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KEY FINDINGS REPORT:

IMPLICATIONS FROM FUTURE POPULATION CHANGES FOR SEARCH & RESCUE IN NZ

For: Search and Rescue Institute New Zealand Ltd (SARINZ)

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FOREWORD

This study identifies foreseeable patterns and trends in NZ Search and Rescue (SAR) incidents and operational responses through to 2030. It aims to assist in critical strategic planning focusing on future demands for SAR.

Conceptually, and operationally, SAR is fundamentally about **people** working together or as individuals to help save the lives of other people – whether lost, missing, injured or simply at-risk. It is important to focus on people, and the populations they represent, in order to understand the necessary type and scale of future SAR response.

To do this, it is necessary to **take stock of expected future population-based changes** that lay ahead for New Zealand and understand the implications of these the type and scale of SAR response needed in the future. This study casts a light on much of what is relevant, while at the same time pulling together essential projections and information profiles on SAR incidents and SAR volunteer responders.

Decisions can only be as good as the information they are based on. There is a strong need for improved recording of SAR incident data and SAR response capability. This data will improve decisions about **capacity, capability and future training needs** as well as **prevention** initiatives, based on greater certainty of what lays ahead.

Many national and international SAR agencies and individuals have contributed information to this study including: NZ Police, LandSAR, NZ Coastguard, Surf Lifesaving NZ, Amateur Radio Emergency Communications (AREC), SARINZ and a range of international SAR experts. The research project was funded by NZ Oil & Gas and SARINZ. They all deserve thanks, recognition and reassurance that their actions will make a positive difference to the SAR sector in the future.

The findings briefly summarised in this report reinforce that:

- the solutions for SAR in the future will be different to those of the past
- strategic planning of response capability is best done with one eye firmly fixed on the future
- the SAR sector and other affected agencies are well placed now to collectively identify the challenges ahead and respond strategically.

EXECUTIVE SUMMARY

The future demand for SAR and its associated response are the core of this demographic study on the SAR sector. Projections on future SAR incidents and demand are made including estimations about the regional distributions of key incident types.

The factors likely to influence SAR in the next 20 years are predominantly population based, and include:

- the predicted overall growth in the NZ population (although this varies regionally)
- high rates of forecast tourism growth
- an aging resident population structure
- changing demographic characteristics (such as greater ethnic diversity)
- the influence of technological changes on the type and number of SAR incidents and SAR response capability

Various baseline profiles generated in the course of this study are highlighted for SAR incident types, subjects/victims and SAR volunteers as well four key incident projections (Land-based, Marine based, Alzheimer's/Dementia incidents and Shore-based Recreation incidents). Findings cast a light on types of incidents and regions projected to experience greatest imbalances in incident-related demand. Projections indicate a future excess of demand for SAR services in all of the modelled incident types (excluding Marine).

Findings point towards a changing context for SAR (in accordance with the changing face of NZ's population) and changing set of tensions (manifest through imbalances of demand over supply) with certain regions predicted to experience these tensions more vividly than others. Implications arise not just for the traditional SAR sector, but beyond including the Tourism and Health sectors.

Recommendations are made on a broader OneSAR[1] 'banner', where the emphasis is on SAR continuing to **adapt to its changing context.** The principal recommendations are to:

- improve volunteer recruitment and retention
- grow roles for women & youth in SAR
- create 'OneSAR' career paths and training opportunities
- evaluate regional and central resourcing
- improve baseline data on incidents and SAR volunteers
- develop paths and models for training SAR volunteers
- take a more coordinated approach to future research and information management
- further applied research and develop/apply improved information systems
- reduce the number of incidents through incident prevention programmes targeting at-risk individuals and groups.

[1] The term 'OneSAR' is used informally within the NZ SAR sector to describe the collective response for a common good from within the SAR sector.

IMPLICATIONS OF FUTURE POPULATION CHANGES FOR SAR – KEY FINDINGS

INTRODUCTION

This study aims to identify foreseeable patterns and trends in NZ Search and Rescue (SAR) incidents and operational responses through to 2030.

