NEW ZEALAND
SEARCH AND RESCUE

NZ Search and Rescue Environmental Scan

2020 update

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1. Executive summary

The following is an update of an environmental scan conducted for the Search and Rescue (SAR) sector in New Zealand back in 2017. In it, you will find:

1. a brief review of how demand for search and rescue has changed since 2017;
2. updates on demographic, economic, social, technological and environmental trends relevant to the search and rescue sector; and
3. an exploration of the possible impacts of these trends on volunteering in the search and rescue sector.

In the 2017 environmental scan, we noted that some macro-level environmental trends were likely to increase demand for search and rescue, while others might ease it. For example, we noted that increased sedentary behaviour, more urbanisation, increased diversity, changing recreation patterns and increased ethnic diversity were all likely to dampen participation in the outdoors, potentially reducing demand for search and rescue. We also observed that technology would be likely to continue improving, offering the potential to keep people safer and more locatable by Search and Rescue (SAR) teams.

By contrast, below we suggest that factors likely to increase the need for search and rescue include population growth, increased wandering, more tourists and more extreme weather due to climate change. We first consider how demand has changed since 2017, before trying to understand the individual drivers at play.

Rather than simply updating key figures to 2020, we have tried to identify particularly relevant or important trends, and to explore what these changes might mean for the sector. One key takeaway should be that some of the environmental trends (e.g. demographic and economic changes) are generally slow-moving, while other changes (e.g. technological innovation and climate change) are accelerating.

On the demographic front, the population is still ageing, women are still outliving men, urbanisation is continuing and we are still becoming more diverse. These changes, while not rapid, do throw up some real strategic challenges for the SAR sector in the medium to longer term. In particular, they relate to issues such as workforce planning and culture, rather than how to manage immediate spikes in demand.

Since the 2017 environmental scan, we have not seen a major change in demand for search and rescue. A 'glass half full' view of this is that, while there has been a slight uptick in land- and aviation-based SAR operations, it could hardly be called a 'spike'. By contrast, a 'glass half empty' perspective might be that prevention efforts have so far failed to significantly reduce overall demand either.

The social trends explored in the update below appear to be moving somewhat faster than the demographic and economic ones. Of particular relevance is the growing sense among most New Zealanders that life is 'moving faster' and therefore people are feeling under time pressure.

Of course, there are just as many hours in a day as 40 years ago, but most people feel there are more demands on their time. This is particularly the case for younger people, people, those struggling to get by economically, and people in full time work or with full-time caring responsibilities. The challenge this presents for the SAR sector is that even a perceived lack of time can substantially reduce the public's willingness to volunteer, or to commit to longer-term volunteering in the SAR sector.

The other major social trend explored below is related to attitudes when people venture into the outdoors. There is some evidence that SAR partners' efforts to raise awareness are working: people are more prepared when venturing outdoors in some respects. However, the fact that some people still stubbornly refuse to pack life jackets when going boating or to prepare properly before going tramping, suggests that there is still work to do in this area. Furthermore, raising awareness should only be seen as part of an overall behaviour change strategy. There may yet be room to systematically consider necessary changes to laws, regulations and enforcement to complement awareness-raising efforts.

We also explore below some of the less obvious links between recent economic and social changes and the SAR sector. Economic growth, tourism and the expansion of the marine economy are all continuing more or less as they were back in 2017. The most notable recent changes appear to relate to the policy decisions successive recent governments have made and the impacts of those decisions on income distribution. For the first time in 5 years, real wages are increasing at the same time as unemployment is falling, and inequality is reducing. While the links to the SAR sector may not be obvious, these changes are particularly relevant for attracting volunteers generally, and particularly for those from diverse and/or deprived backgrounds (two things that unfortunately still correlate quite closely).

This update also explores the question of whether anything has notably changed in terms of relevant technology since the last scan. The pace of technological change is continuing to accelerate. Without trying to be exhaustive (a hopeless endeavour when it comes to technological change), the scan identified a couple of key trends worth monitoring. For example, better ability to solve the 'travelling salesman' problem and developments in artificial intelligence may well offer significant opportunities for speeding up search and rescue in future and improving the chances of success.

Perhaps more challenging than the SAR sector adopting useful new technology itself is working out how to influence the public to adopt helpful technologies. A key part of this is likely to be making it both easy for the public to adopt useful technologies that will help them to be located quickly, and making it less attractive to be blasé about venturing outdoors without a means of being found. In particular, it is likely that ongoing and long-term effort will be needed to convince the public that simply carrying a mobile phone is often insufficient preparation.

The news on the environmental front since the last scan is less positive. While the world is increasingly understanding the reality of climate change, progress to actually curtail it appears to be well short of what is needed to avoid global temperatures increasing.
Even worse, the future projections in terms of sea level rise and extreme weather events due to this warming are getting ever more dire. This is likely to drive higher demand for search and rescue (possibly exponentially more) in the medium to long term, including for mass rescue.

This update includes a deep dive on volunteering. In particular, several demographic trends are likely to have a significant ongoing impact on the SAR sector's ability to recruit and retain volunteers:

- population growth, driven by ongoing immigration (both a contributor to demand for search and rescue, and possible SAR volunteers if diversity is tapped appropriately);
- population ageing and increased disability rates (affecting the physical capabilities of some volunteers, but also offering a source of potential new volunteers);
- ongoing urbanisation, leading to 'hollowing out' of some rural areas (potentially putting strain on a purely locally-led model of volunteering over time); and
- people feeling increasingly time poor and choosing to spend less time outdoors (which could both reduce demand for search and rescue, but also make it harder to attract volunteers).

It appears that there is no immediate volunteering crisis for the SAR sector. In particular, many of the demographic trends described above will continue to occur gradually. This said, just because some trends are gradual does not mean no immediate action is required. Quite the opposite; if action to address them is not taken in a timely manner, more drastic steps are likely to be needed later. This particularly applies to the challenge around getting a more diverse and representative SAR workforce and ensuring it is sufficient as the environment continues to evolve.

Investing to attract a more diverse workforce may also help the SAR sector to navigate an environment that is increasingly volatile, uncertain, complex and ambiguous. This is because having more diverse thinkers can enable a step-change in an organisation's or network's strategic thinking ability and adaptability. However, to realise this significant strategic benefit, the SAR sector will need to actively welcome new perspectives and skills, and be open to doing things differently.

Of course, before it can benefit from the new perspectives of diverse volunteers, the SAR sector needs to actually attract them. People tend not to volunteer for activities that are irrelevant to their lives; so promoting outdoor participation and volunteering for SAR are likely to be highly complementary activities. Also, attracting new kinds of volunteers will require work to understand the differing values and priorities of different generations, genders and ethnic groups. It will also mean pitching the value proposition or 'offering' around volunteering to each demographic in a way that resounds authentically with each.

Some questions SAR agencies may wish to explore as part of trying to attract a more diverse volunteer workforce include:

- What SMART[1] commitments to action might each agency (and/or the sector as a whole) usefully make in relation to securing a volunteer workforce that better reflects New Zealand?
- What does the SAR sector need to know about the demographic groups who do not usually volunteer for the SAR sector (e.g. the values of different ethnic groups, older people, women etc) in order to attract and retain them better in future?
- How might the SAR sector ensure that there are sufficient numbers of volunteers all across NZ, as certain local areas face population decline?

[1] Specific, Measurable, Achievable, Realistic, Time-bound.

In this scan, we also observe that there does appear to be an increased preference for shorter-term and episodic volunteering, particularly among younger generations. This seems to be driven by a combination of factors: people seem to feel they are juggling more priorities, are more economically-stretched and have a much greater array of options for filling their free time enjoyably. This suggests that the challenge around attracting people to participate in the outdoors, and to volunteer in the SAR sector, may well be two sides of the same coin. It is also notable that non-NZ Europeans are both less likely to participate in the outdoors and to volunteer for SAR agencies at present (might these things be linked?).

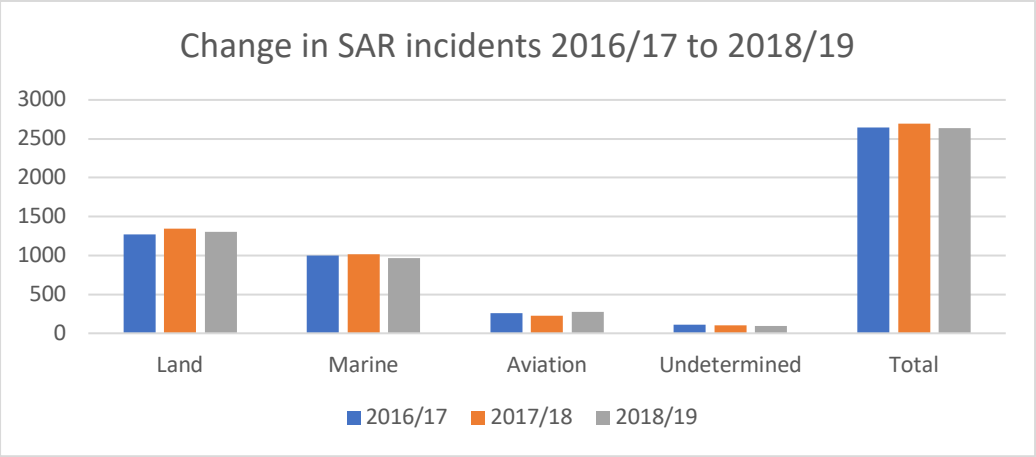
However, available data (particularly from overseas) does not suggest that a decline in volunteering, including for the SAR sector, is inevitable. A targeted and personalised approach to recruiting new volunteers will likely be the best way to attract and retain a diverse workforce. This approach will need compelling answers to the following kinds of questions for potential recruits:

- Why should I care about search and rescue – why would my decision to volunteer for this sector make a real difference in the world?
- What will I (and/or my community) get out of volunteering for the SAR sector? (e.g. training/qualifications/skills, new friends, life satisfaction, recognition etc)?
- How much of my time (e.g. per week) will be needed when I volunteer, and how easy will it be to juggle volunteering for SAR with other commitments?

Finally, it is important to note that while trends can give an indication of the way things are headed, surprises happen. A particularly useful economic concept comes into play here: that of bounded rationality. It says simply that you cannot make decisions on the basis of information you do not have. Hopefully the following environmental scan update slightly widens the current information base available, while acknowledging that the only real constant is change.

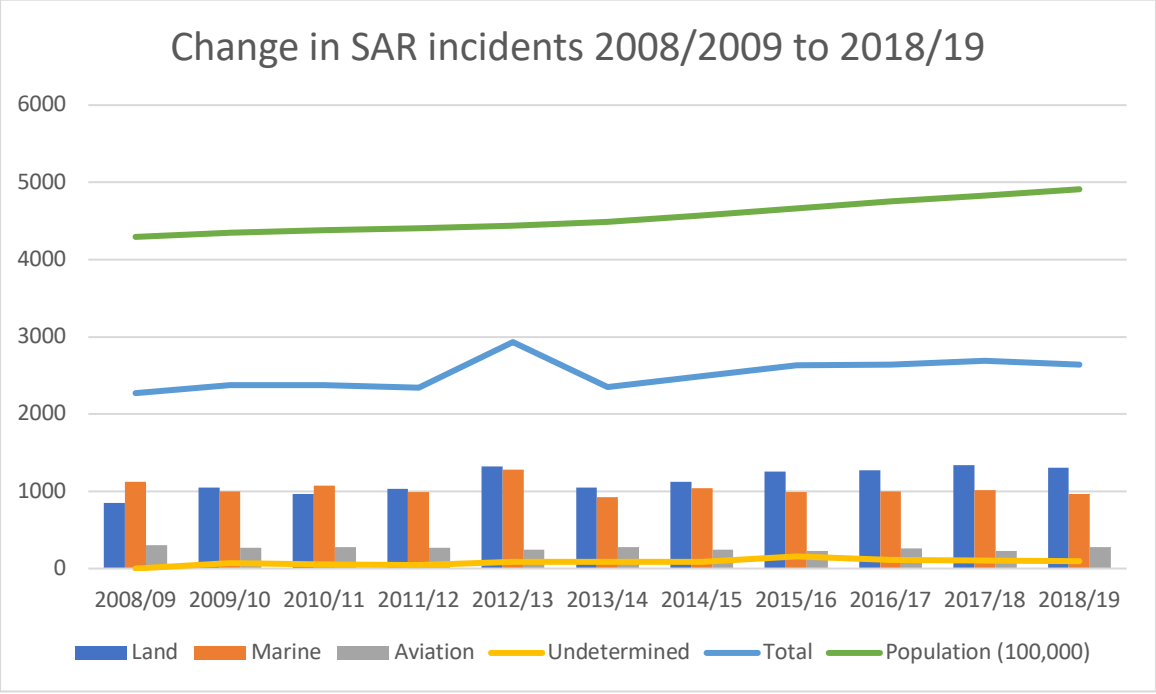
2. Demand trends update

In the figure below, it is clear that demand has not changed dramatically since 2017. This is perhaps not surprising given only 3 years has passed since then.



(New Zealand Search and Rescue 2018)

We can learn more by looking at how demand has changed over a longer timeframe. Extending the time series back ten years, we can see that the total number of SAR operations has mostly slowly tracked upwards in line with population growth.



(NZSAR Annual reports 2008/09 – 2018/19)

While demand has grown at a relatively stable rate over the last 10 years, it is important to avoid so-called 'straight line extrapolation' about the future. In simple terms, it is dangerous to simply place a ruler on the trend lines and assume they will continue. This is for several reasons.

The first reason is that the link between population growth and growth in participation outdoors may weaken in future. For example, changing age, ethnic composition and attitudes may also impact on the link between population growth, participation outdoors and ultimately the need for search and rescue. Secondly, some of the contributors to SAR demand are endogenous; i.e. people can influence them through mechanisms like safety and prevention campaigns, which we hope will reduce the need for searches and rescues over time.

Thirdly, some of the exogenous factors, such as climate change and technological innovation, are characterised by exponential or sudden step-changes, both of which could easily disrupt the slow and steady growth in demand to date. Finally, major events such as wars, storms and asteroids happen and can create unforeseen impacts that disrupt historic trends.

With these warnings about straight-line extrapolation in place, we can now look at what has changed since the original 2017 environmental scan and refresh our analysis of what might impact on the SAR sector in the years ahead.

3. Demography update

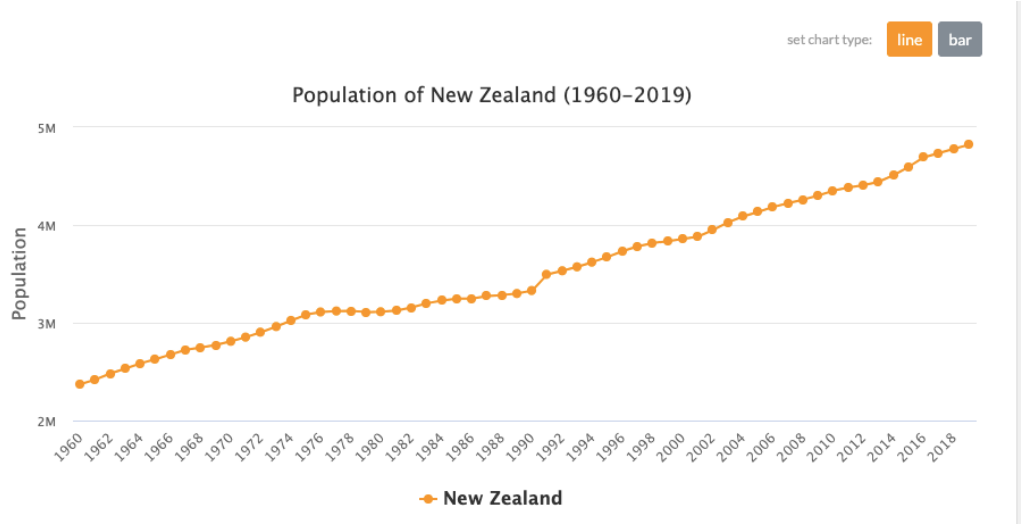
Demography refers to changes in the characteristics of human populations, such as overall size, age, ethnic composition, and distribution around a country. Broadly, we can say that the demographic trends identified in the 2017 environmental scan have continued. But there are a few areas in which we can provide a little more detail about what these changes might mean for the SAR sector.

3.1 The population is still growing

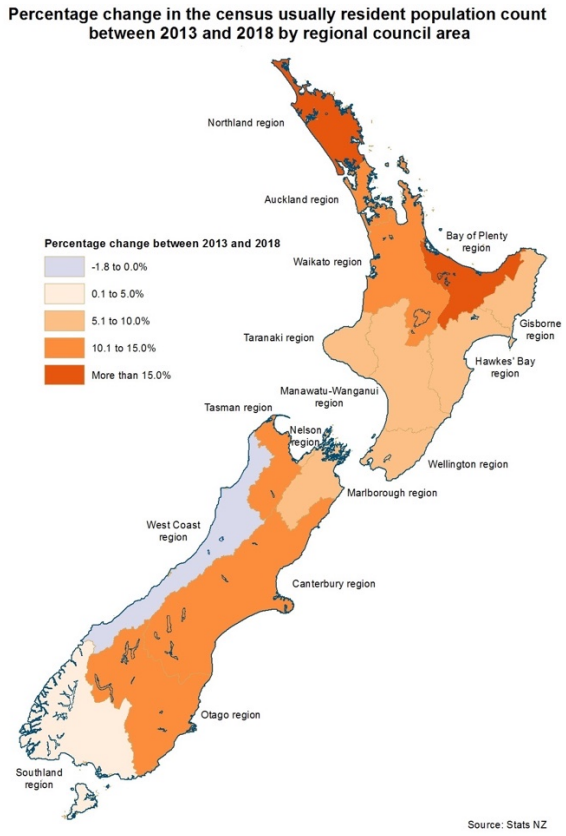
In the earlier scan, we noted that NZ's population was projected to increase to over 4.9 million people by 2020 and 5.5 million by 2025. At that stage, we had to use somewhat outdated projections since the 2018 Census had not yet been conducted. However, we can now refresh our estimates given the new Census data. The 2018 Census population count was 4,699,755; an increase of 457,707 people since the 2013 Census. In other words, the population has grown consistently by about 2.1 per cent a year, with the last two years being no exception.

