Predicting SAR response and operational requirements

NZ population projections through to 2030

For SARINZ

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B Kazmierow – Recreation and Tourism Consulting

Overview

- Origins

- Sponsors:
  - SARINZ
  - NZ Oil and Gas

  Supporters – SARINZ stakeholders and broader network

The project

Aim:
- Identify
  - foreseeable patterns & trends in SAR incidents
  - operational responses through to 2030

Primary objectives:
- Assess how SAR volunteer response will be affected by projected population changes
- Identify changes in the nature of SAR callouts over the next 20 years
- Identify how these will impact training needs

Structure

1. Approach
   - Model
2. Demand: NZ population
3. Key demographic profiles & projections
   - Aged & tourism
4. Supply
   - Agency profile contrasts:
     - Surf v. AREC
     - Coastguard v. LandSAR
5. Incident type profiles
6. Trends
7. Summary
   - Recommendations

Study approach

- Develop and apply a conceptual model

- Analyse relevant secondary data sources
  - demographic projections
  - incident records
  - other information sources
  - review of relevant literature

- Undertake projections

Model

- Demand factors
  - Incident profiles – general and targetted
  - Forecasts
    - tourism/recreation
    - other (including census population, age, ethnicity)

- Supply factors
  - Volunteer profiles and projections

- Outcomes
  - Equilibria or tension?
  - Directions of change
  - Implications for response

DEMAND FACTORS

OVERALL SAR OUTCOMES

SUPPLY FACTORS

Overall NZ population demographic characteristics and projections

SAR call-out demographic characteristics – national , regional and targeted segments

Projections and trends
- related to recreation SAR call-out profiles
- related to non-recreation SAR call-out profiles

SAR volunteer demographic profiles – national, regional and targeted segments

Projections and trends
- related to profiles of different SAR volunteer segments (e.g. Surf-lifesaving, amateur radio operators, LandSAR search etc)

NZ recreation – participation, preferences, profiles and capabilities

-National and regional patterns
-Forecast trend

SAR capability/capacity – existing features & trends

- National and regional patterns
- Volunteer training, retention, recruitment status and implications

NZ tourism

-activity patterns and trends
- international and domestic tourists

EQUILIBRIA or **TENSION**
Resulting from the interaction between DEMAND amd SUPPLY factors

The **INITIAL RESULTS** are baseline levels and patterns of SAR incidents

Supply Actions

Demand Actions

The **LONGER TERM OUTCOMES** are future readiness, effectiveness and efficiency of **SAR response**
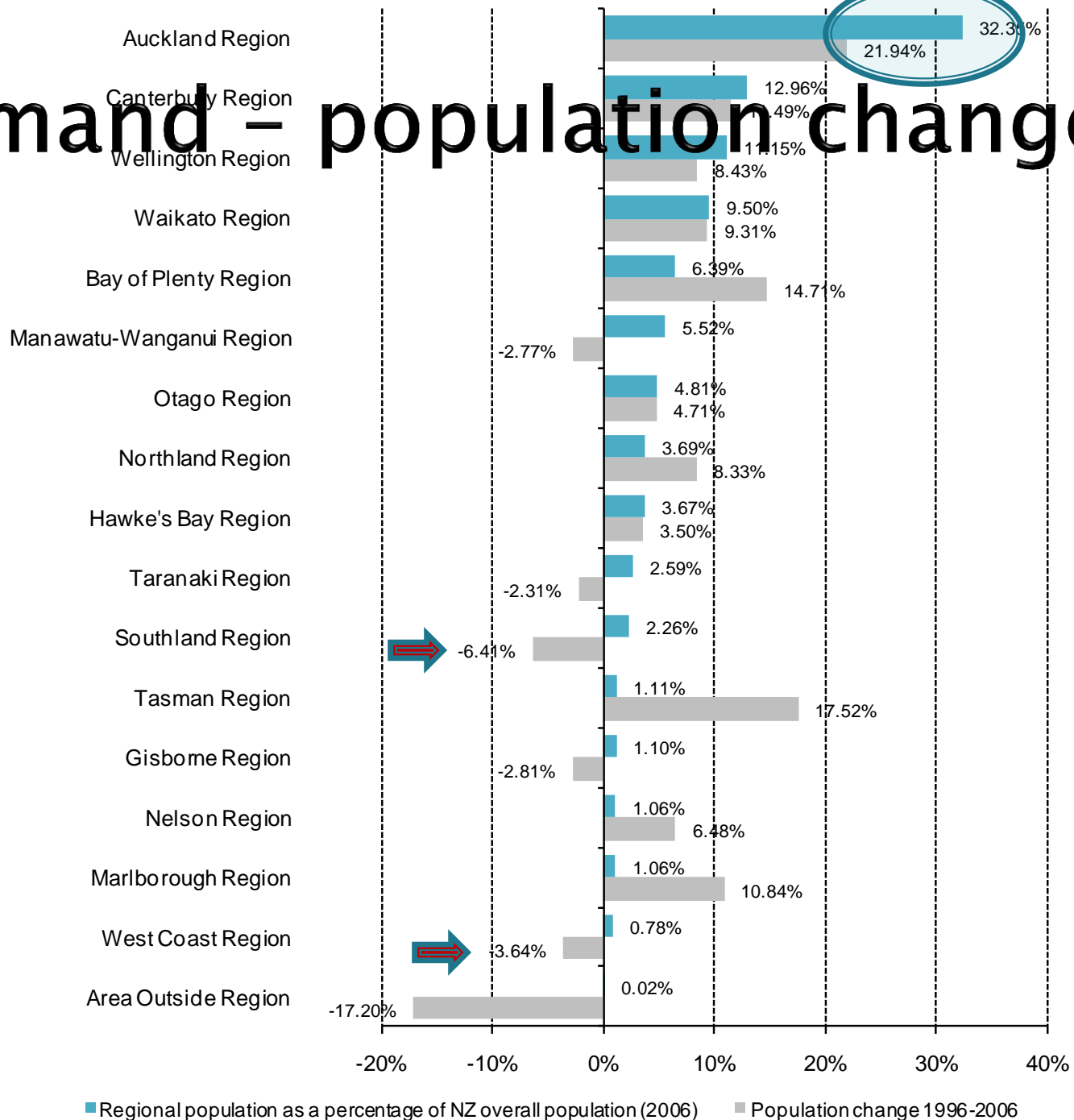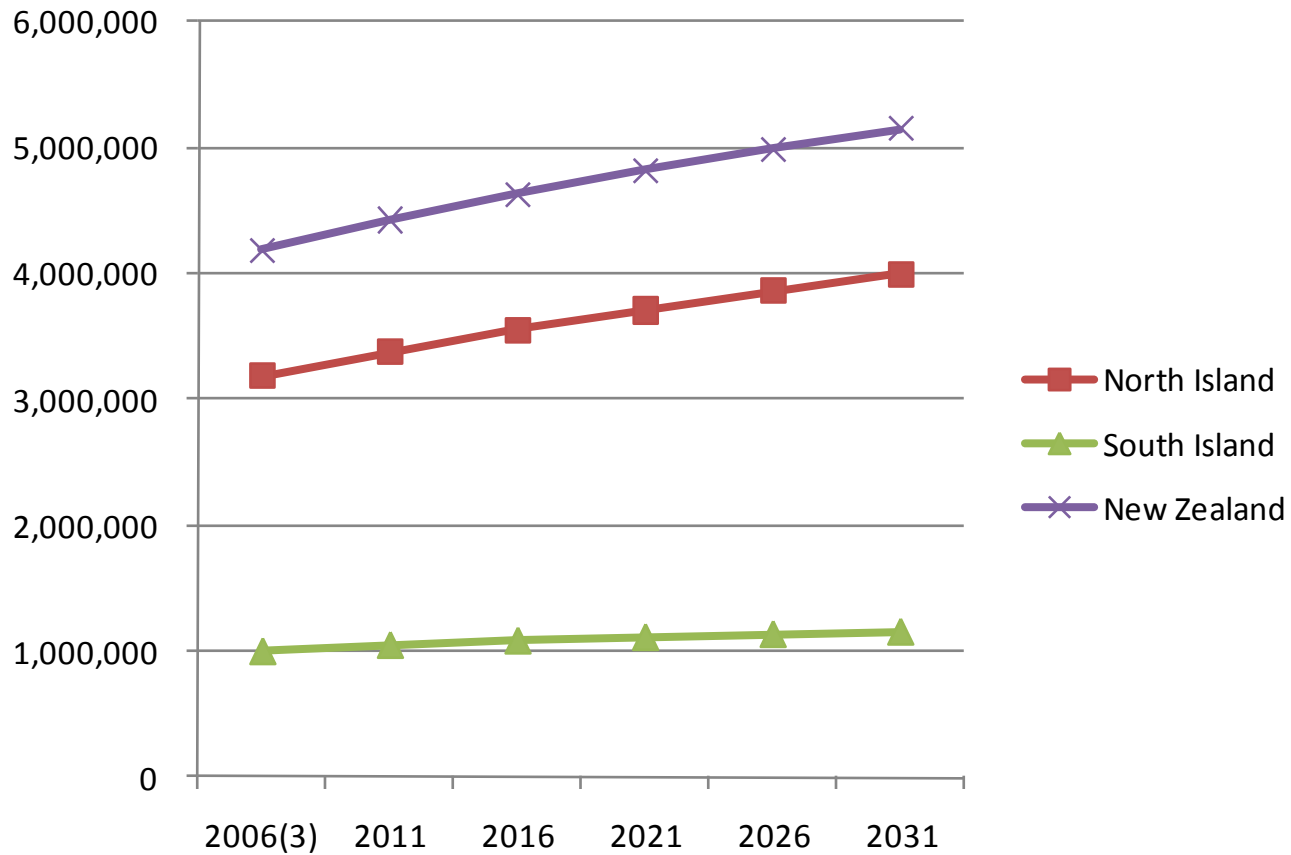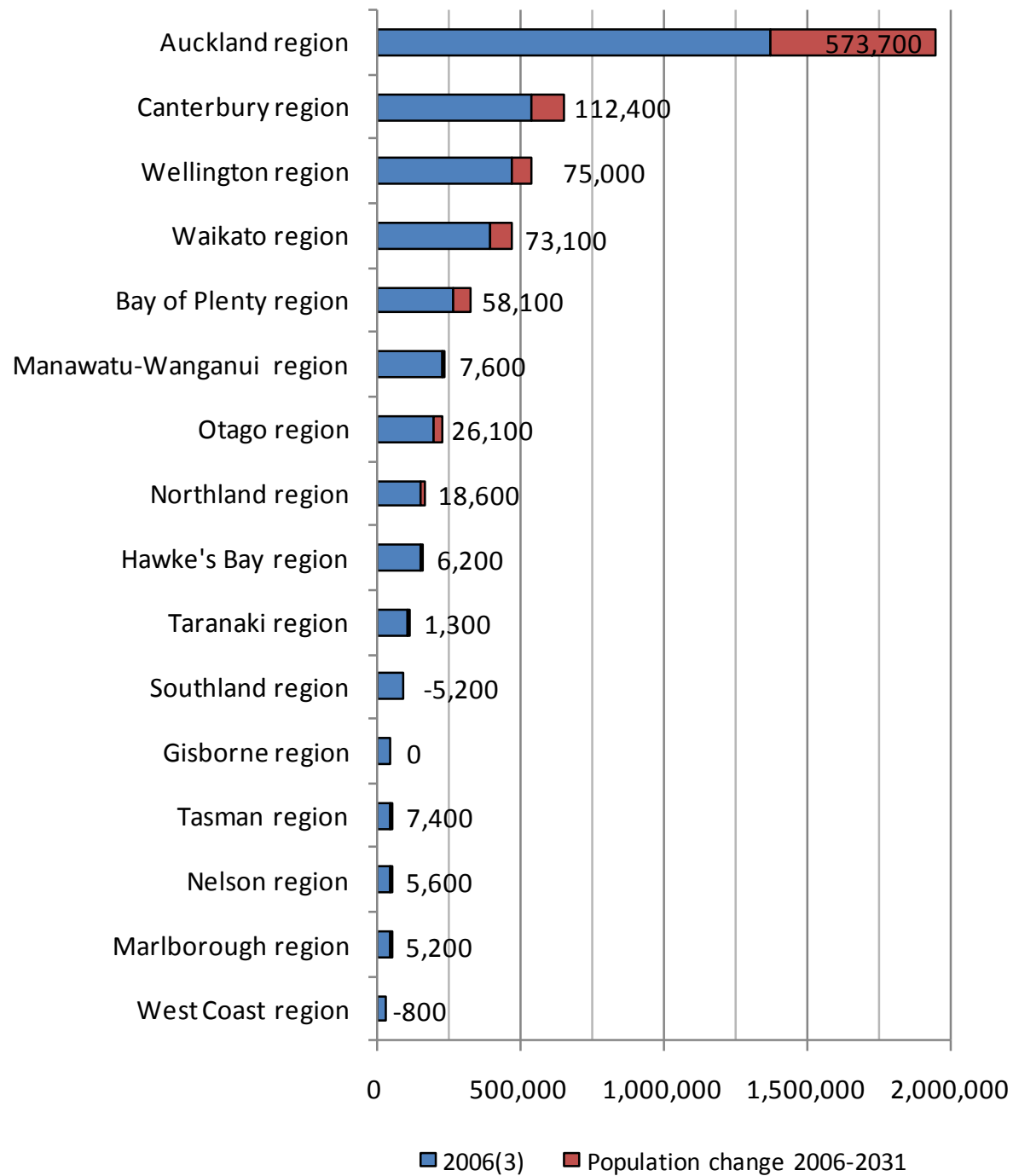
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Demand

- Census
  - Regional distribution
  - Projections
    - Regional populations
    - Age and dependency ratios

