Interleave 1

Flying to Canberra, December 2019: Louisa's story

In early December I set out from Aotearoa-New Zealand for a conference in Canberra, where Mary Lou and I were to present a paper entitled 'Crisis, sexuality education, reproduction and kinship'. My journey involved a stopover in Sydney, where the smoke was inescapable. I remember my shock as the plane landed and there was no difference between the colour of the sky and the tarmac – both were grey. This didn't look anything like an overcast day; this shade of grey spoke of something being terribly wrong. As I peered from the plane window, I also noticed that ground staff working on the tarmac were wearing masks, which at this pre-COVID-19 time was a highly unusual occurrence. After landing and hearing the usual announcements about disembarking, there was an additional notice reassuring passengers that the smell of smoke, which had now penetrated the plane, was not something burning onboard, but caused by the fires outside. I didn't feel reassured; I remember thinking this is just awful, this beautiful city is being smothered in smoke, how in the world are people living in this? In the course of transferring to the flight for Canberra, I had to exit the international terminal building. The first blast of air as the sliding glass doors opened was a shock, even though I'd registered that the smoke was everywhere. My first gulp was like standing by a bonfire on Guy Fawkes Night without the ability to retreat from the stronger fumes. The combined heat and smoke made my eyes water and I rushed to get back into the air-conditioned and comparatively smokeless sanctuary of the national terminal.

Having now smelt the smoke and experienced it (albeit on a very small scale), even this did not prepare me for the view from the plane as we travelled south to Canberra. As I looked out the window, I could see lines of fire moving through the bush for kilometres upon end.

Interleave Figure 1.1: Driving towards the fires in Canberra, January 2020

Source: participant photograph

Thick clouds of smoke hung over areas where the fire was thickest and I remember thinking this is truly an environmental tragedy. What amazed me though was that while I was transfixed by the fires, unable to pull my gaze from the window, no one else in the crowded plane was paying them any attention. I wanted to stand up and shout 'My god, the ground is burning! Stop reading your paper – we need to do something!', but for everyone else, these fires had become part of daily life.

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Reproducing in Climate Crisis

In the Southern Hemisphere summer of 2019–2020, three of us were living in Canberra, Australia's inland capital city, and the other in Auckland, Aotearoa-New Zealand. Like many parts of Australia, Canberra was in the grip of a long drought: the grass was brown, kangaroos had moved down from the mountains into the suburbs to search for food, and the heat was increasingly intense. Canberra's famous street and park trees were dying and the air crackled with dryness. The garden tanks were empty and the forest ponds had dried up. Dedicated citizens set up water stations for wildlife throughout local bushland, recording their activities on digital platforms so that others could join in. Across the Tasman, Aotearoa-New Zealand was experiencing its fourth warmest year on record, with hills usually covered in lush green grass left brown and the earth bearing large crevices and cracks. This especially hot summer season was also extremely dry, leaving the entire North Island in one of the most severe meteorological droughts ever recorded.

The Australian 'fire season' started early. Well before Christmas, bushfire reports became part of daily life. We Australians downloaded the 'Fires Near Me' app, and before travelling anywhere checked our route and destination. The nightly news was filled with images of smoke, flame and heroic, ash-covered firefighters. The scale of the fires was hard to comprehend. Altogether approximately one third of Australia's forests were burnt – more than 8 million hectares of vegetation across the south-east of the continent, an event unprecedented in the last 200 years (Godfree et al, 2021). The fires burned across South Australia, Victoria, Canberra and New South Wales (NSW). Over the summer, the Australian fires became global news. The *Berliner Morgenpost*, for example, developed an interactive map to allow viewers to compare the extent of the burned area to any region in the world.[1] Video images of devastation and survival flooded the internet. In one memorable snippet, a koala staggered from a 42°C forest, coming across a group of cyclists. Reaching for a man's water bottle, it desperately drank,

standing up on its hind legs to lean on the bike. Such behaviour from an iconically shy animal was both touching and appalling.[2]

Humans and animals tried to escape the smoke and flames, but diverse habitats were devastated. Humans worked to save their farms and houses as well as the forests. Many were unable to: over 3,000 homes were lost, mostly in NSW. Vast quantities of rural fencing and buildings were also destroyed. Thousands of local and international firefighters volunteered to help save towns, farms and forests. Thirty-three people, including nine firefighters, died as a direct result of the fires (Hitch, 2020). Another 445 deaths were later confirmed to be indirectly related to the fires and smoke. Authorities issued instructions to thousands of holidaymakers travelling in the coastal areas who then spent long hours in the ensuing traffic jams or following significant detours to avoid the fires and return to the relative safety of cities, often with their pets. People living on the fringes of bushland rescued animals and tried to provide them with food and shelter. A group of surviving koalas from Canberra's Namadgi National Park were moved into a special research facility at the Australian National University (ANU). In total, approximately 3 billion nonhuman animals died: 143 million mammals, 2.46 billion reptiles, 180 million birds and 51 million frogs (Australian Institute of Health and Welfare, 2020; Richards et al, 2020; World Wide Fund for Nature Australia, 2020). It was a frightening and intense time, full of anxiety, grief and dread. Almost nowhere felt safe. We were not safe.

Seventeen years earlier, in 2003, Canberra had experienced an intense urban blaze, ignited by out-of-control fires in surrounding national parks and pine plantations in close proximity to Canberra suburbs. Four hundred and seventy homes were lost and four people died. This part of the city is now rebuilt and replanted – the National Arboretum covers part of this landscape. Since this time, Canberrans have been particularly wary of fires: we understand that fires do not only happen 'out there', in the bush, but can enter cities, especially our 'Bush Capital' surrounded by dry hills, farmland and national parks. In January 2020, Namadgi National Park to the southwest of the city was ignited during a military helicopter landing (part of a reconnaissance exercise for the firefighting effort) (see Figure 1.1). This enormous blaze ultimately consumed 80 per cent of the Park. Citizens in that part of the city – including Rebecca and her family – readied themselves to leave, but ultimately the fire did not enter the urban areas. Fires were also close to the northeast of the city. Flying in from Melbourne or Aotearoa-New Zealand, three of us witnessed the long curling line of flames and smoke burning through the forests and farmland that divide Canberra from the sea. In late January, a fire started near Canberra Airport (10 kilometres to the east of the city centre), but was contained after several days.