In the future, the population is not guaranteed to grow, and certainly not necessarily at the same rate. In New Zealand, population growth is mostly driven by immigration settings. This means different governments could speed up or slow down population growth in future depending on their policy preferences. For example, senior New Zealand First Minister Shane Jones was recently quoted as seeking a discussion on "the changing nature of New Zealand's societal culture through immigration." (NZ Herald 2019)

Furthermore, even if the population does keep growing, this does not necessarily guarantee demand for search and rescue operations will increase at the same rate. In our last scan, we noted that only 0.05 % of the population is involved in a SAR operation each year.



Overall, we do not expect sudden changes in demand for search and rescue services due to population changes at a national level. However, it is worth noting that recent population growth has been particularly concentrated in three different areas. The Bay of Plenty and Northland have seen more than 15% increases in population between 2013 and 2018. By contrast, the population has shrunk in the West Coast region by between 0 and -1.8 percent (Statistics NZ 2019).



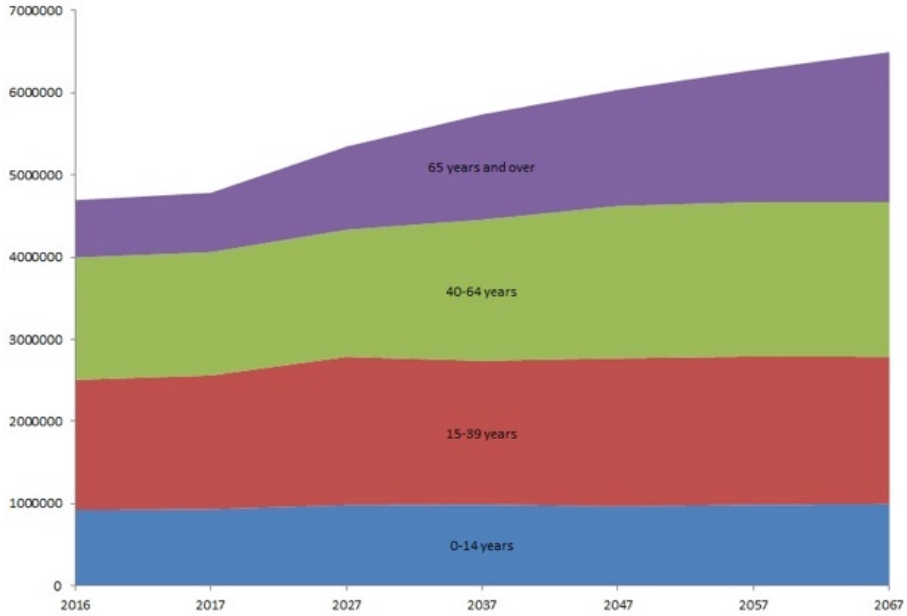
In reality, changes in the regional distribution of population are probably more relevant to the question of where to source future SAR volunteers than to that of what will drive future demand for search and rescue. This is because people do not just participate in outdoor recreation near where they live. Recent work by the Mountain Safety Council has highlighted this point. By exploring where 'hotspots' for injuries and fatalities occur around New Zealand, it has been able to start clarifying the links between where and how people participate in the outdoors, and demand for land-based search and rescue.

The Mountain Safety Council has found that 14% of all land-based searches and rescues occurred in Tongariro National Park that 22% of all tramping search and rescue events were on a Saturday and in the central north island (Mountain Safety Council 2018). They also found that key South Island tramping destinations such as Tasman, Westland and Southland experienced much higher fatality rates than their usual resident populations would suggest. This is perhaps not very surprising given that these are all major tourist destinations.

3.2 We are still ageing (though there are still plenty of young people too)

In the 2017 environmental scan, we noted that one in five New Zealanders (20%) would be aged 65+ by 2031 versus the 13% who were in 2009. Through the most recent census we can see that the ageing of the population is progressing broadly as projected, with the number of older people having risen from 13% to 15% of the total population by 2019. This population ageing is good news insofar as it reflects improvements in both population health and life expectancy. A person born in the mid 1980s has, on average, a life expectancy that is 2 years longer than someone born in 1960 (Statistics NZ 2019).

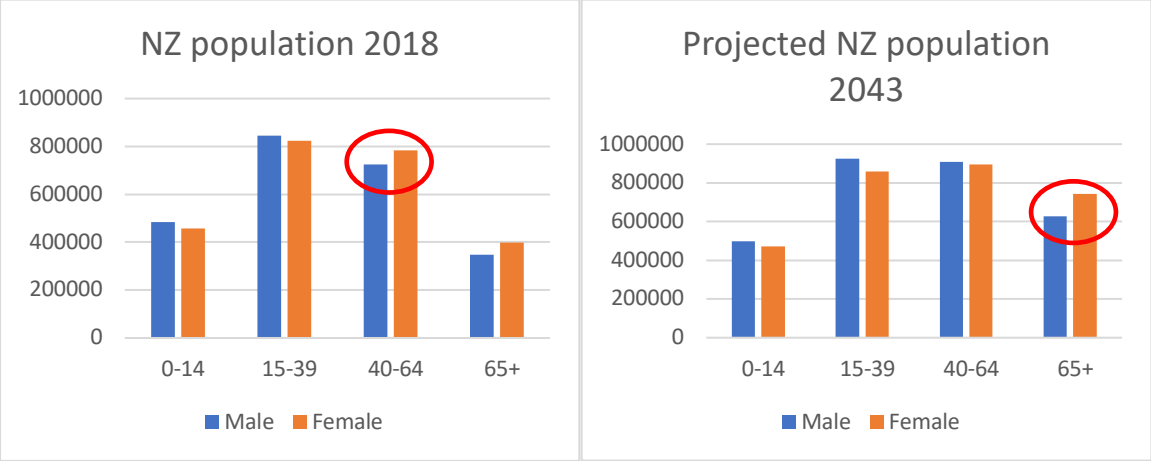
We are just at the beginning of a long period of population ageing. It is important to note that this change is going to happen gradually over the next 40 years as shown in the graph below and while there will be more older people, there will also be more 40-64 year-olds over time.



(Ministry of Social Development 2019)

3.3 *Women are outliving men*

Women tend to live longer than men, which is gradually being reflected in the relative proportions of each gender as the population ages. As demonstrated in the graphs below, there will be significantly more women than men aged 65+ by 2043.



(Statistics NZ 2019)

3.4 *The prevalence of dementia is increasing*

The ageing population is likely continue driving more dementia, which may add to demand for searches and rescues unless effective preventative action is taken. Already, statistics suggest that more than 1 in 5 land searches currently involve people with dementia or other impairment (Lawrence 2019). As one Senior Constable put it recently:

> *"Back in the first days when I joined, most of our searches were people getting lost in the bush. But with GPS now, those bush searches are reducing, but because we have an ageing population, it's changed to the elderly going missing."* (Lawrence 2019)

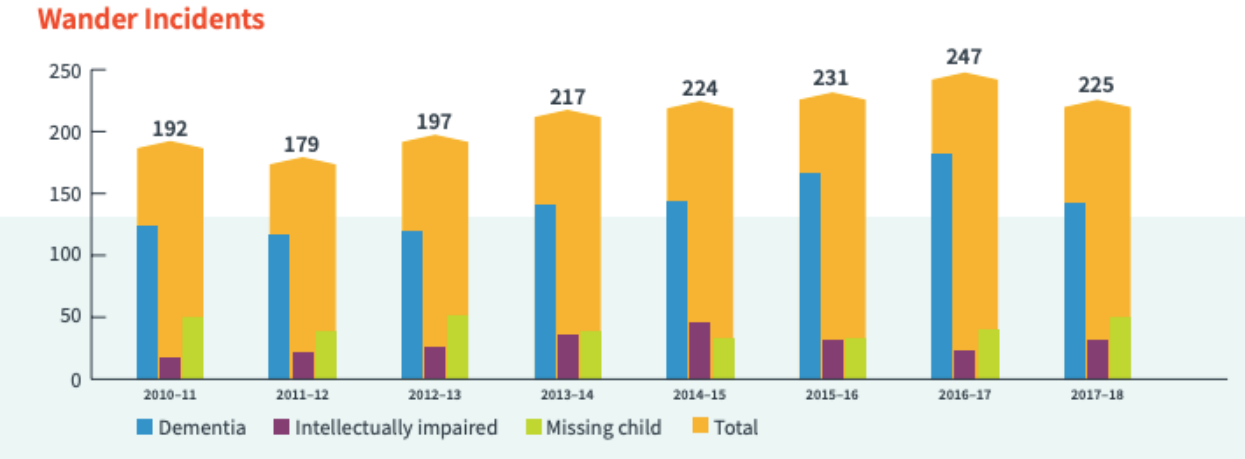
The Ministry of Health has estimated an increase from 50,000 people with dementia to 78,000 by 2026 (Ministry of Health 2014). Alzheimer's NZ has also developed the projections out to 2050 suggesting solid ongoing growth in dementia for the next 30 years. Of course, such projections need to be treated with caution, given that they exclude consideration of possible future advances in the prevention and treatment of dementia.

People with dementia are much more likely to be involved in 'wandering' incidents, whereby disoriented people leave places of safety and don't necessarily know how to return home. Most of those who wander go missing from either their homes or rest homes (Halton 2010). Wanderer incidents were steady at around 23% of category 1 land incidents each year between 2010/11 and 2017/18 (LandSAR New Zealand 2019).

To respond to the expected increase in wandering, the NZSAR Council has been supporting the 'Safer Walking Framework', which brings together agencies not typically involved in the search and rescue sector, such as Alzheimer's NZ, IHC and Autism NZ. This partnership aims to:

- Reduce the likelihood that people with cognitive impairment will leave a safe environment;
- Ensure whānau, carers and response agencies are ready should a response be required; and
- Help locate and return the affected person to a place of safety as quickly as possible.

Arguably, if this framework is successful, over time we should see the number of wandering incidents reduce, or at least staying stable over time, even if there are more people with dementia. So far, the signs since 2017 are promising, though of course one year of reduced incidents does not constitute a clear trend yet.



(New Zealand Search and Rescue 2018)

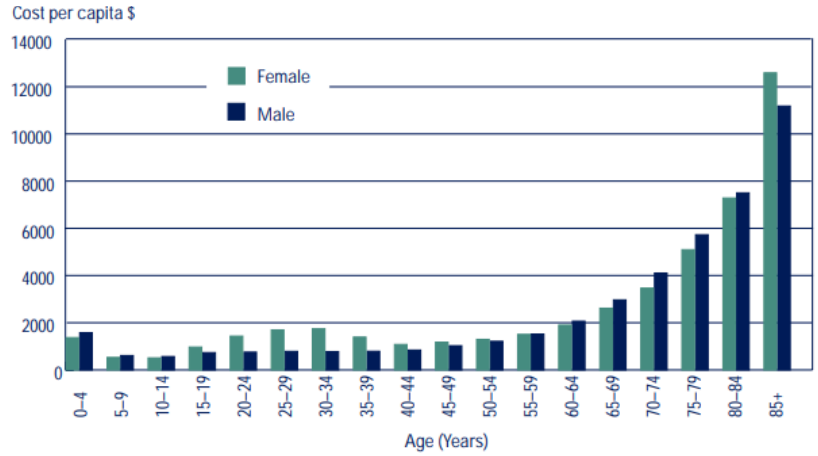
The organisations involved in the Safer Walking Framework have also been exploring the best technologies available to help track people who wander. NZSAR has also funded a research project to investigate alternatives to the existing Wander Search system currently used throughout New Zealand. The work undertaken by WanderSearchNZ and NZ

LandSAR so far provides some thoughtful guidance on both the practical options available to track and find people who wander. They are also currently considering the ethical issues associated with using technology such as GPS tracking systems, and even microchipping, to track and find people who wander.

3.5 Disability generally is also increasing

Cognitive impairment is just one of several many different disabilities that become more common as we age. In 2013, 24 percent of the New Zealand population were identified as having a disability: a total of 1.1 million people (Statistics NZ 2014). As noted in the 2017 environmental scan, New Zealanders are living longer than ever before and spending more time in good health. But as the population ages, large numbers of people identified as living with a disability grow too. This is demonstrated in the graph below.

Estimated per capita expenditure on health and disability support services, by age group and sex, 2001/02



(Ministry of Health 2002)

New Zealand's disability statistics have not been updated since the previous environmental scan. However, between 2001 and 2013, there was an increase of 20 percent in the number of people identifying themselves as having a disability. If this trend continues (and the ageing population suggests it is), we can expect at least 1.3 million people to have a disability by 2023. This makes how to deal with disability a major issue for all New Zealanders and for the SAR sector, both in terms of demand and supply of search and rescue services.

Studies overseas (Burns and Graefe 2007), Sport NZ's Active NZ data, and the New Zealand Office for Disability Issues have suggested that having a disability currently reduces participation in the outdoors. So, in the absence of other interventions, we might expect rising disability rates to reduce numbers of people participating in outdoor activities, and ultimately demand for search and rescue services.

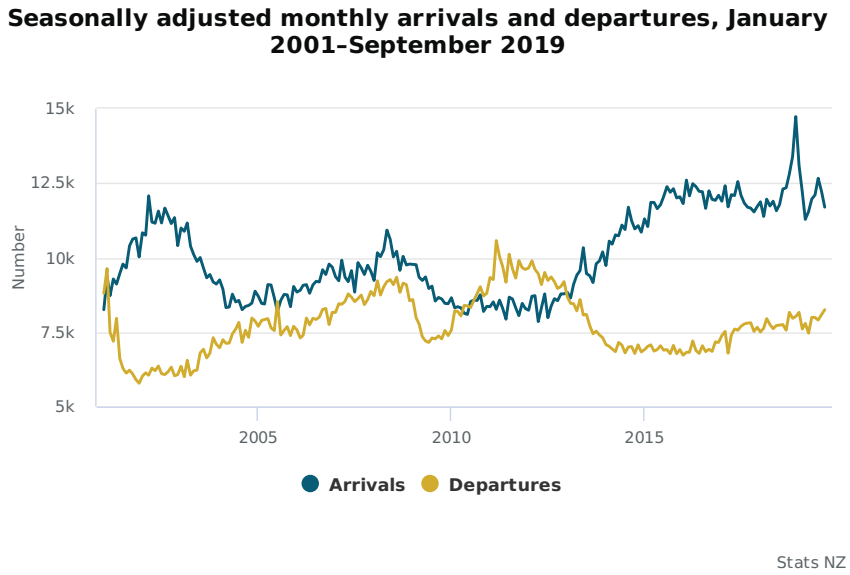
However, with rising understanding of the importance of physical activity for the mental and physical wellbeing of those with (and without) disabilities, there is rising awareness and focus on ensuring that having a disability does not prevent people from enjoying the outdoors (Williams, et al. Summer 2004) (Jaarsma, et al. 2014).
On 11 October 2019, the New Zealand government announced an action plan to improve the wellbeing of New Zealanders with disabilities by addressing inequalities in play, active

recreation and sport. The initiative involves $7 million with the aim of "establishing equity and ensuring disabled people across Aotearoa New Zealand can be just as active as non-disabled people." (Sport NZ 2019).

If the government is successful, many more people with disabilities could be empowered to participate in the outdoors, improving their health and wellbeing. While this could be an excellent outcome, it could also mean that search and rescue services in future may have to consider the particular needs that those with disabilities may have when being rescued. This could, for example, have implications for both the kinds of equipment and training needed.

3.6 We are becoming still more diverse

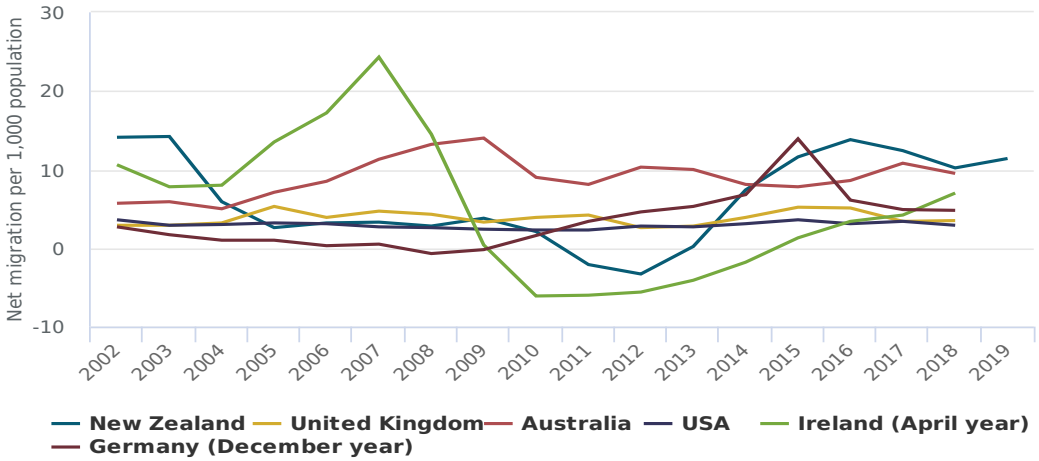
The only reason the New Zealand population is continuing to increase is because net migration is positive; that is, there are more people entering the country than leaving or dying. As the graph below illustrates, the number of people arriving continued to consistently outstrip those leaving the country between 2013 and 2019.



Over the year ended June 2019, around 56,000 new people were added to New Zealand's population, which now stands at over 4.9 million. In other words, in the past year, migrants increased New Zealand's population by about 1.1% (Statistics New Zealand 2019).

But is a 1.1% population increase per year due to net migration a big amount or not? To explore this, we need to compare New Zealand's migration rate to that of other countries. 1.1% was about the same as Australia's immigration rate in 2017-18, but more than triple recent migration rates to the United States and United Kingdom. Countries like New Zealand and Ireland tend to have larger swings in net migration rates because they have small populations (see the graph below).

