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Risk perception and preparedness in a high-wildfire risk community: case study of Northern Wānaka/Albert Town, Otago

Authors: E. R. (Lisa) Langer, Simon Wegner and Andrea Grant
Corresponding author: lisa.langer@scionresearch.com



Figure 1. Homes amongst highly flammable kānuka on the slopes of Mt Iron (Wānaka) are particularly vulnerable to wildfire.

Summary

Recent projections indicate that climate change will increase the frequency, severity, and season length of fire weather conditions in many parts of Aotearoa New Zealand. The magnitude of that risk will depend on climate change mitigation efforts around the globe. As small towns and rural settlements grow and the urban fringe expands, more people than ever are living and recreating in the rural-urban interface (RUI). This in turn means more people are becoming exposed to wildfire risk, and there are more human-related sources of ignition.

The northern Wānaka/Albert Town RUI area has a particularly high wildfire risk. Here we report on the findings from a case study in this area which investigated residents' perception of this risk and actions they have taken or intend to take to mitigate it.

The research is one of several projects aimed at enabling fire agencies and councils to better understand RUI residents and homeowners' awareness and mitigation intentions, and to advise on actions that will lead to improved preparedness for living with an increasing wildfire risk. We also compiled a set of wildfire mitigation and preparedness recommendations that individual landowners and communities can implement to reduce their risk.

Introduction

Extreme fire weather and fire behaviour is increasing in Aotearoa New Zealand. More homes were destroyed during the 2016-2017 fire season than had been in any of the previous 100 years, and this was again surpassed in 2020-2021. Even with climate mitigation efforts, climate change is predicted to increase the frequency, severity, and season length of fire weather conditions in many areas (Melia, et al., 2022; Langer, et al., 2021a; 2021b).

The number of permanent residents and holiday makers living and recreating within the rural-urban interface (RUI)¹ is rapidly growing. This both exposes more people to wildfire threats and increases the potential for wildfires to occur by introducing human-related ignition sources such as mower blade strikes, recreational fires and fireworks, escaped rubbish burns, electrical faults and arson.

Earlier research by the Scion Fire and Atmospheric Sciences group (Langer and Wegner, 2018) suggested that the public does not fully appreciate the increasing wildfire risk or understand their mitigation options. We knew little about the wildfire vulnerabilities, perceptions, and behaviours of residents in the RUI, or about how effective community engagement initiatives associated with wildfire risk and mitigation have been.

To address this gap in knowledge Scion social scientists undertook a case study of a community in northern Wānaka/Albert Town, Otago, an area with particularly high wildfire risk (averaging 178 days of extreme fire weather per year) centred on Mt Iron (Figure 1). The study focused on identifying influences behind wildfire risk perception and wildfire risk mitigation actions among urban fringe residents.

Our research is motivated by wanting to assist fire agencies and councils to better understand wildfire risk perceptions of RUI residents and homeowners, design appropriate mitigations and implement preparations. We also want to consider the practicality and likely uptake of wildfire mitigation recommendations, which have been developed by the team and discussed with fire-agency managers and individual landowners, to reduce community risk and increase the level of preparedness in the increasingly wildfire prone environment.

This work was part of three associated studies funded by the Resilience to Nature's Challenges National Science Challenge Kia manawaroa – Ngā Ākina o Te Ao Tūroa (sitting within the 'Improving the communication of weather and wildfire information' project of the Weather and Wildfire theme). Other funders were Fire and Emergency New Zealand (FENZ) and the Ministry for Primary Industries (MPI) Sustainable Land Management and Climate Change (SLMACC) Fund.

Increasing wildfire risk in Otago

A combination of highly combustible fuels, limited road access, dry summers and limited water resources for fire suppression have long meant the Otago region is a high wildfire risk area. This region and neighbouring Canterbury region have been predicted as having high wildfire risk in the future, with elevated seasonal severity ratings (sum of the daily fire weather severity values for the year) (Figure 2). Notable 2020 wildfires in the Mackenzie Basin (South Canterbury Region) included the Pukaki and Ōhau fires, which burned over 3100 ha and 5000 ha of land respectively.

An average of a 32% increase in fire season length is expected by 2090 in our northern Wānaka/Albert Town case study area. Conditions² on par with those that led to the devastating Australian 'Black Summer' fires of 2019-2020 have already occurred occasionally in parts of Otago, but are expected to become much more frequent with climate change (Melia, et al., 2022; Langer, et al., 2021a; 2021b).

Northern Wānaka/Albert Town community case study

In 2020 and 2021, Scion social scientists undertook a case study of a community in northern Wānaka/Albert Town, in the Otago region. Throughout the case study the research team worked collaboratively with local representatives from FENZ and Queenstown Lakes District Council (QLDC).

