

# Water notes

Water notes for wetlands management



ADVISORY NOTES FOR LAND MANAGERS ON RIVER AND WETLAND RESTORATION



## Wetlands and fire

Fire needs to be carefully managed in order to maintain plant and animal communities, wetland functions and landscape character. Fire can be a useful management tool, indeed it is an essential factor in the ecology of south-west ecosystems. It is needed to stimulate regeneration and regrowth in native vegetation and create a diversity of fauna habitats. However, if it is used inappropriately (too much or too little burning) it can lead to a loss of habitat and species diversity, native seed and peat soils and in some circumstances even endanger human life and property. Frequent fires often contribute to weed invasion and the loss of native plant species. A good understanding of the impact of fire upon wetland ecology is required before consideration of using fire as a management tool.

### Fire regimes

The effect of fire on wetland ecology will depend upon the natural fire regime, which is the pattern of fire occurrence (frequency and intensity) in a particular area. Other important considerations include the time of year fire usually occurs and the patchiness or extent of fire. Many native plants are able to survive or recover from fire by resprouting from buds beneath their bark or from rootstock, germinating from seeds stored on the plant or in the soil, or are able to re-establish in an area by recolonisation.

The appropriate fire *frequency* to use in the management of many plant communities is not necessarily known and

generally can only be inferred from the known life cycles of the various plant species within the plant community. The frequency of fire will have a distinct effect on the composition of plant and animal communities that are present. Fires that occur too frequently (above the "normal" frequency), should be avoided as they favour weed invasion and eliminate native plant species that take longer to produce flowers and set seed. In contrast, infrequent fires can potentially result in very high fuel loads and high intensity fires which in turn favours a particular plant community.

The *intensity* of a fire depends on the amount of fuel available, the stage of plant growth and climatic conditions. High intensity fires (hot burns) consume most of the above ground material and favour germination of certain plant species such as Prickly Moses (*Acacia pulchella*). In a high intensity burn seeds are released rapidly into the soil and the rate of germination may be high. However, the rate of seedling survival may be low if drought or extreme temperatures follow. Low intensity fires (cool burns) can be patchy, leaving some of the above ground material unburnt. The heat of a low intensity fire may not be sufficient to stimulate the release of seeds or expose mineral soil. As a consequence poor seed germination will result and the growth of grassy weeds may be encouraged.



Wetland vegetation following a moderate to high intensity burn in Amstey Swamp.



The *time of year*, or fire season, will affect the intensity of the fire and therefore determine the impact of the fire upon wetland plant communities. Inappropriate timing of fires can result in the loss of seed stocks or mature plants.

Autumn burns tend to be hot, intense and fast moving with a long duration. As a consequence, native fauna mortality rates may be high. Autumn burning is suggested for most regeneration burns and is particularly useful for regrowth of wattle or pea “thickets”. Winter burns have a low intensity and short duration and may produce a “patchy” result, leaving some areas unburnt. Winter burning will disrupt the seeding and flowering of some plants species and the breeding cycle of certain species of native fauna. Winter burning is not recommended for regeneration burns.

Spring/early summer burns are of low to moderate intensity and will often leave some patches of native vegetation unburnt. Fires which occur at this time of year may lead to the erosion of topsoil including seed and nutrients. Burning too early should be avoided as this will result in the loss of the current seed crop of many native plant species. Surface seed germination is stimulated by a fire at this time of year, however it will not result in the germination of buried seed as seed dormancy will not be overcome by a fire of this intensity. A significant disadvantage of fire occurring at this time of year is that it may increase insect and fungal attack upon seeds.

### **Advantages of fire in your wetland**

Fire:

- may trigger seed release and germination in some species;
- stimulates the development of new green shoots, roots and rhizomes of grasses and sedges producing a food source for waterbirds such as ducks and geese;
- may create pools for nesting and feeding waterbirds; and
- can provide favourable habitat for some waterbirds by eliminating impenetrable growth of plants such as sedges, rushes and bulrushes.

### **Disadvantages of fire in your wetland**

Fire can lead to:

- loss of seed as a consequence of inappropriate timing of fires;
- degradation or loss of peat soils (organic-rich soils);
- increased predation of seed by insects;
- fungal attack on seeds;
- changes in vegetation composition and structure;
- exposure of roots and rhizomes;
- loss of vegetation, resulting in reduced biofiltering of incoming surface water flows;
- erosion of soil and increased turbidity in wetlands;

- increased weed invasion;
- destruction of fauna habitat used for breeding, feeding and shelter;
- death of fauna; and
- an increase in water temperature as a result of the loss of vegetation and shade. This can increase the risk of algal blooms occurring.

### **The effect of fire on wetland fauna**

The effect of fire on the survival of wetland fauna depends on the intensity, frequency and extent of the fire and the ecological requirements of the particular species concerned. It is therefore difficult to make generalisations in this regard. Most vertebrate groups can escape low intensity fires by sheltering until the fire front has passed, or by avoiding the fire edge. Low frequency, high intensity, broadscale summer fires have the most dramatic impact on the survival of fauna species. In general, mortality rates as a direct consequence of this type fire are high amongst goannas, possums, bandicoots, wallabies, kangaroos and some bird species such as honeyeaters. Post fire mortality of fauna is also very high as a consequence of both predation and scarce food resources.

The “island effect” is also worth considering as many wetlands are now islands of natural habitat amongst cleared farmland and urban development. A complete burn may therefore be catastrophic, wiping out local populations of plant and animal species. For this reason it is important that “island wetlands” are never completely burnt.