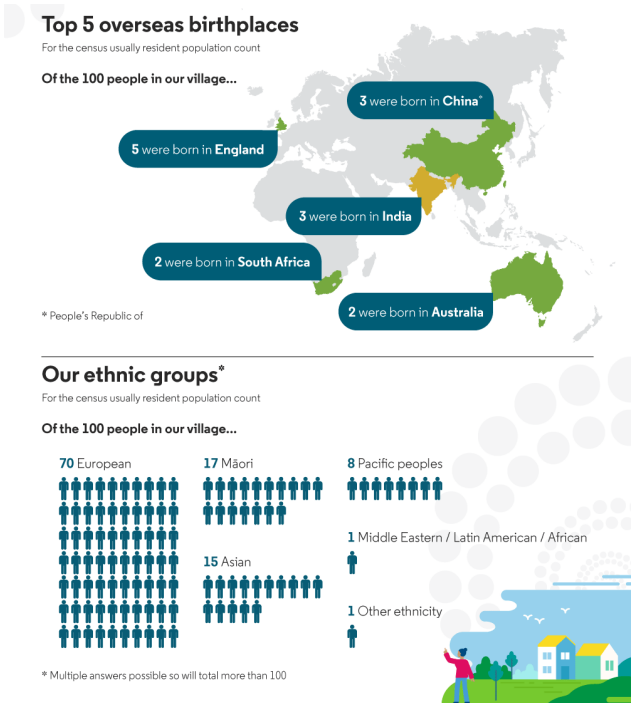
Net migration rate by selected countries, year ended June, 2002-19



Stats NZ

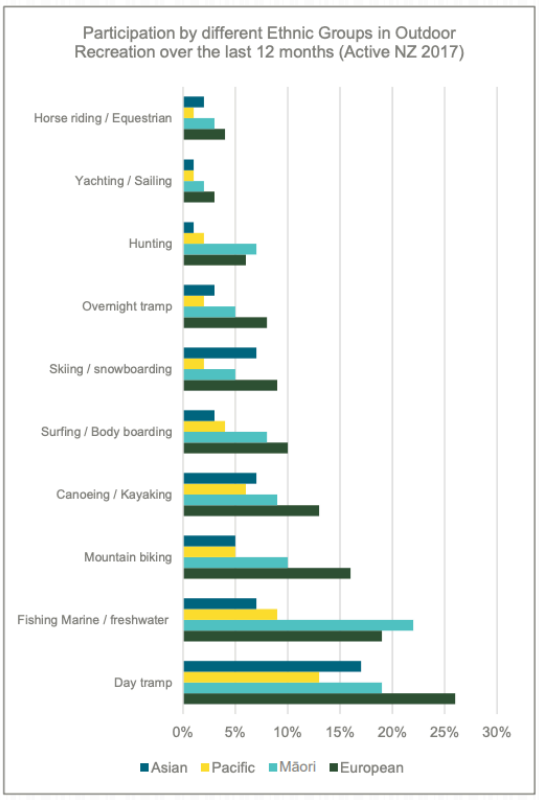
This immigration is fundamentally changing what it means to be a New Zealander. As at September 2019, 27% of New Zealanders (or nearly 1.3 million people) were born overseas (Statistics NZ 2019). This has increased from 25.2 percent back in 2013.

Statistics NZ has developed a new infographic which gives a useful illustration of how New Zealand looks today. As mentioned in the 2017 environmental scan and further confirmed in the most recent 2018 Census data, New Zealand continues to become less populated with people of European descent, and more people of Asian, Māori and Pacific origins. The proportion of New Zealanders who identified as NZ European fell from 74% in the 2013 census to 70% in 2018 (Statistics NZ 2019). **On current projections, fifty-one percent of New Zealanders will be Asian, Māori or Pasifika by 2038** (New Zealand Recreation Association 2018).



(Statistics NZ 2019)

While New Zealand is becoming more ethnically diverse, participation in the outdoors is not. In the 2017 environment scan, we highlighted that Asian and Pacific people were less likely to be physically active, particularly outdoors, than their non-Asian counterparts, including in the outdoors. This trend has not changed significantly since then. The figure below shows that, in the vast majority of outdoor recreation pursuits, NZ Europeans still tend to participate more. The couple of notable exceptions are hunting and fishing, where Māori rates of participation are higher.



(Sport NZ, 2017)

One explanation for the different outdoor participation rates is that different ethnic groups face different constraints and community-defined priorities. For example, research from the NZ Recreation Association found:

> *"Asian migrants wanting to access outdoor recreation, identified cost, time, transport and 'nobody to go with' as the constraints. They value the social opportunities of spending time with family, socialising and creating contacts."* (New Zealand Recreation Association 2018)

The meaning of participating outdoors can be very different for people from different ethnic backgrounds. For example,

> *For Māori, mountaineering can be perceived as an insult to the oldest ancestors, the mountains, and Māori people are more likely to go hunting or fishing in the outdoors – a purposeful activity. NZ Pacific Islanders may gather food and do other family-related activities, but the cost of outdoor activities, and a recent history of working in hard physical jobs may be part of the reasons that Pacific Island peoples rarely tramp/hike* (New Zealand Recreation Association 2018).

Not only do NZ Europeans participate more in the outdoors, but they also get into trouble outdoors more often. NZ Europeans are disproportionately more likely to be involved in a search or rescue (79%) and to be injured (83%) or killed (73%) while outdoors (Mountain Safety Council 2016). By contrast, people identifying as from a Pacific Island, Asian or Māori were all relatively less likely to require a SAR operation.

4. Economy update

In the 2017 environmental scan, we treated the economy and government policy settings separately. However, clearly these two things are highly inter-related, since different governments make different decisions about things like how much tax to collect, who to distribute it to, and how to regulate the economy and society.

While usually the influence is indirect, the economy has the potential to impact on both demand and supply of search and rescue services. The level of economic growth generally, unemployment rates, real wages and distribution of government benefits all impact on both how much leisure time people have available and how they choose to spend it.

On the supply side, economic growth means government is able to collect more revenue through taxes, which can then be distributed to various government agencies like those in the SAR sector, to fulfil their core functions. There is also a strong link between higher incomes and educational status, and volunteering rates. In particular, those who have higher real wages, who are more educated, and who own a house are all more likely to volunteer.

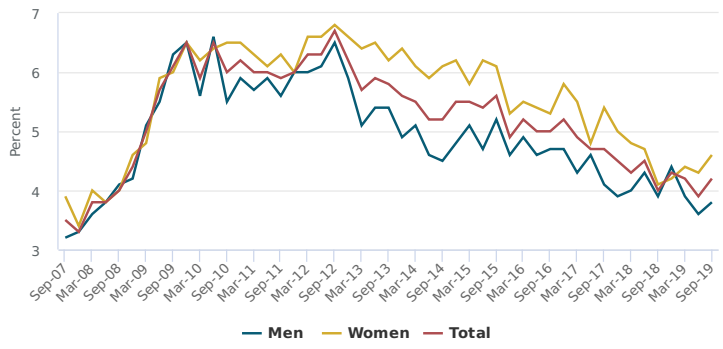
Increases in economically-productive activities like tourism can also result in increased demand for search and rescue downstream. This was demonstrated poignantly both after the recent volcanic eruption on White Island, and a major hot air ballooning accident a few years ago. Of course, disasters like these are rare, but there is plenty of demand that arises when more people go tramping, boating or taking trips to remote places in small planes.

So, has anything changed in relation to economic and social settings since the 2017 environmental scan, and if so, how might such changes impact on the SAR sector?

4.1 Overall, the economy is still growing, and unemployment declining

In the 2017 environmental scan, we noted that annual real GDP growth was projected to rise to a peak of 3.8% before slowing to 2.4% by 2021. The expected spike in GDP never happened and instead it gradually slowed to its current rate of 2.4%. That said, according to the OECD, New Zealand's employment rate has remained high relative to most OECD countries, rising from 75% of the working age population to 77% by 2019. (OECD 2019) Alongside this, the unemployment rate has dropped to 4.2%, slightly below the 4.25% that was projected at the time of the 2017 environmental scan (Statistics NZ 2019).

Unemployment rate by sex, seasonally adjusted, Sep 2007 – 2019 quarters



(Statistics NZ 2019)

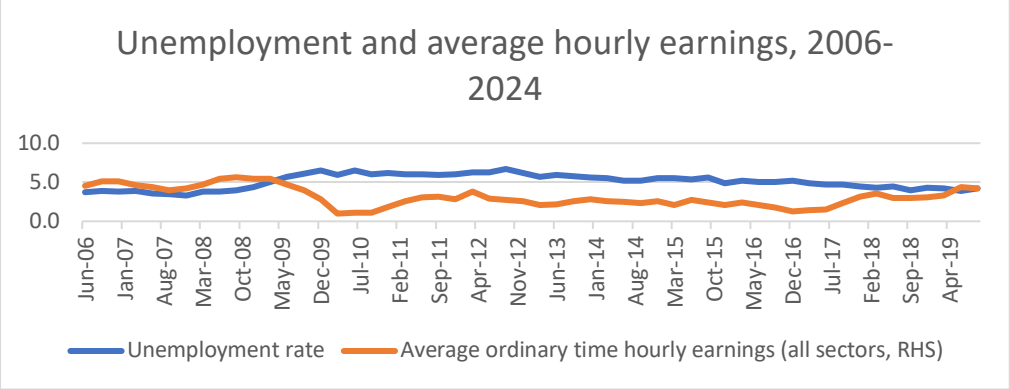
Real wages have increased since 2017

While economic growth and low unemployment are generally considered good things, there is some evidence to suggest that full time employment may displace some other civically-beneficial activity, such as volunteering.

Furthermore, higher employment rates do not necessarily translate to higher wages and disposable income. The 2017 environmental scan observed that, adjusting for inflation, real wages had shown a downward trajectory for the previous 5 years. This concern has driven a desire by some governments (including New Zealand's) to start seeing economic and social improvement in a more balanced way. This is partly why there has been a recent move in New Zealand and other countries to prioritise 'gross national wellbeing' rather than just 'gross domestic product' (Samuel 2019).

So, has there been an ongoing reduction in average real wages since the 2017 environmental scan? In short, no. Real wages are endogenous; that is, able to be affected by changes in government policy. For example, on 1 April 2018, the Government raised the minimum wage by 75 cents, to $16.50 an hour and it will continue to rise in increments to $20 an hour by 2021 (at time of writing it has already risen again to $17.70). Analysis by Statistics NZ has found that this very first increase pushed wages and salaries up "with some of the biggest increases coming from some of the lowest paid industries". For example, average hourly earnings for accommodation and food services, and retail trade increased 2.1 and 1.6 percent respectively, for the June 2019 quarter (Statistics NZ 2018).

In the graph below, you can see that, since July 2017, unemployment has continued to track downward, but average real wages have started growing again. This is good insofar as increased real wages mean the average New Zealander has more money to pay for things like participating in outdoor recreation. In short, if people have a good job and plenty of income, they are both more likely to spend money on recreation (often outdoors) and to volunteer, both of which impact on the SAR sector, but in different ways.

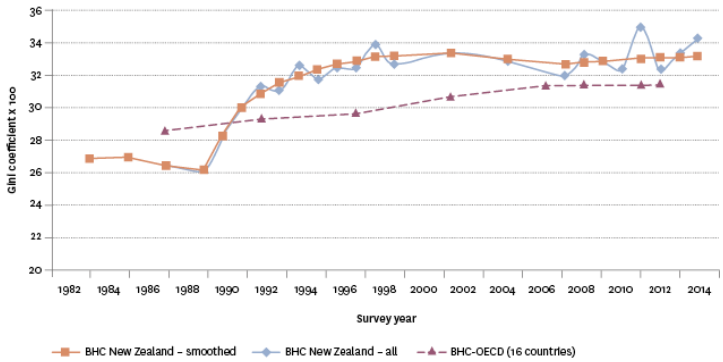


(The Treasury 2019)

NZ governments have been making inroads into inequality

Not everybody automatically benefits from economic growth. This is relevant for the search and rescue sector because rising inequality may indirectly create challenges for securing a sufficient number and diversity of volunteers. If people spend more time working to get enough income to live, they tend to have less time available for volunteering. This is particularly the case for people from economically-disadvantaged households, such as many Māori and Pacific families, who disproportionately find themselves working multiple jobs.

As measured by the gini coefficient (where a higher coefficient means more inequality), New Zealand had a consistently higher level of inequality than the OECD average between 1990 and 2014, as illustrated below.

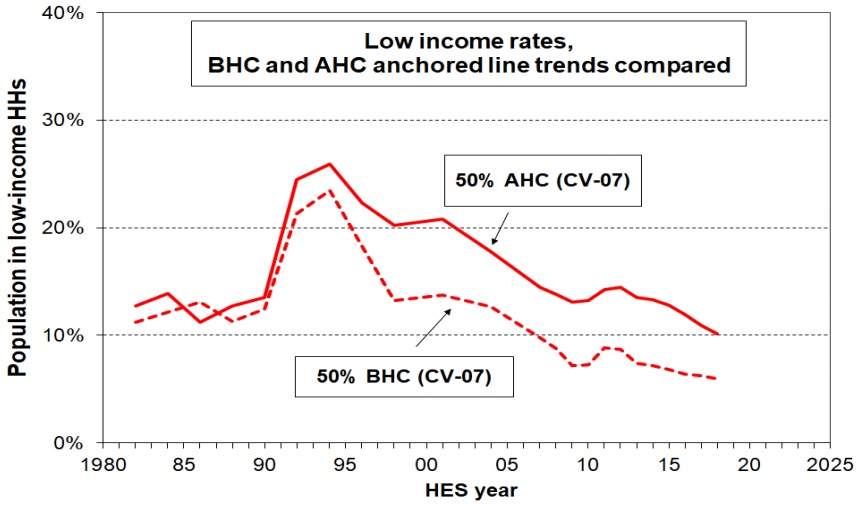


(Bryan Perry 2015)

So, what affects how equal or unequal a country is? Household income levels and rates of taxation and transfers (more often called 'benefits') to poorer families have a particularly strong impacts. For example, between the late 1980s and early 1990s, poverty rates (measured in multiple different ways) more than doubled "due to rising unemployment, falling average real wages, benefit cuts and the introduction of market rents in social housing (Ministry of Social Development 2019).

Over the last three decades, housing costs also have continued to take a much larger proportion of household income, especially for low-income households. This is demonstrated by the size of the population in low-income households being significantly higher once housing costs are taken into account (ACH = 'After Housing Costs' low income household line, whereas BHC means 'Before Housing Costs').

While challenges remain in addressing high housing costs for many New Zealanders, successive governments' efforts to reduce inequality appear to be starting to work. Poverty steadily fell through to 2007 with improving employment, a rising average wage, rising female employment, the introduction of income-related rents and the Working for Families package (Ministry of Social Development 2019).



This said, there remain indications that there are some persistent and lingering effects from the poverty and inequality that characterised New Zealand between the late 1980s and early 2000s. For example, a survey of 900 people by the Council of Trade Unions in 2019 found that "56 percent struggled to pay for basic necessities like rent, power and petrol" (Radio New Zealand 2020).

> "Low wages and high rents are a bad mix, and that's what a lot of working people are caught in the middle of." – *Council of Trade Unions* (Radio New Zealand 2020)

Those at the bottom of the income distribution typically spend a higher proportion of their incomes. This means that any reduction in inequality is likely to have a disproportionately positive impact on their ability to participate in the outdoors, and to volunteer. In short, reducing inequality is good news for more volunteering. It is also good news in terms of enabling people from more ethnically diverse backgrounds to volunteer, since a greater proportion of non-NZ Europeans suffer economic deprivation.

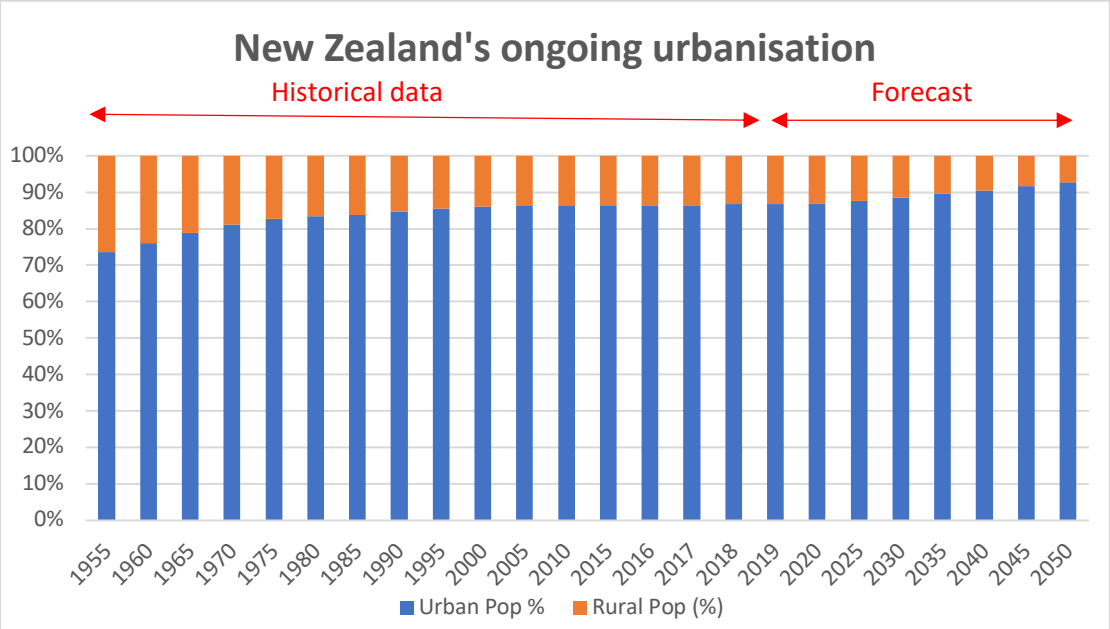
4.2 Urbanisation, due to economic realities, is still hollowing out rural NZ

In the 2017 environmental scan, we noted that the population outside Auckland was projected to be static or decline over the next 30 years. In this update, we can demonstrate that urbanisation has been a remarkably stable feature of New Zealand's population change over the past 60+ years, and is projected to continue through 2050.

Statistics New Zealand classifies 402 places as rural settlements. Of those, 146 decreased in population between 1996 and 2018; 20 remained the same; and 43 increased by less than 10 per cent. Over that period, the proportion of New Zealand's population living in major urban areas increased by 8 per cent, while the proportion living in rural settlements dropped 25 per cent (New Zealand Herald 2019).

Author and well-known economist Shamubeel Eaqub explains why urbanisation is continuing, saying:

> *"Movement towards cities is driven by access to jobs, and jobs - especially in service industries - tend to be in cities because that's where most people are."* (New Zealand Herald 2019)



(Statistics NZ)

This is not to say that the rural centres will not grow at all, but rather that the rate of their growth is projected to be up to three times slower than that of major urban areas. For example, over 2017 and 2018, all of the main urban centres continued to grow while West Coast was the only region where GDP decreased (Statistics NZ 2019). Statistics NZ also forecasts that rural centres will continue growing by an average of just 11%, compared to 37% in the main urban areas out to 2043.