Our specific aims were to:

- Identify influences behind wildfire risk perception and mitigation in suburban areas of the northern Wānaka/Albert Town RUI.
- Understand how to encourage residents in complex, diverse urban-fringe neighbourhoods towards better preparation for wildfire in New Zealand.

Under the guidance of FENZ, we targeted residents in high wildfire risk areas of northern Wānaka/Albert Town around Mt Iron, about 70 km northeast of Queenstown (Figure 3).

¹ The RUI is defined as having two components: the intermix is where small residential properties and other urban-associated buildings are interspersed with predominantly rural land uses. The true interface or urban fringe is where dense blocks of suburban housing or industrial development adjoin—but are sharply delineated from—large areas of vegetation.

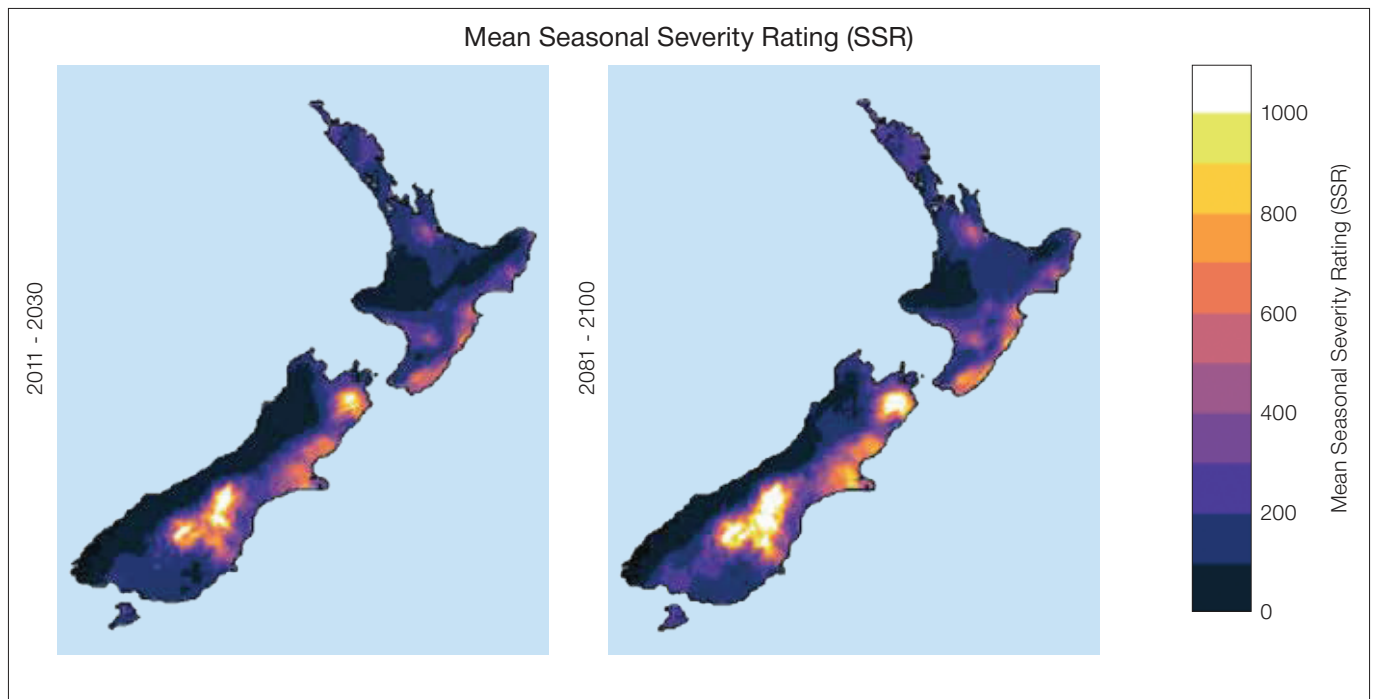


Figure 2. Mean Seasonal Severity Rating (SSR) for 2011-2030 and 2081-2100.



Figure 3. Case study area with survey zones labelled from an allied FENZ survey. (1. Mt Iron, 2. Clutha River, 3. Sticky Forest, 4. elsewhere within northern Wānaka, and 5. elsewhere in Albert Town).

² 'Black Summer' conditions have been calculated and based on a combination of two criteria: seven days mean Fire Weather Index > 54 (based on combination of temperature, precipitation, relative humidity and wind speed) and rolling 30-day daily severity ratings > 20.

