Notes on a bushfire on Wagga Wagga Station, Yalgoo Shire

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January 2012

Large bushfires in the Murchison shires of Yalgoo, Mt Magnet, Sandstone and Meekatharra are rare events because the cover of flammable vegetation is usually insufficient to carry fire, the exception being where spinifex (*Triodia* spp.) dominates ground cover. The non-spinifex mulga/bowgada/acacia shrubland vegetation is 'fire sensitive' (i.e. readily killed by fire) and these ecosystems could be characterized ecologically as fire independent – fire does not play an important role in their maintenance.

The spate of bushfires this season is the first in the living memory of elderly people in the district. The region has experienced above average rainfall, for example Mt Magnet received 438 mm in 2011; the long term annual average is 234 mm. Good summer and winter rainfall has resulted in extensive growth of native grasses and herbs, which have cured and are now flammable. Reduced grazing pressure by sheep since the mid 1990s may have contributed to the grass fuel build-up.

The Wagga fire was started by a lightning strike some 25 km N of the Wagga Wagga homestead in the Yalgoo shire on 28 December 2011. It was finally controlled on 6th January 2012 after burning about 20,000 ha.

This fire was the latest of a spate of bushfires in the region, but is unlikely to be the last this season. I will prepare a more detailed report later, but wanted to pass on some preliminary observations, which may be helpful should we have similar fires on DEC properties in the region.

- The fire was managed by Yalgoo Shire with FESA support. Local pastoralists, SES, workers and machinery from the Shires of Yalgoo and Mt Magnet, and 3 DEC employees from Geraldton and Jurien were in attendance.
- Fuel conditions: Well above average summer and winter rainfall has resulted in extensive annual and perennial native grass and herb cover - especially wind grass (*Aristida* sp.) and wanderrie grass (*Eragrostis* sp.).
- While there are extensive patches of virtually continuous (100%) grass cover in the mulga/bowgada/acacia shrublands, there are also landsystems where fuels (grass cover) are patchy, however there is fuel continuity through the landscape by way of 'wicks' of continuous grass cover, such as along by-washes and creeklines, flow-on areas, mulga flats and sandy loam soil country. So while the extent of grass cover is variable, the landscape is permeable to fire under these conditions.
- Wind grass is a low (10-15 cm high) plant with very fine stem and leaf components (~0.25 mm thick) with a very high surface-area-to-volume ratio, making it very flammable. It forms a complete (100%) ground cover on some sites with low open overstorey. It is recognized by the Department of Agriculture as an 'increaser' in response to heavy grazing.

- When fully cured (as it is now) it is extremely flammable. Even at 100% cover, fuel load is low (estimated 2-3.5 t/ha).
- Fuel (cured grass) moisture content sampled at 1400 hrs on 5 Jan. was very low at 4.6% o.d.w.
- Peak of the day weather conditions during the fire run were:

    - Max. temps. Range 36-38C.
    - Min RH: Range 20-25%.
    - Winds over the duration went anti-clockwise around the clock. Strongest winds measured were on 5 Jan. At 2m above ground, wind constant NW @ 22-25 km/hr gusting to 35 km/hr for most of the day.
- Rates of headfire spread were the highest I have observed in any fuel type. During peak weather conditions on 5 Jan., spread rates in areas of 100% wind grass cover were consistently 12-15 km/hr with bursts to 18 km/h on wind gusts. At times, graders had trouble keeping up - quite remarkable to observe. Spread rates in wind grass were consistently 50-60% of wind speed (measured at 2m above ground).
- Smoke plumes were generally poorly developed, comprising individual wind-driven smoke columns with poor convective development, indicative of relatively low intensity, low energy release and fragmented headfires on account of low and patchy fuel loads.
- Because of fuel patchiness, overall landscape level headfire spread rate was 5-7 km/hr. Under calm, cooler evening conditions, rates of spread were 60-100 m/hr with flames to 0.2 m.
- Fire boundary was convoluted, with headfires burning in tongues rather than a continuous fire perimeter - reflecting patterning of grass fuel.
- Fires exhibited some low intensity, short distance (20-50 m) spotting. The maximum spotting distance I observed was ~250 m.
- Under peak conditions, headfires easily breached narrow station roads and tracks. Small embers and flame zone radiation were sufficient to start fires (hopovers) across tracks in fine, very dry wind grass fuel.
- Direct attack on the fire was usually not possible because of poor access and the fragmented fire perimeter. Indirect attack was mostly employed by cutting mineral earth containment lines away from the fire perimeter.
- Loaders constructing fire breaks in wind grass started fires when crossing stony quartz country with light grass cover - small sparks from the steel buckets striking rocks were enough to start fires - something to be wary of. Graders did not seem to have this problem. Loaders or bulldozers were necessary to clear scrub and small trees so graders could construct containment lines.
- Flame heights were generally quite low - <1 m with occasional flare-ups to 3 m. Headfire flame depths ranged from 3-15 m. Flame residence time in wind grass was brief at ~5 seconds.
- Fire behaviour subsided dramatically to 'creeping' fires when conditions, especially wind speed, abated in the evening. Until late in the action, firefighting was mostly done during daylight hours, on account of limited resources. A capacity to work at night, to do some edging and backburning when the fires were ‘asleep’, would have been very effective.
- The level of fire damage and mortality to the overstorey (mulga and other acacias etc to 4 m) could be lower than initially expected on account of the generally low flame hts and low flame residence times. There will be extensive patches of

- As mentioned, the suppression strategy was mainly indirect attack by cutting wide (30m) mineral earth breaks / containment lines away from the fire edge. Rocky outcrops, stony hills and breakaways etc. made accessing the fire difficult.
- There was little or no edging or backburning done. Perhaps there was a concern that the backburning / edging could escape, significantly advancing the fire front, or that there were insufficient resources to safely manage backburns / edging. However, edging / backburning done under the supervision of an experienced firefighter, and at night when conditions abated and the fires 'went to sleep', could have been highly effective and less environmentally damaging.
- The FESA helicopter was valuable for directing operations as it was otherwise difficult to know exactly where the headfires were. Air observers were able to provide intelligence on the nature of the country, accessibility, fuel condition and fire behaviour, hopovers, spotfires, guide containment line construction and tactics, assist ground crews with navigation and report on the disposition of resources.
- Given that local pastoralists and shire workers in this region have little or no bushfire fighting experience, they went about doing what they were tasked to do, admirably, showing leadership and initiative. Most can operate machinery competently and have good local knowledge of the bush.
- I suggest we need a better risk management framework to help decide whether or not these fires should be suppressed or left to burn out. Considerations include long term fire damage to the environment, loss or damage to pasture, stock and infrastructure (fences, water points etc.), other values at risk, good neighbour relations, suppression costs, opportunity costs and suppression-related environmental damage.
- I will obtain maps from satellite imagery of the extent of fires in this region at the end of the fire season (April – May?) because there are likely to be more.
- I will also install a network of monitoring sites to measure plant mortality, fire response and post-fire regeneration.


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