Year at 30 June	2013	2018	2023	2028	2033	2038	2043	Increase
Main urban area	3,227,600	3,554,900	3,789,900	3,975,300	4,142,800	4,289,000	4,420,600	37%
Secondary urban area	249,000	266,300	275,300	282,700	289,200	294,200	298,300	20%
Minor urban area	351,700	380,800	393,700	402,600	408,900	412,400	414,100	18%
Rural Centre	75,400	79,500	81,400	82,800	83,500	83,800	83,800	11%
Other	538,500	583,100	617,600	646,300	670,600	690,500	706,400	31%
	4,442,200	4,864,600	5,157,900	5,389,700	5,595,000	5,769,900	5,923,200	

(Statistics NZ 2019)

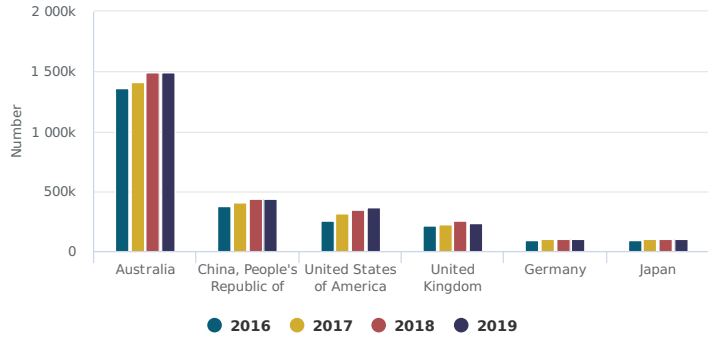
Economic growth and jobs tend to work hand in hand. Consequently, over the next 30 years, economists expect a scenario of: "many of these small communities essentially not having enough people to be viable" (New Zealand Herald 2019). This is likely to drive ongoing urbanisation, which may well have significant impacts for the search and rescue sector, particularly in terms of recruiting and retaining volunteers in small rural communities.

4.3 Tourism, particularly outdoors, remains lucrative for New Zealand

Tourism has continued to contribute strongly to the New Zealand economy since 2017. The number of international visitors increased 1.3 percent (47,939) in the year ended March 2019, following an increase of 7.8 percent in the previous year (Statistics NZ 2019). 3.9 million tourists arrived in the year to ended September 2019, up 95,319 from the year ended September 2018, with visitors from Australia hitting a record high of 1.5 million (Trading Economics 2019).

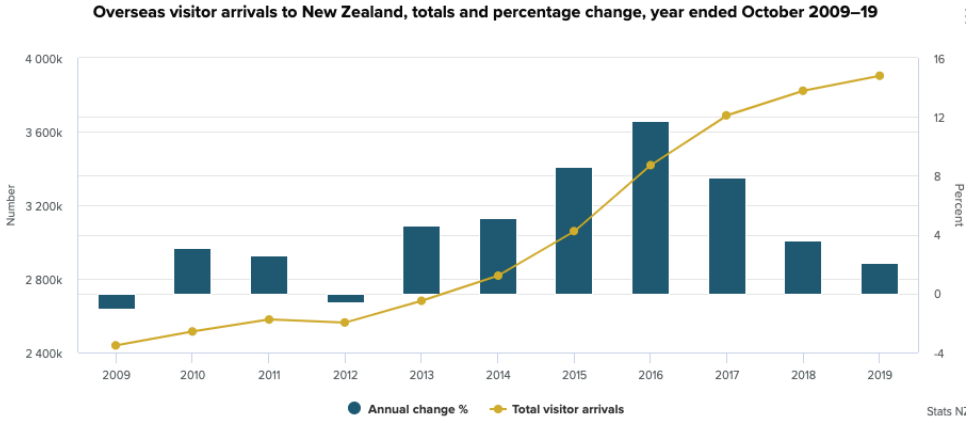
Tourism expenditure contributed $12.9 billion to the New Zealand economy in 2016. By March 2019 this had reached $16.2 billion (Statistics NZ 2019). The following graph gives an indication of the main source of visitors to New Zealand.

Overseas visitor arrivals by selected country of residence, year end March 2016-2019



(Statistics NZ 2019)

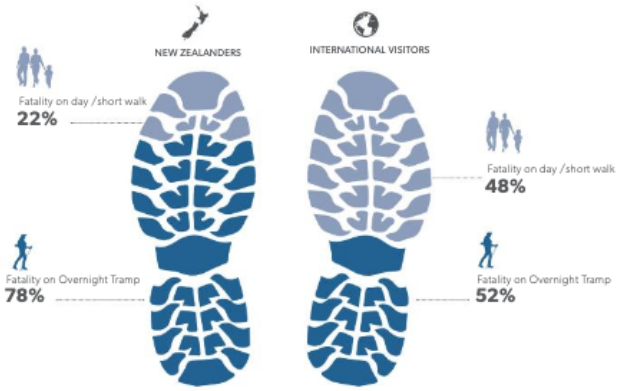
While the total *number* of visitors to New Zealand has continued to increase, as illustrated in the graph below, the growth rate has begun to taper off over the past 3 years. This has been driven by a drop in visitors from Asia, and particularly from China.



(Statistics NZ 2019)

Walking and hiking have been popular draw cards for international visitors for a long time. For example, 73% of holiday visitors participated in walking or hiking in the last 3 years – an average of 1.1 million people per year. (Tourism NZ 2019) Another 1.53 million adults took part in recreational boating over the 2018-2019 summer (Maritime New Zealand 2019).

The way international visitors participate in the outdoors tends to be quite different from that of New Zealanders. Most international visitors (75%) participate in short walks of 3 hours or less. Only 3% of them participate in an overnight trek or tramp (Tourism NZ 2019). Whereas many more New Zealanders are killed in overnight tramps, for international visitors the split between short walks and overnight tramps is much more even. This may suggest that kiwis are often over-confident when it comes more ambitious tramping expeditions, whereas international visitors are perhaps less well-prepared for short walks (Mountain Safety Council 2018).



(Mountain Safety Council, 2018)

4.4 The marine economy is also still growing

In the 2017 environmental scan, we pointed out that global merchandise trade has increased massively over the past 20 years. In the year ended March 2017, the marine economy contributed $3.8 billion to New Zealand's economy. Over the same period, shipping contributed around $1.4 billion (Statistics NZ 2019). Fishing revenue is also estimated to have contributed around 2% of New Zealand's annual GDP, or approximately 1.8 billion in the year to October 2019.

In short, the marine economy is big business and still growing. In the year ended June 2019, there were 322,000 cruise ship passengers, up 24 percent from 2018 (Statistics NZ 2019). More than two thirds of this increase came from Australian passenger numbers and three quarters of them were aged 50 or over. Over this time, cruise ship expenditure in New Zealand totalled $569.8 million, an increase of 28.2 percent since the previous year (Statistics NZ 2019).

As predicted in the last environmental scan, we are now starting to see unmanned seafaring vessels in our seas as well. An unmanned surface marine vessel, called a Saildrone, has become the first to circumnavigate ca (sailing 22,000 kilometers) over 2018 (The Maritime Executive 2019). Furthermore, in December 2017, China unveiled what it claims to be the world's fastest unmanned surface sea vessel with a top speed of over 50 knots or 92.6 km/h (BelTA - People's Daily 2017).

The continued increase in sea-based trade, fishing and recreation (e.g. more people on cruise ships), along with more unmanned vessels, means we should continue to expect more marine traffic in the years ahead. This does not necessarily translate to more people needing search and rescue (demand is reasonably stable at present). However, it does suggest the task of keeping people safe in more congested seas will become increasingly complex over time.

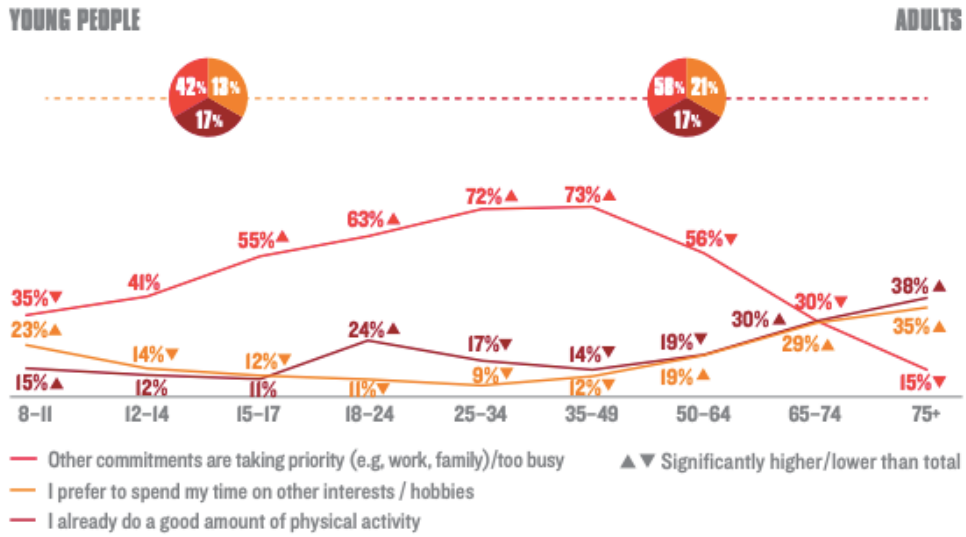
5. Social trends update

In the 2017 environmental scan, we noted that the top five activities New Zealanders spent most of their time on had stayed stable since 1998/1999. Those activities were sleeping, paid work, watching television, eating and drinking, and socialising with others. The Statistics NZ research underpinning these results has not been updated since that time. However, we can glean further insights on by looking at recent research on volunteering and time use.

5.1 New Zealanders feel busier than in the past

In its research on the search and rescue sector, Volunteer NZ noted that around 500 respondents submitted comments, many of which highlighted the theme that they felt time poor. Do we actually have less time available to us than previous generations? Of course not: we all have exactly the same number of hours available in a day and arguably because we live longer lives, we actually have more time.

When we say we are busy or time poor, what we are really saying is that we are trying to juggle many competing priorities in the same amount of time. There is a hint that New Zealanders are feeling more pressure to juggle various priorities in a day, including meeting the expectations of our workplaces, communities, friends and family. In particular, younger people appear to feel particularly pulled in different directions. For example, recent research by Sport NZ suggested that young people are much more likely to see 'time' or 'other commitments' as a barrier to participating in active recreation, relative to adults.



(Sport NZ 2016)

Volunteering NZ has also interviewed a wide range of people about their perceptions of being time-poor and found that there are likely to be quite different pressures on different demographics. They comment that:

> *"Older New Zealanders are retiring later in life, which reduces the length of time they could engage in volunteering following their paid working career. New Zealanders are having children later in life which reduces the amount of time middle-aged adults have available for volunteering. Young people are fully engaged in the*

workforce and leading busy lives often focusing on paid work rather than making voluntary contributions." (Volunteering NZ 2017)

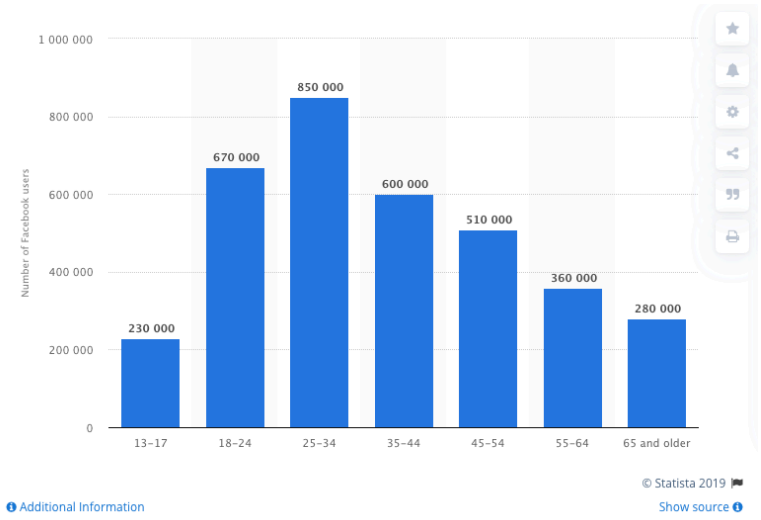
Volunteering NZ also found a mix of sentiments around people being genuinely time-poor due to work and family life pressures and people who simply *perceived* they were too busy to volunteer (i.e. more a question of relative priorities).

5.2 We're spending more time on the couch

One reason we seem to struggling to get enough done in a day is that the range of entertainment options available has expanded significantly. So has the quality and ease of access to entertainment. For example, a 2016 study found that 3.2 million New Zealanders watched more than 23 hours of television a week, excluding time spent on devices. Furthermore, New Zealanders were found to spend a further 15 hours a week using the internet, with this figure predicted to rise due to the rising prominence of internet-based television (Burrows 2016).

"I think it's getting more difficult to attract volunteers because people are more time poor and/or there are so many distractions or entertainments that people prefer in what little spare time they have." (Volunteering NZ 2017)

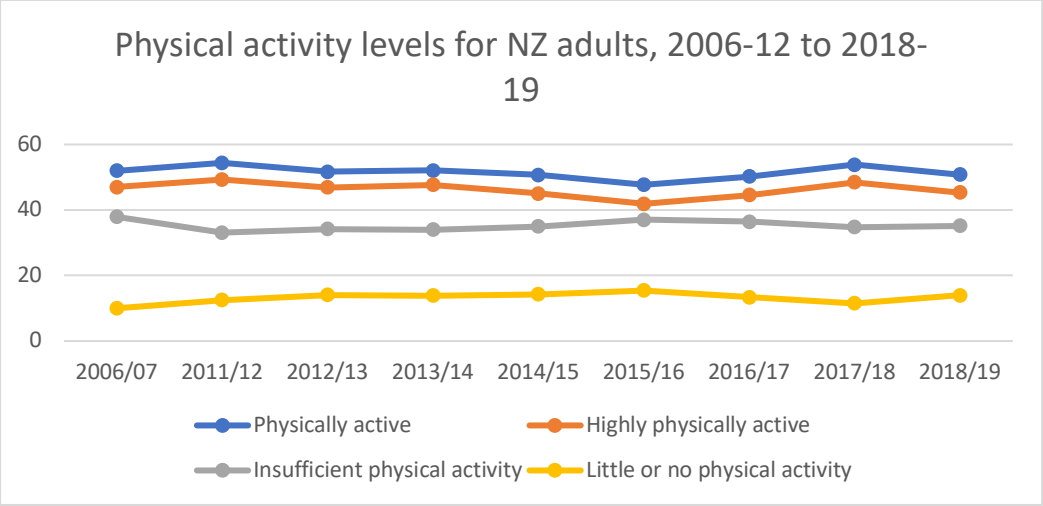
Currently three quarters of the New Zealand population are active Facebook users, second only to YouTube, which had an additional one percent using it actively. Furthermore, according to the NZ E-sports federation, in New Zealand 67% of the population play video games and 48% of those players are now female (New Zealand eSports Federation 2019).



(Statista 2019)

In view of an ever-expanding array of non-physical entertainment options available, it is perhaps not surprising that the trend towards kiwis being sedentary has continued unabated since the 2017 environmental scan. As demonstrated in the graph below, over the last 3 years, the number of adults either 'physically active' or 'highly physically active' originally increased marginally, then fell again.

In other words, there has been no sustained increase in physical activity levels (Ministry of Health 2019). Around 1 in 3 adults (aged 15 and over) were again found to be obese in the latest New Zealand Health Survey (Ministry of Health 2019). The prevalence of obesity for children has also risen from 11% in 2016/17 to 11.3% in 2018/19. Obesity also remains higher for Pacific Islanders (15.5%) and Māori (9.9%) (Ministry of Health 2019).



(Statistics NZ)

5.3 We are beginning to understand that safety when outdoors matters

Another social trend relevant to the SAR sector relates to attitudes regarding participation in the outdoors. There is plenty of evidence that links attitudes regarding how to be safe in the outdoors and the number of injuries, fatalities, and demand for search and rescue. So, how have attitudes to outdoor participation changed since the 2017 environmental scan?

Water safety attitudes

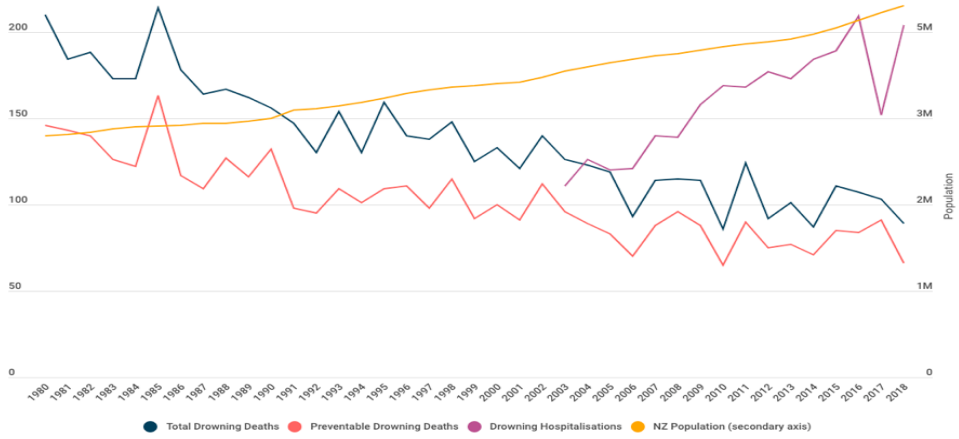
In 2018, over 1,515,500 people took part in recreational boating (Maritime NZ 2019). Over the past few years, the recreational boating death toll has dropped from 32 in 2014/15 to 15 in 2018/19 (Maritime NZ 2019). This is a nearly 53 percent reduction in deaths. So, annual variation notwithstanding[2] (e.g. due to colder or hotter summers), things seem to be improving.

There are also some positive signs that the efforts to ensure people prepare before heading outdoors, carrying the appropriate safety equipment, are beginning to pay off. For example, as at 31 May 2019, the number of New Zealanders carrying a locator beacon when heading into the wilderness had reached an all-time high, with 114,000 in use nationwide, 87,600 of which were registered with the Rescue Coordination Centre NZ (Maritime NZ 2019). This said, further improvements remain possible. For example, Maritime NZ notes that the majority of the 15 fatalities over 2018/19 might have been avoided if lifejackets had been worn, two forms of waterproof communication were taken to call for help, weather conditions were properly checked before going out, and alcohol consumption was avoided.