Key demographic changes anticipated for the NZ population until 2030 include an overall increase in population size and an aging and ethnically more diverse population structure. Regional populations show a marked contrast, with certain regions growing at particularly high rates (such as Auckland expected to increase 42% from 2006 to 2031), and some regions projected to decline in size: Southland (-6%) and West Coast (-2%). These types of broad population change are the main context within which patterns of SAR incident demands, and SAR response/supply factors are considered in an in-depth study of demographic changes and their implications for SAR[2].

The geographical pattern of SAR incidents is uneven when compared to regional populations, and in relation to SAR response capability in terms of volunteer numbers. Different types of incidents also show correspondingly unique geographic patterns, which suggests that strategic planning for SAR needs to consider each specific pattern.

However, there are common patterns that arise from the profiling of various incident types. Most incidents tend to occur within the subject/victim's home region and neighbouring regions. Incidents also tend to cluster within particular regions, and may be expected to grow at rates similar to the projected regional population growth. Certain regions account for a disproportionately high incident occurrence - meaning that these high-demand regions are able to be identified now and resourced accordingly, while taking into account predicted future incidents/demands and demographic factors affecting future SAR response.

Recommendations are put forward to help address primary issues and help shine some light on potential means for ensuring positive and effective responses for SAR. These aim to address a changing set of challenges of the future while still achieving the same enduring goal – of effectively and efficiently saving lives.

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[2] A description of methods and advice on use and interpretation of results are specified in the report. The two volume report was prepared for SARINZ by authors Gordon Cessford and Bronek Kazmierow (2010), entitled: *Predicting SAR response and operational requirements based on NZ population projections through to 2030* (unpublished report – B Kazmierow Recreation & Tourism Consulting, Porirua; author contact: bronek@clear.net.nz).

IMPORTANT FACTORS FOR THE FUTURE

Among the factors expected to have a strong influence on future patterns of SAR incidents are:

- Regional **population growth projections** (noted earlier).

- **Tourism** - rates of forecast growth in international visitor arrivals and visit duration are larger in contrast to domestic-based tourism. Recreation and tourism are major contributing factors to the number of SAR incidents.

- **Technology** - although specific implications of technological changes are difficult to predict, certain tenets are generally held by SAR experts, such as an anticipated growth in expectations of SAR victims for successful and immediate response due primarily to technological changes. Greater uptake and use of technological devices amongst recreationists may also result in higher levels of reliance and risk taking, resulting in potentially greater demand for SAR callouts. Technological changes have improved search and rescue response capability – and has the potential also to continue to improve response in the future. Increasing application of tracking devices for at risk individuals (e.g., individuals with Alzheimer's/dementia at risk of wandering) show much promise in reducing the need for some specific larger scale SAR responses.

- **Aging resident populations** - along with future growth in the aged (65+ age group) is predicted an increased SAR demand stemming from Alzheimer's/Dementia related incidents. These incidents are highly geographically constrained, occurring in certain regions more than others. Largely urban based, and specific to certain regions, the scale of incidents can be predicted with relatively high degrees of accuracy.

- **Changing demographic characteristics** – such as more diverse ethnicity and correspondingly diverse recreation patterns and incident demands.

These factors along with other anticipated changes pose issues for SAR, in terms of the type of structure and levels of resourcing to deliver efficient and effective response. This is particularly relevant to volunteer capability and capacity. Recruitment, retention and training issues may become more of a concern in relation to specific SAR delivery functions nationally (e.g., in relation to communications delivered through Amateur Radio Emergency Communications - AREC) or regionally.

KEY RESULTS

A series of SAR incident and subject profiles and projections may be found in the main report. These are grouped into content areas (refer table below).

