Submission in response to:

Embracing the climate challenge: Tasmania's draft climate change action plan 2016-2021

My name is **Jennifer Brown**. Originally a nurse, I completed a Master of Public Health and worked for state government in health protection. I'm currently studying law at RMIT. As an athlete, I'm known in the Tasmanian community for competing in ultra-marathon trail running events locally and internationally. As a mother of two, I'm passionate about protecting the planet for current and future generations. In 2015, I raised awareness of climate change and $15,000 for the Climate Council by running non-stop for 160km along the Port Davey and South Coast walking tracks.

I write in response to the request for submissions in review of: *Embracing the climate challenge: Tasmania's draft climate change action plan 2016-2021.*

While acknowledging the importance of managing emergency responses to natural disasters, the draft plan lacks focus on the environmental impact of climate change in Tasmania and the consequent public health implications.

In particular, I refer to three main areas:

1. Wildfire and smoke
2. Heat stress, and
3. Changing patterns of disease.

The increased risk of large wild fires in both remote and urban environments, and the associated public health implications of smoke from these fires on the Tasmanian community, is of significant concern.

1. I acknowledge and support that the draft plan highlights the need for more resources in the management of bushfires, in conjunction with Tasmania Fire Service and the Parks and Wildlife Service, to protect the urban environment. It also seeks to implement fuel reduction targets and other more minor but important projects. However, there is **no specific emphasis in the draft plan that recognises the environmental impacts of climate change-fueled wildfires on firesensitive vegetation**, especially within the Tasmanian Wilderness World Heritage Area (TWWHA).

   Tasmania is the custodian of the Outstanding Universal Values (OUVs) recognised by UNESCO, such as refugia of endemic vegetation with Gondwanan links (e.g. *Athrotaxis* pencil and King Billy pines). The Tasmanian Parks and Wildlife Service (PWS) has the important job of meeting the international obligations or the World Heritage Convention and the protection of the OUVs within the TWWHA. Wildfires in these and other remote wilderness areas are a huge concern, as they are difficult to fight and can burn for significant periods. The **associated public health risk and ongoing smoke exposure to the Tasmanian community from these fires should also be considered a priority** as part of this plan.

2. The increased likelihood of prolonged and elevated temperatures experienced in the Tasmanian urban environment, and the associated impact of this on public health, is also of concern. The draft plan **does not address any public health concerns in relation to increases in heat wave frequency and severity**, or their public health implications on the Tasmanian community. While I recognise the great work done by public health services to set up the heat stress alert system and implement important protocols for management of heat stress, there is an ongoing need to continue to fund this area of work and liaise with emergency services across Tasmania to ensure adequate resourcing. It is also vital that state and local governments work together to implement effective planning strategies to provide cooler, climate friendly public spaces and housing.

3. Finally, I note the draft plan does **not mention the effect of climate change on the increased likelihood of disease outbreak**, as environmental conditions shift in Tasmania, nationally and globally.

Wildfires and smoke

A view is regularly expressed in mainstream media that lightning fires in wilderness areas are natural and therefore the impact should be considered natural. However the Parks and Wildlife Service (PWS) does not support this view in their monitoring and reporting system for Tasmanian National Parks (2013). PWS state that lightning fires (as seen with the recent TWWHA fires in 2016) are not entirely natural, with human-induced climate change being a contributing factor. This has manifested in increased drought conditions in south-west and western Tasmania as well as an observed increase in the number of lightning strikes unaccompanied by adequate precipitation to extinguish an ignition. In 1986 Bowman and Brown (1986) could accurately state that "In Tasmania there is no strong relationship between thunderstorms and fire." Unpublished records held by PWS uncategorically refute the relevance of this statement for the last two decades (DPIPWE 2010).