[2] 19 - 20 boaties, on average, die each year (based on last five years); 19 in 2017, down to 4 in 2018 and 18 so far in 2019 (Maritime NZ 2019)

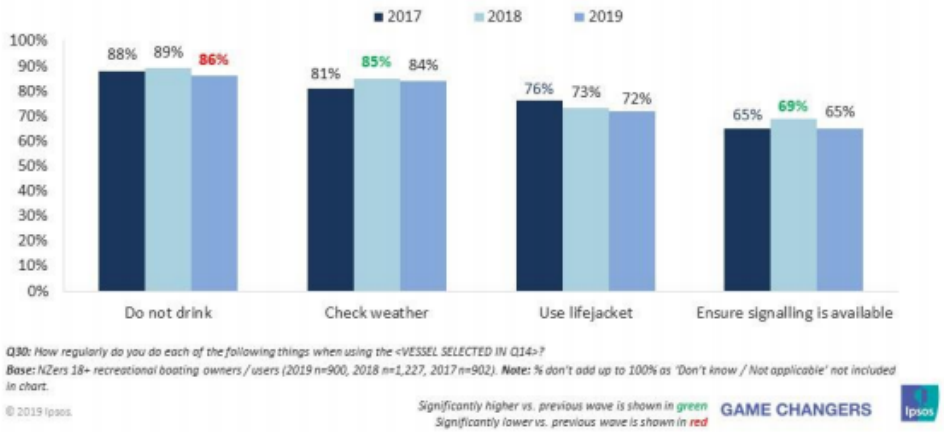
Of course, fatalities in the water do not just happen when people are participating in recreational boating. New Zealand has one of the highest drowning rates in the OECD, most of which relate to swimming. In 2017 there were 92 preventable deaths involving water (Water Safety NZ 2018). However, as the graph below highlights, the number of fatal drownings is reducing over time overall, though there is still work to do on reducing near-drowning hospitalisations.

1980 – 2018 View of Drownings



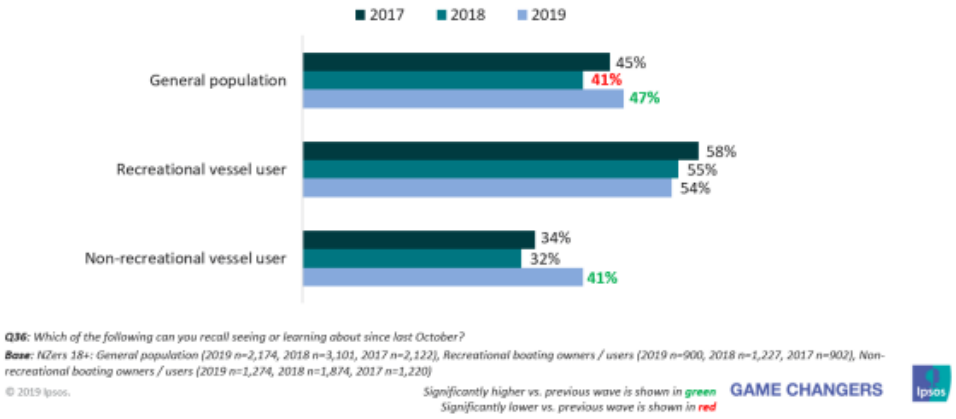
(Water Safety NZ 2018)

So, does this downward trend in fatalities for both boaties and swimmers mean the SAR sector has unequivocally succeeded in its public messaging? Unfortunately, we cannot conclude this. It appears that for many boaties, the safety messages are still not getting through as illustrated below.



While there was a decrease in the proportion of non-drinking boaties in 2019 (86% versus 89% in 2018), there was also a decline in boaties who make sure there are at least two ways that they are able to call or signal for help (65% in 2019 versus 69% in 2018). Weather-checking and lifejacket use have remained stable (Maritime NZ 2019). There has also been little change in the number of boaties who have completed formal boating education courses: just 1 in 5 (Maritime NZ 2019). Most worryingly, there has been a significant decrease in the number of boaties who say they ensure there are enough lifejackets for all their passengers 'every time' (Maritime NZ 2019).

It also appears that while the safety messaging has successfully raised awareness among the general population and non-recreational vessel users, it has not done the same for those actually taking part in recreational boating. It appears the messaging is not yet getting through to recreational vessel users as effectively as it could.



Land safety attitudes

In the 2017 environmental scan, we also noted that there was considerable room to improve preparedness when people ventured into the outdoors on land. So, have peoples' attitudes towards safety on land improved or worsened since then? It is difficult to answer this question definitively because there does not appear to have been any update or repeat of the 2017 attitudes survey to date.

However, we can gather some data from recent surveys. For example, during 2018, 134 people who were participating in land activities across New Zealand were surveyed across nine sites. The research found that, despite efforts to raise awareness:

- Nearly half of day walkers did not leave intentions about their trip;
- Only 13% of respondents were carrying distress beacons; and
- There was little difference in general equipment carried between those who were in poor weather compared to those in fair weather.

It is also possible to extract a couple of useful insights from other trend data. For example, the vast majority of fatalities in 2017 occurred on 'advanced' or 'expert' walking tracks, or 'off track'. Furthermore, a disproportionate number (44%) of fatalities happened when people were either solo tramping or had been separated from their group. Men were found to be more than twice as likely to be killed when tramping than women. Perhaps most tellingly, three quarters of fatalities were caused by either falling or drowning, with hypothermia being the next biggest cause (Mountain Safety Council 2018).

What can we conclude from all of this data? Perhaps that significant further reductions in fatalities could be achieved if those involved made better assessments of how dangerous the environment was and their own relative capabilities. This might indicate the need for more targeted social marketing campaigns to raise awareness that a 'she'll be right' attitude is likely to significantly increase the odds of dying while outdoors. Of course, this is already the tenor of many existing campaigns by various SAR agencies, so perhaps this simply confirms that existing awareness campaigns and enforcement efforts are on the right track.

6. Technology update

What can we say about the impact that changing technology may be having on the ability of the SAR sector to fulfil its role? Basically, it appears that improved technology has enabled, and is continuing to enable, a significantly improved search and rescue response.

For example, one review by Dave Greenberg (veteran rescue helicopter pilot and outdoor safety expert) in October 2019 explored how New Zealand's search and rescue capability has changed over the past 15 years. He performed this review by examining how the technology available now would have improved the search and rescue response back in 1994 drawing on a specific case study. One of the review's more memorable conclusions was as follows:

> *"The technology available in 2019 has vastly improved some SAR capabilities. GPS capability, EPIRBs, vessel and aircraft tracking, satellite phones and electronic searching aids have all been developed or improved."* (Greenberg, Has New Zealand Search and Rescue improved since the 1994, Pacific Storm event, in the South Pacific? 2019)

Of course, improvements in technology do not just relate to that used by the SAR sector itself. The ability to speed up and improve the success rate of search and rescue operations also lies in the hands of the public and depends on the equipment they have with them. In short, promoting appropriate adoption of safety equipment among the general population is just as important as the SAR sector exploiting the latest technology for finding people. It may well be that promoting behaviour change among the public is actually a bigger challenge since the technology available tends to improve over time anyway.

6.1 "Always on" technology may still be giving a false sense of security

In the 2017 scan, we noted that New Zealanders are more digitally-connected than ever before. This trend has continued, with there now being 6.53 million mobile subscriptions for a population of just 4.77 million people (Hootsuite 2019). Mobile phone usage overall has increased to 92% as predicted.

However, a significant ongoing challenge remains ensuring that people don't assume that simply having a cell phone will necessarily keep them safe in the outdoors. Since the 2017 environment scan, the information and guidance available to the public about what to carry to be locatable when outdoors appears to have become much clearer. A recent example was the national advertising campaign promoting VHF radio use, which Maritime NZ ran from December 2018 to February 2019. The campaign clearly encouraged boaties to carry and use a waterproof VHF marine radio, as the best means of calling for help in coastal areas (Maritime NZ 2019).

It may be that safety awareness campaigns are not going to be sufficient to ensure the public takes the right precautions. The struggle to change the public's behaviour is highlighted by the recent decline in the proportion of people carrying two water-proof ways to signal for help, despite Maritime NZ's recent campaign and the research mentioned above which showed that relatively few trampers carried a beacon and weather-appropriate kit (despite that fact that a lot of clear information on what is needed is now available).

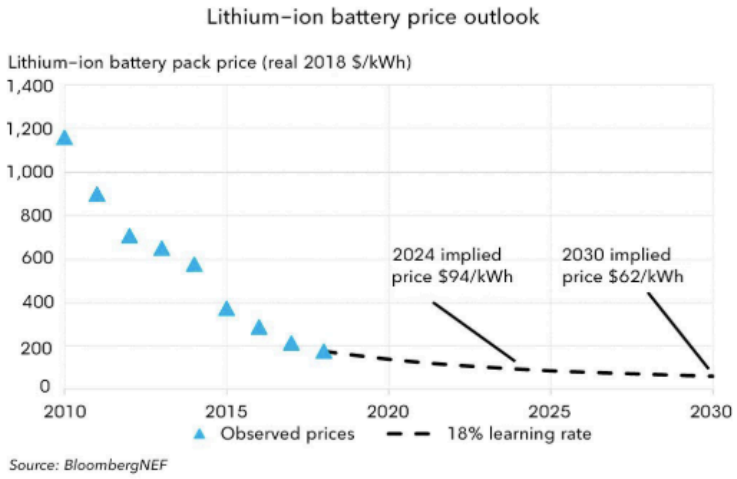
Happily, the SAR sector appears to already be on top of this issue. For example, the 'Benchmarking Preventative Activities ("BePA") report takes a holistic look across preventative practices to improve public safety while outdoors across the whole sector. It might also be useful to consider, alongside the "BePA" report something like a "BePA impact" report, that seeks to evaluate, or collate and report on evaluations, of how effective different kinds of prevention-oriented interventions are over time.

Other tools, like legislative change and enforcement action, can be useful parts of a regulator's toolkit as well. For example, a recent change in the domestic commercial sector since the last environmental scan saw float-free Emergency Position Indicating Radio Beacons (EPIRBs) become compulsory on commercial fishing vessels at the beginning of 2019. The new rule was based on data and incident reporting that had "clearly showed a number of deaths could be attributed to inshore fishing boats sinking with manual EPIRBs on board that were unable to be deployed." This change has already been identified as resulting in one successful rescue of crew (Maritime NZ 2019).

A further example was a collaboration over 2 years between Maritime NZ and 19 Otago harbourmasters in which harbourmaster and maritime officers worked together on random days throughout the summer to check boatie behaviour. This included issuing infringement notices for boaties who were found to be speeding or who didn't carry lifejackets (Maritime NZ 2019).

6.2 *Implications of the explosion of electric-assisted transport options*

As of early 2020, readers will have noticed a significant increase in the number of mobility-assisted vehicles in usage in recent years. These include electric bikes (e-bikes), electric scooters, mobility scooters, canoes with inboard electric propulsion, and even electric water bikes for the very wealthy (see, for example, https://nz.manta5.com/). Part of the reason these technologies taking off is that the costs of 'normal' bikes and scooters has stayed reasonably stable over recent years, while the cost of electrical components like batteries has fallen significantly. For example, many e-bikes use lithium-ion batteries, the price of which has plummeted since 2010 and continues to fall (Goldie-Scot 2019).



The increased use of small, electrically-powered, vehicles has significant potential implications in terms of both the demand for, and supply of, search and rescue. On the demand side, the potential implications were well summed up by one member of the NZSAR Council, who commented that:

> *"All of these have the ability to take people further and faster into the wilderness, and to facilitate the same for older, less fit or less mobile people. The implications are greater search areas and in many cases a need for much better (and different) preparation. It doesn't take much imagination to visualise SAR looking for a septuagenarian who has had a blood sugar crisis after getting a flat battery on the e-bike they rode up a back-country track on a whim – and bad weather is setting in."*

Note that, in the example above, two trends are converging to create a novel and potentially dangerous set of circumstances. The first is the tendency for people (particularly New Zealanders) to be over-confident and under-prepared when heading outdoors. The second is the ability to get further, more quickly, which can increase the necessary radius of search and rescue operations, making them significantly more challenging in the process.

However, there is also the potential for NZSAR to 'fight fire with fire' when it comes to electronically-powered vehicles. For example, Central Okanagan Search and Rescue (COSAR), in the Canadian province of British Columbia, has used e-bikes in both urban and rural rescue operations. They now have a total of 11 e-bikes that can be used in the event of an emergency. Brian Stainsby of COSAR commented that:

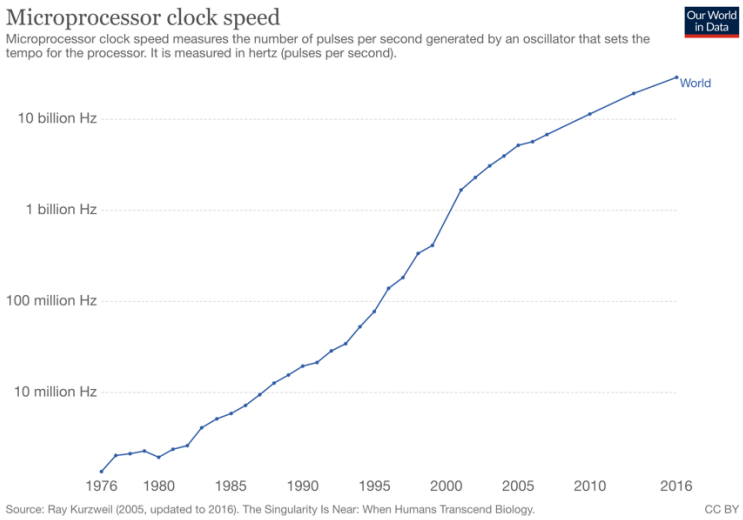
> *"It's usually very steep or somewhat rugged and areas that would normally take us a lot longer and likely tire out our members as they get to their subjects that we would locate… most definitely it can certainly make a difference between somebody surviving and not surviving, or having a worse injury versus recovery much quicker because we get to them quicker."* (Lam 2018)

E-bikes are not new in New Zealand Search and Rescue either. In January 2019, e-bike manufacturer Frank Witowski, donated the first e-bike to Search and Rescue in Nelson, receiving very positive reviews from LandSAR staff about the ability to cover significantly greater distance more quickly. In particular, they noted that the bike had enabled him to cover a 50km loop in 3 hours and 45 minutes (Anderson 2019).

Of course, reliance on electronics has both strengths and weaknesses. For example, given that much NZ bush terrain is very steep, some areas of the wilderness may not be suitable for bikes at all, let alone e-bikes. Similarly, electric water bikes may struggle in rough waters (although arguably so would swimmers!) Furthermore, one of the comments made by LandSAR in trialling the e-bike, was that the battery was very low by the end of the exercise. This makes having spare batteries critical if using electronic devices as part of search and rescue operations. It also suggests that systems that can easily switch between electric and manual mode are likely to be more suitable than purely electric ones.

6.3 *Accelerating computing power continues, unlocking new future capabilities*

In the 2017 scan, we noted that the pace of technological change is accelerating rapidly as it gets to the 'elbow' of an exponential growth curve. We also observed that this remarkable progress had arisen from the simple fact that computing power had doubled roughly every 18 months for the previous 40 years (an observation known as 'Moore's law').



In recent years, some commentators have expressed concern that the accelerating pace of technological improvement could not last, given that the size of computer chips could not shrink indefinitely. Yet, while transistors cannot keep shrinking indefinitely, we are still seeing major advances in the speed and capability of computers. How is this possible?

The reason for the continued rapid pace of technological evolution is that other technologies are increasingly being used to squeeze more performance out of the same basic materials. Further speed and performance improvements are increasingly now being achieved, for example, through:

- better algorithms and software;
- more specialised chips – e.g. new and dedicated chips are being designed for neural networks, computer vision for self-driving cars, voice recognition and internet of things devices;
- greater use of cloud computing to enable networked processing;
- new materials and configurations; and
- quantum computing.

Of these, quantum computing was originally considered the most unlikely way to speed up computers. However, in September 2019, Google announced that it had successfully performed the first complex computation only possible on a quantum computer. This signalled a major step forward in computing power. Quantum computers can perform calculations hundreds of thousands of times faster than classical computers. While quantum computers are not about to become widely available any time soon, their creation means that certain previously unsolvable statistical problems may now be able to be cracked.

Quantum computers have direct relevance to search and rescue insofar as they offer the potential to help solve the so-called 'travelling salesperson problem'. This involves the

trying to find the most optimal route to multiple locations most quickly. Consider, for example, a situation whereby Coastguard, LandSAR and/or Surf Life Savers are all required in multiple locations simultaneously. These so-called Mass Rescue Operations (MROs) are (currently) "low-probability, high consequence events that require a response to provide immediate assistance to a large number of people in distress (Greenberg, Testing New Zealand's Readiness for a Mass Rescue Operation 2018).

What is the best way in these situations to deploy resources so as to save as many people, as quickly as possible? It turns out that the possible options for how to coordinate activities quickly become impossibly large for classical computers to find the best route. Quantum computers, by contrast, will be able to definitively answer statistically-challenging questions like how best to deploy multiple resources to multiple locations in quick succession very soon.

More generally, improved ability to process data and make sense of it to inform better decision-making is important for all businesses. However, it is particularly relevant for the SAR sector because agencies need to sort through vast amounts of data to rapidly pinpoint people in distress (for example, a stricken boat in the middle of the Pacific Ocean). The ever-improving ability of computers to see and process large volumes of data, along with better satellite and GPS capabilities, will keep enabling improved performance in future.

More immediately, the SAR sector has recently significantly improved its ability to understand those in need of search and rescue, and how to better serve them, by introducing SARdonyx. This new integrated information system replaces existing single-agency data stores with a multiple-agency solution which brings together information on all SAR operations. This will no doubt improve both the ability to take a strategic perspective across all partner agencies and enhance cooperation and decision-making across the whole sector. Virtually every business on the planet is now struggling to make sense of the sheer quantity of raw data available. Data itself is not much help unless it is turned into insights that can improve decision-making. However, given the rapid date of improvement in computing power, looking ahead there are a couple of further enhancements that may be possible, starting from the new capability offered by SARdonyx. In particular, there may be opportunities to partner with organisations like Google or IBM, both of whom are heavily invested in Artificial Intelligence (AI) technologies.