SAR Incident Types	**SAR Subject Types**
• Land-based (2819 incidents) • Marine-based (2968)	• Trampers (1208 subjects) • Walkers (488) • Hunters (434) • Alzheimer's/Dementia (193) • Despondent (166) • Tourists - Land (710) • Tourists - Marine (157) • Older Aged (65+) - Land (394) • Older Aged (65+) - Marine (139) • Shore-Based Recreation (102)
SAR Volunteer Summaries	**Future Incident Projections**
• LandSAR NZ (2806 volunteers) • Coastguard NZ (2110) • Surf Life Saving NZ (15003) • Amateur Radio Emergency Communications (1292)	• Land-based SAR Incidents (total) • Marine-based SAR Incidents (total) • Alzheimer's/Dementia Incidents • Shore-Based Recreation Incidents

SAR INCIDENTS SUMMARY - LAND-BASED

All of the Police *P130* [3] land-based incident records over 4 years from 2005 to 2009 were analysed, totalling 2819 incidents involving 3805 individual SAR subjects.

- Regional patterns of incidents contrast with the distribution of New Zealand's population – under-representation of incidents in Auckland region, and over-representation in Southland, Otago, West Coast, Tasman and Marlborough
- The pattern of incidents is also non-representative of LandSAR volunteer capacity – with an over-representation of incidents in Wellington, Southland, Auckland, Tasman and Bay of Plenty regions
- 80% of incidents involve New Zealand subjects
- 31% of incidents are in urban settings, whereas rural incidents (69%) tend to occur in remote natural areas/parks (52%) & rural natural areas (16%)
- Recreation activities are the most common origin of incidents (73%) - the largest of these are Tramping, Walking and Hunting

[3] This refers to the Police incident record form and the supporting database.

- Certain regions have very high rates of recreation based incidents, including Southland, West Coast, Tasman and Canterbury
- High rates of psychological incidents (e.g., Despondent and Suicides) are found in Auckland and Northland regions
- Certain regions have high proportions of non-local subjects, such as Tasman, Southland and West Coast regions, each having high levels of Tourist subjects
- Over-representation of German and Israeli Tourist subjects
- Over-representation of subject in the 15-39 yr age group, males (particularly in NZ subjects - 71%), and Caucasian NZ subjects

LAND-BASED INCIDENT PROFILES - AT A GLANCE

Health: Alzheimer's/Dementia

193 Land subjects, 60% male, aged, ethnically representative, urban concentrated incidents, regionally unevenly distributed relative to source populations.

65+ age group

364 Land subjects: males over-represented (66%), ethnically representative, urban concentration (more-so for Dementia cases, although recreation cases were concentrated in remote natural areas/parks), most occurring in home regions.

Despondents

166 Land subjects, predominantly male (66%), over-representation of Europeans, regionally unevenly spread relative to populations (with over-representation in Wellington), most incidents occurred in subjects' home regions.

Recreation: Trampers

1208 Land subjects, predominantly male (71%), with over-representation in 15-39 age group, ethnicity pattern similar to Non-Tramper subjects (but over-represented in European), high proportions of tourists (36%) compared to Non-Tramper subjects, incidents geographically unevenly distributed with heavy concentrations in Southland and Otago regions (both with high proportions of tourist subjects), concentrated in remote natural area/parks, most outside of subjects home regions.

Walkers

488 Land subjects, even gender balance, with over-representation in 15-39 age group, ethnicity pattern similar to Non-Tramper subjects (but over-represented in European, and notable even representation of Asian subjects), relatively high levels of Tourist subjects, incidents spread geographically with highest concentration in Wellington, with concentration of incidents in remote natural areas/parks (more so for Tourist subjects), most occurring within subjects home regions. Almost three-quarters of subjects in Walking incidents on the West Coast were Tourists.

Hunters

434 Land subjects, almost entirely male (97%), with over-representation in 15-39 age group, ethnicity pattern similar to Non-Tramper subjects (but over-represented in European, and notable relatively high representation of Mäori), very low proportion of Tourist subjects, geographically highly dispersed incidents (most in Waikato, Southland, Bay of Plenty and Canterbury) and over-represented in Waikato and Southland populations, predominantly occurring in remote natural areas/parks, high proportion in incidents occurring outside of subjects' home regions (46%).

Tourist: **All land-based incidents**

710 Land-based Tourist subjects: represent 22% of all Land subjects, the main nationalities (>10%) are North America, Australia, UK, Other Europe and Germany (with Israel notable at 8%), with over-representation of Germany, other Europe and Israel relative to visitor arrival figures.

