Species/ regrowth

- Many of australia’s native plants and fire prone and very combustible, while numerous species depend on fire to regenerate [1]
- However, all burn severity classes in the burned subcatchments recovered rapidly to pre-wildfire conditions within six years (Figure 6). Lower burn severity classes (negligible, low, and moderate) recovered to pre-wildfire NDVI conditions within two years post wildfire. Higher burn severities (high, very high, and extreme) have little spectral difference between the pre- and post-wildfire data by six years post fire (2006/07) in all four subcatchments. [3]
- The drier the vegetation community, the lower the dRI value immediately post fire, with DSFs communities having the lowest dRI values post fire (Figure 7). Drier vegetation communities also had a larger proportion of areas burned, while wetter communities had a larger proportion of unburned areas (Table 2). [3]
- Knox and Morrison (2005) also demonstrated the quick response of resprouting sclerophyll vegetation, finding that shrubs resprouting from lignotubers had greater reproductive output at sites with longer rather than shorter inter-fire intervals. In comparison, obligate seeders are often killed by wildfire and require a fire-free period after germination and adequate post-fire rainfall to ensure seedling growth and development (Lamont and Markey 1995), which slows down the overall vegetation response process. [3]
- As discussed by Gill (2012) and Enright et al. (2012), there are few medium to long-term studies with unequivocal data on recovery time of vegetation communities within Australia. Within the study area, Jacobson (2010) showed that after only 12 months post fire in a DSFs study site, ground vegetation had recovered to 73% pre-fire means, shrubby vegetation had revered to 50% pre-fire cover, and canopy had returned to 35% pre-fire cover. These results are consistent with the generally reported recovery period of 5 yr to 7 yr in the dry sclerophyll forests, woodlands, and heathlands in the Sydney Basin (van Loon 1977, Conroy 1993, Penman and York 2010). More recently, Caccamo et al. (2015) have also demonstrated a rapid 5 yr to 7 yr recovery of dry sclerophyll forests in the Sydney Basin using MODIS imagery. [3]
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Wind

- High winds can accelerate the spread of wildfires by carrying embers and burning debris over long distances. This allows fires to jump firebreaks, roads, and other barriers, making containment efforts more difficult. In dry and forested environments, embers can travel a mile or more ahead of the main fire, igniting new fires in areas that would otherwise be considered safe. These secondary ignitions, known as spot fires, rapidly increase the number of active fronts a crew must manage. [2]
- As fires intensify, radiant heat increases, potentially igniting structures and vegetation without direct flame contact. This extreme heat can also dry out nearby vegetation in advance of the flames, creating a feedback loop that allows the fire to expand rapidly. [2]

- Wind also promotes the rapid spread of fire by spotting, which is the ignition of new fires by burning embers lofted into the air by wind. Spotting can occur up to 30km downwind from the fire front. [1]
- There is a threshold wind speed of around 12 to 15km/h which makes a significant difference in the behaviour of bushfires in the open. When wind speeds are below this threshold, fires with heavy fuel loads burn slowly. However, even a slight increase in wind speed above this threshold results in a significant increase in fire behaviour and advancement. [1]
- https://www.ga.gov.au/education/natural-hazards/bushfire data
- https://www.bom.gov.au/climate/averages/tables/cw_009225.shtml data

Rain

- Dry fuel will burn quickly, but damp or wet fuel may not burn at all. As a consequence, the time since rainfall and the amount of rain received is an important consideration in assessing bushfire danger. Often a measure of the drought factor, or moisture deficit, will be used as an indicator of extreme bushfire weather conditions. [1]
- This rule is a guideline for extreme fire behavior: If the temperature is above 30ºC (86ºF), humidity is 30% or lower, and wind speed is 30 km/hr (19 mph) or higher, there's an increased fire risk. Knowing the 30-30-30 rule boosts awareness during periods of high danger. [4]
- Fuel moisture is driven by long-term climate coupled with low precipitation and higher temperatures that dry out fuels on the landscape. Leaf water content (normalized difference moisture index, NDMI) has been found to be a driver of fire severity (Estes et al. 2017; Parks et al. 2014). Climate drivers interact with fuel amount and continuity across the landscape and are often confounded by interannual climate variability (Abatzoglou et al. 2018). [6]
- The relationship between drought and fire is complex, and the frequency and intensity of drought events impact fuel flammability and fire behavior. Fire size and area of high-severity fire were found to be greater during drought events than moderate or wet periods across the western US (Crockett and Westerling 2018). [6]
- However, a wet spring followed by a period of dry months can bring abundant fuels and understory conditions that then rapidly dry out, leading to larger fires. [6]
- Wetter conditions may promote the production of fine fuels that can promote fire during subsequent drought years (Jin et al. 2014). [6]
- Alternatively, prolonged drought conditions and lack of precipitation can reduce the availability of forest fuels, thus limiting fire occurrence and leading to less severe fire in ecosystems that then become fuel and biomass limited. [6]
- https://www.bom.gov.au/climate/outlooks/#/overview/summary data

1. https://www.ga.gov.au/education/natural-hazards/bushfire
2. https://kestrelinstruments.com/blog/the-unpredictable-force-exploring-the-impact-of-wind-on-wildfire-spread?srsltid=AfmBOopH9QxX0_r6uYMFwneT3WxGXcUb-IHX7p_EmCCHWoxN0vY0oAdx
3. https://link.springer.com/article/10.4996/fireecology.1203053
4. https://www.ecoflow.com/us/blog/wildfire-season-safety-evacuation-home-prep

5. https://www.scientificamerican.com/article/how-wildfires-create-rain-and-change-the-weather/
6. https://link.springer.com/article/10.1186/s42408-023-00200-8