In recent years there has been an explosion of interest and investment in one particularly useful element of AI, called machine learning. Machine learning happens when a machine, over a period of time, gets better at a task it wasn't explicitly told how to do. It is now possible to program computers to learn through trial and error, the same way a human does, but with the added advantage of being able to process vast quantities of data (e.g. spotting anomalies in large volumes of satellite images).

If you can measure it, you can improve it. But computers that learn can do both much faster.

There have been plenty of recent demonstrations of how powerful machine learning is enabling computers to eclipse human capabilities in certain situations. For example, machine learning computers have already been able to beat world chess champion Garry Kasparov, 'Go' strategy champion, Lee Sedol, and the best players of 'Jeopardy' in the world.

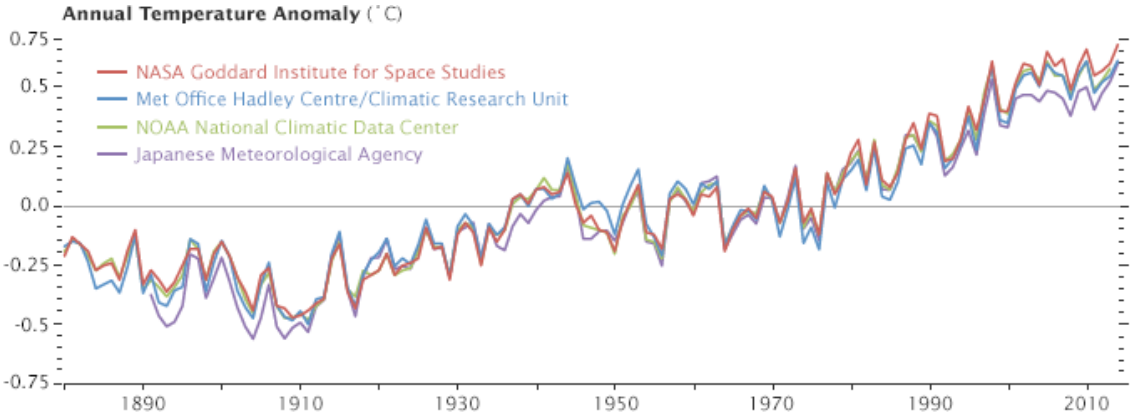
In summary, using the information collected and integrated in SARdonyx, as well as the wealth of case studies and rescue footage data collected by SAR agencies, it may be possible to bring a machine-learning approach to search and rescue. Such an approach could help identify new and improved ways of both preventing harm and conducting search and rescue operations most efficiently and effectively in future.

7. Environment / climate update

The 2017 environmental scan highlighted that global warming was likely to be felt strongly across the Pacific region, particularly due to the many low-lying coral islands located at sea level. We noted that rising oceans, frequent tropical cyclones, flash floods and droughts were likely to have a dramatic impact on the Pacific Islands and New Zealand. This is exactly what we've seen come to pass so far, though if anything the pace of change appears to be even faster and impactful than anticipated. Why might climate change be actually accelerating though?

7.1 Climate change is accelerating

The average global temperature on earth has increased by about 0.8 degrees Celsius since 1990. Two-thirds of the warming has occurred since 1975, at a rate of roughly 0.15-0.20 degrees per decade. While this might seem like a small amount, it is actually significant because it represents an average over the entire surface of the planet. It takes a huge amount of heat to warm all the oceans, atmosphere and land by that much. In the past, a one- to two-degree drop was all it took to plunge the earth into the Little Ice Age. Evident in the graph below is that more extreme annual temperature anomalies are becoming far more common.



The impacts of global warming on the weather so far are already well documented, fuelling "sea level rises, heatwaves, storms and the decline of vulnerable ecosystems such as coral reefs." (Milman 2018) Most recently, scientists linked devastating hurricanes in the US, record droughts in Cape Town, forest fires in the Arctic (Watts, Jonathan; Taylor, Matthew 2018) and so-called 'mega-blazes' in Australia all to the current effects of climate change. The Australian bushfires have claimed many lives, burnt millions of acres of farmland and bush and destroyed 400 homes (Kelly 2020).

Furthermore, the author of a key UN climate report says that the world is 'nowhere near on track' to avoiding global warming beyond the 1.5C pre-industrial period target. This is perhaps not surprising as the US President Donald Trump has announced that the USA is pulling out of the Paris climate accord, and the Australian Prime Minister, Scott Morrison says there is no money for "global climate conferences and all that nonsense." (Watts, Jonathan; Taylor, Matthew 2018)

The impacts of climate change are already being felt globally, but they will also have significant and growing implications for New Zealand. One forecast of what to expect went as follows:

> *Long, hot summers will be more common. It will likely rain more on the West Coast and less in most of the rest of the country, and, perhaps unsurprisingly, drought conditions will increase. Meanwhile, the sea will rise by about 20 to 30cm, while extreme winds are likely to increase in eastern regions, but humidity is set to reduce everywhere except the West Coast.* (Radio NZ 2019)

There are already many indications that New Zealand is already beginning to experience the effects of global warming. For example, many parts of the country experienced their warmest year on record in 2019. These included:

- Chatham Islands – 1.7 degrees above average (records began 1878);
- Blenheim – 1.2 degrees above average (records began 1932);
- Dunedin – 1.1 degrees above average (records began 1867);
- Rotorua – 1.1 degrees above average (records began 1886); and
- Invercargill – 1.0 degree above average (records began 1911) (Zaki 2020).

There is now a scientific consensus that climate change, no matter what happens now, is likely to lead to more extreme weather events, coastal and river flooding, and large-scale singular events such as ice sheet collapses. In New Zealand, the Ministry for the Environment says extreme coastal water levels, currently expected to be reached or exceeded once every 100 years, will, by 2050-2070, occur on average at least once a year (Blundell 2018).

The increased probability of major, as well as more frequent, disasters is likely to drive increased demand for New Zealand's search and rescue services. Climate change is changing the patterns of hazards facing the whole Pacific region. These changes in weather patterns undermine local knowledge – which is normally one of the most powerful assets in predicting and managing impacts for organisations and sectors like SAR. The uptick in disasters is also likely to lead to a much higher probability and frequency of need for Mass Rescue Operations (MROs) in future.

To be able to plan and prepare for the effects of climate change, SAR agencies need to plan and prepare for new disaster patterns, intensities and probabilities and find novel ways to ensure help is available when needed across the entirety of the NZ Search and Rescue region. Given the massive size of this region, this is no small task. In particular, the challenge is likely to require more modelling, consideration and adaptative organisational planning by all search and rescue agencies than ever before. As one report on climate change put it starkly:

> *"Disasters are not exceptional any more: They are the norm. We, and the governments that serve us, better start treating them that way."* (Older 2019)

8. Close up on volunteering

For the purposes of this environmental scan, a volunteer is someone who donates their time without coercion, for no monetary payment with the aim of benefitting unknown others and themselves (Hall and Innes 2004). Volunteers remain the lifeblood of the New Zealand search and rescue sector. Over 12,600 people are involved in search and rescue; and more than 95% are volunteers (New Zealand Search and Rescue 2018).

So, what are the potential implications for volunteering of the changes described in this updated environmental scan?

8.1 Demographic changes and volunteering

The section on demography highlighted a few key trends, all of which are likely to impact on volunteering. In particular, it is clear that the population is continuing to age and becoming more ethnically diverse and more female (since females tend to outlive males). It is also clear that while people participate in the outdoors all across the country, the population is becoming more and more urban. But what do these changes mean for the future of volunteering in the search and rescue sector?

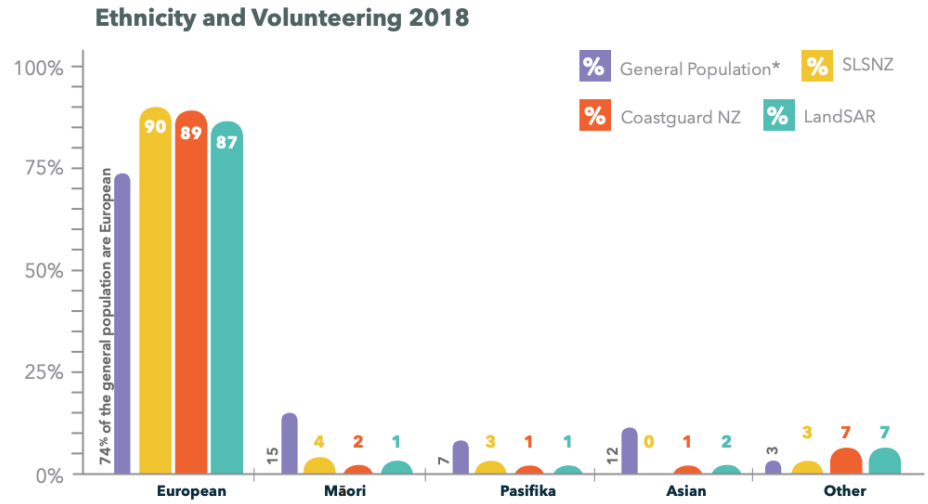
8.2 The SAR sector still relies heavily on white, middle-aged men as volunteers

In the last environmental scan, we observed that the SAR sector as a whole did not reflect the diversity of New Zealand. As at 2019, 76% of the SAR volunteer population was still male and aged over 40 (Volunteering New Zealand 2019). As the manager of the NZSAR Secretariat, Duncan Ferner, has observed:

> *"Our volunteering demographic (mostly men aged 40+) does not match the demographic of the increasingly diverse communities being sourced for volunteers."* (New Zealand Search and Rescue 2019)

As identified in the 2017 scan, the main exception to this is still Surf Lifesaving NZ, which has nearly equal numbers of male and female members, and 60% of whom are 19 years old or younger (Surf Lifesaving NZ 2019).

So, has the sector become any more 'reflective of NZ society' since 2017? In short, no. A recent report has highlighted that there remains a mismatch between those who currently volunteer in the SAR sector and the diverse face of New Zealand (Volunteering New Zealand 2019).



(Volunteering New Zealand 2019)

Quite apart from embracing ethnic diversity, even encouraging more women to volunteer remains a real challenge for the sector. For example, one recent report suggested that there has only been a 4% increase in female volunteers between 2010 and 2018 (Volunteering New Zealand 2019).

8.3 In reality, NZ is not about to run out of white, middle-aged men

While little progress on embracing diversity appears to have happened in the last 3 years, should SAR agencies even worry about this? One possible concern is that, unless it becomes more representative, the SAR sector will find it harder and harder to get volunteers. Indeed, Volunteering NZ has asserted this, saying:

> *"Deciding not to engage and reduce barriers to participation for other ethnic groups means that **your pool of potential volunteers will get smaller and smaller**, not to mention the skills and experience the sector is missing out on."* (Volunteering New Zealand 2019)

But is this assertion – that the pool of potential volunteers will shrink – actually valid? The data gathered as part of this environmental scan suggests not. In aggregate number terms, the NZ population overall, and even the number of people who fit the 'traditional' SAR recruit (Middle-aged, NZ European men), is increasing, not shrinking.
Furthermore, feedback from those working in the SAR sector for the 2017 scan did not conclude that there was a universal lack of volunteers across the country at present. Instead, some of those with whom we spoke even went so far as to comment that they had more volunteers than they needed and insufficient demand was deterring some volunteers from keeping their skills current.

We also noted that there seemed to be an emerging 'mixed picture', whereby urban areas had strong or even oversubscribed volunteer groups, in contrast with areas with shrinking populations and local economies. Overall, as observed in the section on the economy above, continued urbanisation appears to be continuing this trend (albeit gradually).

Looking ahead, population projections suggest that there will be plenty of people fitting the existing typical profile of a search and rescue volunteer (at least in highly populated areas)

over the next 20 years. The number of 40-64 year olds is projected to increase from around 1.5 million to around 1.8 million and the number of males in this age bracket will increase from around 725,000 to around 900,000. In short, we are not going to run out of middle-aged and older men in urban areas any time soon.

In addition, the numbers of people aged 20-39 is also likely to stay stable over the next 20-30 years. In other words, we don't need to worry about suddenly running out of young people due to population ageing either.

8.4 But the SAR sector needs to diversity its volunteer base anyway

Changes in family formation are creating new demands on potential recruits' time

Of course, simply having a lot of prime-aged people around does not necessarily guarantee they will have either the time or inclination to volunteer. Volunteering for any organisation depends both on what people find interesting or relevant, but also the amount of time they have available.

For example, changes in family formation and care arrangements can have a major impact on how much free time people have available.

There is growing evidence that Millennials are more likely to either stay living at their parents' house, or to return home after a few years. A recent survey of almost 450 New Zealand parents showed 21% of respondents had one or more millennial children currently living at home, with another 12% saying one could return "any time" (Stephenson 2019).

From 1996 to 2013, the number of people in multi-generational householders grew by 49%, to 496,383 (BRANZ 2016). Reasons for this shift, which has mirrored that occurring in both the USA and UK, included for example:

- saving for a house or travel;
- lack of affordable rental accommodation;
- mental health issues; and
- needing help with childcare.

It appears that this so-called 'failure to launch' is then feeding into decisions to get married and have babies later (Statistics NZ 2019). Then, even once they have babies, many women are now generally returning to the workforce faster than in previous generations.

> *"Our volunteers are mostly mums/parents and it seems difficult to get people involved – mainly I think to more mums going back to work sooner after having kids – there is just no time for anything else."* (Volunteering NZ 2017)

The delay in family formation and increased prevalence of multi-generational living arrangements (particularly where younger family members are caring for older ones) are likely to have a big impact on the time people have available for volunteering. For example, they mean that many of the kinds of people who used to be in a position to volunteer in their mid-40s are now often still occupied with full time parenting duties. Similarly, others who may have had more time available to volunteer in middle age are increasingly finding their

time occupied with caring for their ageing parents, who are now living longer than previous generations.

> "We find the young and the elderly give their time generously, but the middle aged have nothing extra to give" (Volunteering NZ 2017)

Might inequality of volunteering reflect inequality of participation outdoors?

It is one thing to say that the SAR sector's traditional volunteers are facing new pressures and demands on their time; that is a practical reason for seeking to diversify the SAR volunteer base. However it is by no means the only, or even most important reason.

There are currently major inequalities in terms both of how different demographics (different ages, ethnicities and genders) participate in the outdoors. The current over-reliance on white, middle-aged males reflects this broader inequality of access to the outdoors.

People tend to volunteer in activities relevant to their own lives, those of their families and communities. It is quite simply unrealistic to expect people to volunteer for activities to which they have had no exposure in the rest of their lives. For example, few people currently volunteer for school boards who do not have children at the relevant school themselves. Again, few people volunteer for sporting organisations who have not themselves participated at some time or who have children doing so. In other words, the need to recruit a more diverse array of SAR volunteers is part of a broader challenge to make the outdoor participation relevant and accessible for all New Zealanders.

Furthermore, as efforts to support a broader array of New Zealanders to participate outdoors gain momentum, arguably the case for embracing a more diverse workforce will become even more pressing. For example, if more Māori, Pasifika, Asians, older people and females participate in the outdoors, it will become even more relevant to understand and influence their participation habits and perceptions. It may be that strategies needed to influence these different groups to participate outdoors safely are very different from those needed for middle-aged New Zealanders of NZ European descent.

In summary, as participation rates (hopefully) in the outdoors become more equitable, recruiting and retaining a more representative workforce should help the SAR sector to be more effective both in avoiding a commensurate spike in demand for search and rescue and improving the chance of operational success by embedding good safety practices in diverse communities.

A diverse workforce also offers better ability to cope with a rapidly-changing environment

A further possible rationale for working towards a more representative sector is that it may significantly improve the SAR sector's ability to deal with a rapidly-evolving environment. There is research (Syed 2019) to suggest that tackling complex challenges demands more than just intelligence and skill; it also demands cognitive diversity. The question this raises is whether having a greater diversity of people (e.g. different ages, ethnicities, gender etc) can and will provide such cognitive diversity.

Furthermore, not all problems are complex. Sometimes problems need creative solutions, while other times we just need to apply best practice. The fact that creative problem-solving

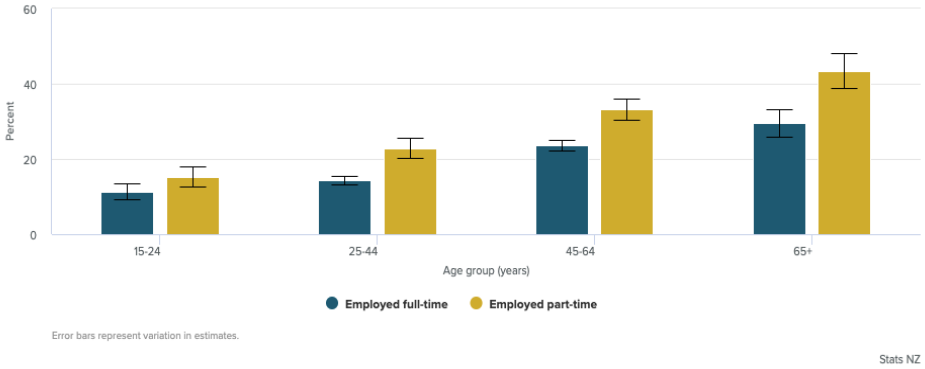
is not always required is why SAR agencies have best practice and SAR response guidelines in the first place.

Of course, even operationally there may be certain circumstances where creative team problem-solving is required. However, more often exploring options creatively relates to the strategic and long term planning requirements rather than operational ones. For example, there may well be value in bringing together diverse parts of the SAR sector and different perspectives (ages, ethnicities, disabilities etc) to consider how best to tackle the strategic challenges identified in this environmental scan. However, there is less likely to be value in brainstorming different possible ways to helicopter a person off a cliff or to pluck someone out of the ocean when faced with real time pressure.

Older people, women without children, and people with disabilities are under-tapped

While changes to family formation trends and living arrangements mean that some people have less time available to volunteer than in the past, others have more. For example, across the NZ population, fewer women are having children and these people may have more time available to volunteer if they can be attracted to do so. Similarly, the number of older people (both male and female) leaving the workforce, may offer a significant 10-20 year boost to volunteer numbers if they can be attracted. This is because older people and those less attached to the workforce are typically more likely to volunteer, as demonstrated below.

Volunteer rates by full- and part-time employed people, June 2018 quarter



(Statistics NZ 2018)

While there is a positive association between age and disability, there is every reason to believe that many search and rescue functions could be undertaken by people aged over 65, in the medium term.