Gender balance slightly tilted towards male (59%); age tended to be over-represented in 15-39 age group, with most incidents relating to recreation activities (97%) – of these predominant were Tramping (58%) and Walking (21%); Tourists feature in high proportions of Skiing/Boarding incidents, Tramping, Climbing, Walking and Rafting (all over 30% of all such incidents); high geographical concentration of incidents in Otago, Southland, Canterbury and West Coast regions (featuring in over 30% of all incidents in Southland, Otago and West Coast regions). Tourist subjects incident locations tended to focus strongly on Remote Natural Areas/Parks (78%).

SAR INCIDENTS SUMMARY - MARINE

All of the Police *P130* marine-based incident records over 4 years from 2005 to 2009 were analysed, totalling 2968 incident records, from 4546 individual SAR subjects.

- Incident distribution is not representative of the NZ population, with under-representation in Auckland, Canterbury and over-representation in Wellington, Northland, Tasman and Marlborough Regions
- The regional distribution of incidents does not match up well to the distribution of Marine SAR volunteers. There is a relative over-representation of incidents versus volunteers in Wellington, Tasman, Otago and Nelson regions
- 94% of Marine incidents involve NZ subjects
- Almost all (90%) incidents originate from recreation activities – of these, Boating-general is the largest source. A large contributing activity is Shore-based fishing/diving/gathering (a specific profile is presented in the main report)
- Subjects are predominantly male (85%), with an over-representation of subjects in the 20-49 yr range. Compared with Land-based SAR subjects and the NZ population as a whole, Marine subjects tend to be more middle aged
- Unlike the case with Land-based incidents, Marine subjects are largely representative of New Zealand population
- For NZ subjects, most incidents occur in their home regions

MARINE PROFILES - AT A GLANCE

Health: 65+ age group (Marine-based only)

139 Marine subjects: males heavily over-represented (95%), ethnically representative, most occurring in home regions.

Recreation: Shore-based marine fishing, diving and gathering

102 Marine subjects, male dominated (88%), over-represented in 20-29 age group, ethnically non-representative (with over-representation of Mäori, Polynesian and Asian groups), few Tourists (6%), geographically concentrated with an over-representation in Auckland region (40% vs. 32% population), mostly in subjects' home regions (92%).

Tourist: All Marine-based incidents

157 Marine subjects: 5% of all Marine subjects, the main nationalities (>10%) are North America, Australia, UK, Other Europe and Germany, with over-representation of Germany and other Europe relative to visitor arrival figures; predominantly male (76%).

Geographical concentration of incidents in Otago, Auckland and Bay of Plenty regions, with Tourists comprising large proportions of Marine subjects in Otago, West Coast and Nelson (all over 20% of subjects).

PROJECTIONS TO 2030 - KEY INCIDENT PROFILES

Four key incident type projections were developed drawing from various source data:

Land-based incidents:

An imbalance of demand over supply is predicted (with a growth in the number of incidents of 25% from 2010 to 2030; or a 4% increase when adjusted for expected population growth during this period). The outcome for the West Coast region is for a greater imbalance of demand over supply (with both the number of incidents and the number of incidents per 10000 residents increasing 25% by 2030 – refer Fig. 1 overleaf).

Alzheimer's/Dementia incidents:

Very high rates of growth predicted in incidents for Marlborough (93% increase), Northland (88%), Nelson (80%), Bay of Plenty (78%), Taranaki (63%) and Auckland. Auckland has both a large increase in incidents (104%) and in the number of incidents adjusted per head of resident populations (a 53% increase). The projected outcome for Auckland region is an imbalance of demand over supply.

Marine incidents:

A future increase in the number of incidents nationally is predicted. However, when adjusted for growth in the NZ population, the projection is for a slight reduction (-2%) in the number of incidents per 10000 residents. Most regions show static projections with the exception of Northland, which is projected to experience an increase of 9% in incidents per 10000 residents. At a national level, the projected outcome is a balance between supply and demand.