The risk of wildfires continues to threaten TWWHA natural and cultural values, particularly fire-sensitive vegetation. There is a pressing need for strategies to mitigate these risks. A recent study from the University of Tasmania concluded a need to declare fire bans, and take stronger precautions to protect fire sensitive vegetation, when the rainfall total for the previous month falls below 50 mm (Styger, 2015) It is in these rainfall-deficit conditions that response planning to protect remote rainforest should take place. When the forest fire danger index is elevated and there has been more than 50 mm of rain in the previous month, response planning should focus on the protection of alpine areas, rather than rainforest. The UTAS study also concludes that there is a need to establish a more representative network of meteorological stations than presently exists in the wilderness areas of western Tasmania to assist with fire risk assessment and prevention.

In 2016, we have already seen the effects of increased temperatures, dry conditions and dry lightning strikes on the TWWHA fire-sensitive rainforest and alpine vegetation. Historically, wildfires burn button grass vegetation in the TWWHA, but would stop at boundaries with fire-sensitive forest because the latter is usually damper and less flammable than button grass. However, unseasonably dry weather in

2015 has seen the fires penetrate into rainforest and alpine vegetation, causing devastating effects that are known to take decades to recover, if at all. Many of these fires are incredibly difficult to fight due to the remote nature of this wilderness. The fires can and have burned for long periods of time, and extended across vast areas of landscape.

Smoke from these fires travels even larger distances. It can affect very large areas and a large percentage of the population. Smoke consists of a very complex mixture of particles and gases including carbon monoxide, nitrogen oxides, and volatile organic compounds. In addition, increased concentrations of the secondary pollutant ozone have been noted during large fires. All are of significant health concern.

On a population level the major concern is the very small particles, or PM2.5-particles - with an aerodynamic diameter smaller than 2.5 micrometers - that can penetrate deep into the lungs. These small particles in urban air are known to have an effect on respiratory and cardiovascular health, even at concentrations well below the current air quality standards. During bushfires, PM 2.5 concentrations are many times higher and regularly exceed the air quality standards (Johnston, 2011)

At a global scale, it is estimated that around 340,000 premature deaths each year can be attributed to smoke from landscape fires. Data show that on days when severe smoke plumes affect Sydney's air quality from bush fires, deaths increase by around 5% and hospital admissions for lung problems increase even more. In Melbourne, the risk of having a cardiac arrest is significantly increased on bushfire-affected days (Johnston, 2011). With recent bushfires in Tasmania and likely increased activity of future fires, the impact of smoke on the community has intensified and will continue to do so. The burden of smoke-related illness will increase strain on the health system and ultimately increase costs for the State Government and the Tasmanian community.

I propose that the draft plan more specifically considers the threat of wildfires in the TWWHA and the subsequent broad-reaching implications to the ecosystem, tourist industry and public health. The plan should recognise the need to work closely with PWS and TFS, CSIRO, UTAS and Public Health Services to secure increased resources for managing these inevitable wildfires.

Increased heat events

Extreme heat events, also known as 'heatwaves', are expected to occur more frequently and become more severe over most land areas of the globe during the 21st century (IPCC, 2012). Heatwaves are an underrated hazard; not only is hot weather in Australia part of the culture of a 'sunburnt country' heatwaves are silent killers, less dramatic than floods and storms, and claiming the lives of those who are less visible in society — older people, the sick and socially isolated (Loughnan, 2013).

For south-eastern Australia, climate model projections are for average temperatures to rise by 0.6 to 1.5°C by 2030 and by 1.0 to 5.0°C by 2070 when compared with temperatures for the period 1980 to 1999 (IPCC, 2000). These changes will be experienced as an increased frequency of very hot days and warm nights, and an increased duration of extreme heat events (CSIRO, 2012).

Heatwaves in Australia have a greater negative impact on public health than any other natural hazard. As climate change progresses, heat exposure stands to cause additional heat-related illness and death, especially for the most vulnerable groups such as older people, young children, people with chronic disease and those living in built-up areas in cities. As a result, the demand for emergency services, such as ambulances, will increase during hot weather.