Figure 1.1: Looking towards Parliament House, Canberra and showing Namadgi National Park on fire

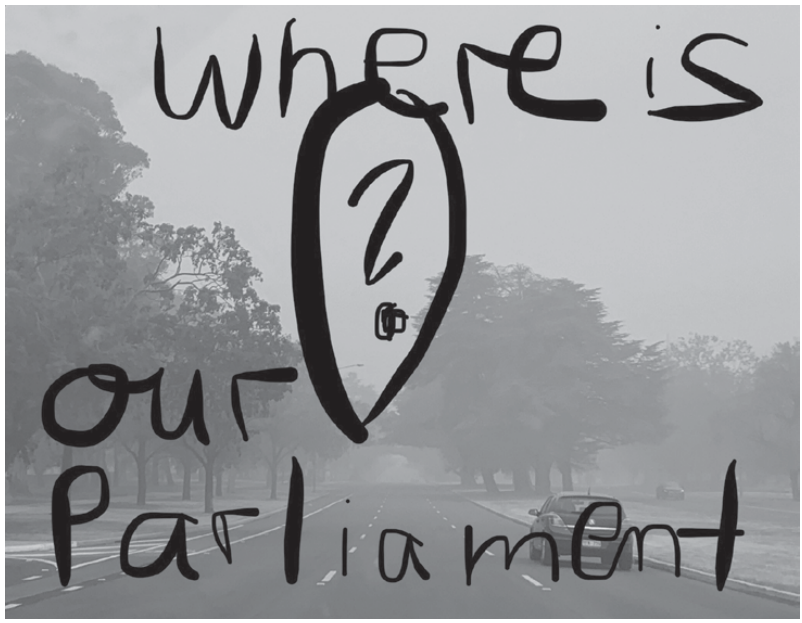
Source: participant photograph

By mid-December 2019, the city was enveloped in smoke from surrounding fires. On some days, Canberra – known as a city of clear skies and clean air – had the worst air quality in the world. Particulate levels were 23 times the hazardous rating (ABC, 2020). Visibility was shockingly low – people's photographs, often shared online, demonstrated the ghostly absence of iconic views (see Figure 1.2).

The sun disappeared into a shimmering yellow and grey that sometimes turned into a deep browny-red. Wind drove smoke in at strange times – the wonderful desert-like cool night air that makes the hot Canberra summers bearable instead brought intense smoke. Doors and windows had to be closed and sealed, and parents were advised to keep children inside. Childcare centres and holiday camps closed. Just as the world started to hear about a strange new virus appearing in Wuhan, China, most Canberrans went into voluntary lockdown. Some started wearing masks.

But lockdown did not mean safety. The smoke kept coming in, and the fires continue to pose a threat. All of us kept our most precious belongings packed and we were repeatedly asked to be 'fire ready'. We had to keep on top of the news, watch the 'Fires Near Me' app and have a clear plan about when we would leave our homes and where we would go. The only places to go were local sports grounds or schools; it was not possible to escape

Figure 1.2: 'Where is our Parliament?' Participant photograph highlighting the severe lack of visibility and making a political statement about the absence of governmental action during the fires and in relation to climate change more broadly, taken a short distance from Parliament House, Canberra



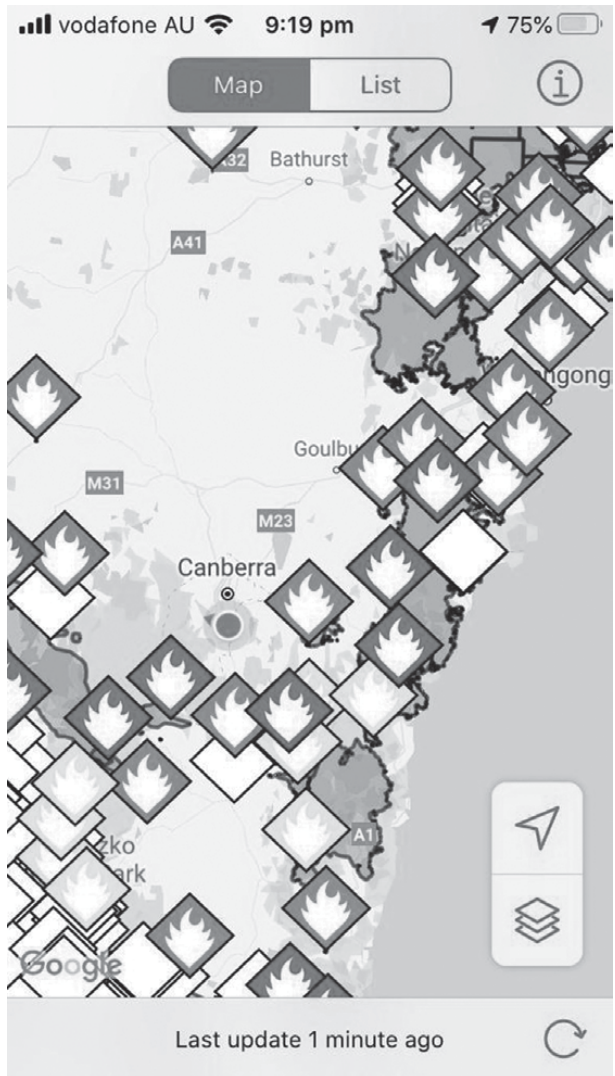
Source: participant photograph

Canberra to places that were usually easy to drive to – the coast (the fires were terrible there) or Sydney (the roads were lined with fires and sometimes closed). If you did not have the resources to fly and relocate, the only option was to stay put and wait it out. The 'Fires Near Me' screenshot given in Figure 1.3 shows the extent of fires near Canberra in January. The app uses coloured diamonds to indicate the level of danger of each fire in a time-sensitive fashion. Rebecca sent this image to her family in Aotearoa-New Zealand to convey the seriousness, scale and number of fires in the region.

Situating the 2019–2020 Australian megafires

How is it possible to make sense of this devastation? Many commentators have remarked that these fires constituted a 'season like no other' (Rowland, 2021: 12). During the fires (and since), two partially contradictory explanatory discourses circulated in popular accounts and everyday conversation. The first, which we call the 'nothing to see here' discourse, figures the fires as typical Australia. This explanation points to the undeniable fact that Australia has long experienced bushfires. Proponents of this account argue that,

Figure 1.3: Screenshot of fires surrounding Canberra on the 'Fires Near Me' app



Source: taken by Rebecca; permission to reproduce this image was granted by the Royal Firefighting Service of NSW

although severe, fires are to be expected in Australia and consequently that this conflagration, while spectacular in its breadth and destruction, should not be seen as atypical in Australian climate history. The second discourse, while concurring that Australia is a bushfire country, instead argues that the 2019–2020 fires were extraordinary and clear evidence of global climate change, or what First Nations fire expert Victor Steffenson (2020: 183)

calls 'environmental mess'. We call this the 'climate change' discourse. In this account, the intensity of the fires was attributed to the long preceding drought, itself attributable to increased temperatures, caused by human activities such as the burning of fossil fuels. Both discourses articulate political allegiances. The first position was held by the conservative Morrison government (then-Prime Minister Scott Morrison was notoriously absent, holidaying with his family in Hawaii during the initial weeks of the fires; he also made several serious political blunders, famously forcing a distressed pregnant resident from a severely fire-affected town to shake his hand on camera). The second position aligns with the liberal, environmentalist left.[3]

It seems to us that neither discourse persuasively accounts for the 2019–2020 fires. While both acknowledge the historical significance of fire to Australia, neither adequately articulates the significance of that history to our current predicament. In our view, the history of fire in Australia and the current state of our country are biosocial phenomena that must engage with Aboriginal practices of fire management which pre-date colonization and continue to the present day. This book is an attempt to describe particular aspects of this biosociality – those relating to reproduction, care and kinship – as it unfolded in Australia in 2019–2020. This story has implications for many other places recently affected by out-of-control fires – including California, Spain, Brazil, India and Greece – and, in less direct ways, places affected by other disasters such as flooding and hurricanes. How might feminist social scientists contribute to making sense of these calamities and their impacts on human and nonhuman individuals, families and communities as entwined events?