Marine shore-based fishing, diving and gathering incidents:

Strong increases in both the number of incidents (43%) and incidents per 1000 residents (20%) nationally are predicted nationally. The projected outcome is one of tension, particularly for those regions where non-European ethnicities are well represented (principally Auckland and Wellington).

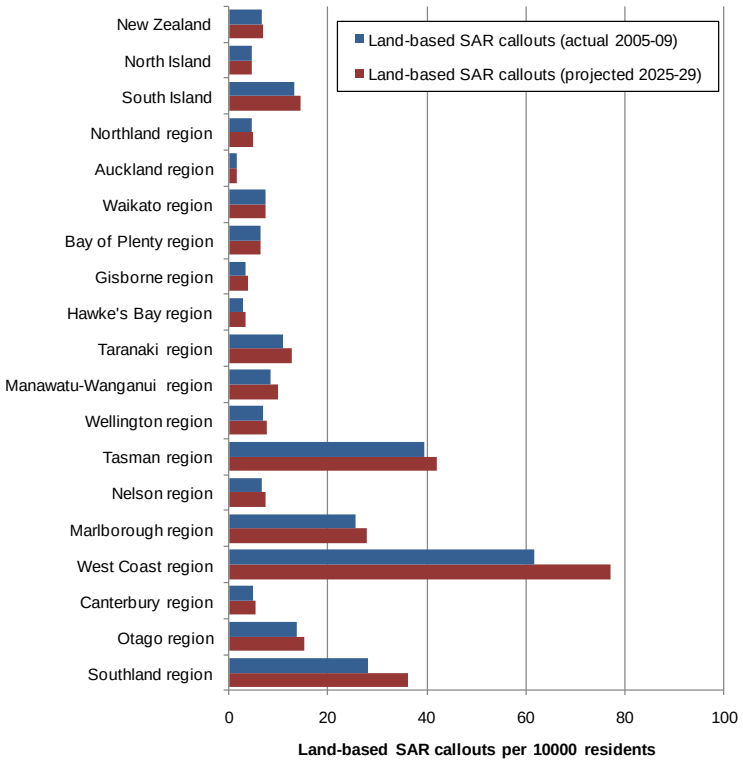

Fig. 1: Land-based SAR incidents – present vs. estimated future.

Volunteer profiles were developed using information from SAR group membership databases (with necessary precautions taken to ensure that no individual member could be identified from this information).

The various SAR volunteer pools can be broadly characterised as:

- fixed/finite (relative to the less-bounded scale of international tourism)
- predicted to be static or shrinking in several regions/functions
- diverse and unevenly distributed
- gender imbalanced - with males accounting for more than three-quarters of membership in all but one group (Surf Life Saving)
- aging (which is of immediate concern for AREC, Coastguard and LandSAR – refer Fig. 2)
- predicted to become increasingly rare in the future, due to various factors including diminishing potential volunteer pools and increasing dependency ratios
- expected to have a wider range of skill demands in the future, due to increasing uptake/use of technology for SAR
- predicted to be more difficult to resource regionally, due to increasing competition for scarcer volunteer resources