The usual resident population is 2,811 (Statistics New Zealand, 2019) with more than 250 homes on the steep slopes of Mt Iron. This is a high wildfire risk area with multiple major wildfire risk factors (Figure 4). The homes are nestled in highly flammable kānuka vegetation, classified as ‘threatened – nationally vulnerable’ by the Department of Conservation (DOC) and the visual character of the area is valued. This has led to the District Plan restricting the clearing of kānuka. Homes have been constructed with wildfire-susceptible designs and materials, such as wooden exterior walls/sidings and exposed decks. Some properties have only one evacuation route and limited firefighting access via steep, narrow roads. In response to the many wildfire risks, a ‘red zone’ with a total year-round fire ban has been designated by FENZ and displayed in signs in the area (Figure 5).

In addition to community and homeowner contexts, local planning rules and guidelines are also likely to be important influences on whether and how communities prepare for wildfire. Local plans, combined with the Resource Management Act 1991 impose various considerations and priorities, some of which may conflict with ensuring wildfire preparedness. For example, residents and agencies have to juggle requirements for soil and water protection, biodiversity, landscape amenity, access into and out of new developments, covenants on vegetation cover and building materials (e.g. timber cladding) with measures to mitigate wildfire risk.

The population of the Queenstown Lakes district, including Wānaka and Albert Town, is growing rapidly, with recent subdivision developments including a high proportion in the RUI.

Many residents are new to the area or are short-term national and international visitors, and some may lack wildfire awareness and experience in preparing for wildfire. Signs of growing awareness are emerging, however. Some recent subdivision consent applications on Mt Iron have been declined partly on the basis of wildfire hazard and some landowners have been penalised for clearing their own pathways through vegetation for fire safety. Nevertheless, as it is difficult for the council to prevent development of existing subdivisions within current rules, construction continues in the high-wildfire risk areas.

Despite several significant wildfires in the district over the past decade, some northern Wānaka/Albert Town community residents have not personally experienced a significant wildfire.

Research approach

Our research had two components – a qualitative study and a quantitative survey.

1. Interviews, focus groups and workshops

We collected qualitative data primarily via interviews, focus groups and workshops. A total of 64 key stakeholders and RUI residents were involved between June 2020 and April 2021. Participants included fire-related agency professionals from FENZ, QLDC, DOC, Otago Regional Council (ORC), Emergency Management Otago and a wildfire consultant, elected councillors, representatives from local Māori organisations and community residents.