The Pyrocene

In this book, we begin our exploration of the biosociality of bushfires by engaging with environmental historian Stephen Pyne's notion of the 'Pyrocene'. Across a range of publications, Pyne uses this term to highlight the significance of humans' relation to fire in the planet's current ecological predicament. The term is in many ways very similar to terms more commonly used in social theory and sociology, such as the Anthropocene (popularized by scientist Paul Crutzen and widely used in the geo and social sciences and humanities) and the Capitalocene (popularized by political geographer Jason Moore [2017] and feminist technoscience studies scholar Donna Haraway [2017], among others).[4] In each case, these terms describe our current epoch as one in which geological strata, and thus our entire global environment, have been shaped by human activities. The terms are used to make claims that the previous geological epoch, the Holocene (dating from 10,000 years ago and characterized by the retreat of glaciers, the migration of many species and the rising dominance of humans) is now over.

Such claims are scientifically contested. Among those who agree that the Holocene has ended, there is also serious debate about timing. Some date the Anthropocene or Capitalocene from the Industrial Revolution, some focus on the rise of human agriculture 12,000 years ago, while others focus on the development and deployment of the atomic bomb. Other theorists write of the Plantationocene, highlighting the historical significance of colonization and slavery to our current biopolitical situation (see, for example, Haraway et al, 2015).

In contrast to many Anthropocene geologists, social scientists and humanities scholars, Pyne argues that the Pyrocene does not come after the Holocene, but rather is a better term for the entire period since the Pleistocene (Ice Age). Our era, he argues, is shaped by fire rather than ice: 'the Holocene is the Anthropocene. Since the last glacial epoch, warming has been continuous, with minor blips, and throughout those millennia humanity's firepower has made it more and more dominant. Today, there is no aspect of the Earth that we have not altered' (Pyne, 2019a: 187).

The vastness of scale Pyne evokes here arguably runs the risk of ignoring the 'great acceleration' in human geological impacts described by many other scholars and scientists. Although he does signal the current situation as a crisis, Pyne also highlights the long, slow burn of the Pyrocene. In contrast to some accounts of the Anthropocene, his articulation refuses to naturalize the labours of humans in the preceding age (that many call the Holocene). Pyne's contribution is his extensive engagement with and explication of the long histories of human effects on, or coevolution with, ecosystems. It is this work that allows us to connect Australia's long history of fire with our contemporary experience of environmental mess. The Pyrocene describes both the positive, world-shaping practices of First Nation peoples across the world (including Europeans), the decimation of these in acts of colonization, and the negative effects of such decimation and of the burgeoning of nonsustainable fire-related practices (such as burning fossil fuels) during industrialization. Pyne's account of the Pyrocene helps us here to think about the 2019–2020 fires as an historically and geographically situated, relational biosocial event.

Pyne makes large claims for the significance of fire in human history, arguing that Homo sapiens are both products of the Pyrocene and its key actors: 'The firestick became the fulcrum by which to leverage opposing thumbs, bipedal locomotion, big brains, language, and the rest into reconstructing physical environments, which then changed the changer … It's hard to imagine the sapients thriving, much less dominating, without it' (Pyne, 2019a: 201).

Humans, Pyne asserts, are the only species to deliberately set fires (although three Australian birds – the black kite, the whistling kite and the brown falcon – are also known to use burning sticks to set fire to grass during

hunting). Historically, humans used fire to cook food and to manage crops using firestick farming; they also used fire to provide heat for their own and other animals' bodies, including dogs (Haraway, 2003; Rose, 2011). Human's intra- and inter-species sociality has been shaped by fire. According to Pyne, our bodies have also been formed through our use of fire: cooking food meant we developed small guts and big brains. The smoke and heat of fire also allowed food to be preserved, facilitating human movement (Pyne, 2019a: 129, 201). Ecologies and environments have also been sculpted by these activities. Australia is one of the clearest cases in point. As the oldest, driest and hottest inhabited continent on Earth, historian Tom Griffiths suggests that Australia has long been 'the fire continent' (Quince and Phillip, 2020).

Prior to European colonization in the late 18th century, Australia was cultivated and cared for through complex sets of practices developed over millennia (Pyne, 1998; Morrison, 2020; Steffensen, 2020; Gammage and Pascoe, 2021). These practices included deliberate fire-setting and the management of naturally occurring fires, and were specifically tailored to the particular habitats or ecosystems that were the spiritual and material responsibility of the people living on, and with, that part of 'Country'.[5] Australian plants have coevolved with these practices and many require fire to germinate and to flourish. Fire was used to control the growth of other plants and to maintain open spaces for farming, and for human and animal habitation and movement. Australian animals have for tens of thousands of years lived with and benefited from our First Nations peoples' firestick farming (Jones, 1969) – moving into previously burned land to eat the fresh growth, for example. Both histories of these practices and accounts of their contemporary iterations emphasize the quality of these fires, which were carefully planned, well controlled and most often 'cool'. These fires had specific, constructive purposes and hugely positive spiritual and cultural significance, as Steffenson's book *Fire Country* explains:

> There is a large diversity of ecosystems in the landscape – each have their own special characteristics and treasure. Learning all the trees and medicines is a must for understanding how to apply the right fire for the right country. The old people managed the country that needed fire in a certain way, to keep the diversity of ecosystems. As a result, the people and the animals had access to all the places that could supply particular resources they needed to survive. (Steffenson, 2020: 60)

For Pyne, Australia provides an iconic example of the catastrophic outcomes of the destruction of traditional fire practices through colonization: 'it is Australia's contact with Europe that tracks, with eerie fidelity, the acceleration in humanity's firepower that has made the Pyrocene not simply a check on

a succession of glacial breakouts but a runaway phenomenon in its own right' (Pyne, 2019a: xii).

European colonizers had little or no understanding of the significance of fire in the Australian context and failed to see the landscape as shaped by First Nations peoples' care and labour. Bringing European concepts of land management, fertility and nature to an entirely different place involved extensive and often catastrophic acts of violence to people, animals and plants. As First Nations peoples were pushed off their land and/or killed, colonizers cleared forests, introduced non-native animals and sometimes used fire in immensely destructive ways, allowing fires to burn too strongly and for too long in the wrong season (Mariana et al, 2022). Long-established and carefully cultivated landscapes, often consisting of large trees and open grasslands (which English colonizers likened to gentleman's parks) (Gammage, 2011) were used to farm destructive hoofed animals and grow non-native crops, or became crowded with shrubs, weeds and trees (Mariana et al, 2022). In Indigenous terms, Country became dirty or sick (Gammage and Pascoe, 2021).