Demand – population change
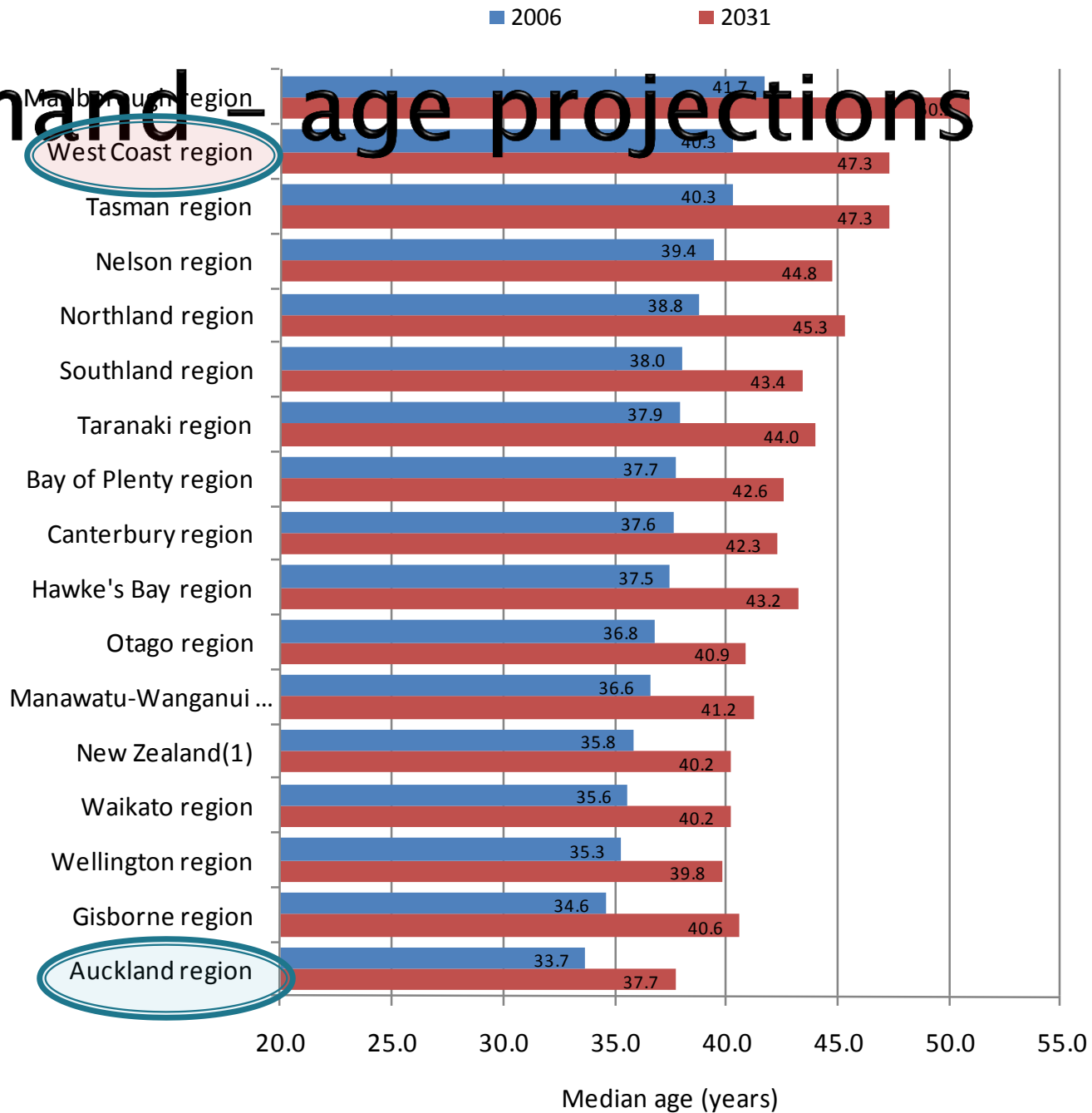

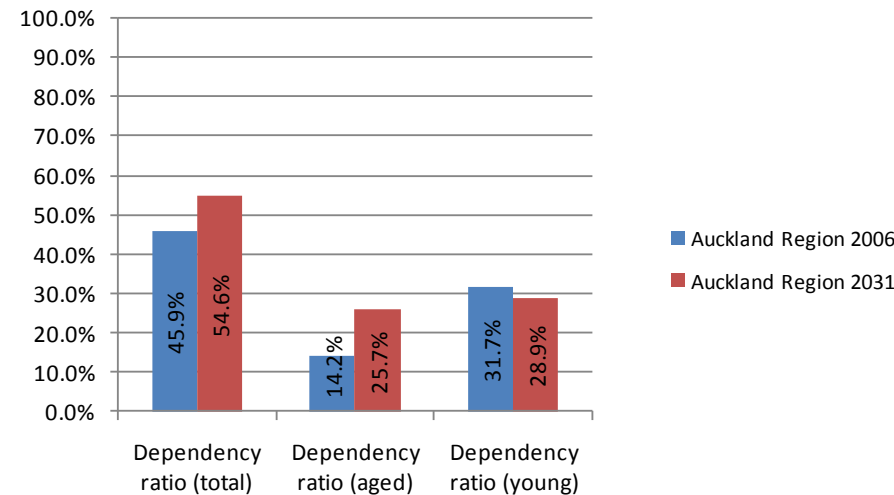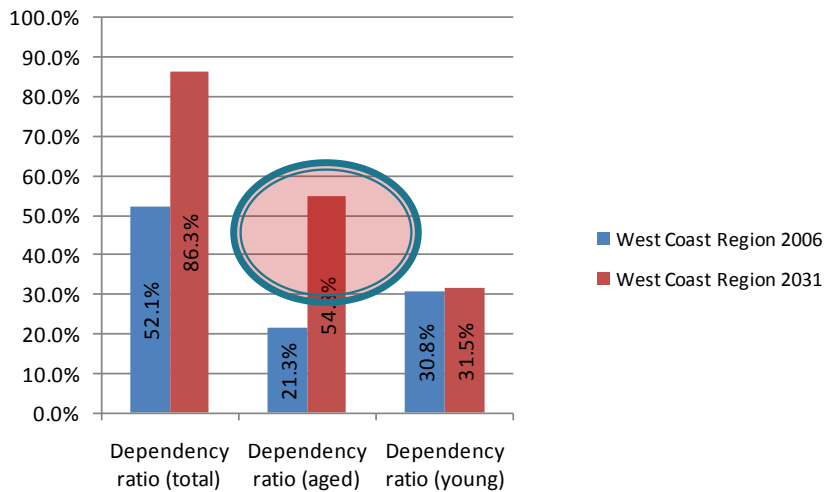| Region		
Auckland Region	32.36%	21.94%
Canterbury Region	12.96%	11.49%
Wellington Region	11.15%	8.43%
Waikato Region	9.50%	9.31%
Bay of Plenty Region	6.39%	14.71%
Manawatu-Wanganui Region	5.52%	-2.77%
Otago Region	4.81%	4.71%
Northland Region	3.69%	8.33%
Hawke's Bay Region	3.67%	3.50%
Taranaki Region	2.59%	-2.31%
Southland Region	2.26%	-6.41%
Tasman Region	1.11%	17.52%
Gisborne Region	1.10%	-2.81%
Nelson Region	1.06%	6.48%
Marlborough Region	1.06%	10.84%
West Coast Region	0.78%	-3.64%
Area Outside Region	0.02%	-17.20%

■ Regional population as a percentage of NZ overall population (2006)   ■ Population change 1996-2006

Demand – population projections

Region	Population
Auckland region	573,700
Canterbury region	112,400
Wellington region	75,000
Waikato region	73,100
Bay of Plenty region	58,100
Manawatu-Wanganui region	7,600
Otago region	26,100
Northland region	18,600
Hawke's Bay region	6,200
Taranaki region	1,300
Southland region	-5,200
Gisborne region	0
Tasman region	7,400
Nelson region	5,600
Marlborough region	5,200
West Coast region	-800

■ 2006(3)   ■ Population change 2006-2031

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Demand – age projections

Legend: ■ 2006 ■ 2031

Region	2006	2031
Marlborough region	41.7	50.5
West Coast region	40.3	47.3
Tasman region	40.3	47.3
Nelson region	39.4	44.8
Northland region	38.8	45.3
Southland region	38.0	43.4
Taranaki region	37.9	44.0
Bay of Plenty region	37.7	42.6
Canterbury region	37.6	42.3
Hawke's Bay region	37.5	43.2
Otago region	36.8	40.9
Manawatu-Wanganui ...	36.6	41.2
New Zealand(1)	35.8	40.2
Waikato region	35.6	40.2
Wellington region	35.3	39.8
Gisborne region	34.6	40.6
Auckland region	33.7	37.7

Median age (years)

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Demand – age dependency

Key profiles

Applying the model
▸ Baseline data

Some examples
▸ Projections for dementia incidents
▸ Projections for incidents based on recreation/tourism and population forecasts
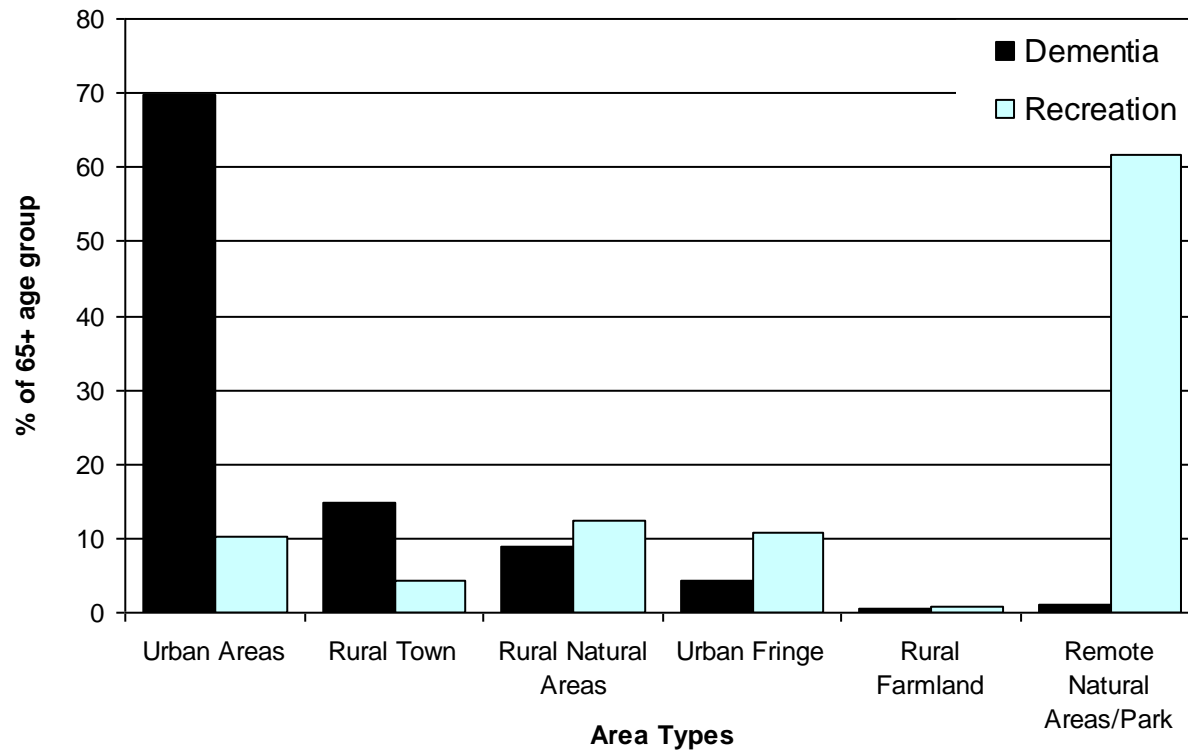
EXAMPLE: AGED