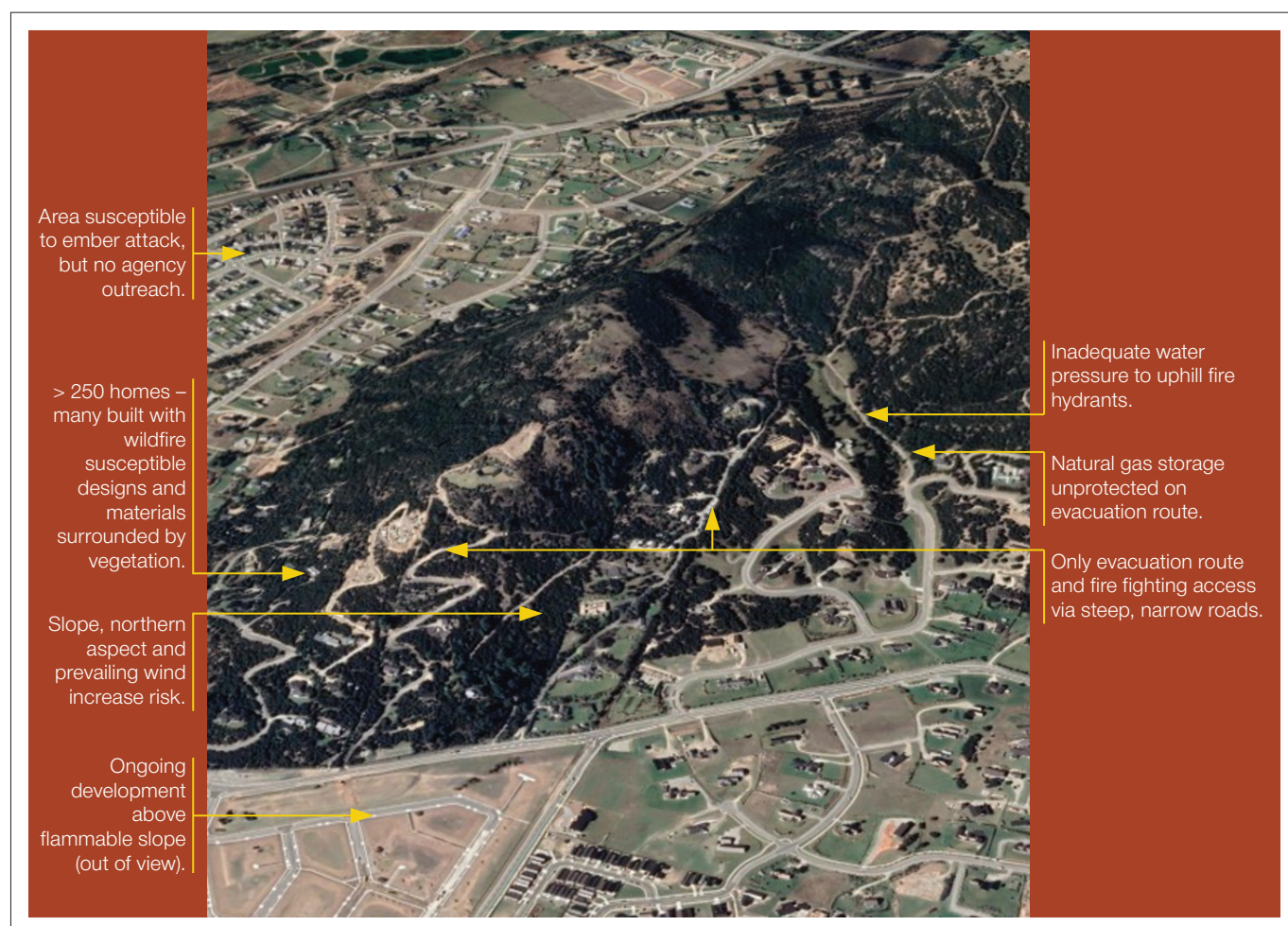


Figure 4. Wildfire issues in the Mt Iron community.



Figure 5. All year-round Total Fire Ban Zone sign near start of road extending up Mt Iron.

The first phase of engagement (in June and November 2020) aimed to identify influences behind wildfire risk perception and preparedness in suburban areas of the RUI.

The second phase involved discussions with local agency staff and residents active in resident associations stakeholders in April 2021 around a range of possible wildfire risk mitigation and preparedness actions for the community. The potential actions were compiled from a review of international literature, revised to suit New Zealand conditions and assessed to ensure they were compatible with relevant legislation. We sought to gather opinions on the practicality and likely uptake of the recommendations by RUI residents in the case study area.

2. Survey of residents

Quantitative data about residents' community connections, risk perception and current and planned mitigation activities were collected via an online survey. A postcard invitation to complete an on-line survey (Figure 6) was sent to all addresses within the primary target area during November 2020 and January 2021 (Figure 3, zones 1-3).

To allow comparison with residents in more densely developed areas, a link to the survey was subsequently advertised locally. This link was open to all residents in the wider survey area of northern Wānaka and Albert Town north of Highway 84 and south of the Clutha River (Figure 3, zones 4 and 5). This increased the total target population to 6,564 residents (Statistics New Zealand, 2019).

The survey was completed by 286 people. Homeowners and people with higher levels of education were over-represented while Māori and those who identified as Asian were slightly underrepresented when aligned with Census data. The respondents were slightly more likely to be female and, consistent with the local area, to have a higher income than the national average.

Key research findings

1. Summary of interview, focus groups and workshop findings

Wildfire risk perceptions and preparedness: Mt Iron permanent residents. Mt Iron permanent residents involved in the case study exhibited high wildfire awareness and anxiety. This has been amplified by the October 2020 wildfire that destroyed 48 houses at Lake Ōhau, 70km away. These residents have voiced their concern to local agencies about the potential threat to lives and property. Their concerns focus on issues such as restrictions on removing kānuka from around their properties (Figure 7), flammability of cedar cladding of their houses, and access for fire trucks on the one-way evacuation routes for residents. In the words of some of our study participants:

"I'm upset that the covenants on my property, like a lot of them, preclude me from removing stuff that's within two metres and in some cases a metre of my house... I've seen those green kānuka burn and it just explodes. It's like it's laden with some sort of accelerant."

Resident IC1

Resident homeowners were often unaware of the wildfire risk prior to purchasing their property and several questioned why development had been permitted in the area without adequate infrastructure for wildfire protection. Coupled with this is the issue of one-way access being the same route for people evacuating as emergency services trying to enter the area.

"It [wildfire risk when purchasing section or building house] never ever crossed my mind really, until probably we moved in, people started talking about it. So not only that we've built in cedar. And every two or three years I baste the cedar with more oil. The whole bloody thing goes up. I mean the house is a wooden house. It is oiled. It will go up a treat."

FG4, Resident 6

"I wasn't aware of it [the risk before buying the section]. You know, we came from Australia, we bought, basically [during] a weekend trip, I wasn't aware of the kānuka and how flammable that really was... I think the other thing that having bought into the place and then assessed the rest of the issue what really got me was there's only one entrance into [the area]. And from a fire mitigation [point of view] I don't know how the hell that ever got past planning in the first place."

FG4, Resident 7

The large numbers of recreational walkers on Mt Iron and big increase in population over the Christmas/New Year holiday period were also considered to amplify the wildfire risk and the risk to life.

"One of my primary concerns on Mt Iron is the risk to life. So many people use Mt Iron, the walking tracks."