In places designated 'National Parks' (a process that began in the early 20th century), native flora and fauna were sometimes left alone to 'flourish' without fire, which over many decades led to an over-accumulation of flammable material and serious imbalances in plant and animal ecologies. Our cities were built in and around bushland – reflecting settler Australians' own love of the country's unique flora and fauna. Gradually, over the second half of the 20th century, non-Indigenous scientists and officials started to pay attention to First Nations peoples' knowledge about fire and began to deliberately burn forests to prevent out-of-control fires (Weir et al, 2020: 307). Importantly, these regimes were in no way comparable to the sophistication of Indigenous burning practices and often caused grave damage, according to First Nations' experts (Chenery and Cheshire, 2020; Steffensen, 2020; Gammage and Pascoe, 2021). Referring to studies of Aboriginal burning practices in three very different parts of Australia, including Canberra, Weir, et al (2020: 307) show that although governmental regimes of burning were in part inspired by historical and contemporary Indigenous practices, they were often undertaken without 'empowering Aboriginal people to do so themselves, or even engaging with contemporary Aboriginal land managers'. (Interestingly, Canberra's very small programme of Aboriginal fire management comes in for praise in this text see also King [2019].)

Into the 1990s and 2000s, governmental controlled-burning programmes were underfunded, and landscapes became loaded with pyrogenic material; in most parts of Australia, First Nations people were also not permitted to burn as much as they needed to in order to maintain Country in the right condition. With long droughts and increasing temperatures, Australia became a pyre (Gammage and Pascoe, 2021: 147; Mariana et al, 2022).

Up to the present day, political disputes among the major parties and the Australian Greens have also continued to rage about the frequency, intensity and location of controlled burns. The capacity to use fire as a mitigation measure has also been questioned when confronted with weather conditions as intense as those experienced in 2019–2020. Some experts have argued that no amount of burning or logging could have saved the environment when the land was so dry and the heat so intense (Bowman et al, 2021). Organizing sufficient fires is expensive and time-consuming, and deliberately setting fires and allowing lightning strike fires to burn are risky and complex strategies: things can get out of control without the lifelong, millennia-long knowledge that First Nations people bring to this task. Public debate during and after the 2019–2020 fires raised questions about how to include Indigenous expertise in 'cool burns' alongside other technological practices such as using fire retardants, aeroplanes and water trucks (Ross and Quince, 2020), and such discussions are ongoing. Weir, Sutton and Catt argue that 'public debates about prescribed burning rarely grasp the agenda Aboriginal people bring' (Weir et al, 2020: 308; see also King, 2019). The books of Victor Steffenson, Bill Gammage and Bruce Pascoe play a significant role in educating wider Australian publics about First Nations' understandings of the role of fire in caring for Country, exhorting our leaders to recognize the literally life-saving potential of this knowledge.

Like Indigenous fire experts, Pyne strongly argues against traditional European suppressive approaches to fire in the Australian context: 'Fire suppression, outfitted with industrial means such as air tankers, helicopters, engines and vehicles to ferry crews can dampen a landscape's fire load; but if that land needs fire or has the natural means to kindle it, then the consequences of suppression will end in counterproductive conflagrations' (Pyne, 2019a: 193).

Pyne names this 'the fire paradox': 'The more we try to control burning', he writes, 'the worse the burning that results' (Pyne, 2019a: 193). Instead, a mix of strategies is needed. As First Nations fire expert Joe Morrison states: 'People need to see and understand that an unburnt country is not 'wilderness' and how country should be – but country desperately calling for fire to rejuvenate it and restore the balance of risks. Not uncontrolled damaging fires, but fires that are understood, planned, patchy and regular' (Morrison, 2020).

Bushfires (controlled or not) are only one element of the Pyrocene. Over millennia, European cultures developed their own expertise in fire, focusing on the extensive harvesting and burning of ancient plant reserves in peat, coal and oil. As Pyne argues, these skills underpin the colonization and urbanization of many parts of the world, and the intensity of contemporary mobilities of people, goods and capital. They are also the key cause of the current environmental mess: both climate change and toxic pollution result

from extracting and burning fossil fuels. Making connections to other forms of global crisis, particularly zoonotic viruses and pandemics, is more difficult and may indicate limits to using 'Pyrocene' rather than 'Anthropocene' or 'Capitalocene' to describe our Age. As environmental historian Tom Griffiths (2020: np) argues: 'COVID-19 spilled over from wild animals to humans and became a pandemic because of ecosystem destruction, biodiversity loss, climate change, pollution, the illegal wildlife trade and increased human mobility.' Humans' capacity to use fossil fuels to power cars, trucks, ships and planes means that both human and nonhuman animals move around in unprecedented ways, facilitating the spread of viruses and bacteria. Pandemics are, as many scientists have argued, increasingly likely in these circumstances (Knowles, 2021). Human consumption of nonhuman animals and human mobilities are also both at stake in zoonotic pandemics. Shaped by cooking, our capacity to eat animal flesh without becoming sick depends on using high temperatures to destroy viruses and bacteria. Cooking meat also requires the capture or farming and storage of animals and carcasses before cooking, which introduces multiple risks of infection. While extensive management regimes typically reduce these risks, practices at the margins – of forests and of regulation – introduce new dangers. The possible source and trajectory of the COVID-19 pandemic from bats through exotic meats to humans typify these risks. Ultimately, the Pyrocene is about much more than fire.

Troubling the Pyrocene concept

As many critics have argued in relation to the Anthropocene (Braidotti, 2013; Colebrook and Weinstein, 2015; Haraway et al, 2015; Haraway, 2016), we must be careful to distinguish groups of humans when theorizing the Pyrocene. Not all humans have contributed equally, although many have in some ways benefited in the short term. Although a global phenomenon, the Pyrocene is unevenly distributed in terms of both culpability and effect. Wealth matters here: because they have profited from them, those who did the most to create Pyrocenic industries are more likely to be able to shield themselves from their effects. Rich people can afford air-conditioned homes and air purifiers, can pay for medical treatments of associated health effects and move to less-affected parts of the world. But as the COVID-19 pandemic has shown, wealth is not an absolute protector and even luxurious mobility can be associated with danger. As we learnt in Canberra in the summer of 2019–2020, only a privileged few can escape the smoke. As the photograph in Interleave 1 shows, the Pyrocene articulates a profound paradox in that the vehicles we use to escape fires are also implicated in the ongoing climate crisis that renders fires more likely.