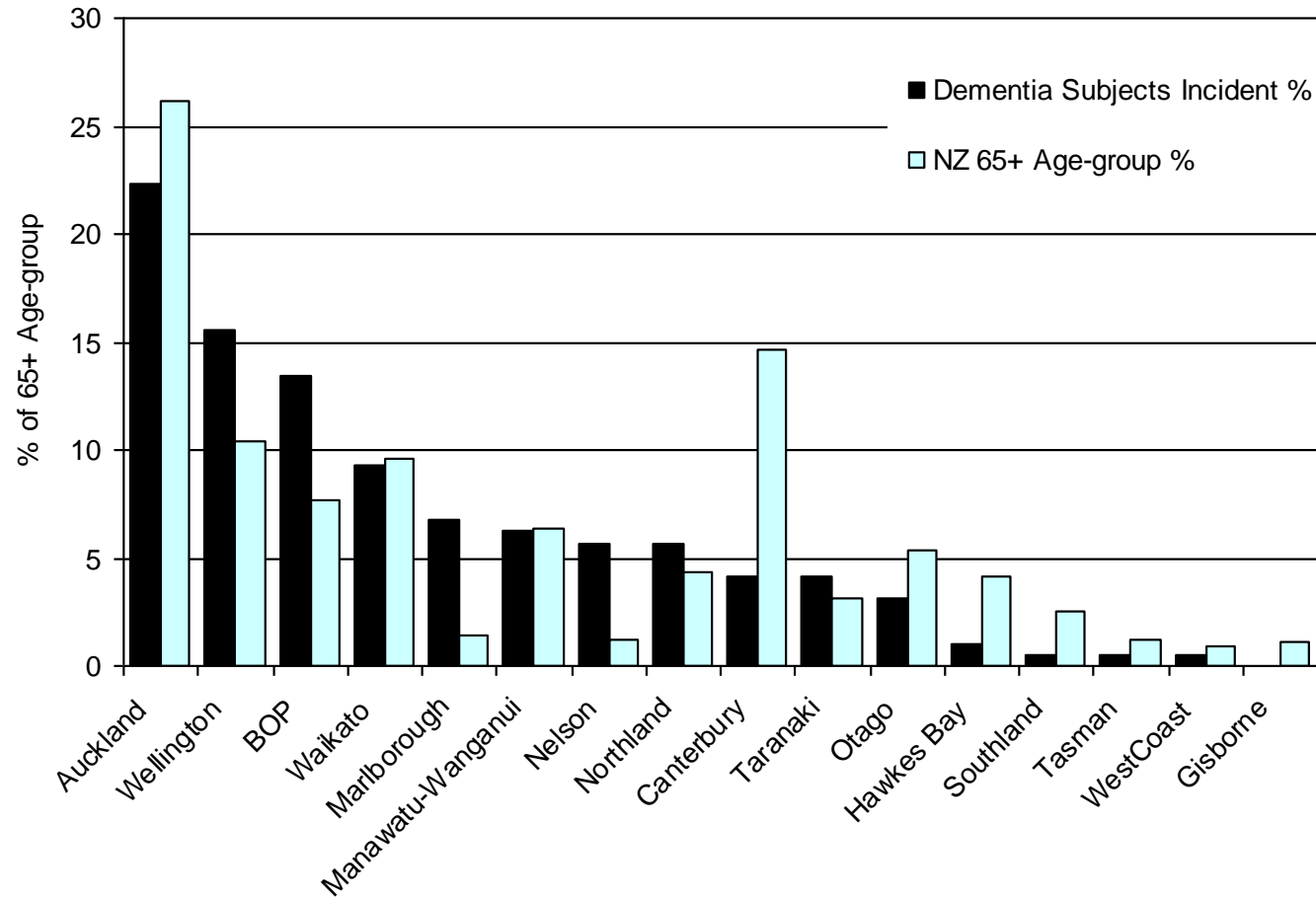# 65+ SAR Subjects – Recreation activities
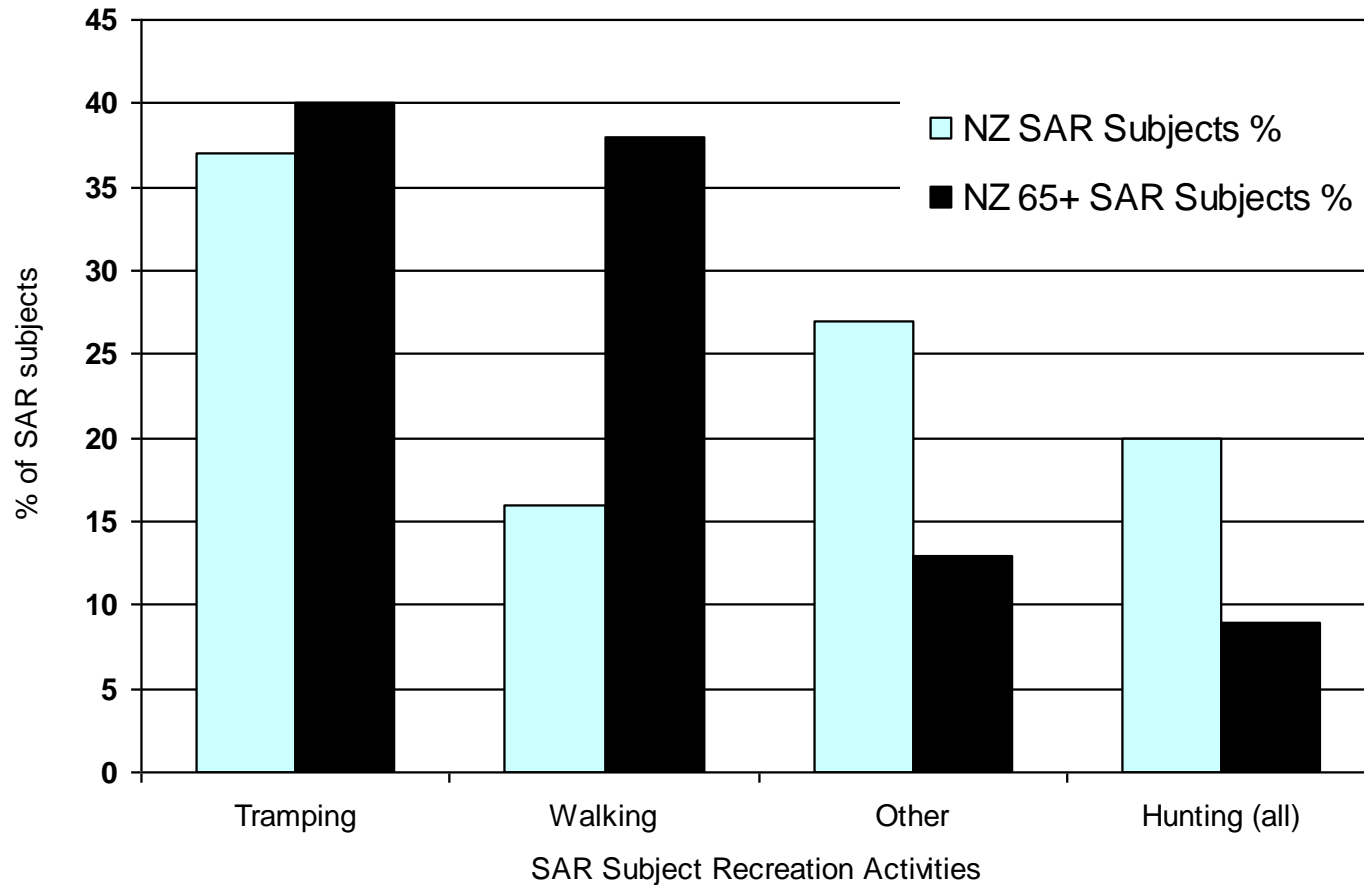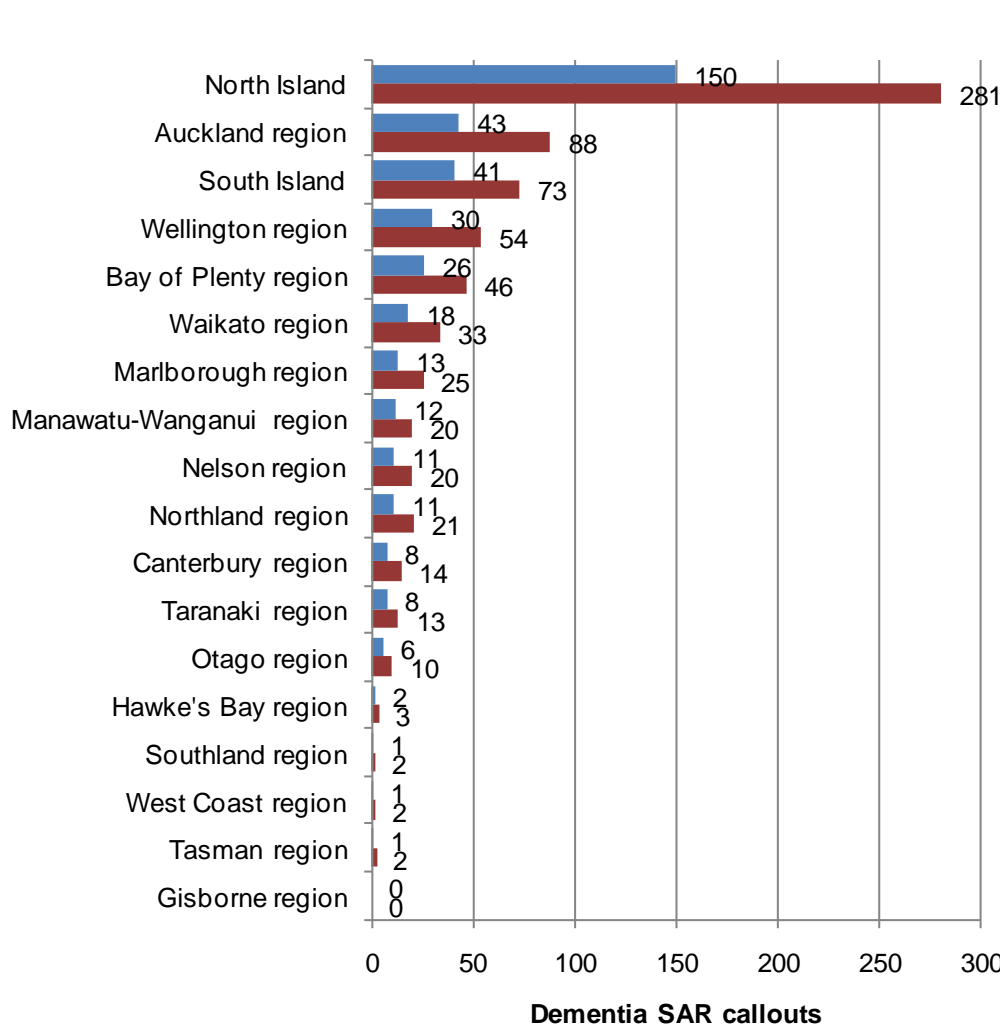
Dementia – Age–profile
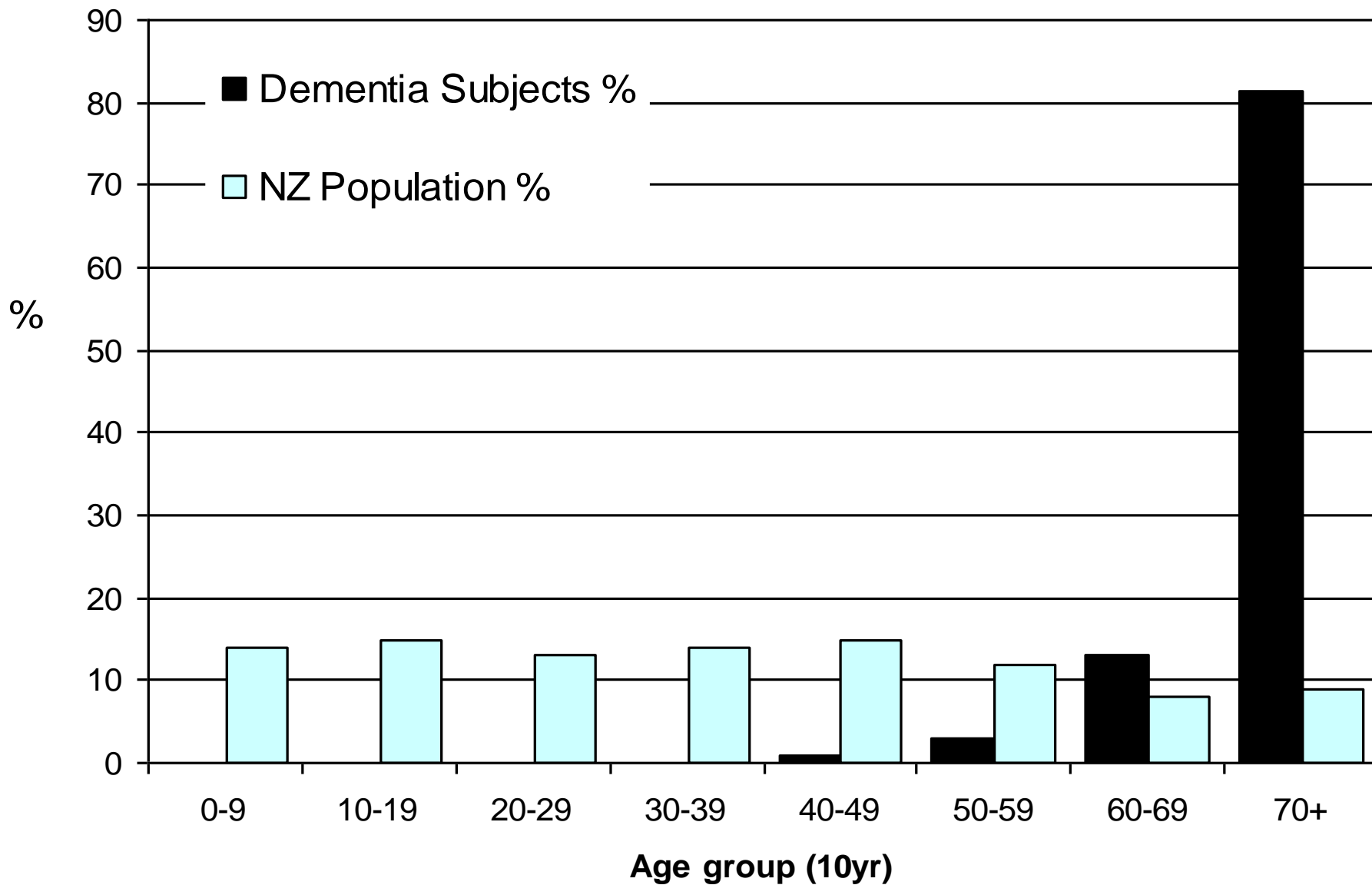
65+ Age-Group – Dementia vs Recreation
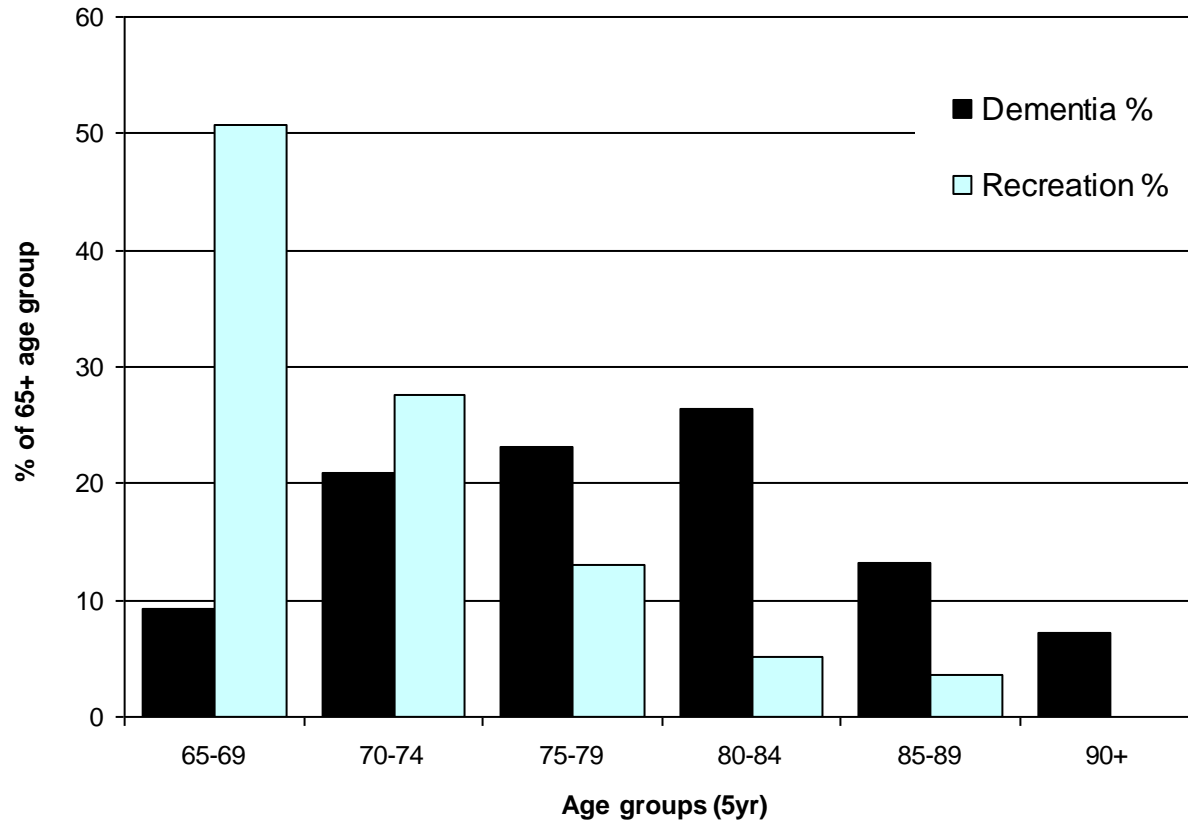
65+ Age-group – incident locations

Dementia incident spread vs 65+ pop

Incident projection – Dementia

Left chart — Dementia SAR callouts

Region	SAR Callouts Dementia Base (2005-09)	Projected SCDB (2025-2029)
North Island	150	281
Auckland region	43	88
South Island	41	73
Wellington region	30	54
Bay of Plenty region	26	46
Waikato region	18	33
Marlborough region	13	25
Manawatu-Wanganui region	12	20
Nelson region	11	20
Northland region	11	21
Canterbury region	8	14
Taranaki region	8	13
Otago region	6	10
Hawke's Bay region	2	3
Southland region	1	2
West Coast region	1	2
Tasman region	1	2
Gisborne region	0	0

Axis: Dementia SAR callouts (0–300)

Right chart — Dementia SAR callout index

Regions (top to bottom): New Zealand, North Island, Auckland region, South Island, Wellington region, Bay of Plenty region, Waikato region, Marlborough region, Manawatu-Wanganui region, Nelson region, Northland region, Canterbury region, Taranaki region, Otago region, Hawke's Bay region, Southland region, West Coast region, Tasman region, Gisborne region

Axis: Dementia SAR callout index (0.00–6.00)

Legend:
- SAR Callouts Dementia Base (4 year period 2005-09)
- Projected SCDB (4 year period 2025-2029) for over 65 year dementia series
- SCDB index (per 10000 residents based on 2006 pop)
- SCDBI (per 10000 residents based on 2026 pop)

Aged incident characteristics

▸ Many 65+ SAR subjects have recreation incidents – especially Tramping and Walking in outdoor settings

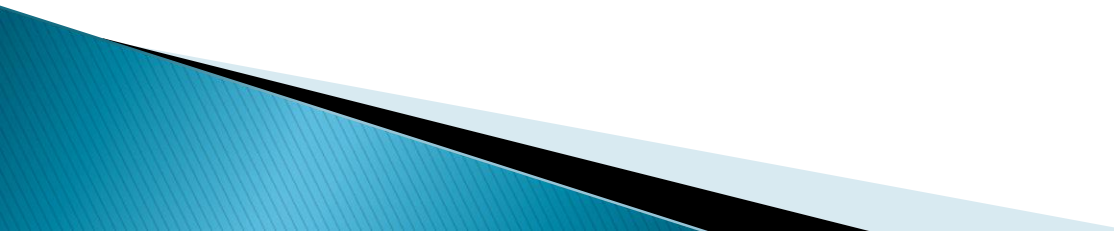▸ But at 65+ the occurrence of non-recreation **dementia** incidents increases

Dementia:

