provide resources for, and undertake, further research, into all aspects of fire, including fire ecology, fuel and hazard evaluation and reduction, fire suppression and fire behaviour;
- undertake public education programs to emphasise that planned burning does not necessarily eliminate the risk of unplanned wildfire, and can be equally as hazardous and catastrophic as unplanned wildfire, especially if undertaken under inappropriate conditions and circumstances;
- ensure training for bushfire officers and firefighters includes elements of ecology, so that they understand the reasons for, and fundamentals of, biodiversity conservation;
- governments mandate, and homeowners implement, construction of bushfire-safe housing that complies with or exceeds Building Standards in bushfire prone areas
- school education programs be delivered to prevent, and procedures be developed to detect and discourage, potential arson and arsonists, including in the bushfire management community.