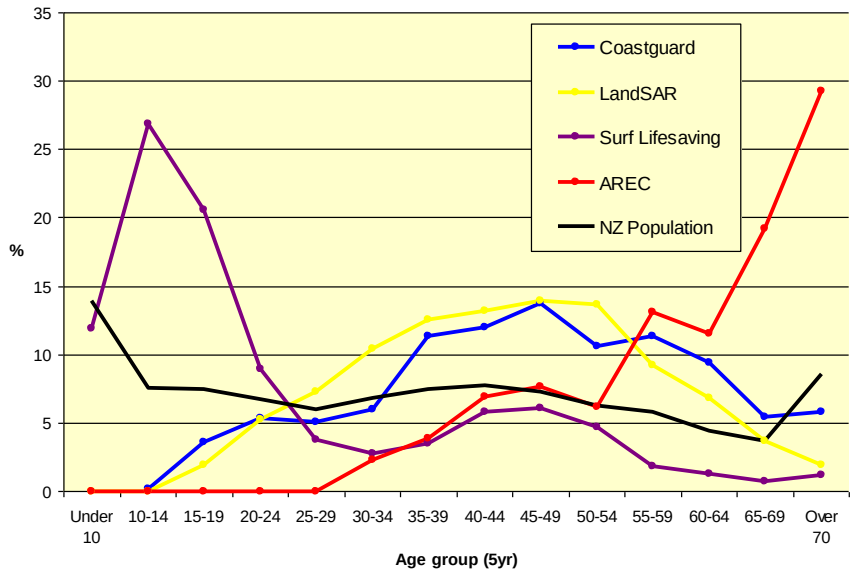

Fig. 2: Age structure of SAR volunteer agencies – vs. NZ population.

The **broad-brushed future** picture for SAR, distilled from the more detailed patterns and projections described earlier, is one of **a changing context** (in accordance with the changing face of NZ's population) and **changing set of tensions** (manifest through imbalances of demand over supply). Certain SAR regions are predicted to experience these tensions more vividly than others – especially where both demand and supply factors will work in unison to generate greatest tensions. This is demonstrated mostly clearly with the projected future of Land SAR incidents on the West Coast - projected to experience a large growth in demand for SAR and increasing incidents, along with a reduction in SAR supply (due to a shrinking and rapidly aging population base).

Tensions are expected in some regions and not others, varying depending on incident type. The projected future is one of **greater extremes in terms of the tensions or gaps between supply and demand**. Some regions are better placed to address pressures for increased SAR response than others, due primarily to the intractable dynamic of population growth (e.g., Auckland). Looking forward, there are opportunities for SAR to continue to **adapt to its changing context** – including greater **focus on recruitment and retention** of SAR capability/capacity in certain regions/SAR agencies, and across all regions/agencies in respect of the role and deployment of females, youth and a broader range of ethnic groups. Making SAR volunteering attractive to those particular groups will require a re-think of how SAR volunteers can be utilised, their motivations and expectations, and the changing demands for the mosaic of skills and expertise required to deliver the most relevant and effective SAR response for the future.

So, what's up for SAR in the next 20 years?

- **Larger resident populations** in most regions, especially Auckland, with some regions projected to decline in population size.

- **An aging population** which is accentuated in certain regions, such as Marlborough. This will pose issues for SAR in terms of diminishing population/resource base to mobilize volunteer capacity and also growth in the number of aged related incidents, such as Alzheimer's/Dementia.

- **A large rate of growth of tourism** – resulting in greater occurrence of SAR incidents and in respect of certain incident types, such as Tramping. These demands will occur in certain regions that will be least resourced to respond - based on static or diminishing potential volunteer pools.

- **Future strains on SAR volunteer supply** – both in terms of numbers of volunteer prospects and also in relation to regional-based funding. Regional imbalances in volunteer supply (vs. resident population and vs. numbers of incidents) warrant review by SAR agencies. Gender and age imbalances observed in the existing SAR volunteer populations may also need to be addressed in order to overcome projected constraints.

The more **detailed pictures,** by way of profiles, illustrate more specifically the contrasting future for SAR. These highlight the diverse range of operational contexts and demands driving each of the main SAR agencies. On the basis of projections used, there will be tensions in terms of excess demand for SAR services in three of the four modelled incident types:

i) Land-based incidents (due to recreation/tourism pressure)

ii) Alzheimer's/Dementia (based on NZ's aging population); and

iii) Marine shore-based fishing, diving

and gathering incidents (based on ethnicity projections).

The supply and demand factors considered as part of this study have, in themselves, implications for SAR. The profiles enable comparisons to be made across the volunteer SAR sector, and highlight regional differences within. Certain features stand out as having importance for SAR readiness in the medium to long term, particularly in relation to aging volunteer profiles. These are demonstrated most clearly with AREC and also, to a lesser extent, with LandSAR and Coastguard.