▸ Over 92% urban locations near home, rare anywhere else

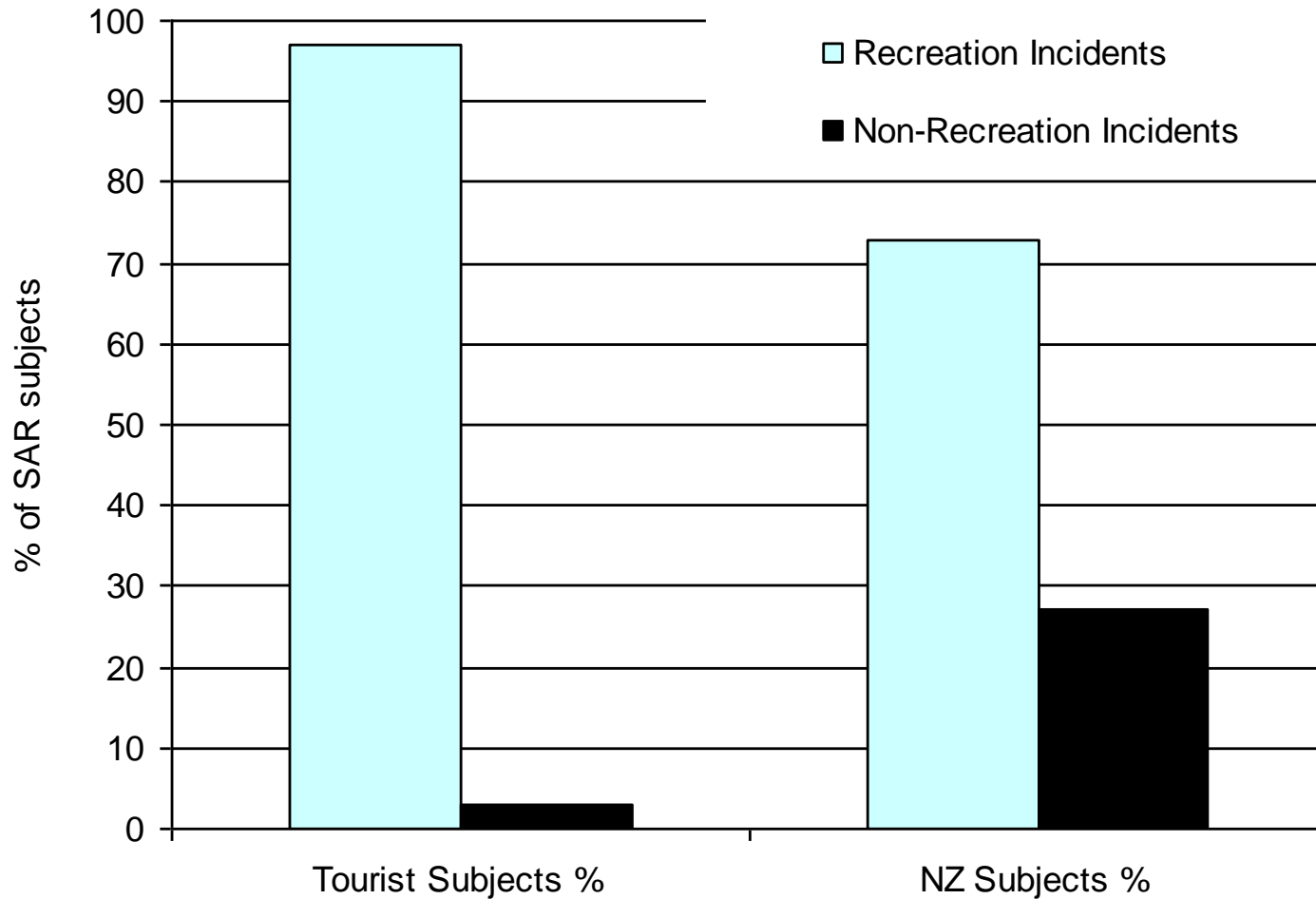▸ Closely linked to population home pattern – sustained urban SAR pressure

EXAMPLE: TOURISM

Tourism and Recreation

- Tourism is a major variable in incident patterns – impact is uneven

- It is independent of NZ population distribution, and impacts more in remote areas

- It significantly boosts the recreation component of SAR demand

- New Zealanders will keep travelling for recreation, but this may change in locations

Demand – SAR subjects – Tourist %
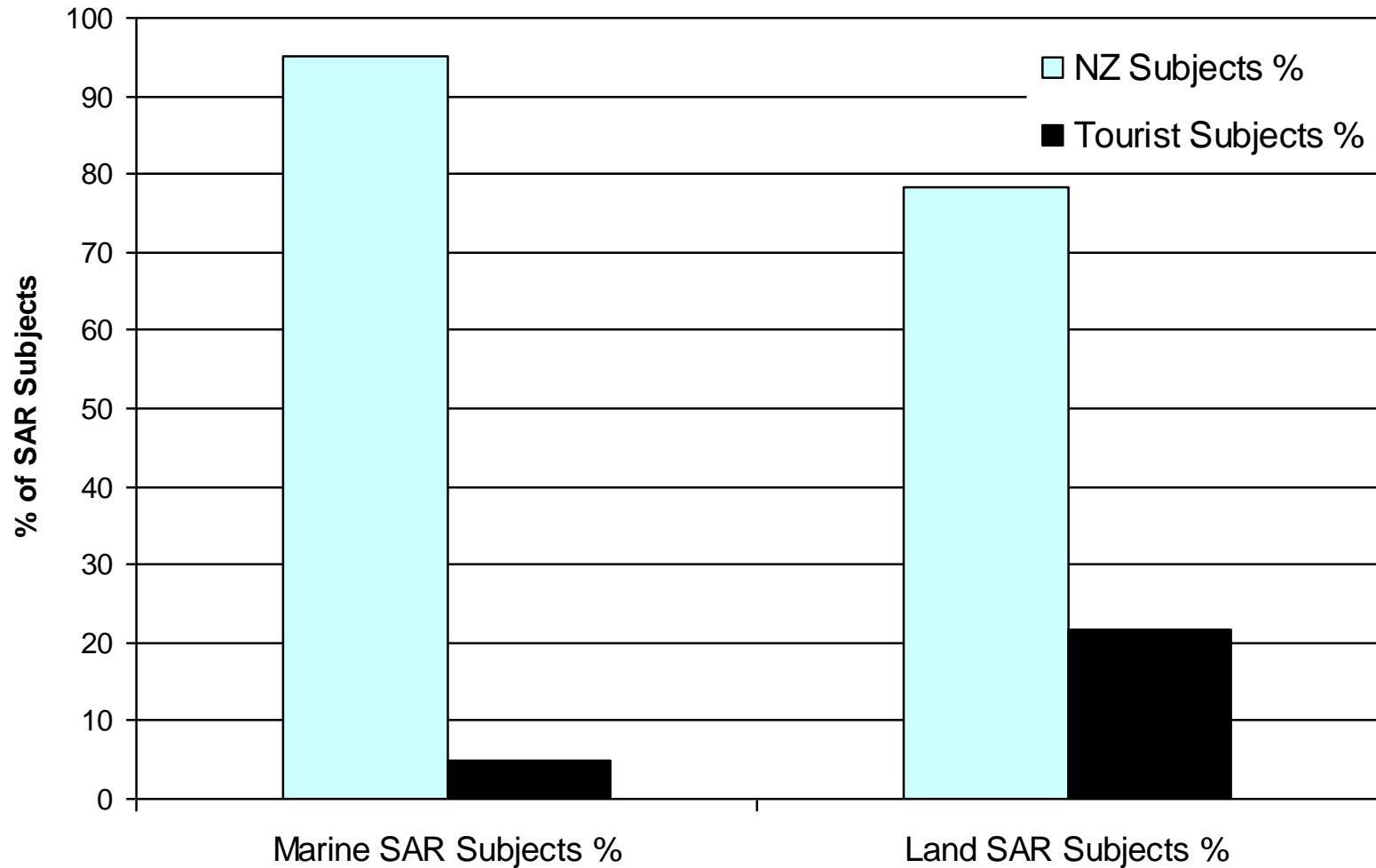
Demand– Tourist Incident activity type

Demand – Tourist proportions in activities
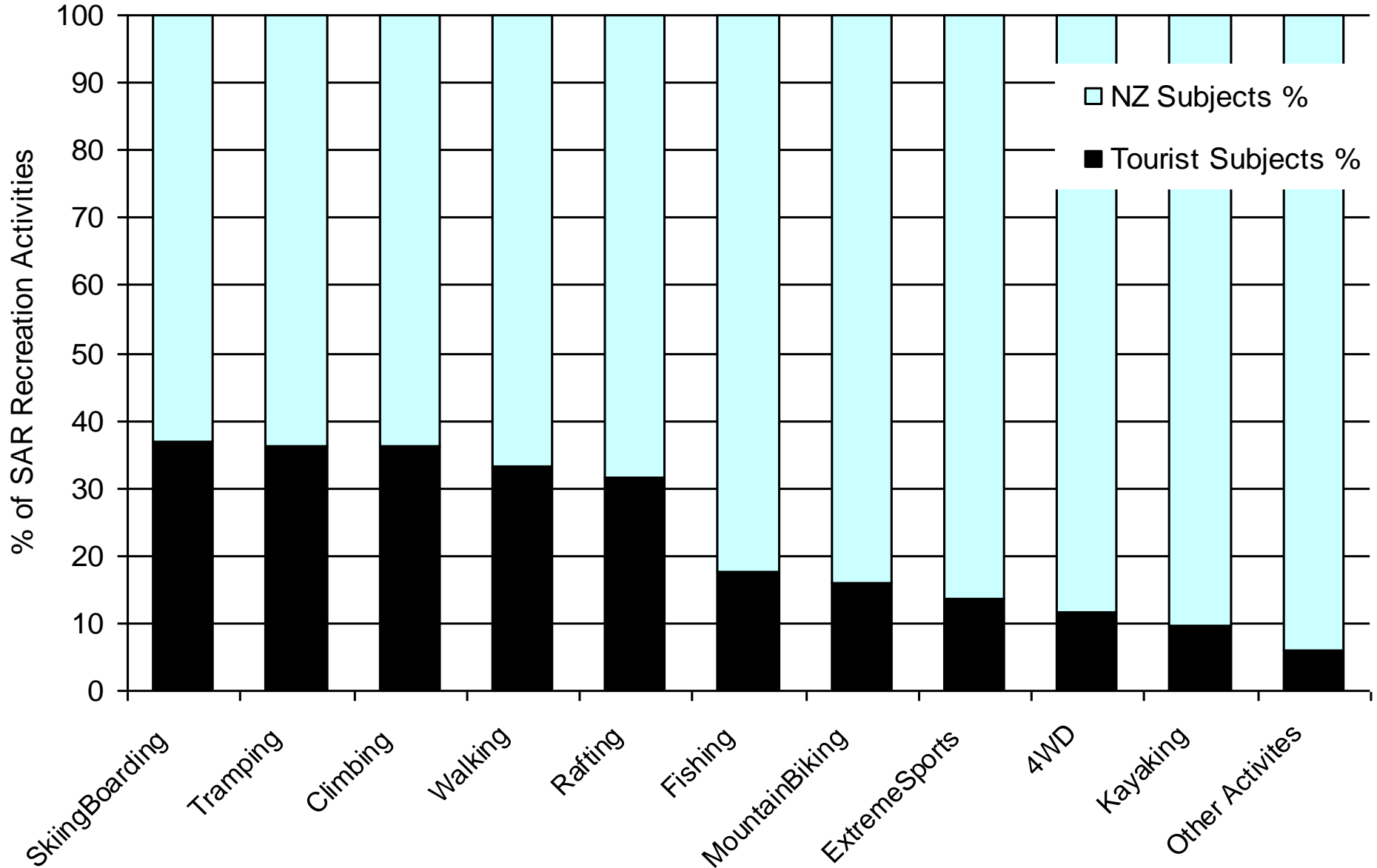
Tourist vs NZ SAR Subjects – Rec Activities