Racial and ethnic differences are also significant here. Aboriginal Australians living in remote areas (First Nations people are far more likely

to live in remote regions than any other ethnic group in Australia) are significantly more exposed to bushfire smoke and other forms of air pollution, including smoke from outdoor cooking fires (Clifford et al, 2015). A report on the 2019–2020 fires by Bhiame Williamson et al (2020) shows that they disproportionately affected Aboriginal people, particularly children aged five and under, as they occurred in areas with higher than average numbers of younger Indigenous families. More than one tenth of the children directly affected by the fires were Aboriginal, even though Indigenous people comprise only 2.3 per cent of the population of NSW and Victoria (the two states where the fires were most fierce). Williamson et al (2020) also articulate the specific harms to Indigenous people created by witnessing the damage to Country involved in out-of-control fires. Loss of trees, plants and animals is akin to losing family for Aboriginal people. Out-of-control fires are also a deeply painful reminder of the enduring systemic failure of Australian governments and citizens to recognize First Nations' expertise in caring for Country. Williamson et al (2020) call on those documenting the experience of the fires and developing policy responses to acknowledge and pay serious attention to these additional, additive traumas. Linguistic racism also runs through written accounts: the 2019–2020 fires were dubbed the 'Black Summer', without any consideration paid to the positive meaning of 'Black' to Aboriginal and Torres Strait Islander peoples. Like Williamson et al (2020), we have chosen not to use that epithet in this book.

Pyne's account of the Pyrocene pays no attention to sex/gender or reproduction, although Australian scholarship on Indigenous firestick farming notes the different responsibilities of men and women in relation to caring for Country with fire, arguing that these were significantly disrupted by colonization and are currently being reshaped through engagement with settler notions of firefighting and sex/gender (Gammage, 2011: 160; Eriksen, 2013a, 2013b; Eriksen and Hankins, 2015). Historically, as feminist archaeologists, anthropologists and historians have argued in studies of many different times and places, humans' use of fire to cook and farm, to build and make was associated with a gendered division of spaces and forms of work, and thus the enacting of 'kinds' of bodies (Avakian and Haber, 2005; Allen and Sachs, 2012). Contemporary figurations and experiences of sex/gender remain shaped by these differentiating histories of human engagements with both wild and domesticated fire. Geographers Nigel Clark and Kathryn Yusoff (2018) argue, for example, that (European) fears of out-of-control fire is connected to fear of unmanageable sexual desire (culturally associated with female and queer sexualities). Australian representations of bushfire control, as we saw in the 2019–2020 media reports, are highly gendered, portraying fire 'fighting' as embodying masculine power (Tyler and Fairbrother, 2018). Australian geographers Joshua Whittaker, Christine Eriksen and Katharine Haynes (2016) argue that such representations and cultural narratives impact

decision making in bushfire situations, where men are more likely to stay to 'defend' their homes (thus risking their lives), while women are more likely to leave (see also Eriksen et al, 2010; Tyler and Fairbrother, 2018). Such representations also ignore both Indigenous Australians' long histories of positive engagements with fire and the specific formations of sex/gender in First Nations communities. In engaging with the Pyrocene in this book, we want to critically explore the ways in which sex/gender and reproduction are done in the current epoch. How is climate entangled with sex/gender and reproduction in Australia?

These entanglements are evident in living situations, interpersonal relationships and expressions of distress. A report on the health impacts of the 2019–2020 bushfires argues that homelessness, drug and alcohol use, and domestic violence typically increase during extreme fires (Australian Institute of Health and Welfare, 2020). Qualitative research undertaken by Debra Parkinson (2019) after the 2009 fires in Victoria also points to an increase in domestic violence, as well as the challenges of raising these issues when public discourses emphasise the need for recovery. Academic claims about increased risk of domestic violence, reported in national newspapers, became controversial during the 2019–2020 fires, raising questions about the proper time and place for feminist commentary on sex/gender and critique of the heroic discourses prominent in bushfire-related media. Other media representations, including a popular 2021 ABC TV drama entitled *Fires*, included a small minority of women as firefighting heroes. Similarly, an Indigenous women's firefighting crew, based in Eastern Victoria, made headlines during the 2019–2020 fires (Smethurst, 2020).[6] These representations signal the much-understudied entanglements of sex/gender, 'race' and the Pyrocene, highlighting important questions we will address in this book.

Making Pyrocene babies

Throughout the fires, the ANU encouraged its staff to contribute their expertise to national debate and action. Such contributions achieve the university's 'mission' as 'The National University'. Mary Lou and Celia had been thinking together about reproduction and climate change for some time and felt that the bushfires had highlighted many key concerns about the naturalization of heterosexual biogenetic storying of reproduction, the privileging of some forms of parenting or caring above others, and the poorly acknowledged entanglements of humans with other species and environments.

Keen to explore interdisciplinary research collaborations, Mary Lou and Celia met with Professor Sotiris Vardoulakis, an international expert on air quality, in early 2020. Sotiris was busy writing guidance for the Australian

government and public, including pregnant women, about how to manage smoke pollution. They also talked to Professor Paul Dugdale, a public health clinician and academic, who was managing public health advice for Canberra during the worst of the fires and smoke. Sotiris and Paul introduced us to Professor Christopher Nolan, an endocrinologist putting together an interdisciplinary team of clinicians, nurses, psychologists, anthropologists and epidemiologists for a project entitled 'Mother and Child 2020' (MC2020), to study the short-term and long-term health effects of the fires and smoke on women and children in Canberra and the NSW South Coast. We were delighted to be invited to join this team (and are still involved in this project), but also framed a different, sociological investigation to gather qualitative data from women and their partners about their experiences of pregnancy, birth and newborn parenting. Sotiris and Paul agreed to be involved and the project was funded through the Research School of Social Science's Cross-College Grant scheme, through which we were able to employ Rebecca. Extending the team to include Louisa, who visited Canberra in December 2019 in the midst of the fires, was a natural development of her long-term collaboration with Mary Lou on issues relating to pedagogy, sex/gender and reproduction.

As a biomedical investigation, MC2020 focuses on mothers and babies. In this book we look beyond the parent/child dyad to consider the complex entanglements of bodies and worlds that constitute reproduction in all its forms. Thinking sociologically, we ask what it was like to conceive, gestate and/or give birth to a child in the southeast of Australia in 2020. How did the parents of what we might call 'Pyrocene babies' make sense of pregnancy, birth and newborn parenting during the intense fires and the start of the COVID-19 pandemic in Australia? More broadly, what can these experiences tell us about the meaning of reproduction in the current era, often referred to as one of climate change, crisis or even emergency? Although our empirical work focuses on people with babies, hence our subtitle, in this book we take an expansive view of reproduction, including humans, nonhumans and environments in our analysis. Rather than thinking only of mothers and children, we understand reproduction as diverse, interconnected, intergenerational modes of living. For us, reproduction is biopsychosocial, geographically and temporally located in every respect. As we will show, this expansive understanding of reproduction allows us to make meaningful connections between 'making (bushfire) babies', climate, kin, care and COVID-19.