Resident IC5



Figure 6. Postcard invitations containing individualised QR codes and written links to an online survey sent to all addresses within the primary target area.

Mt Iron permanent residents in our study, many of whom are very aware of the wildfire risk, have started taking mitigation actions and plans and identified concerns to achieving further mitigations (Figure 8). To date, actions have been primarily individual property preparations. One resident even reported awareness of the wildfire risk driving their house design, constructed a concrete bunker and installed garden irrigation using Australian bushfire recommendations for guidance.

"We were very aware of the fire risk when we bought and that was one of the reasons that we thought very carefully about buying there in the first place... so we designed our house with, putting fire mitigation, designed our garage in the old concrete bunker. That's our place of last resort... your first call was to get out, obviously. But if you get stuck, at least you've got a place that potentially could provide refuge.... We're really looking at it because I looked at the Australian bushfire kind of standards, when we were looking at doing that and part of the design process... And the other thing that we've done is with the irrigation..."

FG4, Resident 4

"We have the [water] tanks in place. We have the hoses in place, some... have bunkers in place to hide. But the reality of it is we don't have the time when it happens in those times to effectively do anything about it... The 30,000-litre tank and a hose to deal with fire [act] as an insurance backup."

FG3, Resident 3

"I leave my key in my car. I'm assuming that it's coming from the south. It's coming from north I'm running, but I don't want to be looking for my car key."

FG3, Resident 2

However, more collective community actions are occurring with neighbourhood resident associations becoming vocal and asking agencies to act, for example prepare a mitigation plan and install an early warning system. A community collective consent application to replace kānuka on their properties is being considering by concerned residents.

"[What] I am pushing for amongst the three primary organisations is a mitigation plan. So it's a holistic plan that looks at all of those developments, along the lower

slopes of Mt Iron, and specifically in the red zone, in Wānakas' red zone. And I don't know the science behind this, but I mean, presumably, firebreaks could be identified, and presumably, some property is more at risk than others. So you know, a recommendation for those properties."

Resident IC5

"On Saturday, we had a working bee at the bottom of our property with all everybody involved to clear the long grass, that's on the verge, on the side of the road."

FG3, Resident 3

A positive step is that QLDC, Emergency Management Otago and FENZ have recently established a Mt Iron Wildfire Risk Reduction Project Group to help support evaluating and implementing risk reduction actions.

However, there are no immediate solutions to the poor planning and roading issues (Figure 9) for the community, and some wildfire-aware homeowners remain apprehensive about their on-going ability to insure their properties.

"I've been advised by my insurance broker that because of the fire risk, it probably negates my house insurance... my insurance broker may read the cover, it's been nullified by having that combustible material so close."

Resident IC1



Figure 7. Kānuka clearance restrictions have resulted in existing homes and house extensions constructed close to mature flammable vegetation on Mt Iron.

Preparedness actions and plans: wildfire risk aware Mt Iron permanent residents

Actions taken

- Lawns managed to reduce dry fuels and mown during cooler or wetter days.
- Some vegetation management, including pruning, clearance or replacement with less flammable species, though covenants limit these actions in some areas.
- Water gardens.
- Some plastic household water tanks and garden irrigation installed.
- A few internal fire bunkers built within house/garages.
- Leave keys in parked cars facing towards evacuation routes for quick retreat.
- Recognised need to be prepared and have informal plans to evacuate.
- Increasingly know neighbours and discuss evacuation routes.
- Neighbourhood resident associations becoming vocal, requesting agencies prepare mitigation plans, install early warning systems and approve kānuka clearance.

Proposed actions

- Further vegetation management on properties and community spaces.
- Discussing community collective consent application to replace kānuka.
- Community want early warning system installed.
- Considering homeowner and neighbourhood vegetation drenching systems.
- Further internal bunkers being considered.
- Rectify unnamed road and jumbled house numbers.

Remaining concerns

- Reducing actual and perceived barriers to consented clearance of kānuka.
- Some residents want to retain vegetation to obscure housing development.
- Some narrow roads, inaccessible driveways, cul-de-sacs and no alternative access to evacuate.
- Topography limiting water pressure to fire hydrants in some subdivisions.
- Fire danger publicity will affect ability to insure.
- Costs and difficulty of retrofitting homes after construction has been completed.
- National and district level planning which does not adequately consider wildfire risk although Resource Management Act to be reviewed.
- Relative lack of wildfire risk mitigation guidance appropriate for urban fringe properties.

Figure 8. Preparedness actions, plans and concerns identified by Mt Iron residents during interview and focus group discussions.



Figure 9. Narrow steep roads which are the only evacuation route can cause safety issues for residents and fire trucks.