Chart comparing Tourist Subjects % and NZ Subjects % across Top-10 SAR Recreation Incident types. Y-axis: % of SAR Recreation types (0–60). X-axis categories: Tramping, Walking, Climbing, Mountain Biking, Fishing, Rafting, SkiingBoarding, Hunting Deer, Kayaking, Flying activities, Other.
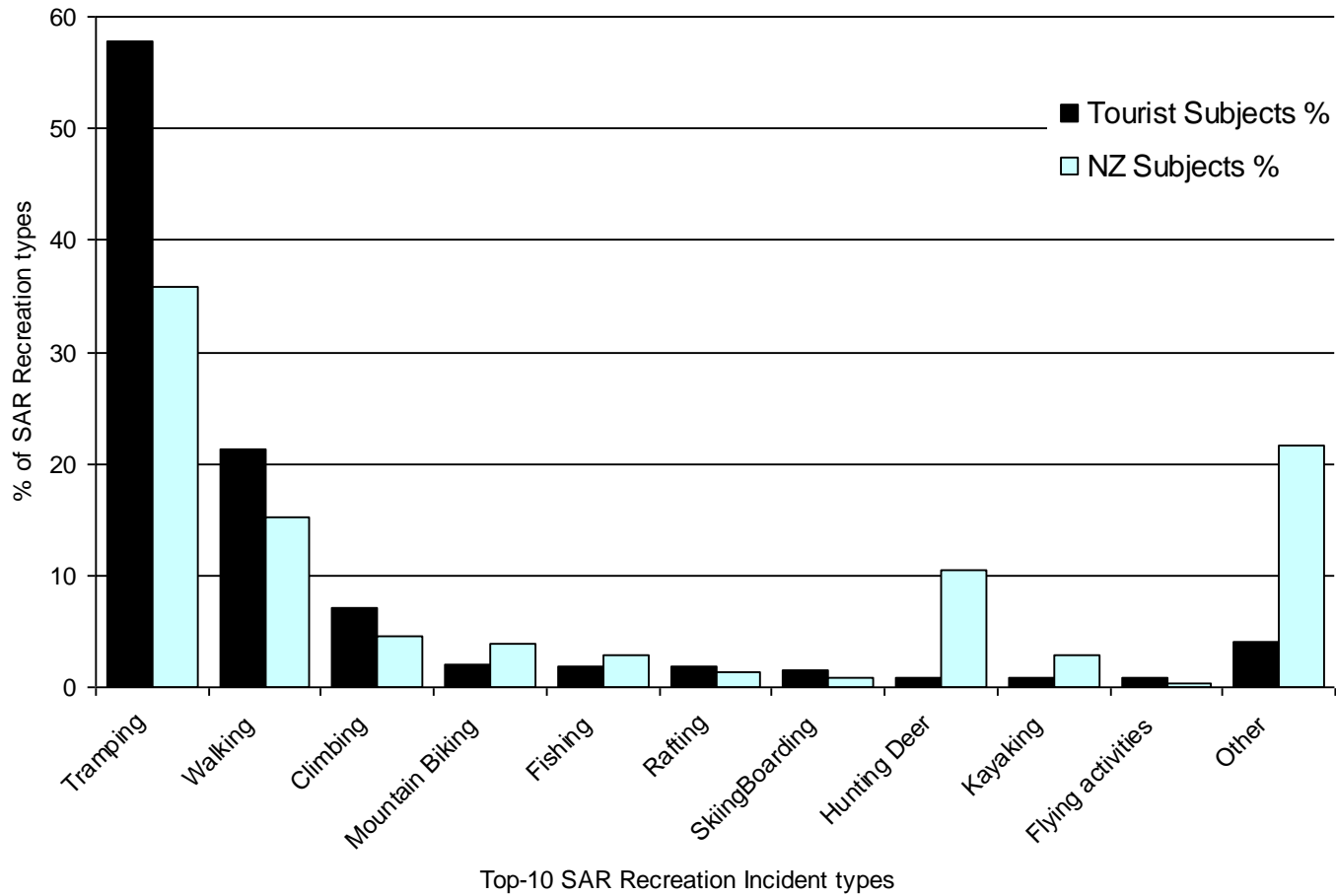
Demand– Tourist proportions in regions
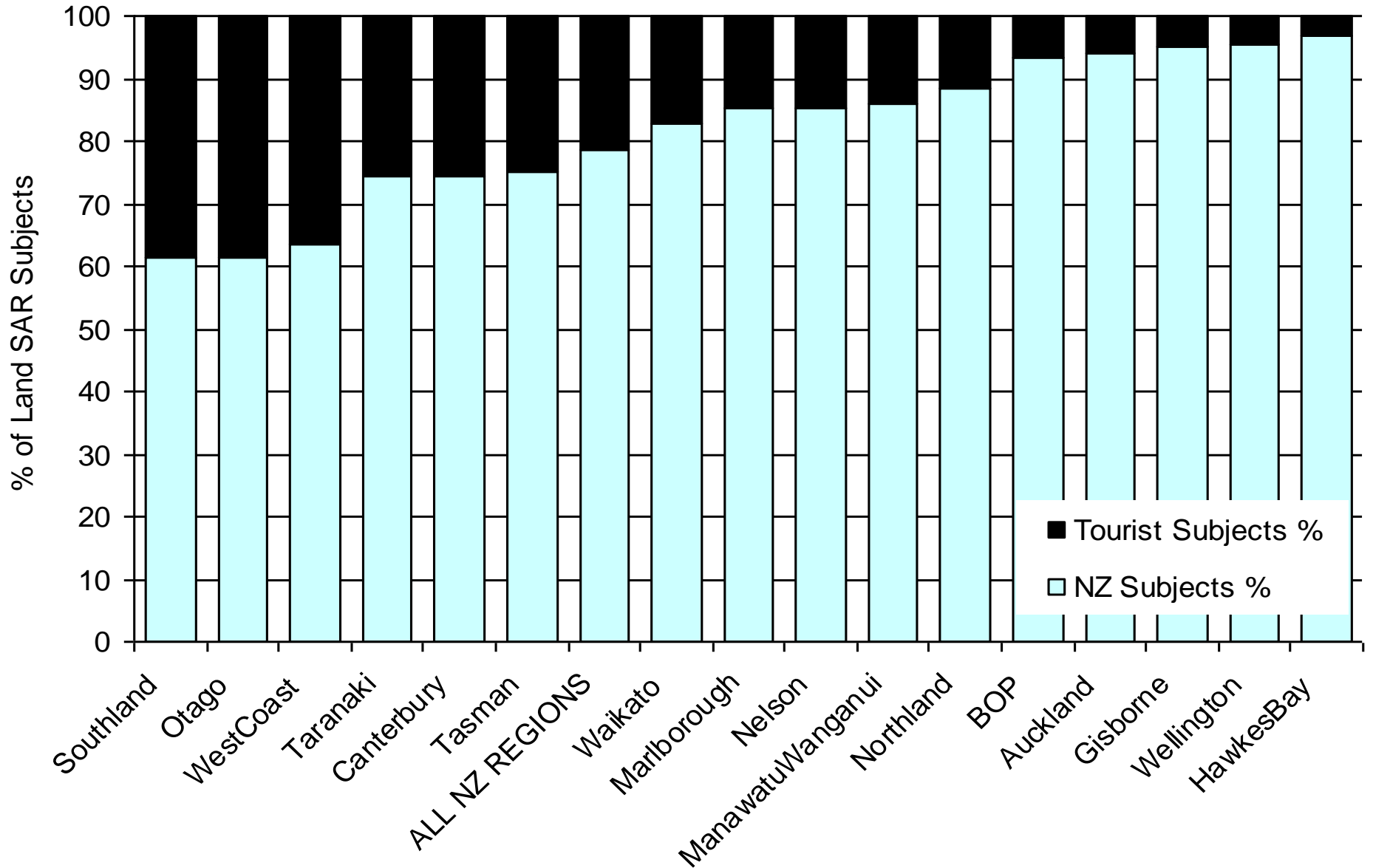
Demand – Non-locals in regions
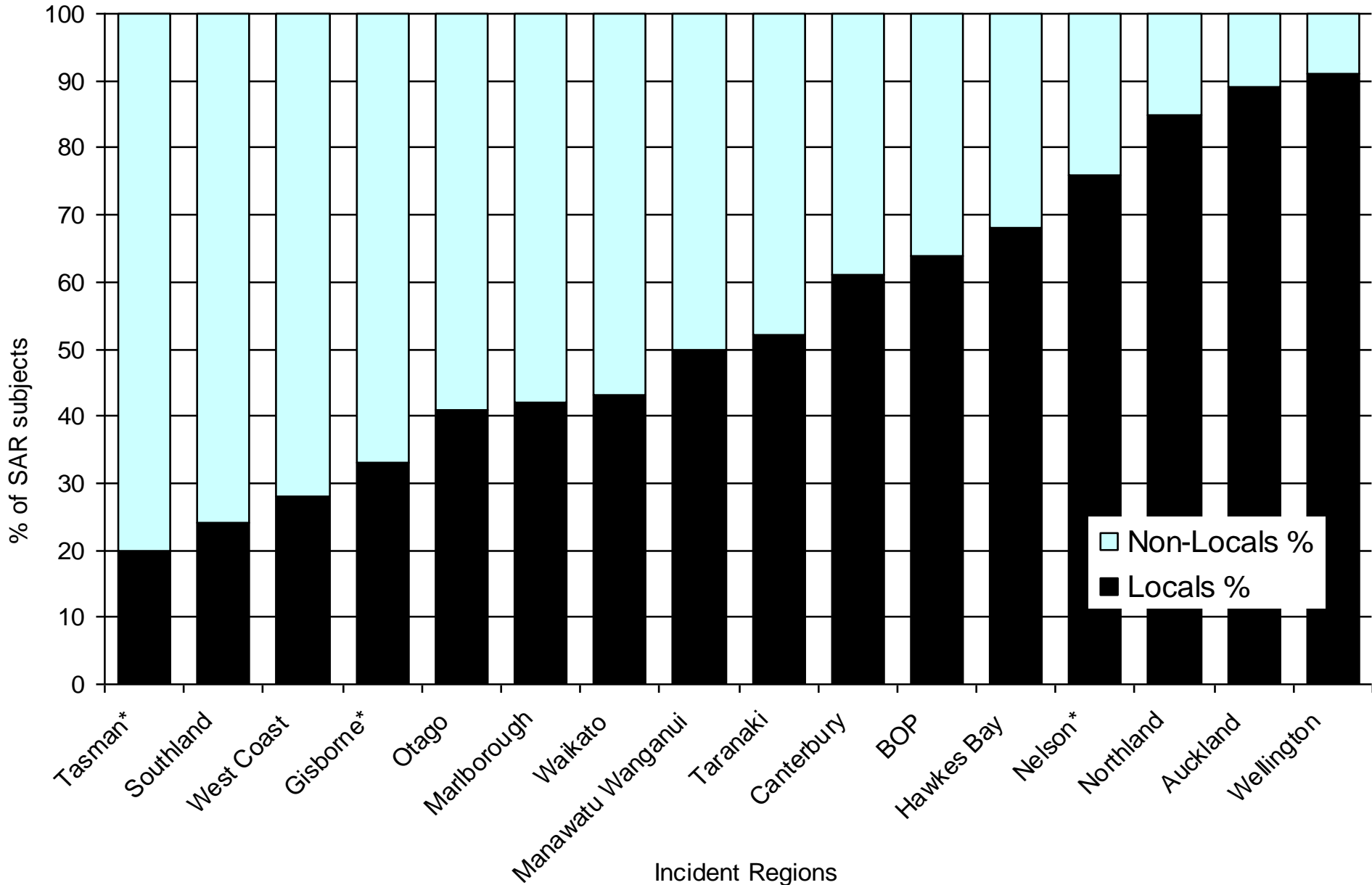
Demand – Non-locals/Tourists in regions
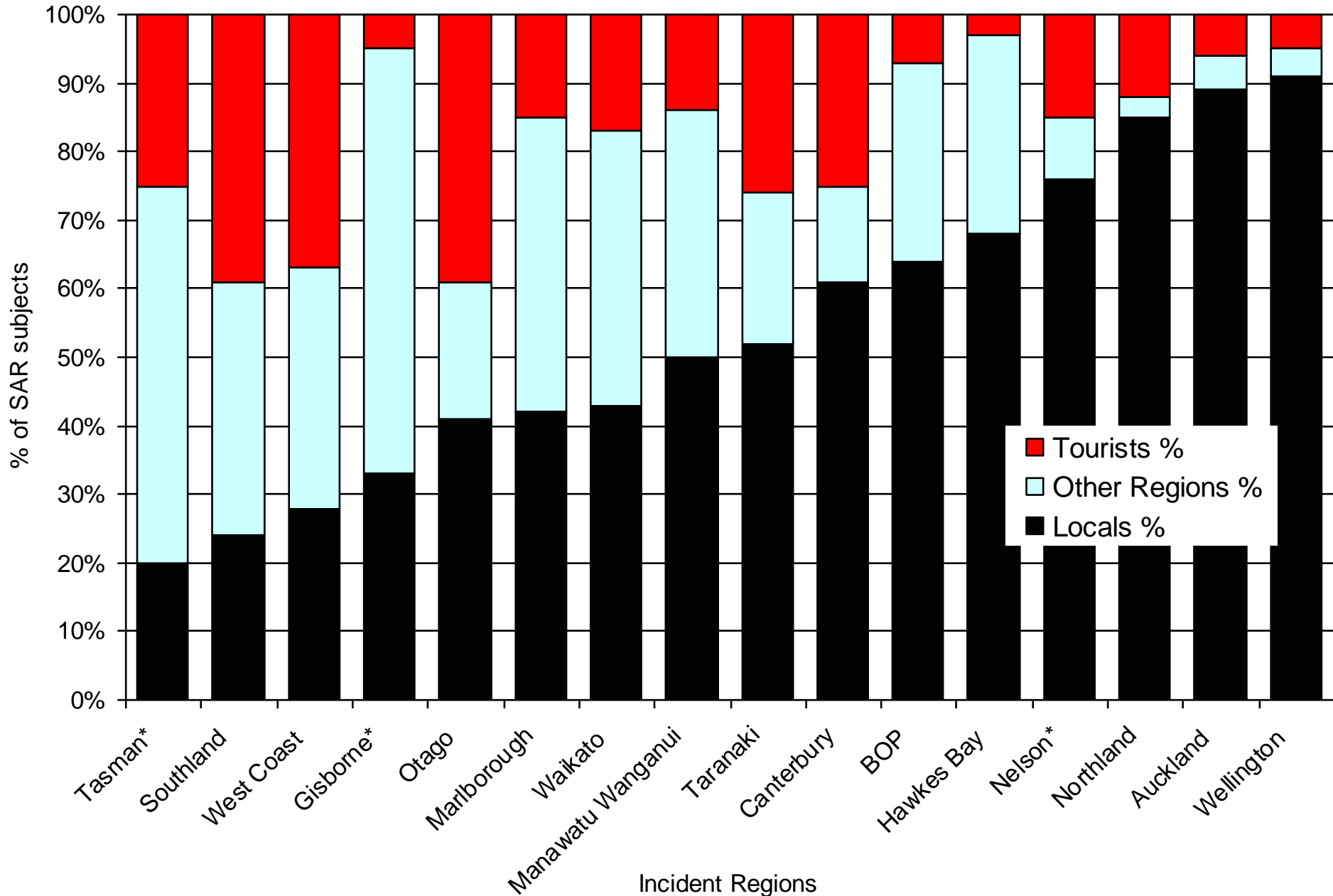
Home vs Incident location

SAROP Incident Region (Column)

Subject Home Region (Row)	Auckland	BOP	Canterbury	Gisborne	Hawkes Bay	Manawatu Wanganui	Marlborough	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	Wellington	West Coast	All Victims
Overseas	6	7	25	5	3	14	15	15	12	39	39	26	25	17	5	37	22
Auckland	89	4	2	0	2	2	5	0	2	4	4	9	4	15	1	4	9
BOP	0	64	0	0	0	0	0	0	0	0	0	2	0	8	0	1	5
Canterbury	1	0	61	5	0	0	10	3	0	7	5	0	8	0	1	17	10
Gisborne	0	0	0	33	5	0	0	0	0	0	1	0	0	0	0	0	0
HawkesBay	0	0	0	19	68	2	2	0	0	0	1	0	0	2	0	0	2
ManawatuWanganui	0	2	1	5	9	50	1	0	0	1	0	3	0	1	1	0	5
Marlborough	0	0	0	0	0	0	42	0	0	0	0	0	0	0	0	0	2
Nelson	1	0	0	0	0	0	17	76	0	0	0	0	36	1	0	1	4
Northland	1	0	0	5	0	0	2	0	85	0	1	1	0	5	0	0	2
Otago	0	0	5	0	0	0	2	0	0	41	18	1	0	1	0	8	8
Southland	1	0	2	0	0	0	1	0	0	4	24	0	0	0	0	0	3
Taranaki	0	0	0	0	0	0	0	0	0	0	1	52	0	1	0	0	3
Tasman	0	0	0	0	0	0	2	6	0	0	1	1	20	0	0	1	2
Waikato	2	21	1	29	2	2	2	0	2	0	3	3	1	43	1	0	7
Wellington	0	3	2	0	12	30	2	0	0	3	2	3	4	6	91	2	15
WestCoast	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	28	2
Total column %	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
n=	162	191	334	21	66	254	121	34	52	359	315	145	208	366	356	248	3232

- Can show where subjects in any Incident region came from

- Can show where subjects from any one home region had their incidents

Home Region

Incident region	Auckland	BOP	Canterbury
Auckland	94	4	3
BOP	0	69	0
Canterbury	1	0	82
Gisborne	0	0	0
HawkesBay	0	0	0
ManawatuWanganui	0	2	1
Marlborough	0	0	0
Nelson	1	0	0
Northland	1	0	0
Otago	0	0	7
Southland	1	0	2
Taranaki	0	0	0
Tasman	0	0	0
Waikato	2	22	1
Wellington	0	3	2
WestCoast	0	0	0
Total column %	*100*	*100*	*100*
n=	153	178	249