Findings presented on the **amount of volunteers relative to the number of incidents** for each region help to identify those regions that are either above, or below average in terms of relative volunteer resourcing potential for SAR. **Those regions where resourcing is below-average warrant closer examination in order to determine whether they require specific management interventions targeted at increasing retention and recruitment of volunteers**. This should be done in light of the longer term projections identified for each region. Examples of relevance here for LandSAR include Wellington, Southland, Auckland, Tasman and Bay of Plenty regions; and for Coastguard/Marine: Wellington, Tasman, Otago and Nelson regions.

In general, the findings of this study point to the need for **SAR strategic planning** to take account of the projected changes in demand for SAR and also changes in SAR response capability/capacity. These changes are driven by long term demographic change resulting in an aging and ethnically more diverse population, with a greater number of more diverse activities (and likely demands for SAR). Findings suggest a reduction in future volunteer capacity/capability in certain regions (e.g., West Coast) or functions (e.g., Radios - AREC). Technology is a key variable which is anticipated to affect SAR at a number of levels, including both the potential for improving SAR efficiency and effectiveness, and at the same time creating further challenges in terms of changing incident demands and volunteer skill requirements. Challenges lay ahead in terms of greater resource competition for SAR (particularly in regions projected to age most rapidly).

Findings highlight opportunities for SAR agencies to **apply management responses** that best suit the specific contexts for each agency/region or incident type. Various potential initiatives are outlined including programmes to:

i) **improve volunteer recruitment and retention (including training)**;

ii) **grow roles for women & youth** in SAR;

iii) create **'OneSAR' career paths** and training opportunities; and,

iv) **evaluate regional and central resourcing** (particularly in relation to pressures from greater professionalising of SAR).

The solutions required to meet the challenges of the future for SAR will be different to those of the past. SAR will need to respond in new ways to a changing context, to different pressures, issues and opportunities. Among these will be pressures associated with increased incidents relating to increasing numbers of tourists, dementia-related incidents and technological changes affecting both the occurrence and response to all incident types. Concurrent with those changes will be shifts in the response capacity needed to deal with incidents in the future (i.e., more urban based incidents) and necessary skill requirements (i.e., more technologically-savvy). Overall, the study demonstrates the importance of information sources as a key driver, or' fuel', for projecting out the future for SAR

KEY RECOMMENDATIONS

i) The profiles and projections presented in the report provide a baseline against which future changes can be tracked. There are considerable opportunities to **improve baseline data and their alignment** in accordance with a 'OneSAR' principle.

   a. Improve consistency of information collection for SAR incidents, subjects and volunteers

   b. Consider extending information collection on SAR volunteers to include ethnicity, occupation and interest/skill areas

ii) Identify/apply initiatives for **improving SAR volunteer recruitment and retention**, including identification of common pathways for long term volunteer involvement:

   a. Target agencies/regions projected to experience greatest tensions

   b. Focus on motivations and satisfactions of SAR volunteering

   c. Identify and consolidate volunteer roles across agencies/sectors

   d. Review resourcing and roles to take account of incident projections and current and likely developments in technology

iii) Develop paths and models for **training SAR volunteers** based around the SAR Core Competency Curriculum. Needs for training can be prioritised based on the findings on this report (addressing, for example, specific gaps and needs in relation to aging volunteer-bases for LandSAR and Coastguard)

iv) Explore opportunities to **apply GIS** based systems for SAR operations, including remote-access search decision/operational support systems

v) Take a **coordinated approach to future research and information** management across the SAR sector

vi) Aim to reduce the number of incidents through **incident prevention programmes targetting at-risk individuals and groups** based on their respective profiles (e.g, working in conjunction with relevant agencies to direct education and safety initiatives targeting tourists of specific nationalities visiting National Parks) or on broad-based initiatives (e.g., in relation to use of GPS and other location/communication technologies and search-aids such as beacons).

vii) The literature review undertaken as part of this project identified large gaps in SAR research generally, and specifically in population-based studies and projecting/forecasting future incidents. A series of recommendations for **specific applied research** and other detailed recommendations, including the opportunity for further incident projections, are identified in the main report.

FURTHER INFORMATION

This summary report and other resources, including the full report from this study, are available from SARINZ: www.sarinz.com.