"If our insurance companies become aware that... properties are targeted as high-risk areas, then we might have difficulty getting insurance on the house. And again, I just think if the risk to human life is kind of what's paramount to me. So if we lose our insurance, okay, I'm going to be pretty upset about it. But like I say, if it ever comes down to it, and there's a loss of life, and I didn't do everything that I could."

Resident IC5

Wildfire risk perceptions and preparedness: wider community. The wider northern Wānaka/Albert Town area includes holiday homes, short and long-term rentals for both domestic and international visitors, pre-schools, a primary school and a popular holiday park with short-term and semi-permanent residents. The wildfire awareness and preparedness measures of this wider community differ from residents of Mt Iron itself. There appears to be lower fire-risk awareness, with reports of fires being lit on the beach, use of fireworks and braziers, and inappropriate disposal of cigarette butts.

"It's not perceived as a [wildfire] risk by the rest of the population. It's just our risk because we live there. If it goes up, it goes up."

FG4, Resident 6

"Every time there's a grass fire in summer, caused by something, someone driving past doing something, the issue raises its head quite a lot... a car drove down the main road, threw something out the window and started the grass fire, that the whole community had to rally around and very quickly bring under control."

FG4, Resident 4

Nevertheless, newspaper reports and social media posts by councillors and residents about wildfire risk are becoming more common. Awareness is likely to grow as more publicity and community conversations take place. Already one participant in the study noted the vulnerability of pre-school locations and their distance and difficulty in transporting young children to designated civil defence centres if a wildfire occurs.

Māori community in region. A relatively small but growing proportion of the community identify as Māori compared with the wider New Zealand population. While many Māori in the area are affiliated with Ngāi Tahu and some are mana whenua (hapū and iwi with customary land rights), the majority of Māori in the area are mataawaka (Māori living in an area but who are not mana whenua). Many Māori bring their own traditional, generational knowledge of fire. Māori interviewed as part of this study spoke of their knowledge that north-westerly wind brings fire; cooking should be done at night when the air temperature is cooler; and that fires should be lit near a water source rather than near habitation.

Cultural networks and active communication are strong, although no marae or communal meeting ground exists in the Queenstown/Wānaka area. The Mana Tāhuna Charitable Trust is a Queenstown based pan-Māori organisation with support from Ngāi Tahu formed to support whānau (families) through the response to Covid-19. It aims to improve the wellbeing of Māori within the Tāhuna community. The Hawea Māori community also has a strong network that meets regularly. These groups offer agencies the opportunity to extend their engagement and transfer knowledge within Māori communities, which could lead to further individual and collective wildfire preparedness actions.

2. Summary of survey findings

Turning now to the findings of the survey residents' community connections, risk perception and current and planned mitigation activities of residents in the wider area of northern Wānaka and Albert Town. Table 1 summarises the key findings from the survey of residents, illustrating their concern, beliefs and perceptions of responsibility around wildfire, and mitigation efforts before and after property construction, as well as the variations in responses between and within different wildfire risk zones.

The results indicate that many residents feel that elements of wildfire mitigation and response are someone else's responsibility to a certain extent. Those who live closer to Mt Iron (higher wildfire risk) undertook more mitigations than those in lower risk areas. Of note is the limited uptake of many straight-forward, low or zero-cost mitigation measures by at least half of the respondents.

The survey was well received by many residents and appears to have raised awareness of the problem that wildfire risk presents. The survey was well received by many residents with some respondents reporting the survey itself raised their risk awareness and prompted them to act. Like the qualitative interviews and focus groups it helps guide agencies in their future engagement with local

communities. The implications of the survey are further illustrated by the quotations from four respondents:

"Worth being aware of even if you don't think it's a threat where you are. Had a mental walk around the area I live in!"
(P007)

"It's given me 'food for thought' and will certainly start a conversation tonight! Thank you."
(P0168)

"Survey has made me realise we need an evacuation plan!"
(P0240)

"This survey has certainly given me a lot to think about, things like: - if the trees outside our deck start to burn, the deck will start burning and spread to the house - are we prepared? - what will we do to evacuate and keep everyone safe? - discuss all of the above with my family. Thank you for this. Will be looking around for firefighting courses on how to prevent, handle the situation and deal with it afterwards if it should ever happen to us."
(P3615)

Table 1. Key residents survey findings.