Incident projection – Rec. & Tourism

SAR incident callouts
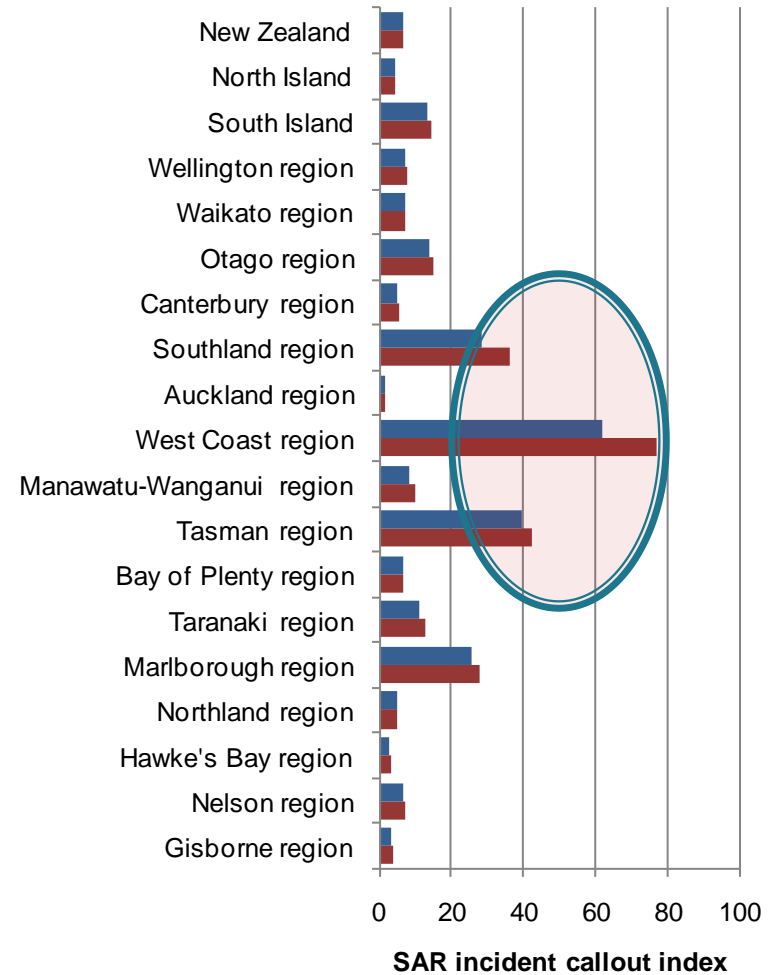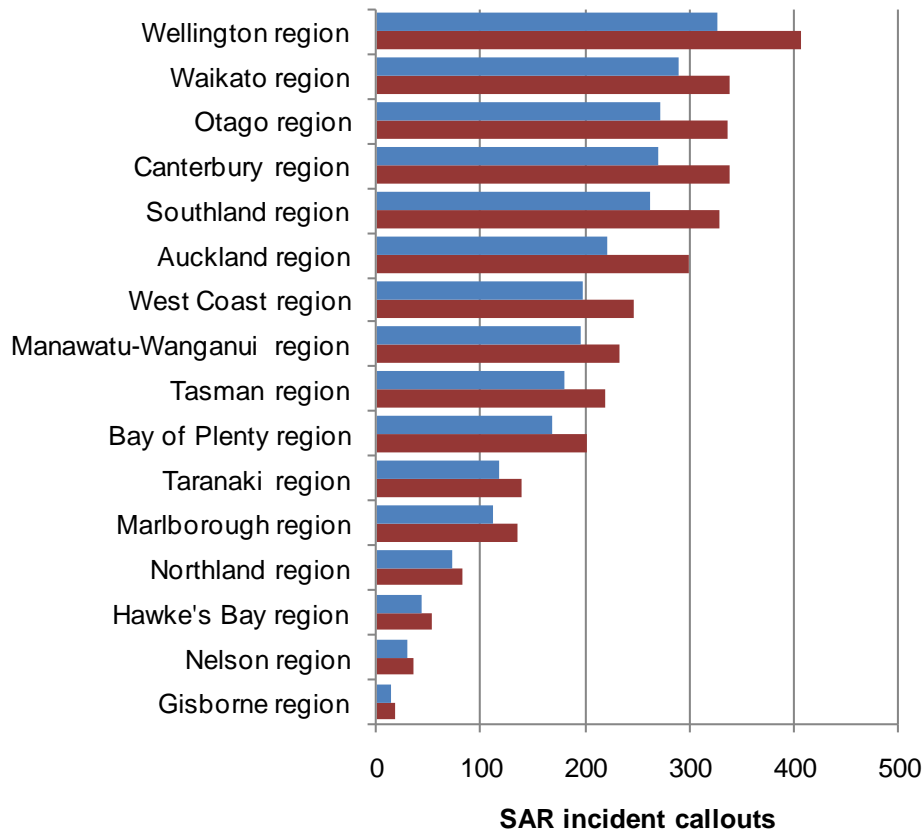
- SAR Callouts Base (4 year period 2005-09)
- Projected SCB (4 year period 2025-2029) Visitor Nights series

SAR incident callout index

- SCB index (per 10000 residents based on 2006 pop)
- SCBI (per 10000 residents based on 2026 pop) Visitor Night series

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Model outcomes

▸ Which profile types are projected for major change in next 20 years?
  ◦ Dementia – national level and regional
  ◦ Tourism – particularly at regional level

▸ Which regions are most likely to feel the strain?

Tension predicted - regions

- For Land incidents, NZ as a whole will experience some tension, although there are some regions more affected:
  - West Coast – major (rec. & tourism)
    - Increased visitor incidents, dwindling volunteer capability/capacity
  - Most other South Island regions (dementia/rec. & tourism)
  - Auckland (dementia - although population growth may help)

Implications stemming from projections?

Adaptive responses
- Resourcing
- Training
- Prevention & education

- Caution: scale is important when interpreting patterns
  - national vs. regional

Supply

- Agency profiles
  - Regional distribution
  - Impacted also by demographic projections
    - Regional populations
    - Age and dependency ratios

- Examples:
  - Surf vs. AREC
  - Coastguard vs. LandSAR

Supply– SAR volunteer age profiles
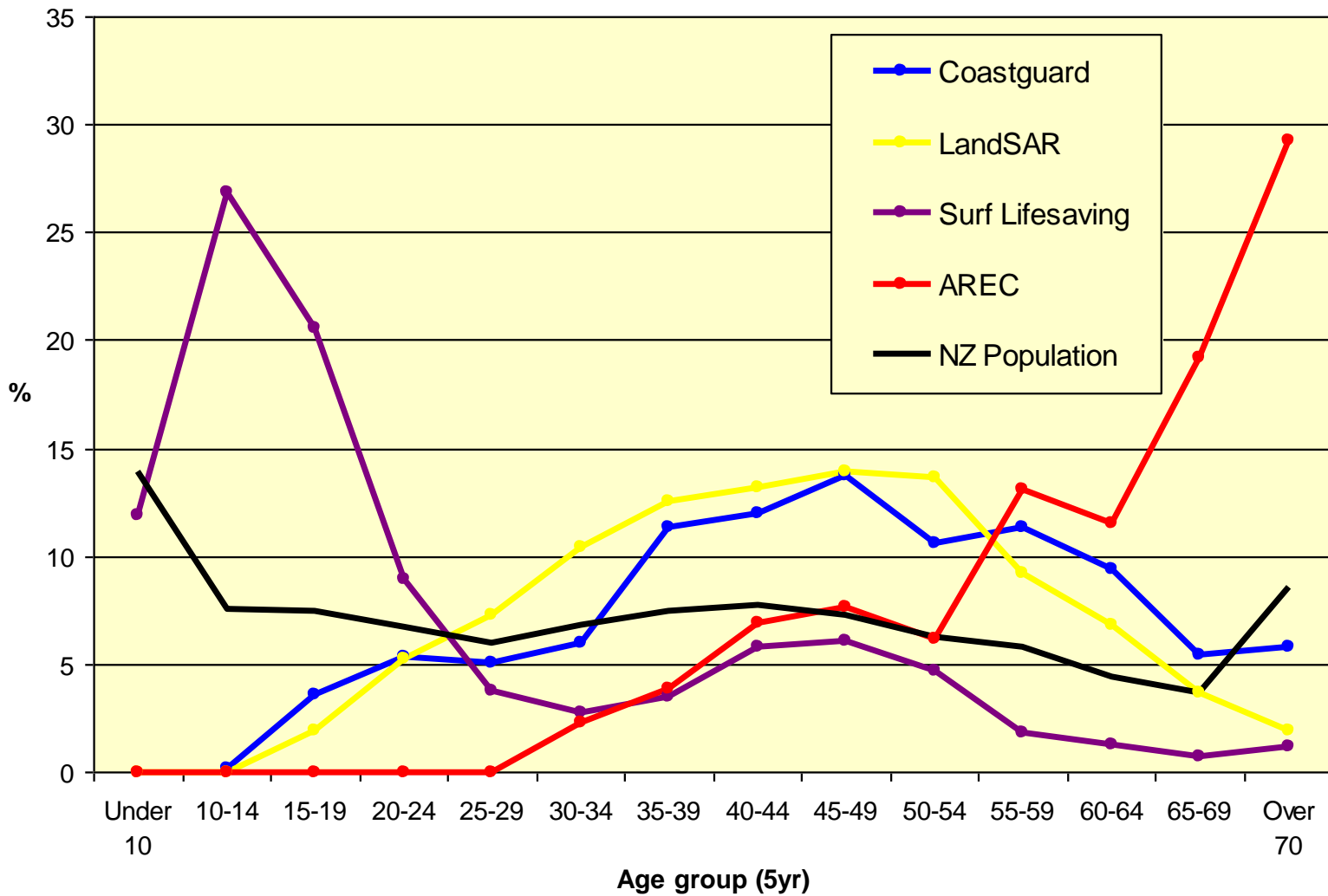
EXAMPLE: SURF
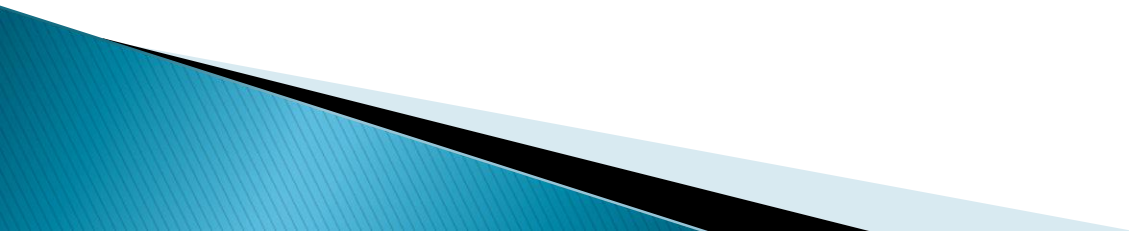
Surf Life Saving – distribution
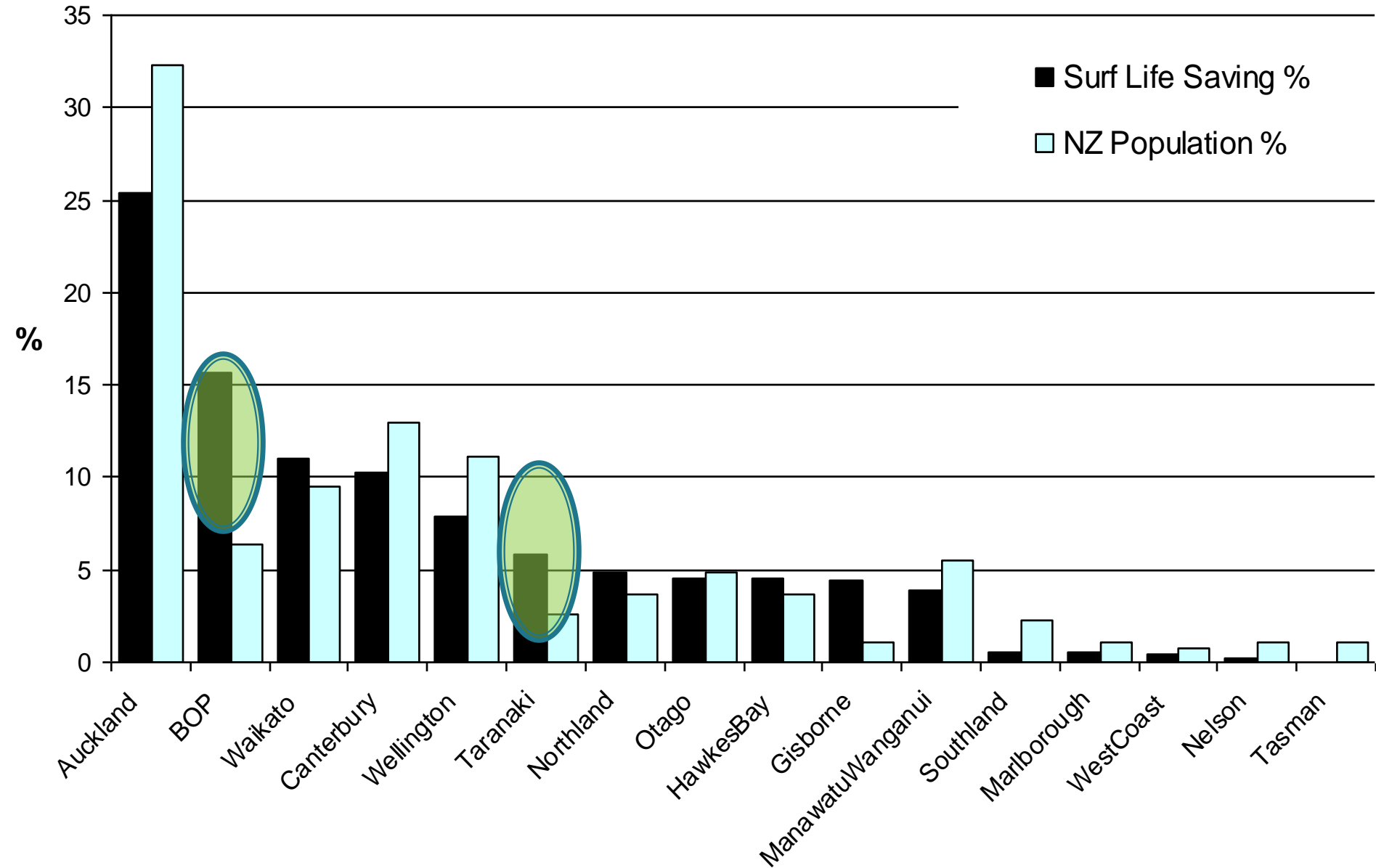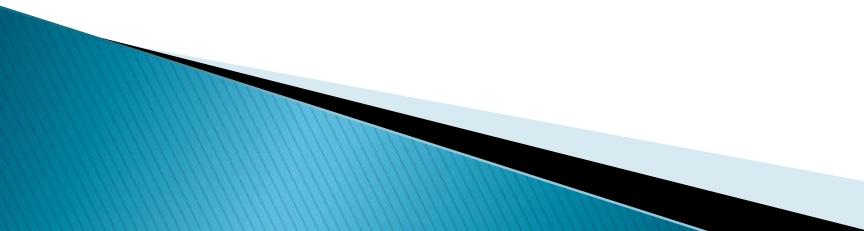
Surf Life Saving – age distribution (potential)
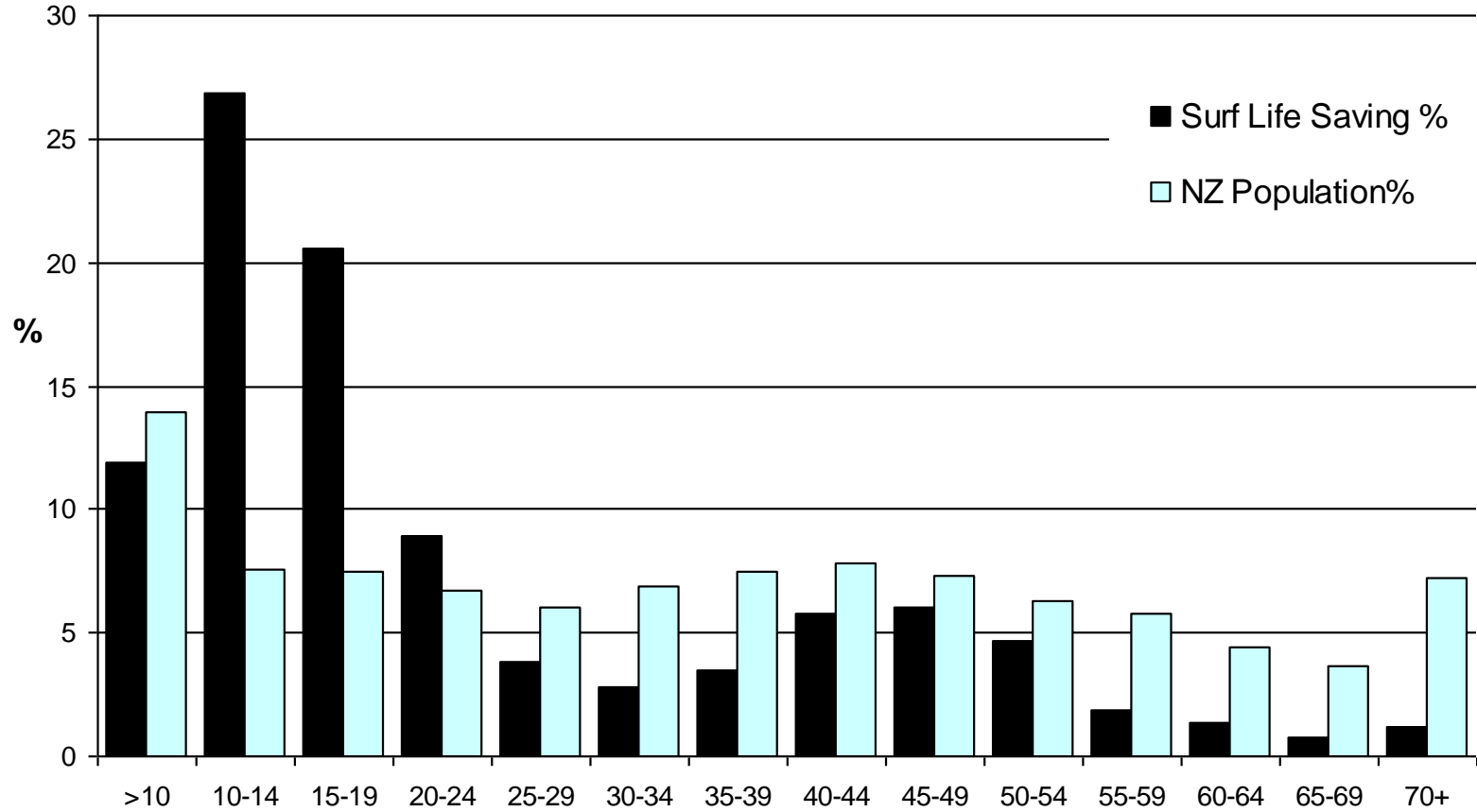
Surf Life Saving – gender by age (Retention)
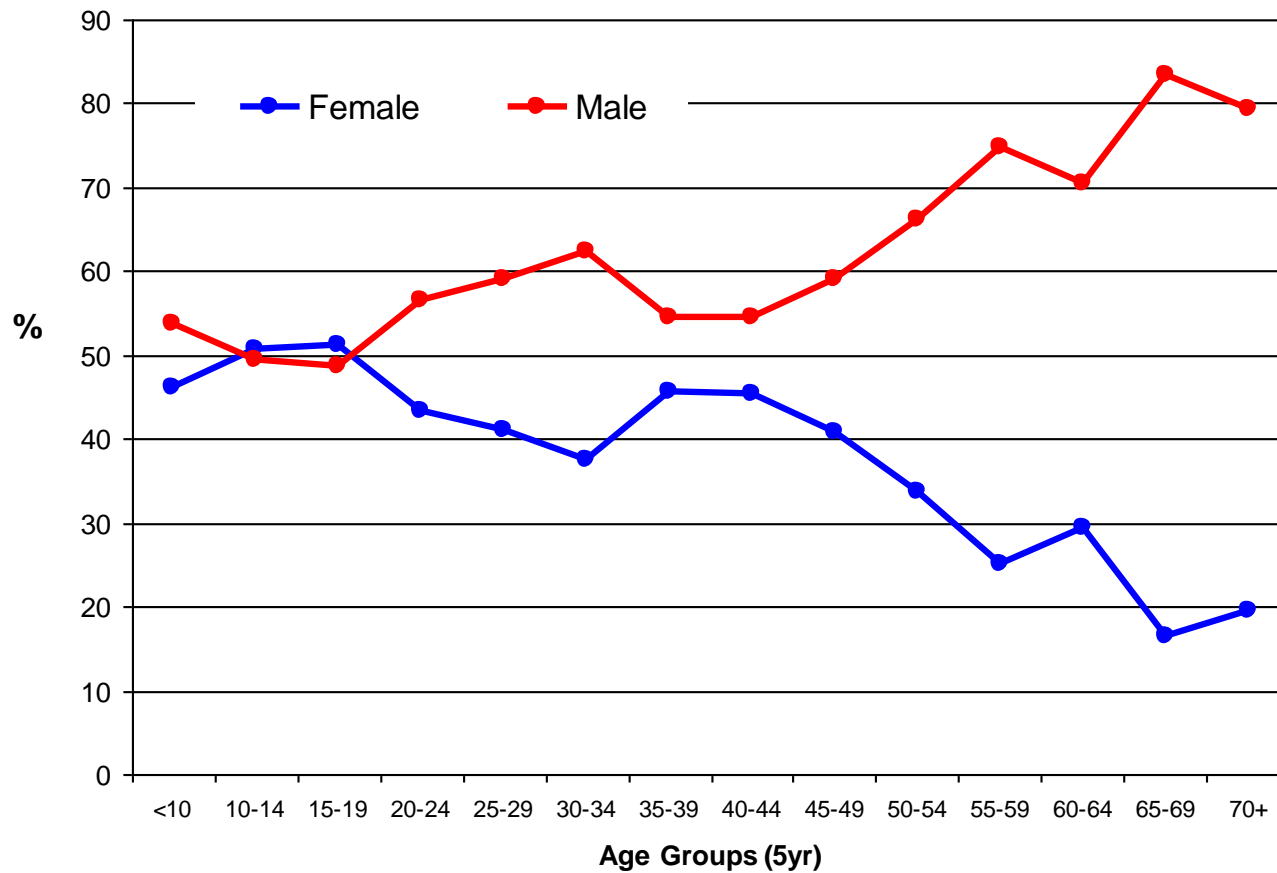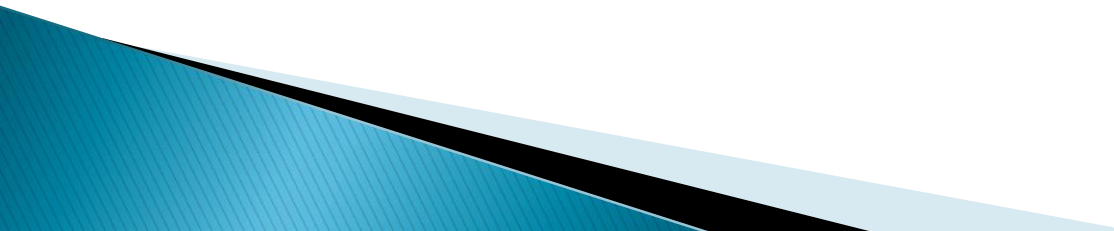
Surf Life Saving – some points