Existing studies of bushfire babies

We quickly learnt from our medical and scientific colleagues that very little is known about the health impacts, whether short-term or long-term, of

bushfire smoke on pregnant women, foetuses or infants (Holstius et al, 2012; Black et al, 2017; Abdo et al, 2019). The vast majority of research on air quality and reproduction has focused on the effects of chronic air pollution on foetuses rather than bushfire smoke or mothers, exploring the impact of air pollution on birthweight, preterm birth, infant mortality, respiratory disease, and many other conditions in childhood and adult life (Poursafa and Kelishadi, 2011; O'Donnell, 2017; Klepac et al, 2018).

One of our MC2020 colleagues, Associate Professor Alison Behie, is a biological anthropologist specializing in the physical effects of exposure to bushfires. With her colleague Megan O'Donnell, Behie undertook research on the 2003 Canberra fires and the notorious 2009 fires in Victoria. In two papers, O'Donnell and Behie (2013; 2015) discuss the need to study environmental disasters and their impact on birth outcomes, particularly in the context of climate change. Theirs was the first study to look at the impact of an environmental disaster on the reproductive outcomes in an Australian population. O'Donnell and Behie (2013: 345) specifically examine 'changes to gestational age, birth-weight and secondary sex-ratio of babies born in the nine months following the ignition of the 2009 Black Saturday fires'. Their 2015 study found that contrary to previous research, in a cohort of male babies exposed to the 2003 Canberra bushfires, birthweights were above average. They attribute this to maternal stress and increased glucose levels in the mothers, which acted to accelerate growth. More generally, they suggest that this could indicate an adaptive response to environmental disaster ('heightened environment responsivity'). Their 2013 study of the 'Black Saturday' fires found evidence that maternal exposure to bushfires in the second and third trimesters increased the chances of pre-term birth and lower birthweights in babies, a finding echoed in Abdo et al's (2019) research on the impact of wildfire smoke on pregnancy outcomes in Colorado.

This focus on the foetus is not surprising: feminist research has long argued that pregnant women are typically figured as environments for foetuses in biomedical, scientific and environmentalist literature, as well as in popular culture (Duden, 1993; Roberts, 2007; Salmon, 2011; Sänger, 2015). The existing biomedical literature on the effects of toxins, including air pollution, is no exception. In much of this research, mothers become 'environments of exposure' (Landecker, 2011; Lamoreaux, 2016; Mansfield, 2017), positioned as responsible for at least trying to control exposures to toxins (Possamai-Inesedy, 2006; Crighton et al, 2013; Mackendrick, 2014). In contrast, recent scientific research on epigenetics acknowledges the uncontrollability of environmental pollutants and potential intergenerational exposures, although here again, feminist scholars argue, the focus on the vulnerability of the foetus and maternal responsibility tends to be reiterated, even as mothers are reimagined through the lens of environmental factors over which they have limited control (Mackendrick, 2014; Mansfield, 2017).

Epigenetic and other contemporary medical research also extends the period of maternal responsibility to include a concept of pre-pregnancy maternal health, which tends to frame all women of childbearing age as 'potential mothers' (Waggoner, 2013; 2015; see also Roberts and Waldby, 2021).

Figured as environments or transmitters of generational health, mothers are more likely to be the target of public health and media warnings about the risks of environmental and chemical contaminants, whether linked to transmission while in the womb or via 'toxic' breast milk (Possamai-Inesedy, 2006: 408; Mello, 2015). Mothers navigate this burden in a number of ways, using a range of strategies including following public health information (Crighton et al, 2013) and 'precautionary consumption', that is, choosing the 'right' food and consumer products to limit children's exposure to chemicals (Mackendrick, 2014). Mackendrick (2014: 705) argues that through such labour, women are held 'accountable for children's futures'. This burden of care is mediated by social class and the distribution of risks of environmental hazards for mothers across social groups (Downey, 2005; Mackendrick, 2014; Murphy 2015).

Debates about foetal exposure to bushfire smoke seem to have had little impact on Australian public health discourses to date. The Australian government's report on the health impacts of the 2019–2020 fires, for example, includes only two references to pregnancy, which are both contentless – pointing only to pregnant women as 'vulnerable' without explaining how and stating that more research is needed (Australian Institute of Health and Welfare, 2020). The report presents no data on the health impacts on pregnant people, foetuses or newborns (Oderberg, 2021), nor does it pay specific attention to Aboriginal and Torres Strait Islander children and families (Williamson et al, 2020). Through detailed questionnaires and the collection of biomedical data, MC2020 is designed to gather groundbreaking data about the impact of fires and smoke on mothers and babies. The team also planned to undertake physical examination of babies during their first years of life – initial hopes of collecting placentas and undertaking detailed measurements of newborns were thwarted by the COVID-19 pandemic, which rightly curtailed all non-essential access to birthing suites and biological samples. In conversation with this biomedical research, this book explores how ideas about the vulnerabilities of foetuses and pregnant women were articulated during the 2019–2020 fires and the start of the COVID-19 pandemic, and how parents responded to these articulations.

Pyro-reproduction: key themes and approach

Canadian feminist technoscience studies scholar Michelle Murphy (2016: np) observes that: 'We are living in a historic moment when life on earth unevenly

shares a condition of already having been altered by human-made chemicals, a condition that might be called alterlife. Alterlife names a historically new form of life that is altered by the chemical violence of capitalism and colonialism.' While Murphy's focus is on chemical exposure, we find her notion of 'alterlife' generative for our study of reproduction in the Pyrocene, which we will call Pyro-reproduction. Engaging with Murphy's writing via the concept of Pyro-reproduction helps us apprehend how historically new forms of life (and death), kinship, care and embodiment are associated with megafires. At the same time, it enables us to pay attention to the *longue durée* of humans' relationship with fire and the slow burn of climate change – highlighting significantly different temporalities to those associated with human-made chemicals. Thinking of Pryo-reproduction as a form of alterlife also helps us grasp the uneven ways in which capitalism and colonialism distribute healthcare in the pandemic both in Australia and around the world.

In her short essay Murphy (2016) makes four propositions in relation to researching alterlife. First, she advocates for 'non damage-based accounts' of the infrastructures of capitalism and settler-colonialism. We understand this as a call to not look away from damage, but also as a refusal to let counting the carnage be the end goal of research or politics. Relatedly, her second concern is 'finding critical and creative ways of using environmental data to create ways of holding governments … responsible for environmental violence' (Murphy, 2016: np). While the scale of our research does not allow for the collaborations Murphy envisages, the ways in which we tell stories about the effects of fires in this text are intended to trouble conventional ideas about responsibility when it comes to reproduction and climate change. Such an approach forces us, and hopefully our readers, to understand that responses to the bushfires and the pandemic can and must recognize how such events are entangled. Third, Murphy calls for expanding understanding of the 'intergenerational and looping temporalities of industrial chemicals' (Murphy, 2016: np). Similarly, we ask questions about what it means to live with bushfire smoke for extended periods. In trying to apprehend how such events make an impact beyond the visible environmental havoc, we ask: what are the intergenerational temporalities associated with the biopsychosocial consequences of the megafires? How does bushfire smoke loop – that is, how does it activate previous events or harms (for example, decades of governmental inaction on climate change and massive investment in carbon economies) and how might it act unpredictably in the future? How are the increased frequency and intensities of such events changing the reproductive futures of people, plants and animals?