Connection to area and community	<ul style="list-style-type: none"> • Respondents were more connected to their community than the national average: >90% said they had neighbours they could turn to for support (compared with 56% nationally, Statistics New Zealand, 2015). • Most said they speak with neighbours a few times a month. • Fewer than 4% said they felt no sense of community – this group could be hard to engage with in any community outreach initiatives. • Participants reported getting their sense of community primarily through neighbours, recreational or sport-related groups, or work rather than the resident's associations, schools or cultural groups which are often used as avenues of engagement.
Concern about wildfire	<ul style="list-style-type: none"> • Concern about wildfire was higher among people living in the higher risk areas (Zones 1-3 within 200m of Mt Iron, Clutha River and Sticky Forest than Zones 4-5 elsewhere in northern Wānaka and Albert Town) (Figure 10).
Beliefs about wildfire risk and mitigation	<ul style="list-style-type: none"> • Respondents generally disagreed with the belief that 'reducing the risk of fire is up to every individual homeowner and resident'. • Respondents were either neutral or marginally agreed that 'house survival is mainly due to chance' and that 'no amount of preparation could affect wildfire risk'. • Weather, surrounding vegetation and landscape were perceived to have the strongest influence on house survival. • This represents a challenge for agencies promoting wildfire mitigations and preparedness actions.
Perceptions about responsibility	<ul style="list-style-type: none"> • Respondents believed that agencies should be slightly more responsible than households for deciding when people should evacuate during a wildfire, defending homes during a wildfire, and ensuring that people are aware of the wildfire risk.
Mitigation actions undertaken (before house construction)	<ul style="list-style-type: none"> • Relatively few residents considered wildfire at the stages when they have the greatest opportunity to shape their own risk: when choosing or designing a home. • Most respondents (63%) said they did not consider wildfire risk at all when deciding to buy or rent their home. • Of those who had decision-making influence in the construction of their homes, only around 40% reported that wildfire played any role in their decisions.
Positive mitigation actions undertaken (after house construction) (Figure 11)	<ul style="list-style-type: none"> • Most respondents reported completing some mitigation activities, and the number of actions taken was weakly associated with estimates of the likelihood that a wildfire would occur within five years and would damage or destroy their home. • Most participants reported having insured their homes (94%) and keeping lawns short and green (91%). • The least common mitigation action was discussing wildfire risk or mitigation with a fire expert. • People who had lived longest in the Wānaka and Albert Town area displayed higher levels of mitigation. • People who had previously witnessed wildfire reported more mitigation actions than those who had not.

Limited mitigation actions undertaken (after house construction) (Figure 11)	<ul style="list-style-type: none"> • Half or less than half the respondents reported completing the following mitigations: <ul style="list-style-type: none"> – Storing firewood/other fuels inside or > 5m from house (46%) – Clearing leaves/debris from roof/gutters within past 6 months (32%) – Removed all trees/shrubs within 1m of home (41%) – Thinned and pruned trees/shrubs within 10m of home (51%) – Thinned and pruned trees/shrubs > 10m of home (51%) – Made an evacuation plan (39%) – Discussed wildfire preparations with household members (40%) – Discussed wildfire preparations with neighbours (17%) – Discussed wildfire preparation plan with fire expert (13%). • People living in high-risk areas completed more mitigation actions on average (7%) than those living in lower-risk areas (5%); however, there was no difference in how much people considered wildfire risk when choosing a home or when building or remodelling their home suggesting they either chose their home despite the higher risk or learned about the risk only after choosing/renting or building/remodelling the home.
Wildfire, controlled fire, or firefighting experience	<ul style="list-style-type: none"> • A quarter of residents (25%) were not aware of the total ban on fire and fireworks on Mt Iron. Awareness was greater among people living in high-risk Mt Iron area (Zone 1, 84%) than in other areas (Zones 2-5, 70%). • Surprisingly, neither those who had previously witnessed wildfire nor those who had homes threatened by wildfire reported higher levels of concern or estimated likelihood of wildfire affecting their homes.
Household evacuation	<ul style="list-style-type: none"> • Assistance required for household evacuation was apparent within some homes and was described as: <ul style="list-style-type: none"> – Only residents > 65 years old (17%) – Children who would need help evacuating (11%) (this applies to nearly a third of residents living <200m from Mt Iron) – Pets/livestock/other animals (57%).



Figure 10. Research findings showed that concern about wildfire was higher among people living in higher risk areas of Mt Iron, Clutha River and Sticky Forest, but lower in surrounding expanding residential areas.