- Surf has large numbers (15,000)

- Extreme proportion of youth (unique) and gender balance (also unique)

- An opportunity for cross-over training and increased participation? Coastguard?

- Note the large drop off in female retention – an opportunity to learn? Large SAR under-representation of females

- Find the drivers for participation and factors influencing drop-off

Supply– SAR volunteer age profiles

Chart showing percentage (%) of SAR volunteers by age group (5yr). Legend: Coastguard (blue), LandSAR (yellow), Surf Lifesaving (purple), AREC (red). Age groups along x-axis: Under 10, 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, Over 70. Y-axis from 0 to 35 (%).

Annotations: "Recruitment and Drop-off patterns?" and "Cohort effect or natural peak?"
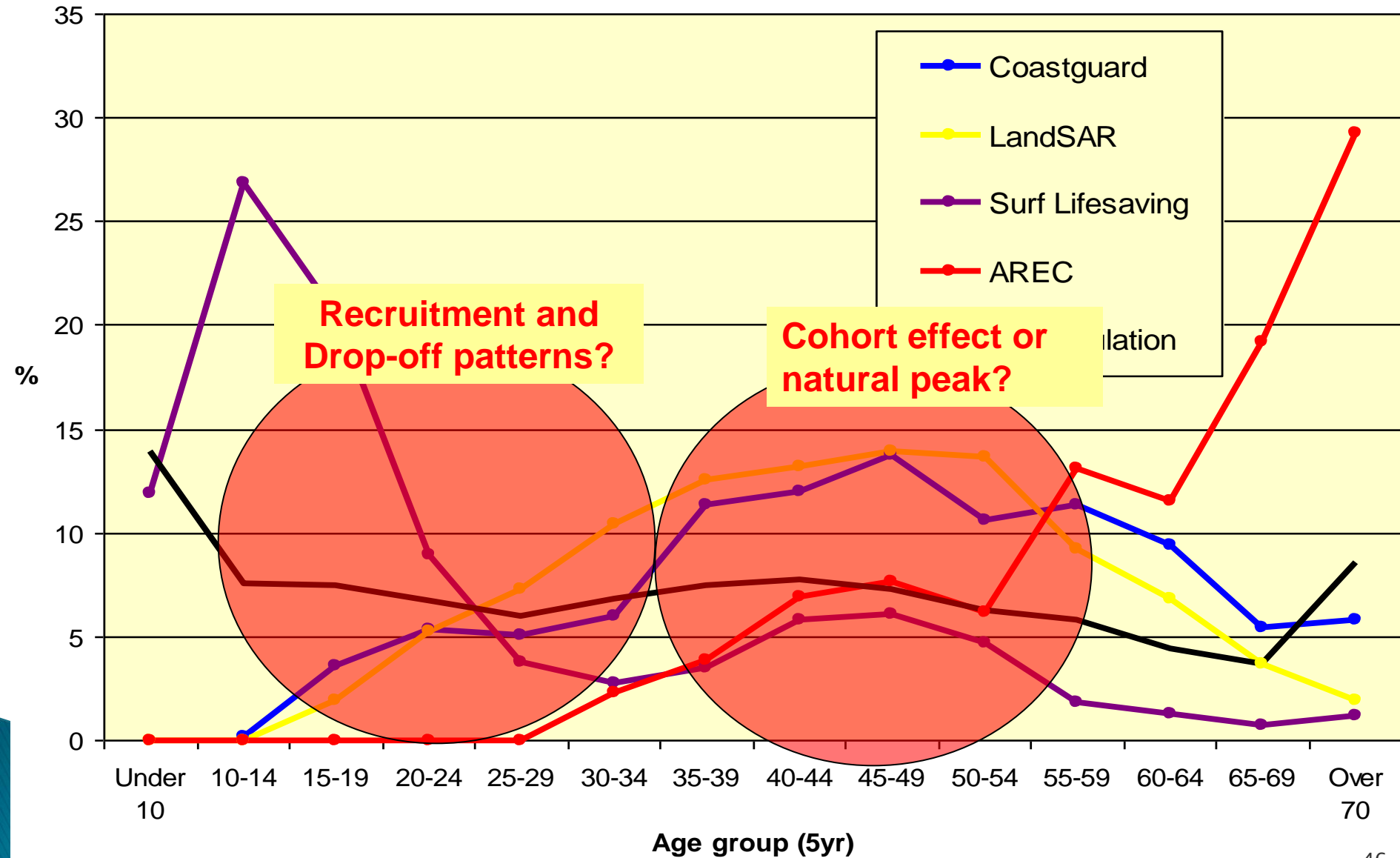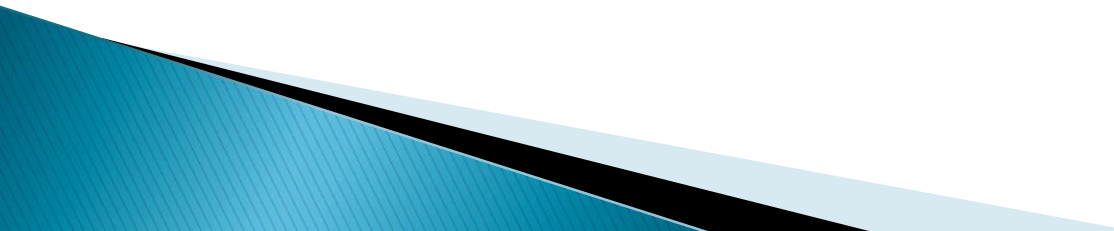
AREC – some points

- Opposite to surf – very 'old' age profile

- Succession issue evident

- If AREC role in SAR comms is important, then this requires urgent attention

- AREC members note aging membership, recruitment, changing technology and training as key issues of concern

- Could this be an extreme model for other SAR sectors as population ages?

Agency specific supply vs. demand

- LandSAR membership vs Land SAR incidents (P130)

- Coastguard membership vs Marine SAR incidents (P130)