### **How to organise a fire management plan for your wetland**

As there is no set fire regime which is applicable to all wetlands, it is important to have an understanding of the ecology of your wetland and identify the reason for using fire as one of a number of management tools. Prior to using fire as a management tool, a fire management plan should be developed. The Fire Plan will need to address the basic issues of *Prevention* “Stop a fire starting in the bushland”; *Preparedness* “Get ready to keep the fire small”; *Response* “Put the fire out quickly”; and *Recovery* “Help the bush to recover”. The fire management plan should also consider the conservation value and recreational objectives of the wetland concerned and the nature of surrounding land uses. In general, the landowner / manager is responsible for the prevention, preparedness and recovery initiatives and the Fire and Rescue Service or Volunteer Bush Fire Brigade is responsible for response activities. The following points should be considered in your fire management plan:

- your Local Government Authority (LGA), local fire brigade and Fire and Emergency Services (formerly Bush



Fires Board) should be consulted to find out about prohibited and restricted burning times, to gain advice on personnel and equipment requirements and to obtain assistance wherever possible. Indeed for public land one or the other should be present on the day to oversee the work and check any breakouts.

- Under the Bushfires Act, there is a legal requirement for landowners or land managers to manage land in a manner which reduces fire hazard.
- Identification of key stakeholders and consultation between the various groups is an essential part of plan development.
- Prepare a map of the area to provide an overview of what is known of the local flora and fauna, hydrology and geology. Ecologically significant areas should be clearly identified.
- Understand the ecological issues. Avoid biologically sensitive areas (for example areas of peat accumulation, known fauna breeding sites, areas containing rare flora or threatened ecological communities) and ensure that fires do not occur more frequently than the time required for plants to set seed.
- Prepare your site – ensure that firebreaks and fire access tracks are maintained and located in strategic positions and that weeds are controlled.
- Seek to maintain habitat diversity for a range of fauna and avoid burning during fauna breeding seasons.
- Use mosaic burning which involves using a series of small burns over several years to produce pre- and post-fire habitats. This method provides a range of habitat types for fauna and limits the impacts of predation and competition following a fire. Never burn the entire wetland within a 1 – 3 year timeframe; by making use of natural firebreaks if possible (for example drains or tracks).
- Foam and other additives should not be used on wetland fires as they often contain nutrients and surfactants.
- Make allowances for the movement of fauna out of the area by opening gates and fences.
- Reduce grazing of regenerating native vegetation by rabbits by implementing rabbit control measures after burning.

An excellent reference to assist you in the development of your Fire Plan is “Fire Management Planning for Urban Bushland” produced by Fire and Emergency Services and the Urban Bushland Council of WA Inc.



*Regeneration of wetland vegetation following fire.*

## “Prescribed” burning

Prescribed burning is one method which can be used to reduce the risk of uncontrolled wildfire by limiting the build-up of fuel loads in remnant bushland. Prescribed or planned burning should not take place unless:

- consultation with all stakeholders has taken place prior to the burn;
- a comprehensive written prescription has been produced stating the objectives of the burn and the methodology to be followed;
- the person in charge of the fire is trained and competent in planned burning;
- adequate resources are available; and
- local government requirements are met.

Weather conditions should be monitored to predict smoke and fire behaviour. Wind direction should be considered to ensure that smoke will not be carried toward sensitive areas such as main roads, airports, schools or residential areas. Burning should also be avoided during the growing season as green vegetation produces more smoke.

## How to manage fires around your wetland

### Wetland vegetation

Unless fuel reduction using prescribed burning is identified as providing an ecological benefit it is undesirable to use it in wetland vegetation. Alternatives to burning in these areas include the thinning out of undergrowth and litter using hand tools or machinery. Slashing should be timed to achieve maximum fuel reduction.

### Weed control

Weeds contribute to an increase in fire hazard risk and fire intensity. Control of annual weeds using chemicals and hand tools during the early growth phase will help reduce



subsequent fuel loads, fire frequency and the intensity of fire at ground level. Consult with Agriculture Western Australia for advice on the appropriate use of chemicals for the control of weeds.

### Firebreaks

Firebreaks should be at least 20 m from the boundary of wetland dependent vegetation and have a maximum surface width of six metres. In some cases existing roads, pedestrian and cycle paths and fire resistant natural features such as rocks and gullies may be used. Biologically sensitive areas should be avoided with firebreaks being constructed in already degraded or disturbed areas wherever possible. The construction of firebreaks must take into account the possibility of the spread of dieback. In this respect, the Department of Conservation and Land Management may be consulted for advice regarding techniques that prevent the spread of dieback.

Caution is required when planning the use of fire in a wetland so that controlled burns and wildfires do not lead to unacceptable fire frequency and the loss of both habitat and species diversity. Consideration should be given to only conducting small-scale manageable prescription burns at strategic locations, avoiding environmentally sensitive areas. Prescribed burning should only be a small part of an overall fire management plan and burns in wetland areas should be a well planned event undertaken by appropriately trained personnel.

### Further Reading

Available from Water and Rivers Commission

Water Note WN3, Wetland vegetation  
Water Note WN1, Wetlands and weeds  
Water Note WN4, Wetland buffers  
Water Note WN5, Wetlands as water bird habitat

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For more information contact



WATER AND RIVERS  
COMMISSION

Level 2, Hyatt Centre  
3 Plain Street

East Perth Western Australia 6004

Telephone: (08) 9278 0300

Facsimile: (08) 9278 0301

or your regional office

Website: <http://www.wrc.wa.gov.au>

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