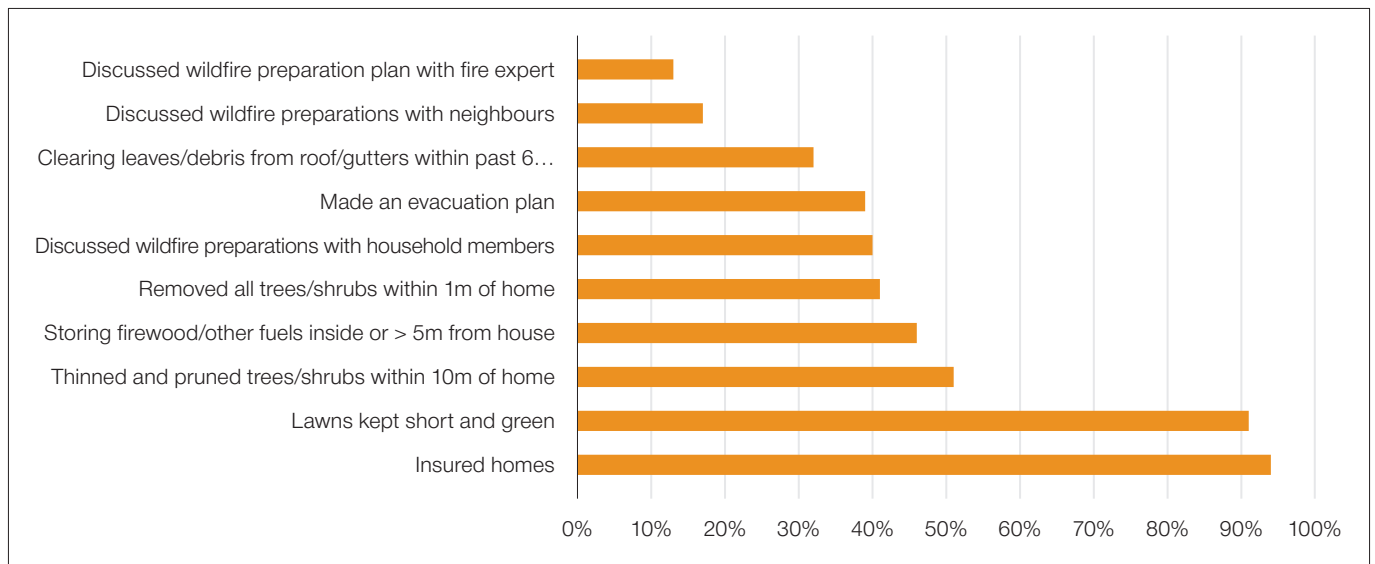


Figure 11. Limited mitigation actions undertaken after house construction reported by Wānaka/Albert Town postal survey participants.

Conclusions

Improving wildfire awareness and preparedness among homeowners and communities is essential. Climate change and growing housing development in the RUI are increasing the risks from wildfire.

Our case study of the northern Wānaka/Albert Town area highlighted the complexities that can exist within even a small geographical area and community related to wildfire mitigation and preparedness. Research findings have led to a number of recommendations for fire agencies and councils (Figure 12). Agencies hoping to engage with residents in the RUI need to be aware that they are dealing with a range of different perceptions and attitudes to wildfire mitigation.

Many residents residing close to Mt Iron in the wildfire prone area of northern Wānaka/Albert Town were acutely aware of the wildfire risk and have commenced or plan to take mitigation and/or preparedness steps. However, others, including those further from Mt Iron and short-term residents, appear to lack awareness and have taken few wildfire risk-mitigation and preparedness actions. Overall, there is distinct room for improvement as survey participants reported that they had on average completed only half of the possible mitigation actions named in the survey.

While our participants were well-connected to their community overall, our survey identified a small group who do not feel part of their local community and may be hard to reach. Community engagement and knowledge transfer also need to be extended to hapū and pan-Māori organisations to benefit from their strong networks.

A key output of the project are the **wildfire mitigation and preparedness recommendations** developed by the research team to guide homeowners and communities in:

- constructing or remodelling a home
- landscaping or designing defensible spaces
- preparing at the start of each wildfire season
- making response plans
- what to do during a wildfire event.

These mitigation recommendations are freely available.

<https://www.ruralfireresearch.co.nz/tools/wildfire-risk-reduction-and-mitigation-actions>

Recommendations for agencies

Our key recommendations to fire-related agencies arising from this project are:

- Agencies should work with residents to raise awareness of wildfire risk and preparedness in the RUI in areas identified as particularly wildfire prone.
- This includes raising awareness of the wildfire mitigation and preparedness recommendations by encouraging residents to apply relevant recommendations developed as a result of this project.
- Support positive wildfire preparedness actions by those building or remodelling homes prior to construction in areas with particularly high wildfire risk.
- Encourage house and property maintenance initiatives which have had limited uptake to date and are inexpensive.
- Constantly encourage residents to mow lawns, prune or remove vegetation and remove firewood in close proximity to houses where permitted, water gardens when conditions are extreme and prepare evacuation plans.
- Extend community engagement and transfer knowledge to Māori community groups to benefit from their strong networks to encourage individual and collective wildfire preparedness actions.
- Agencies should consider planning to assist household evacuation of some resident groups (such as elderly, families with young children or those with pets or livestock).
- Agencies could also investigate raising the wildfire awareness and preparedness measures of short-term residents, including tourists.

Figure 12. Recommendations for fire agencies and councils derived from this northern Wānaka/Albert Town case study.

Acknowledgements

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