As we discuss in Chapter 2, none of our parent participants identify as Aboriginal or Torres Strait Islander. It is important, nonetheless, to pay heed

to Williamson et al (2020)'s argument that extreme bushfires have additional and specific impacts on First Nations families both because of their positive connections to Country and their experiences of the intergenerational trauma of colonization, which involved the loss of rights to care for Country, including through burning. Murphy's fourth provocation is to ask how 'the condition of alterlife invites us to attend to the possibility of alternative life forms, of life otherwise, and of future survival' (Murphy, 2016: np). Here, we consider how reproductive life is changing in relation to the COVID-19 pandemic and the 2019–2020 fires, and speculate on what this means for multispecies survival in landscapes that burn more frequently and with greater intensity. Our investigations lead us into several key arenas: air, breathing and smoke; technologies, digital platforms, data and biosensing; and care, kinship and sex/gender.

Air, breathing and smoke

In recent years, air and breathing have increasingly been integrated into social scientific thinking, from feminist, philosophical and anthropological perspectives, and notably in the work of medical humanities and interdisciplinary others studying breathing and breathlessness in the context of respiratory illness (Richards et al, 2016; Wainwright, 2017; Malpass et al, 2019). There is a small but growing body of literature that attends to the phenomenological and embodied dimensions of breathing, air, smoke and pollution. A key claim of this literature is that 'scholars have tended to ignore the air and the presences it accommodates' (Dennis and Musharbash, 2018: 110). Indeed, air is often framed as 'anti-presence' or a kind of absence: several scholars cite Luce Irigaray's critique of Heidegger, where she accuses him of 'forgetting the air' in his privileging of solidity. In mainstream European philosophy and social theory, Irigaray argues, air is background, the 'loss of grounding', and has remained peripheral (Choy, 2012; Dennis, 2015: 199; Graham, 2015; Oxley and Russell, 2020).

Feminist scholar Magdalena Górska's book *Breathing Matters* offers a posthumanist analysis of breath, emphasizing the relationalities enacted through breathing, where breathing is 'an event of bringing the outside in and the inside out' (Górska, 2016: 28). Górska interrogates how breath helps us reconfigure the boundaries of embodiment, and highlights the transformative potential of breath for thinking about relationalities with atmosphere and the environment. In a year marked by megafires and COVID-19, such transformations and relationalities took many turns that were unanticipated; because of the time and context in which it was gathered, our data provide unique insights into the ever-shifting boundaries between breathing, technologies and environments.

In related work, Louisa has drawn on Todd (2017) to discuss breath as a tool to think with (Allen, 2020). She highlights breath as presence; a 'here and now experience' and an act that is never repeated. It is both singular and relational to the extent that we share the air that we breathe with others (Dennis, 2015; Allen, 2020). Our mutual reliance on air suggests that ensuring its presence 'is a non-voluntary collective life-sustaining responsibility' (Allen, 2020: 8). During the bushfires and COVID-19 pandemic, this sense of breath as a collective life-sustaining responsibility garnered new meaning. Like the First Nations scholars cited earlier, Oxley and Russell (2020: 18) note the way in which 'histories of breath' for marginalized populations must be considered, for example, in relation to exposure to industrial pollutants or the intertwinement of smoking with socioeconomic factors. In our study, the socioeconomics of air and breath were apparent in the ways in which different participants and their networks responded to the threats of smoke and fire.

Technologies, digital platforms, data and biosensing

Technologies and digital platforms play an important part in Pyro-reproduction. Phones, apps, smoke detectors, radios, windows, air filtration systems, virus tests, masks and vaccines all contribute to the making of sex/gender and reproduction in these times of climate crisis. Learning from the Science and Technology Studies and sociological literature on self-tracking and environmental sensing (Nafus, 2016; Pritchard et al, 2019; Roberts et al, 2019), we focus on people's engagement with technologies and digital platforms in both understanding and managing physical risks, but also in (re)making connections of care – for human and nonhuman animals and for their environments. Air-purifying and filtering technologies – from windows through to masks and filtering machines – became essential elements of 'making babies' during the 2019–2020 summer. Since then, of course, masks have become essential to every aspect of human life.

In our study, we were struck by people's take up of these technologies and platforms and wanted to better understand how air quality, measuring air pollution related to bushfires and breath came together during the time of the fires. Like Garnett (2020), we are interested in the different technologies used to measure air pollution and the ways in which these are mediated by diverse dynamics. We talked to public health experts, clinicians and architects, as well as to women who were pregnant and parenting in order to find out the different ways in which people imagined bodies and their biologies in the pandemic. For Garnett, such research involves a rethinking of the relationship between bodies and environments that 'blurs the interior and exteriors of bodies' and troubles ideas about bodily integrity: 'human

occupants were revealed as shaping the composition of particles and these particles then behaved in response to the respiratory dynamics of buildings and bodies' (Garnett, 2020: 69).

The consequentiality of air and the governance of/responsibility for air is raised by several scholars: from the way air delineates who constitutes 'the public' in relation to secondhand smoke and smoke-free legislation (Dennis, 2015), to the paradoxical lack of attention paid to the political ecology of urban air in an age of climate change, global interconnectivity and pollution (Graham, 2015), or the histories of deadly air as a weapon in war highlighted by Sloterdijk (2009), who makes this explicit by framing air as a 'life support system'. Engaging with these technologies and with the discourses of risk circulated by public health officials and others produces new understandings and experiences of our bodies, and particularly of breath and breathing. Learning from this research, we are interested in the governance of air and air quality data in the home, local neighbourhoods and cities.

Care, kinship and sex/gender

Reproduction, Kin and Climate Crisis also contributes to and builds scholarship in studies of queer kinship. Key interventions in queer kinship studies have focused on how new technologies of reproduction queer family making and ideas of the human (Mamo, 2007; Dahl and Gunnarsson Payne, 2014; Lewis, 2019; Riggs et al, 2020), documenting how queer kinship is always already racialized (Puar, 2007; Eng, 2010). Our queer approach analyses relations between reproduction, technology, embodiment and climate crisis. We focus on queer relations between the human and more-than-human: like Dana Luciano and Mel Chen, we don't 'reserve queer theory for LGBTQI-identified people or topics' (Luciano and Chen, 2015: 193).