> "Volunteering has become increasingly the role of older Kiwis... time and financial pressures prohibit younger people from stepping up." (Volunteering NZ 2017)

In fact, giving people with disabilities more responsibility in the search and rescue sector (and helping them to take on challenging new roles) is likely a win-win for both parties. This was recently emphasised in the government's Health and Disability Review report, which said:

> *"Boosting employment of disabled people overall may be the single biggest contributor to improving the wellbeing of disabled people. Bringing their skills to the*

workforce in health will also make the sector more responsive, adaptive, inclusive, and reflective of the community." (Health and Disability System Review 2019)

8.5 How to attract a more diverse voluntary workforce

Looking ahead, what should SAR agencies do to attract a more diverse range of people to volunteer? There are several things that may help.

Understand the values different groups hold

One theory is that SAR agencies need to start by better understanding and reflect the different *values* of different demographic groups. The New Zealand Recreation Association puts this well, saying that we need to "recognise alternative value systems, calls on time and available resources." (New Zealand Recreation Association 2018)

As an illustration, we know that people from different backgrounds see the value of volunteering differently, so it makes sense to present volunteering in the terms that resound best with different communities. For example, simply looking at the question of ethnic diversity, the quotes below (New Zealand Recreation Association 2018) illustrate just how different the starting assumptions and values of different ethnic groups can be.

> *"Many immigrants have come to NZ to improve their lives via hard work in business so giving up time to do something without financial reward doesn't make sense to many immigrants." - Estella Lee (from Chinese Conservation Trust)*

> *"From a Māori perspective, the mountains are our ancient ancestors and to stand on top of them and say you've beaten them is disrespectful." - Dr Ihirangi Heke*

Of course, it is important to recognise that values are not just inhibitors to volunteering. On the contrary, they hold the key for attracting a more diverse array of New Zealanders to both participate in the outdoors and volunteer. For example, by tapping into the Māori concepts of whanaungatanga (kinship, relationships), manaakitanga (respect, reverence) and aroha (compassion), it would be very plausible to attract more Māori to volunteer for search and rescue. Similarly, tapping into Pacific concepts around respect and reciprocity, service, spirituality, family and leadership could offer powerful ways to attract Pasifika to volunteer (Massey University 2016).

Part of this involves championing people to lead, drawing on the particular skills, knowledge and perspectives that are unique to them. For example, in working to attract more Māori into active recreation and sport, Sport NZ explicitly focuses on championing *"participating and leading **as Māori**"*, rather than just adopting a 'one size fits all' approach to inviting participation (KTV Consulting 2017). Similarly, to attract more women, more Māori, more Pasifika and more diverse Asian groups to volunteer in search and rescue, SAR agencies would ideally adopt well-informed, targeted and culturally-relevant strategies of recruitment and retention, rather than adopting a 'one-size-fits-all' approach.

It is clear that different volunteer recruitment strategies can and do furnish very different results. For example, Surf Life Saving has been particularly successful at attracting both females and younger people while other parts of the SAR sector have been less so. While

there may be certain characteristics of Surf Life Saving that make volunteering in that area more attractive to these demographics, there is some evidence to suggest their success at doing so is at least in part the product of a concerted drive to attract a more diverse group of volunteers. This may mean that there are valuable lessons the rest of the sector may learn from their particular approach.

Champion unity and diversity simultaneously

Simply throwing together different people and expecting spontaneous performance improvement is unrealistic. Instead, research suggest that it's important to invest in creating cohesive group or team cultures before expecting them to perform well together. This kind of 'bonding capital" is captured by the quote below.

> ***"Being part of an organisation that not only values search and rescue, but volunteer safety, training, support, crew bonding between all unit members, and being part of one massive family"*** - Volunteer comment regarding strengths of the SAR sector (Volunteering New Zealand 2019)

However, often people believe that creating a sense of team unity requires ignoring difference or asserting that 'everybody is the same here'. This is incorrect. As well as so-called 'bonding capital' (things that tie people together, another kind of capital is needed to embrace diversity: 'bridging capital'. This is basically just the idea that we can also embrace difference at the same time as having some group values in common.

Harvard Professor Robert Putnam highlights that it is quite feasible for people to hold multiple identities at once, meaning that people should not be required to repudiate one identity in order to embrace another. The existence of collective identities can even help overcome any divisions between groups of volunteers that might arise. Putnam says:

> *Experience shows that social divisions can eventually give way to "more encompassing identities" that create a "new, more capacious sense of 'we'.* (Jonas 2007)

So, ideally the SAR sector would look to both create shared group identity (e.g. "being part of the SAR family"), while simultaneously accepting and validating individuality, multiple cultural identities, and any other identity differences.

Take a 'skills and capabilities' approach

Above, we identified that there has only been a 4% increase in volunteering rates of women between 2010 and 2018. Might part of the reason for this be that certain parts of the SAR sector are holding either conscious or unconscious beliefs about the capability of women (and possibly older people and people with disabilities) to fulfil certain search and rescue functions? If so, then one of the keys to attract a more diverse workforce is for sector leaders to explicitly repudiate such beliefs.

But why might some in the SAR sector be struggling to adapt to the idea that women, older people and people with disabilities might make valuable volunteers? Some people may have legitimate concerns that nevertheless provide implicit signals to certain demographics that they are not welcome. Indeed, it is easy to provide subtle signals to certain demographics

that we do not believe they can fulfil certain roles. For example, even Volunteering NZ has commented that:

> *"SAR, however, is also a sector in which health and fitness is essential to most volunteer roles* ***so there is an inherent risk in relying on a volunteer workforce that is ageing****."* (Volunteering New Zealand 2019)

This comment implicitly suggests that poor or insufficient health and fitness is a necessary characteristic of an older, or at least ageing, workforce. Similar sentiments have been expressed about the capability of women and people with disabilities to work in the Police force or military in the past. Instead, we know that health and fitness tend to vary over population distribution curves. So perhaps it would be more constructive to establish certain health and fitness standards required to fulfil certain voluntary roles and identify the roles that do and don't require meeting them.

An explicitly skills and capabilities approach would be consistent with the Ministry of Health's 'positive ageing' strategy and the focus of the Ministry for Women, which is aimed at ensuring the contribution of women and girls is valued and that all women and girls can fully participate and thrive. There may also be opportunities for collaboration and joint Budget bids spanning SAR and other parts of government to ensure the SAR workforce of the future is both fit and healthy enough to volunteer, while being included.

As part of this, it is important to recognise that not every voluntary job in the SAR sector requires very high fitness levels. Parts of the SAR sector are clear on this already. For example, Coastguard NZ already explicitly recruits 'shore crew', who do not require the level of training and time commitment as 'wet crew' operational roles. Surf Life Saving NZ in the Bay of Plenty similarly encourages volunteers to provide support for search and rescue operations in roles like providing provisions and looking after equipment (Volunteering New Zealand 2019). However, just because these role distinctions exist now doesn't mean they are being actively marketed to diverse sections of the NZ population to diversify it over the long term.

"Skills based volunteers do need induction but not technical training. Please consider the newer types of platforms and changing volunteering trends…Volunteering turnover and lack of training can also be positive signs too!"

Being explicit on different skills and capabilities needed for different jobs (i.e. formalising roles much more) would have the benefit of reducing the need to train some volunteers as intensively, though care would be needed to clarify what constitutes 'basic' induction and to specify oversight mechanisms tightly enough to avoid creating new risks. Needless to say, this would mean that the 1/3 of the SAR sector not currently offering an induction programme or training opportunities to volunteers would need to address this rapidly (Volunteering New Zealand 2019). It might also mean considering carefully how much training is really required for volunteers who may only stay for a few months or a year.

To attract more female volunteers, SAR agencies also need to better understand the motivations that drive women, older people and people with disabilities to volunteer. For example, we know that women are often attracted to certain kinds of organisations and not others. Statistics NZ research has suggested that men are most likely to volunteer for sport or recreation organisations (38.7 percent), while women are more likely to volunteer for

religious or spiritual organisations. The same research found that women were more likely to volunteer for health, social services, and education or research type organisations. This raises questions around how well the SAR sector understands what motivates women to volunteer, and how organisational culture may be playing a part.

Taking a more personalised approach for matching volunteers with tasks could prove a 'win-win' for both the SAR sector and for diverse volunteers. Of course, appropriate fitness tests and training is necessary to perform certain functions, but we must remember that to meet current volunteering levels, less than 1% of the NZ population would need to qualify.

8.6 Steps in the right direction

While significant ongoing effort is required, it is important not to become too discouraged about the relatively slow progress towards a more diverse SAR workforce. Workforce reform usually takes time, and the SAR sector is a particularly complex network of organisations.

The NZSAR Secretariat risk matrix shows that good work is already underway to assist SAR agencies to develop and maintain their own volunteer strategies and, as part of this, to focus on "the recruitment, retention and engagement of effective SAR volunteers reflective of NZ Society." (NZSAR Secretariat 2019) There are also other encouraging signs that the sector is moving in the right direction.

For example, the NZSAR Secretariat has recently begun emphasising the importance of accepting diversity by announcing a set of new guiding principles for valuing volunteers (New Zealand Search and Rescue 2019). These principles broadly advocate inclusiveness, responsiveness to volunteers, open and honest communication and collaboration. In short, they are useful because they begin to encourage a set of collective identity and joint values, while acknowledging diversity. That said, the principles only represent a start in a much longer journey needed to attract a more representative cross-section of New Zealanders to volunteer.

8.7 Economic and social changes: impacts on volunteering

Above, we have highlighted that a growing economy does not necessarily translate to everybody having better lives. In particular, with real wages having stalled and inequality having grown for much of the past 3 decades, peoples' sense of available resources (both time and money) to dedicate to volunteering in New Zealand has shrunk. This said, the good news is that both of these are now heading in the right direction, signalling that perhaps the NZ public's appetite for volunteering may pick up again in the near future as well.

8.8 Urbanisation may challenge the current recruitment model

As mentioned in the section on urbanisation, Statistics NZ population projections suggest that high growth urban areas will continue to experience more growth, while secondary urban areas and rural areas are likely to stay still or keep declining. This urbanisation means that people increasingly live and work in urban areas while undertaking recreation activities outside them. By contrast, searches and rescues are conducted all around New Zealand and across the wider Pacific region.

Coastguard, SLSNZ and LandSAR are structured around a federated model run by local communities. This model arguably "enables each local group to be autonomous, which fosters a culture of independence and alignment with local communities" (Volunteering New Zealand 2019). However, the sustainability of the model, particularly for smaller rural communities, may increasingly come into question in the face of ongoing urbanisation.

In particular, it appears likely that certain smaller, and economically-declining areas may find it increasingly difficult to find enough volunteers to meet local SAR demand (which continues to be fairly uniformly distributed around the country). Areas that are likely to come under particular pressure include places where there is currently negative economic growth like Rotorua, Whanganui, Greymouth, Timaru and Whakatane, Bulls and Opunake. Where there is negative economic growth, it is likely to become harder to attract and retain volunteers.

In order to track the changing patterns of volunteering, and mitigate any emerging risks, it may be worth SAR agencies collecting and reporting on changes in its volunteering needs versus capacity, both locally and nationally. This will help the sector quickly identify whether a divide between urban and rural settings is emerging and enable a whole-sector response to the challenge.

The need to co-ordinate across different parts of the country, and different parts of the SAR sector, is likely to grow as a result of urbanisation. It is therefore encouraging to see the latest results of a Volunteering NZ study highlighting that there has been a considerable improvement in collaboration across the sector since 2010 and many examples of agencies working together to ensure the safety of their communities.

> *"Among these examples were Coastguard, Surf Lifesaving NZ and the Maritime Operations Centre combining forces to develop a shared national digital communications platform; and Coastguard representatives sitting on the committee of LandSAR Wanaka."* (New Zealand Search and Rescue 2018)

8.9 Changing economic realities and social attitudes

A recent report for NZSAR confirmed several key trends in volunteering both overseas and in New Zealand. These were:

- people are giving less of their time - the total number of hours volunteered fell by 42% between 2004 and 2013;
- people are volunteering more episodically - there are many more people volunteering, but each is doing less; and
- there is a rise in spontaneous temporary volunteering, facilitated by social media (Volunteering New Zealand 2019).

> "The mode of volunteering seems to have shifted. People seem to be less willing to contribute/contribute to medium/long term volunteer roles, but happy enough to volunteer hours / half day / day when it suits them." (Volunteering New Zealand 2019).

Volunteering is no longer a question of 'many hands make light work'. Instead, a few hands are doing most of it at present. Sometimes referred to as a 'civic core', around 14% of volunteers do half of all the hours volunteered in New Zealand, raising issued of both burnout and succession planning.

For some voluntary agencies, responding to these changing social trends and generational values is pretty straightforward; simply offer more opportunities for people to volunteer in the way they want to. For example, several organisations like *Volunteering Solutions, go Abroad, Go Overseas* have specially curated "2 Weeks Special Volunteering Programmes", in which individuals can experience volunteering over a period of just 14 days.

Yet this raises a particularly tricky challenge for the SAR sector. The sector needs its workforce (or at least some parts of it) to be highly trained. This is difficult to achieve without at least some volunteers making a long term commitment. As the manager of the NZSAR Secretariat, Duncan Ferner, observes:

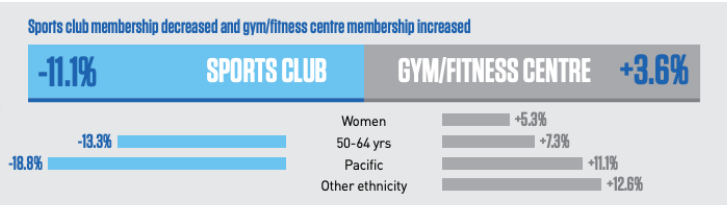
> *Trends in New Zealand show that people who volunteer are shifting to episodic and shorter term volunteering. By contrast, SAR volunteers are highly trained, requiring a long term commitment."*

Consequently, simply offering more episodic opportunities to volunteer in future may not be a suitable strategy for the SAR sector to safeguard sufficient numbers in future. While offering more episodic training opportunities might help, to really grapple with the challenge, the SAR sector arguably needs to better understand the new generations it wants to attract and potentially explore whether a greater proportion of paid workers might be appropriate.

8.10 Why the reluctance to commit?

In terms of attracting new volunteers from younger generations, it is fairly clear what they appear to 'want' in terms of volunteering opportunities…at least at a surface level. For example, volunteers from Gen Y and the Millennial generation appear more often to be looking for opportunities to volunteer that involve some very specific attributes such as "small amounts of time, easy to access, immediate, convenient, focused tasks, informal agreement, and ability to explore." (Roy 2018)

This shift looks, at first blush, like a change in values, particularly among Gen X and Y. It also stretches beyond the SAR sector. We can see it manifested through other similar trends, such as a frequently-reported decline in trust and membership of other formal institutions such as clubs and churches. For example, the 2017 environmental scan highlighted that now only 8% of New Zealanders are part of a club. Over a 16 year period to 2014, sports club membership decreased by 11.1% while gym membership increased by 3.6%.



(Sport NZ 2016)

This reluctance to commit to institutions is not limited to New Zealand either. A 2014 performance audit of New South Wales' State Emergency Services (SES) observed that "twenty six percent of SES volunteers leave each year, many soon after joining" and concluded that the "SES cannot be assured that it has sufficient volunteers to respond to future demands." (Calcutt 2019) Research from the Stanford Graduate School of Business similarly found that "more than one-third of those who volunteer one year do not donate their time the next year at any non-profit." (Eisner, et al. 2009)

One possible explanation about what is driving this reduced tendency to commit to voluntary organisations is that people increasingly want to avoid getting locked in, lest they find themselves unable to meet their own array of other life obligations. One commentator elaborated on this theory, saying:

> *In today's date, everyone is busy managing their work life, socialising, going to the gym, pursuing their hobbies, getting adequate "me time" etc., which are restraining us from long-term commitments. Thus, a considerable growth in the demand for short-term volunteering has also left this sector struggling to utilise this demand by providing enough opportunities and supporting this shift in the nature of how some people would like to volunteer.* (Roy 2018)

So, does this mean we seeing an inexorable shift to a future where volunteering inexorably declines? Not necessarily.

8.11 Glimmers of hope

It would be wrong to conclude that volunteering will inevitably fade away. For example, in 2017, New Zealand was actually ranked as number 6 globally in terms of the number of hours and percentage of people who volunteered (Volunteering NZ 2017). Even more encouragingly, there is data to suggest that younger generations are more likely to want to volunteer than the generations above them.

For example, between 2016 and 2018, the volunteering rate in the USA actually grew from 24.9% to 30.3% (National and Community Service 2020). The same research showed that people from Generation X were actually the most likely to volunteer, with 36.4% of Gen X Americans volunteering (National and Community Service 2020). Similarly, data from Ipsos MORI's Young People Omnibus among school children in Britain, shows there has been a cohort shift towards higher social activism. Nearly half of 14-16 year olds (46%) say they have given their time to help out people in the community in the past two years, compared with just 30% in 2005. Three in ten (29%) are regularly active in their neighbourhood, community or an ethnic organisation compared with just one in ten (10%) in 2005 (Ipsos 2018).

Also, there is also some evidence that the reduced trust in institutions and other people demonstrated by Gen Y and the Millennials, is not necessarily going to endure through to Gen Z. For example, research has shown that Generation Z are nearly twice as trusting than Millennials were at the same age (61% in 2017 compared to 36% in 2002) (Ipsos 2018).

One challenge for all institutions seeking to attract young people is understanding how best to inspire and retain their trust and commitment. Another is to evolve their workforce models to fit flexibly with the reality of volunteers' lives (e.g. finding ways to help potential volunteers to balance study, work and other commitments).

8.12 How might the SAR sector respond to these changing social trends?

The section above made it clear that available time, and perceptions around time availability, play a big role in peoples' decisions around whether to volunteer, how much and for how long. So do perceptions about what constitute worthwhile ways to spend time.

Much of the decision about whether to volunteer, and how much, is driven simply by the perception people hold about how much time they have available after doing 'essential' things like sleeping, working and meeting family obligations.