A number of studies have found that heatwave intensity, duration and timing in the summer season influence the risk of mortality. Numerous international and Australian studies (McMichael, 2008; Basu, 2009; Hajat, 2002; Curriero, 2002) have demonstrated a positive relationship between high ambient temperature and mortality.

A study completed by Monash University showed a Tasmanian threshold for increased service demand when the overnight minimum temperatures exceed 18°C, and when daily mean temperatures exceed 27°C. This indicates that the warmer overnight temperatures and the 'lack of relief' have an impact on the health of Tasmanian residents. Meanwhile temperatures beyond 36°C have a high impact on both ambulance call-outs and mortality (Loughnan, 2013).

There is an ongoing need to continue to fund this area of work and liaise with emergency services across Tasmania to ensure adequate resources. State and local governments need to work together to implement effective planning strategies to provide cooler, climate-friendly public spaces and housing. Despite a target from the previous climate strategy to improve this area of climate-related public health concern, the problem should be considered as an ongoing, ever-challenging area of management. Heat stress should remain an important part of the new action plan, and work should be done to forge links between public health services and local government on the issue.

Disease management

Elevated temperatures in many regions of the world will see an increase in disease. Epidemiological data together with climate modelling predict an increase in the rise of mosquito (vector) borne diseases such as malaria and dengue fever, including in areas not currently affected by these diseases. Modelling predicts mosquito species carrying these diseases will move further south within Australia as temperatures increase due to climate change. While it is not expected Tasmania will experience outbreaks of these diseases due to the presence of infected mosquitoes, it is likely a significantly increased number of cases will travel to Tasmania and be a burden on the health system.

Furthermore, rising temperatures in Tasmania are predicted to increase the incidence of mosquito species carrying already existing diseases within Tasmania. Examples include Ross River fever and Barmah Forest virus. Both are seriously debilitating illnesses that require prolonged medical management (Webb, 2015, 2013).

Other environmental concerns attributed to higher temperatures include increases in gastroenterological infections such as *E.coli* and cryptosporidiosis. Outbreaks of these diseases are often attributed to swimming pools and other public bathing areas. As temperatures increase and people access water for bathing more frequently, outbreaks of these diseases will become more prominent (Inglis, 2009).

Climate change-related increases in temperature will increase the risk of all food-borne infections such as salmonellosis and listeriosis, and may also raise the risk of more severe life-threatening food-borne diseases such as sporadic amoebic meningoencephalitis (Inglis, 2009).

Finally, as sea water temperatures rise, the continued increased incidence of algal blooms with the presence of *Alexandrium tamarense* and *Gymnodinium catenatum*, that carry paralytic shellfish toxin, will have devastating impacts on the shellfish industry and pose a serious and ongoing risk for human health (Farrell et al. 2015).

These diseases are only a few examples of the many epidemiological studies that model possible disease outbreaks associated with climate change in Australia. They are also all direct effects of a changing climate. More subtle are the indirect effects such as population shifts due to changing land use, a changing epidemiology of zoonotic (animal) infections through major relocations of livestock, and a possible shift in avian-mediated (birds) viral infections due to shifts in migratory flight pathways.

A recognition of a changing approach towards disease management and mitigation must be included in Tasmania's action plan on climate change.

Conclusion

Thank you for the opportunity to make a submission in review of *Tasmania's draft climate change action plan 2016-2021.*

In conclusion, I suggest *Tasmania's climate change action plan 2016-2021* should be expanded to incorporate a section on public health. The lead climate authority should work closely with public health services on a plan for the future public health implications of climate change (such as smoke and disease). The action plan should include better preparation for the inevitable consequences of climate change on public health.

The plan should also consider a more detailed discussion on the consequences of climate change for the Tasmanians Wilderness World Heritage Area and a detailed strategic protection plan enabling rapid responses to protect Outstanding Universal Values should be developed in conjunction with PWS, TFS and DPIPWE.

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