In Australia, the start of the COVID-19 pandemic coincided with the 2019–2020 bushfire season. The first Australian cases appeared in late January 2020. In Canberra, there were only a few weeks between the city starting to feel 'normal' again in terms of air quality and fire risk, and the onset of real concern about this strange new virus. Within only a few weeks of coming out of our houses to breathe the air and mourn the huge losses, we were in lockdown (the final fire in NSW was extinguished in early March; Australia went into its first COVID-19 lockdowns on 25 March). All of the parents in our study were caring for a newborn during the COVID-19 pandemic. As we will show, this situation threw up intense challenges for families: how to welcome and care for a baby without having visitors? How to get enough help with existing children during the exhausting final stages of pregnancy while in lockdown or isolation (due to COVID-19 or smoke and bushfires)? How to socialize a baby, and

indeed become a parent, during the critical first year when social contact through mother groups and even informal gatherings at cafes and parks were banned? Once the smoke cleared and people were allowed to go for walks, babies and children were taken outside, but playgrounds were closed and no one was allowed to congregate. We all got used to calling out to neighbours over the fence, but we were not able to get close enough to really admire the new baby or to invite anyone in for a cup of tea. Babies in prams gazed anxiously at strangers' faces or turned away in dismay – they were simply unused to seeing new people. What will the long-term consequences of this be, we wonder? The people we interviewed raised the same question.

In these strange conditions, kinship moved online. Grandparents, siblings and friends tried to connect with new parents, children and babies via Zoom or Facebook. Many of us were also working on these platforms, while some were also trying to educate children. People became exhausted by the mental and physical demands of online communication. So much is lost in these encounters – smell, touch and context. Being with babies is usually a highly physical experience. What does it mean to take these kinning encounters with newborns and their parents online? The biopsychosocial practices of care and kinship were, we argue, queered (set askew) by the non-normative relations associated with the pandemic. In thinking through this issue, we draw inspiration from Haraway's work on response-able and inclusive futures, and related writing on rethinking kin-making possibilities beyond heteronormative nuclear family reproduction in the context of both reproductive justice and ecological crisis (Haraway, 2016; Clarke and Haraway, 2018; Hester, 2018; Clare, 2019).

Writing a book about Pryo-reproduction means thinking about gender and sexuality. We understand these as a set of relations and practices, and focus here on multiplicity and change over time. Like other scholars of queer kinship, we see sex, gender and sexuality as relational and continually in flux. Such an approach continues to be a departure from the majority of the biomedical and sociological literature on bushfire smoke and air pollution, which makes biologistic assumptions about the relations between 'mothers', foetuses and babies based on a binary understanding of sex/gender. In contrast, we do not assume that we know what it means to be a woman, or that a mother must be or identify as a woman, or that any woman is or wants to be a mother. We do our best in the book to be careful with pronouns and to use words like 'women', 'mother' and 'parent' in non-discriminatory and open ways.

STS approaches to care are also key to the questions we ask in this book (see, for example, Mol et al, 2010; Martin et al, 2015; Puig de la Bellacasa, 2017; Lindén and Lydahl, 2021). Framing care as embodied practice, distributed across networks of human and nonhuman actors, these approaches

inform our exploration of how caring for the environment and for human and nonhuman others becomes entangled with questions of kinship, embodiment and reproductive justice.

Chapter outlines

In *Fire, A Brief History*, Pyne concludes that:

> Instead of a prevailing paradigm, we may need to scan more broadly. We need to find amid the bewildering scatter of points – of all the fires, data sets, commentaries, policies, news flashes, sciences; of all the lurches, bumps, and glitches that describe the equants and epicycles of climate and biosphere and people – a regression line called a narrative. The Anthropocene provides a possible context for that to happen. (Pyne, 2019a: 199)

In *Making Bushfire Babies* we gather together and analyse a range of data articulating the relations between the 'bewildering scatter of points' Pyne lists, introducing several more of our own. While we agree with Pyne that new narratives are needed for the Pyrocene, we part company when he suggests that fire's 'ancient alliance with humanity allows for a narrative that centres the action on the mind, hand, and heart of the agent most responsible' (Pyne, 2019a: 200). Indeed, what we attempt in this book is to write narratives that do not centre the human, but rather explore what happens when we refuse or trouble this category and try to think differently about relations in the Pyrocene. We learn from participants' experiences that conventional ideas of motherhood, care, kinship and the value of having children are queered in these kinds of situations and thus will be going forward.

Our methods and the various data analysed throughout the book are introduced in Chapter 2. We also include accounts of our own experiences and elaborate the theoretical resources we are drawing on. Chapter 3 weaves together breath, bushfire smoke, the COVID-19 virus and maternal guilt, tracing the ways in which these came together in varying responses to the unpredictable influxes of smoke and viruses. We ask why our participants felt guilty for breathing in smoke despite knowing it was something over which they had little control. The situation presents an impossible predicament, we argue, whereby the only way not to inhale smoke is for the mother to stop breathing. How did the public health production of pregnant women as a 'vulnerable' group shape participants' stories of parental responsibility and care?

Chapter 4 focuses on experts, machines, masks and buildings. During the bushfires, public health authorities issued daily advice about air quality

based on data produced by government-owned monitoring stations, weather forecasting and information from firefighting teams. We were fascinated by the various ways our participants responded to this advice. We follow air purifiers through the data, drawing on interviews with experts involved in producing public health advice and providing clinical care to pregnant women and newborn babies, and with citizens involved in air quality monitoring. We analyse online information sites and relevant social media posts, as well as photographs taken by pregnant women and their families of their homes and surroundings during the fires. What do these practices tell us about the intersections and misalignments of public health advice, citizen science projects and everyday life?

Chapter 5 points to how people invent new forms of caring, collectively and individually. During both the bushfires and the COVID-19 pandemic, 'families' were articulated in particular ways by health and other governmental authorities, and by citizens, as key forms of social organization and support. 'Families' were often connected to 'homes', as if they are the same thing. New terms, such as 'care bubbles', had to be invented to acknowledge that this is often not the case and new rules were invented about who was close enough (emotionally and legally) to be allowed to be physically co-present in homes they do not legally share. We asked how pregnant women and parents of newborns sought help in extreme and unprecedented environmental conditions. How did formal and informal pregnancy, birth and postnatal care change in this period? In what ways does climate crisis make more people aware of the challenges of kinship and of the need to think again how we understand kin, including kinship with the more-than-human?

Reproductive futures are our focus in Chapter 6. How are climate, mass ecological destruction, reproduction and population linked for our participants? When and how did discussions of these connections come into their lives? More conceptually, how can we open up questions about the connections between climate, reproduction and multispecies kinship? What feelings are provoked when one is making bushfire babies and imagining their futures?

The concluding chapter turns to the potential impacts of the book's argument. The stories we gather call our attention to the unpredictable and diverse ways in which the conjoined crises of climate and the pandemic give rise to new forms of kin, care and making babies. They also point to the myriad ways we gather and respond to information and advice when we are living in the midst of something which often feels unmanageable and where the limitations of individual agency are palpable. There are many ideas about 'the right thing to do': this is true at every level, from taking a breath, through to going outside and to managing populations. Expert knowledge is always partial, political, situated and fraught, and people

invent ways of going on that make sense to them. This book is an attempt to open space for reflection and storytelling that might help us learn to live better now and in the future. Drawing on stories about wombats and orchids in the final chapter, we raise questions about multispecies kinship and what we can learn from nonhuman responses to crises, including new forms of flourishing.