> "Younger volunteers are motivated by more specifically focussed issues affecting them and the future of their families" (Volunteering NZ 2017)

In 2017, women volunteered 1.8 million more hours than men. Why? Simply put, they had more available time for volunteering (or prioritised it more highly) because they spent less time in the paid labour force (Statistics NZ 2017). Does this mean that if people consider voluntary work as valuable as paid employment in future, it might be possible to unlock significantly greater commitment from them? Or does it mean that, given women are increasingly participating in full-time paid work, we should expect and accept that volunteering will inevitably decline?
The important point here is that the future is not a foregone conclusion. The answer to these questions will depend on what factors into peoples' decisions about how to spend their time. So, a key question facing the SAR sector is whether to accept and work with the 'too busy' narrative going forward, or to try to shape potential volunteers' perceptions. As highlighted in the section on social trends, the sector is already hard at work shaping perceptions when it comes to encouraging people to prepare before venturing into the outdoors. Why not also try to shape perceptions around time use in the same way to attract and retain more volunteers, and even induce them to make longer-term commitments?

8.13 Understanding and influencing potential volunteers

If the SAR sector decides it wants to influence the potential volunteers' perceptions and values around time use, the next big question is clearly how to do so successfully. Values represent the overriding, governing motivation for decision-making, and they matter a lot. If you want to inspire any group of people to commit to volunteering, you need to understand their values and ensure that your messaging resounds.

A key challenge for the SAR sector may be working out how to convert the willingness of different generations to volunteer in the short term, into a longer term commitment to training and ongoing service. To do this, the sector might usefully consider how to present volunteering opportunities in terms of the values and expectations that are most likely to resound with different demographics.

Tapping into the values of Millennials

Taking a values-driven approach may mean adopting very different strategies depending on the target demographic. For example, instead of looking to acquire cars and houses, there is some evidence that the Millennial generation is assigning greater importance to personal experiences – and showing off pictures of them (Boston Consulting Group 2016). For example, research has also shown that today's 20-somethings are spending more on travel than they are traditional investments - like down payments on homes. For example, in the year to October 2017, New Zealand residents departed on 2.83 million trips overseas, up 271,800 (11 percent) from the previous year (Statistics NZ 2017).

Millennial travellers aren't heading to Europe, Southeast Asia and South America to party anymore. Instead, their trips are all about authenticity and cultural immersion (Mya 2019). Research into the motivations for Millennials travelling suggest they want to:

- Experience authentic different cultures;
- Find themselves, including the courage to embark on different careers or life trajectories;
- Set themselves apart, being seen as trail blazers;
- Be more physically active than previous generations; and
- Repeat what they see on social media (Mya 2019).

Furthermore, there is a sense that Millennials can be attracted by the offer of 'making a difference in the world'. Perhaps the opportunities Greta Thunberg has provided to her millions of global followers demonstrates best practice here. Just 16, she has inspired hundreds of youth climate protests across more than 100 cities worldwide (CNN 2019). Her brand is one of straight-talking authenticity and actively encouraging young people to belong to a wider movement for change; both things that appeal deeply to younger generations.

These insights arguably give the SAR sector a sense of the 'hooks' required to interest younger generations, like Millennials, into volunteering. There is no reason that volunteering opportunities in the SAR sector could not be presented to younger demographics in a way that highlights the value of authentic life experience. The kinds of experiences SAR agencies might offer could, for example, relate to both 'intangible life experiences' (such as saving a life) and the kind of experiences that will benefit them personally (e.g. experience which can be put on a CV an improve future work prospects).

Of course, pursuing a volunteering recruitment strategy based on population segmentation needs to be done with care. It is easy to over-simplify the approach, which could come off as insincere and easily backfire. For example, when it comes to Millennials, there is also a so-called 'perfection paradox' to navigate. In short, while people from this generation tend to value authenticity, it is not at all costs. As one commentator put it:

> *"Though they love to show their authentic selves, they also know that pimples do not generate likes, and neither do old clothes, fuzzy hair or an ordinary cheese sandwich. In other words: reality outplays perfection, but appeal outplays reality."* (Ipsos 2018)

If the SAR sector wants to attract and retain younger volunteers so as to create a sustainable future workforce, they will need to understand them and target them sensitively. For example, one approach could be to ensure that all opportunities to volunteer area marketed to

this demographic with three key things: a clear statement of why their contribution matters (meaningful purpose), the opportunity to gain authentic life experience, and something that they can post to their Facebook, Snapchat or Twitter feed.

Obviously the kinds of approach being made to older generations to induce them to keep volunteering would need to differ again based on further insights about the values and priorities driving them.

Ensuring volunteers get recognised

Of course, peoples' willingness to volunteer is not just a question of their *attitudes* and *willingness*, but also their *availability*. As highlighted in the section on social trends, most New Zealanders are feeling busier and more pressed for time. This suggest that finding ways to avoid volunteers having to make difficult time trade-offs may also be a valuable way to safeguard the future SAR workforce.

One option might be to explore partnerships with supportive government agencies or businesses who might donate a proportion of their employees paid work time to volunteering for the SAR sector. Among companies that already offer their employees time off to volunteer overseas are Google, SpaceX, Johnson & Johnson and Southwest Airlines (TSheets 2017). The Bank of America boasts that its employees volunteer 2 million hours annually (Bank of America 2020). As well as providing paid time off for volunteers, it also provides grants for organisations where employees volunteer regularly and celebrates employees' impact through a quarterly and annual honour roll and annual Global Volunteer Awards.

It may also be possible to convince government to contribute funding to such a scheme. For example, in August 2016, the City of Aurora, Colorado announced a new Employee Volunteer Programme, giving full-time employees eight hours and part-time employees four hours of Paid Volunteering Time Off (PVTO) every year (Keyser 2018). A month later, the Town of Mooresville, North Carolina also launched a similar volunteer programme, with the director of Human Resources there stating:

> *"We had some employees express concern that they could not afford to donate to every worthy cause that came their way. They were willing to donate time, but money was the issue. This policy was developed as a way for employees to give back to their community without a financial burden."* (Keyser 2018)

It is important to note that most PVTO schemes do not fully reimburse volunteers for all the time they spend volunteering. However, it may be that a partial reimbursement is useful to signal both that volunteering for SAR agencies is a worthwhile thing to do and even to secure a long-term commitment from volunteers. This said, it will be important to ensure that introducing extrinsic incentives, like partial reimbursement, does not inadvertently crowd out intrinsic ones when it comes to volunteering. For example, in the past, researchers have found that paying for people to donate blood actually reduces the number of people who donate because it the displaces natural altruistic motivation with a financial motivation – which turns out to attract fewer people to donate (Titmuss 1997).

Ultimately, the most effective strategy for attracting and retaining volunteers in the SAR sector is an empirical question. So, perhaps an experimental approach with a focus on trying different things and systematically learning what works is most advisable. It may also be that different things work to attract volunteers into different parts of the SAR sector.

Lowering barriers to entry (make it easier for people to sign up publicly)

There is a significant body of evidence to suggest that once people make an explicit commitment to a cause publicly, and start actually doing it, they are much more likely to continue, regardless of how committed they were at the outset.

Part of the reason that securing a small initial commitment from potential volunteers can lead to a much bigger one is that humans are near-obsessed with appearing consistent in our own words and actions. For example, in one experiment, researchers asked participants whether they could erect a large and unsightly wooden sign on the front lawn of different homeowners to support a 'drive safely' campaign. The researchers found that four times as many homeowners in one particular neighbourhood agreed to put up the signs.

What was different about the 'high compliance' neighbourhood? Ten days beforehand, the homeowners in that particular neighbourhood had already been asked to place a small and discrete postcard in their front windows that signalled their support for the same campaign. Because it was so unobtrusive, most people agreed to this request readily. But, because the researchers had their 'foot in the door' with these homeowners, it was then much easier to get them to agree to a much bigger sign later. As influence expert, Robert Cialdini puts it "that small card was the initial commitment that led to a 400% increase in a much bigger, but still consistent change" (Cialdini 2006).

In summary, there are three specific actions which the SAR sector might consider to secure more volunteers in the future (if needed):

- Segment the target participant groups and create campaigns and volunteering 'offers' in language and terms that resound for each particular demographic;
- Explore opportunities to help make it easier / less painful for prospective volunteers to do so, such as landing partnerships with business and government for Paid Volunteering Time Off; and
- Make it painless for volunteers to sign up and start, then seek gradually greater commitments over time, including publicly and/or in writing.

8.14 Exponential changes and volunteering

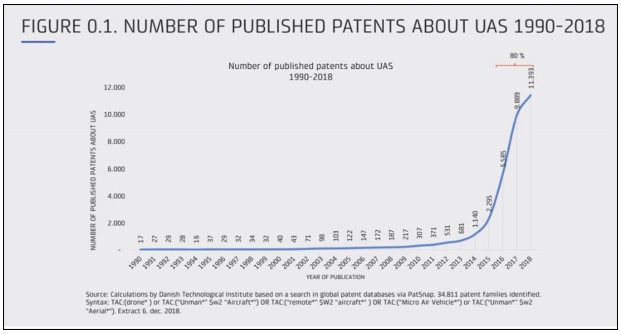
As mentioned above, most of the demographic, economic and social trends described above involve relatively 'normal' trends insofar as the rate of change is relatively gradual. As long as SAR agencies continue to monitor and respond to the evolving picture in proportionate ways, they are unlikely to significantly disrupt the sector's ability to recruit and retain sufficient volunteers. By contrast, this updated scan has already identified two major trends (climate change and technological change) that are exponential in nature, so could easily rapidly change the environment, with major implications when it comes to volunteering as well as demand for search and rescue more generally.

Exponential technological change and volunteering

Technology is increasingly likely to be able to perform functions traditionally only possibly by humans. This is by no means the first time there has been a revolution in capability – as just one example, the invention of looms during industrial revolution replaced many jobs traditionally done by humans with machines. However, the breakneck speed of technological innovation now means many cognitive tasks previously restricted to humans will increasingly be able to be performed by computers and robots.

For example, take the question of how to access people in remote locations; something that is often critical for search and rescue operations. Until recently, SAR agencies really only had options that required humans to play an integral role. Tramping to remote locations, taking a boat, plane or helicopter, all require trained, and very fit people. By contrast, unmanned drones are subject to the same exponential rate of progress as other technologies like computers. Drones and other autonomous systems are not just improving in terms of range, but also in terms of capability due to rapid improvements in the software that drives them. The pace of innovation in this area alone is exponential, and increasingly leading to much more capable robotic systems as shown below (AUVSI 2019).

FIGURE 0.1. NUMBER OF PUBLISHED PATENTS ABOUT UAS 1990-2018

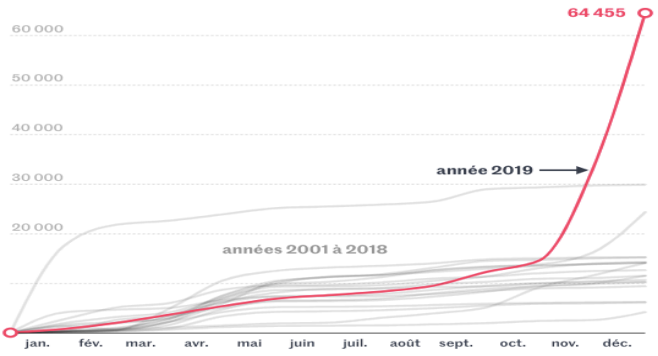


Such developments mean that efforts to describe the current 'state of play' when it comes to technology that may be relevant for search and rescue quickly get outdated. They also mean that in future more and more roles currently fulfilled by volunteers may be able to be outsourced to more intelligent machines. To capitalise on such opportunities, the SAR sector should continue to monitor global improvements in technology and continuously assess opportunities to automate certain of its functions. This is particularly pertinent when we consider the next exponential change.

Climate change and volunteering

The second exponential change described above is climate change. It is difficult to accurately predict the potential future impacts of climate change precisely because our brains are wired to think linearly, not exponentially. We tend to think about change in terms of reasonably straight lines; where the future is a simple projection of the current trend. By contrast, we can easily see how climate change is starting to have an exponential impact with a simple example. The rapid and unprecedented increase in the number of bushfires in New South Wales alone is clearly visible in the graph below. As the graph shows, 2019 represented five times the number of fires that happen in an 'ordinary' year. Of course what this really demonstrates is that the very concept of an 'ordinary' year is beginning to break down – a classic symptom of exponential change.

Number of fires in New South Wales between 2001 and 2019



(Breteau 2020)

How do you plan, recruit and train a largely volunteer-based workforce for search and rescue when you may have to face 5 times as many disasters as occurred in the previous year? This is an important question for the SAR sector to face since we can consider Australia to be something of a 'canary in the mine' when it comes to the likely future impacts of climate change. Above all, it is important to recognise that the current volunteer-based model of search and rescue is premised on demand having remained reasonably stable and only increasing *linearly* over previous years.

While New Zealand is not facing exponential change in demand for search and rescue right now, we can expect this to change in the future. Already New Zealand's firefighters are being called on to assist with the so-called 'mega-blazes' in Australia, placing pressure on the remaining firefighters who may need to deal with fires back in New Zealand. Similarly, major floods are likely to become much more frequent. GNS climate scientist Tim Naish, head of a new Government-funded programme set up to assess the magnitude and rate of sea-level rise says:

> *"We're talking places we will not be able to live in because a so-called one-in-100-year flooding event becomes a daily event."* (Blundell 2018)

More fires, floods and other climate-related disasters could well lead to increased demand for rescue from people caught up in such events while participating outdoors, or at least more requests for support from civil defence agencies. Arguably the current volunteer-dominated model of SAR service provision is based on a couple of thousand people getting 'caught out' infrequently. The viability of this model may well come under threat if climate change fulfils its exponential and disruptive promise.

The NZ government recently reviewed its emergency management system and identified that a range of risks had arisen "in the face of the increasing number of events New Zealand is experiencing, and if a major emergency were to occur" (Department of the Prime Minister and Cabinet 2018) Along with working towards a National Emergency Management Agency, the government has agreed to focus on building a more professional, well-trained and accredited emergency management workforce (Civil Defence 2019). The shift from a largely informal, volunteer-based workforce to a more professionalised one makes sense if we consider that there is a higher risk of large-scale and longer-lasting disasters in future.

While demand is currently reasonably static, in the future it appears likely that climate change will lead to more, and more frequent extreme events and disasters. It also appears

likely that the current trend in volunteers preferring short term and episodic volunteering will continue. Considering these two things together, it might be useful for the SAR sector to follow the example of the emergency management system and consider whether the current high reliance on volunteers (and a highly fragmented set of governance arrangements) will remain viable in the medium to long term.

8.15 Converging trends are driving increased uncertainty

Overall, one of the fundamental characteristics of the current environment is that it is characterised by increased uncertainty. This leads us to further emphasise that simple straight-line extrapolation from current trends is a highly risky thing to do. The future may look very different from the past indeed, in part because of the rapidly changing environment and in part due to the extreme pace of technological and social change. As just one illustrative example, we have seen above that population ageing (and rises in associated wandering activity) could continue to be a significant driver of demand for search and rescue.

However, the spectre of 50 million people with dementia globally in future is driving huge investment in research in this area. For example, researchers from UC Davis and UC San Francisco recently developed a new artificial intelligence tool to scale up Alzheimer's research. They have created a deep learning system to identify amyloid plaques in brain slices of patients, spotting specific subtypes of Alzheimer's disease, in the process enabling precision medicine and faster research (Medgadget 2019). This is an example of 'convergence' between IT and healthcare, which can significantly increase the speed of improvement. If successful, efforts like this could significantly reduce the rates of dementia, commensurate rates of wandering and thus demand for search and rescue. Such marvellous progress in tackling dementia would immediately render the trend data highlight in this updated scan obsolete.

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10. Appendix – Comparing the 2017 environmental scan and 2020 update

A key point made in this update is that the environment is constantly changing. This means that different parts of the environment matter to different extents, as well as in different ways over time. Furthermore, organisations like NZSAR will legitimately and rationally choose to focus their attention on different aspects of the environment at different times.

Accordingly, the following table aims to help the reader understand how the 2017 environmental scan and 2020 update relate to, and differ from, each other.

Comparing the 2017 and 2020 environmental scans

Topic	Description - what this topic does	2017 environmental scan	2020 scan update
Executive summary	Provides an overview of the scan and main conclusions	Included	Included
Terminology	Defines the various terms used to describe the search and rescue sector	Included	Excluded
Purpose	Describes the role of the NZSAR Council and SAR sector	Included	Excluded
Operating context	Sets out responsibilities and expectations on the SAR sector at a macro level	Included	Excluded
Demand for SAR	Identifies sources of demand for search and rescue	Sets out overall demand, land-based demand and demand across NZ search and rescue region	Compares demand since previous scan and longer-term to assess trend
Overview of the SAR process	Clarifies how the Search and Rescue system works	Included	Excluded
Analytical framework	Sets out the framework used to scan the environment relevant to SAR, including demand/supply and capability framing for analytical purposes	Included	Excluded
Demography	Clarifies how changes in the human population of New Zealand may impact on demand and supply of search and rescue.	Included - e.g. considers possible impact of age, ethnicity, disability	Updates to 2020, but moves focus on 'time use' to 'social trends' section
Technology	Sets out relevant technological changes	Included - e.g. explores possible impacts of AI, new data analysis capabilities, big data, sensors, automated vehicles, drones, robotics, virtual and augmented reality and new locator beacons	Updated briefly, highlighting impact of 'always on' technology as well as exponentially increasing computer power
Economy	Identifies how changes in key economic parameters may impact on demand for, and supply of, search and rescue functions	Included - explores possible impact on SAR of main economic indicators, marine economy and tourism	Updates to 2020 and focuses particularly on recent impacts of changes in real wages and inequality and ongoing urbanisation
Politics, policy and legislation	Explores how politics, policy and legislation could change the operating context for the SAR sector	Included - explores potential for politicisation of the sector, potential questions about sector integration and impacts of legislation and funding	Partly included in section on 'economy' above
Environment	Identifies potential impacts of changes in the physical environment	Included - e.g. notes risks of demand spikes due to climate change	Included - emphasises heightened risks around accelerating / exponential rate of climate change
Funding	Sets out funding available to SAR sector	Included, highlighting the complexity and non-transparency of funding arrangements in 2017. Also, notes service is free at point of consumption and not linked to demand.	Excluded
Volunteering	Identifies issues pertaining to obtaining volunteers for the SAR sector	Included - profiles the volunteer workforce, notes that there should be sufficient supply in short term but could get harder in future	Included - systematically explores possible future volunteering pressures in view of updates to 2020 above.
Training	Provides overview of arrangements to train the SAR sector	Included	Excluded
Service model resilience	Identifies potential risks of service failure	Included, emphasising increased risks of service failure due to major weather events	Included in section on environment / climate change