EXAMPLE: COASTGUARD

Supply – Coastguard members distribution
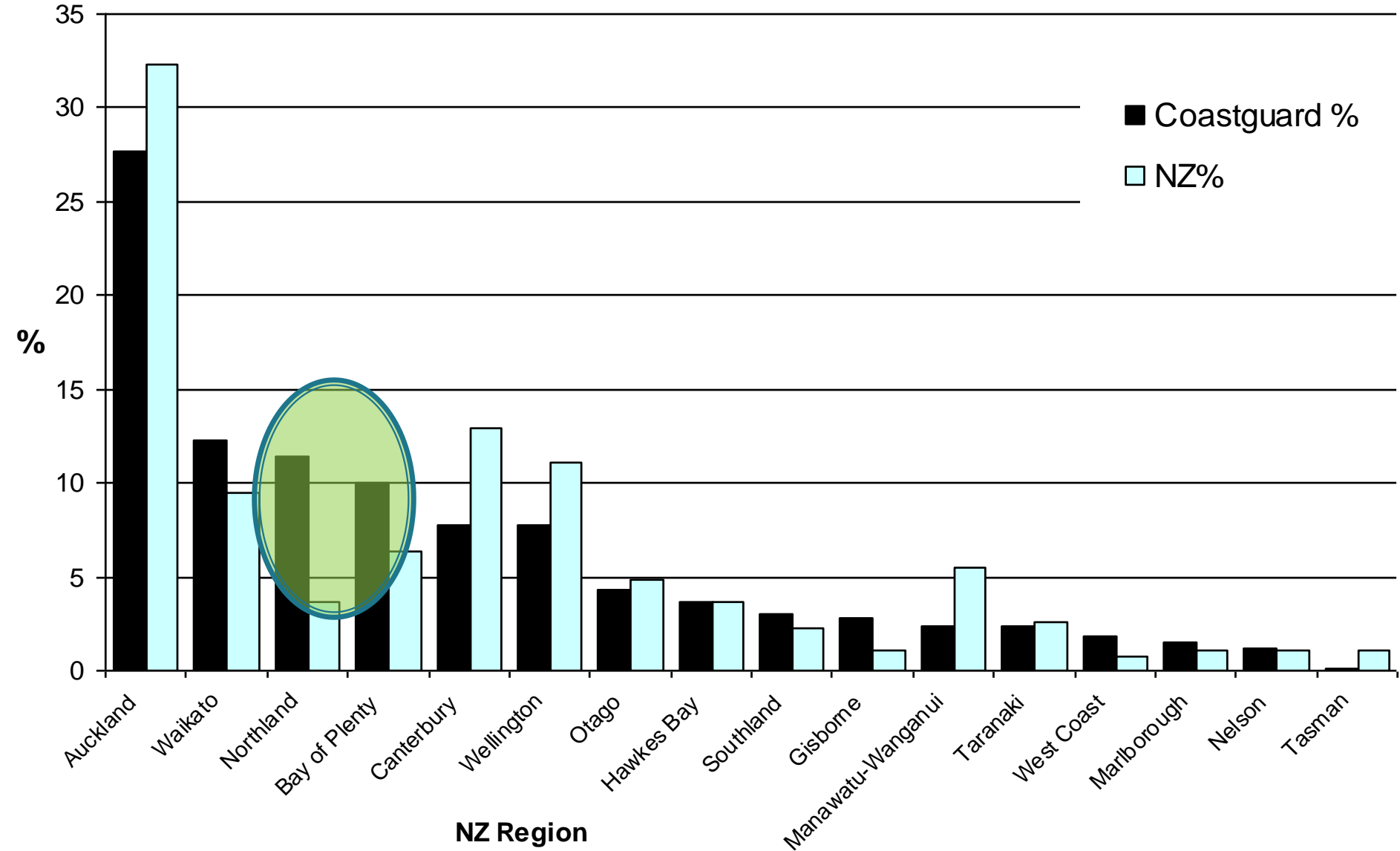
Coastguard Members % vs Marine Incidents %
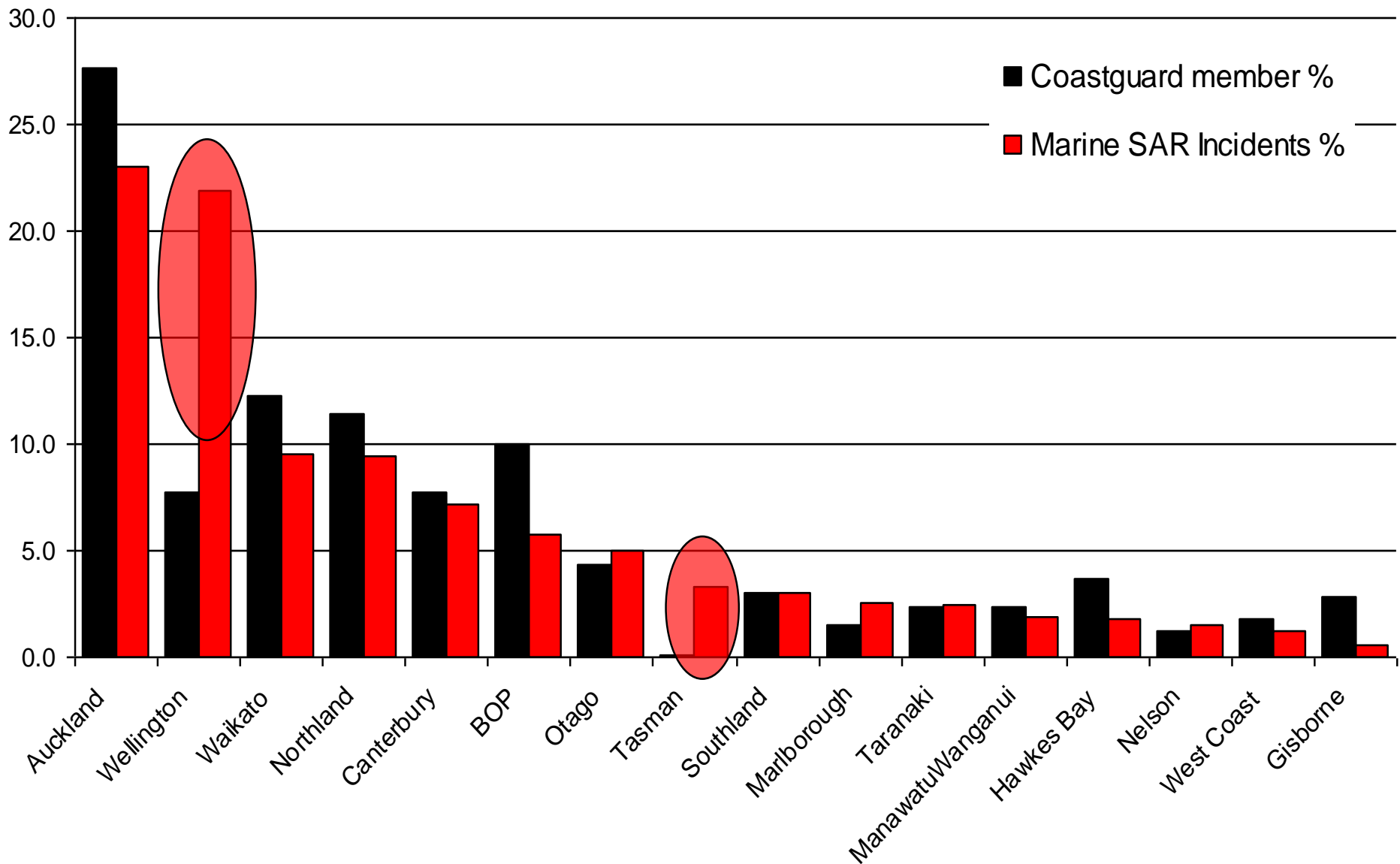
Coastguard Members % vs Marine Incidents %

# Coastguard Members % vs Marine Incidents %

Chart legend:
- ■ Coastguard member %
- ■ Marine SAR Incidents %
- □ NZ Population %

Y-axis: 0.0, 5.0, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0

X-axis categories: Auckland, Wellington, Wai...
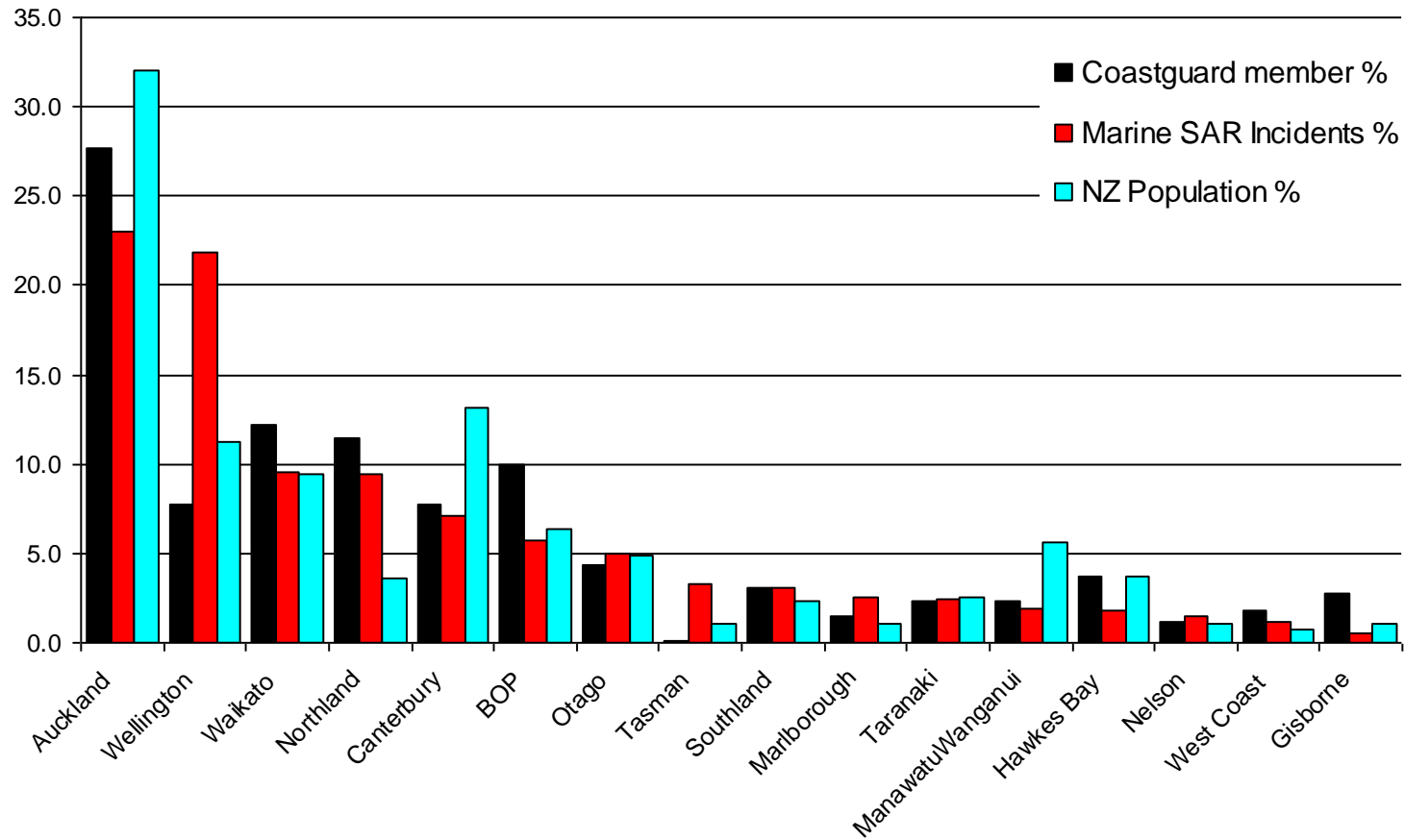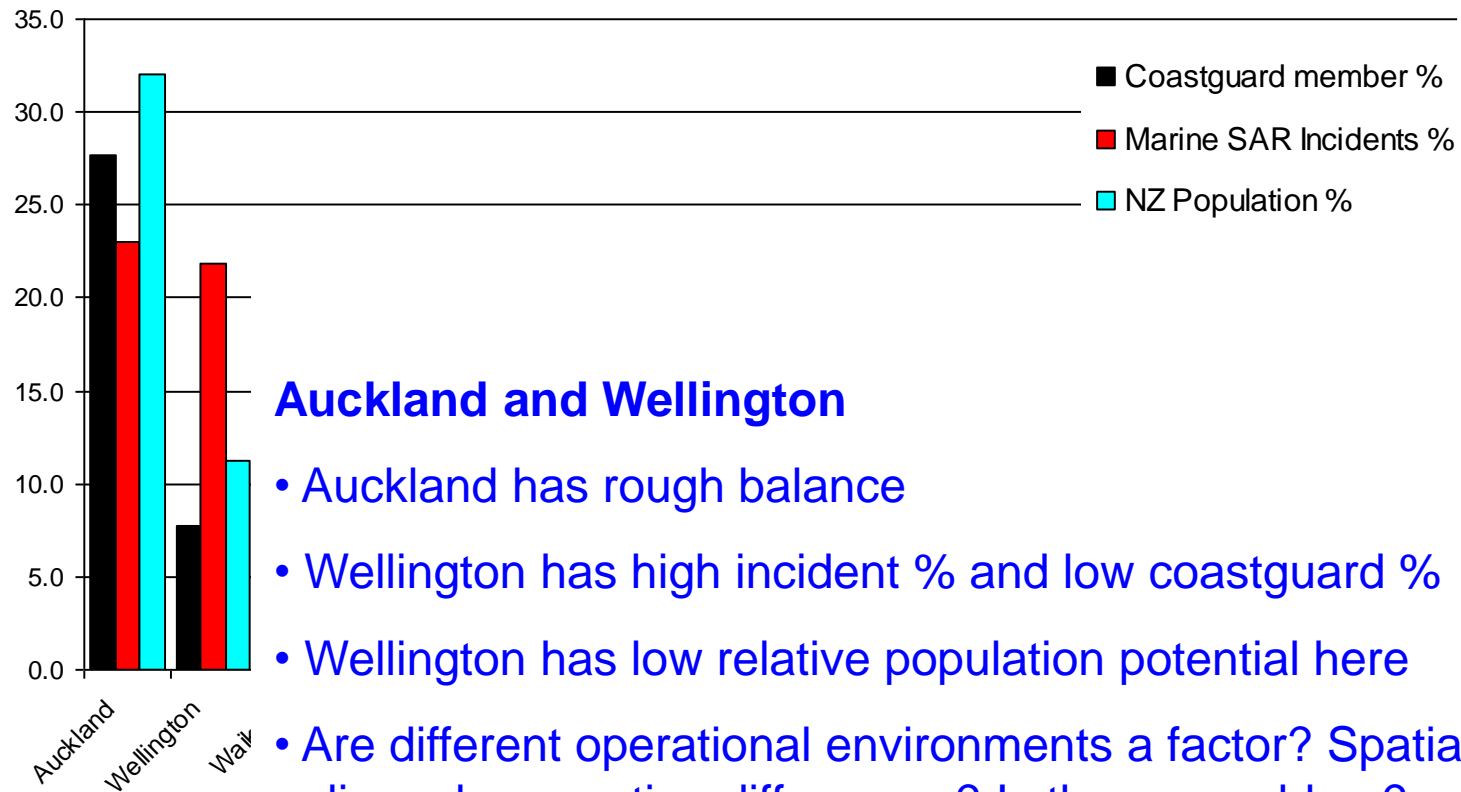
Auckland and Wellington

• Auckland has rough balance

• Wellington has high incident % and low coastguard %

• Wellington has low relative population potential here

• Are different operational environments a factor? Spatial spread, police role, reporting differences? Is there a problem?
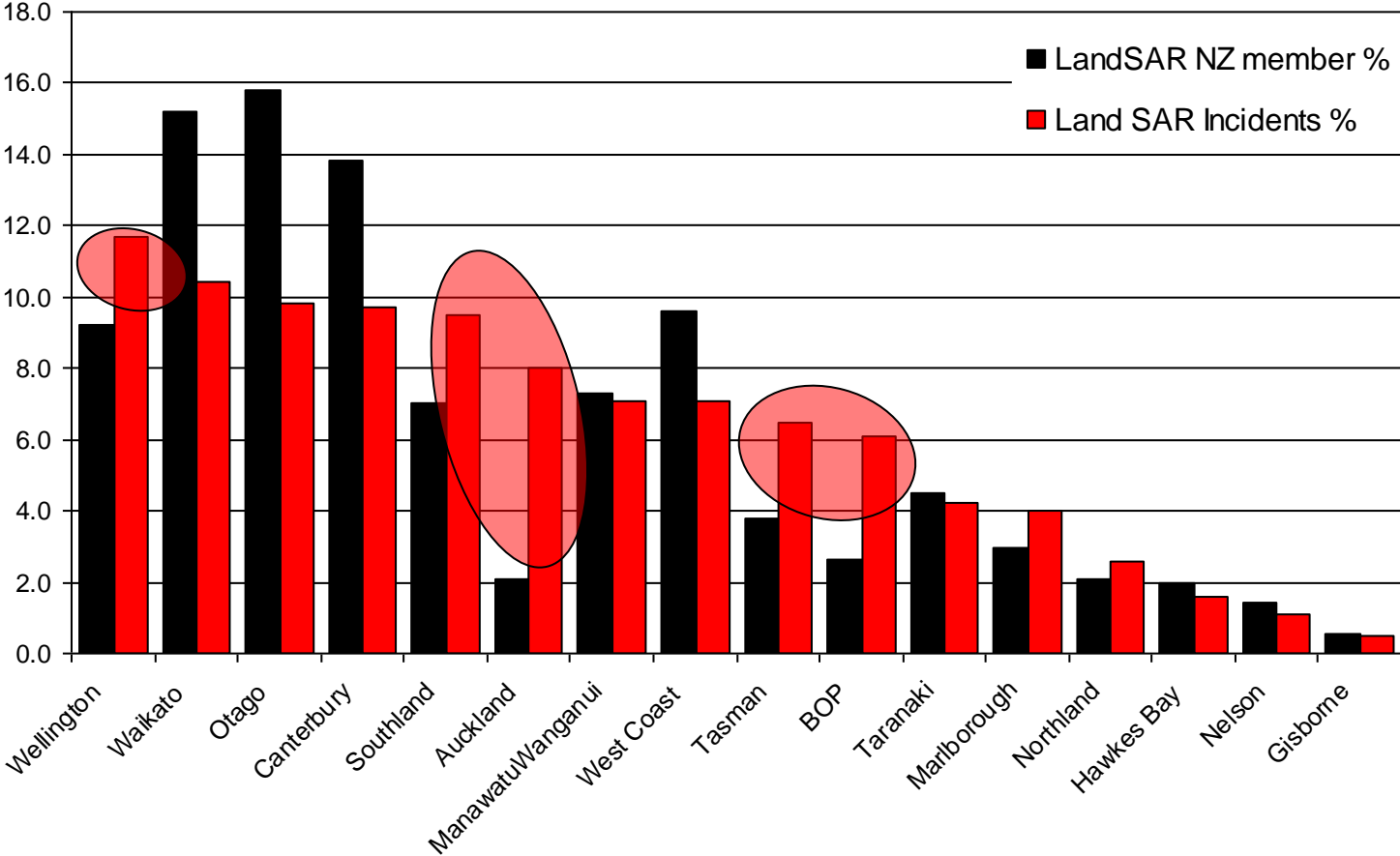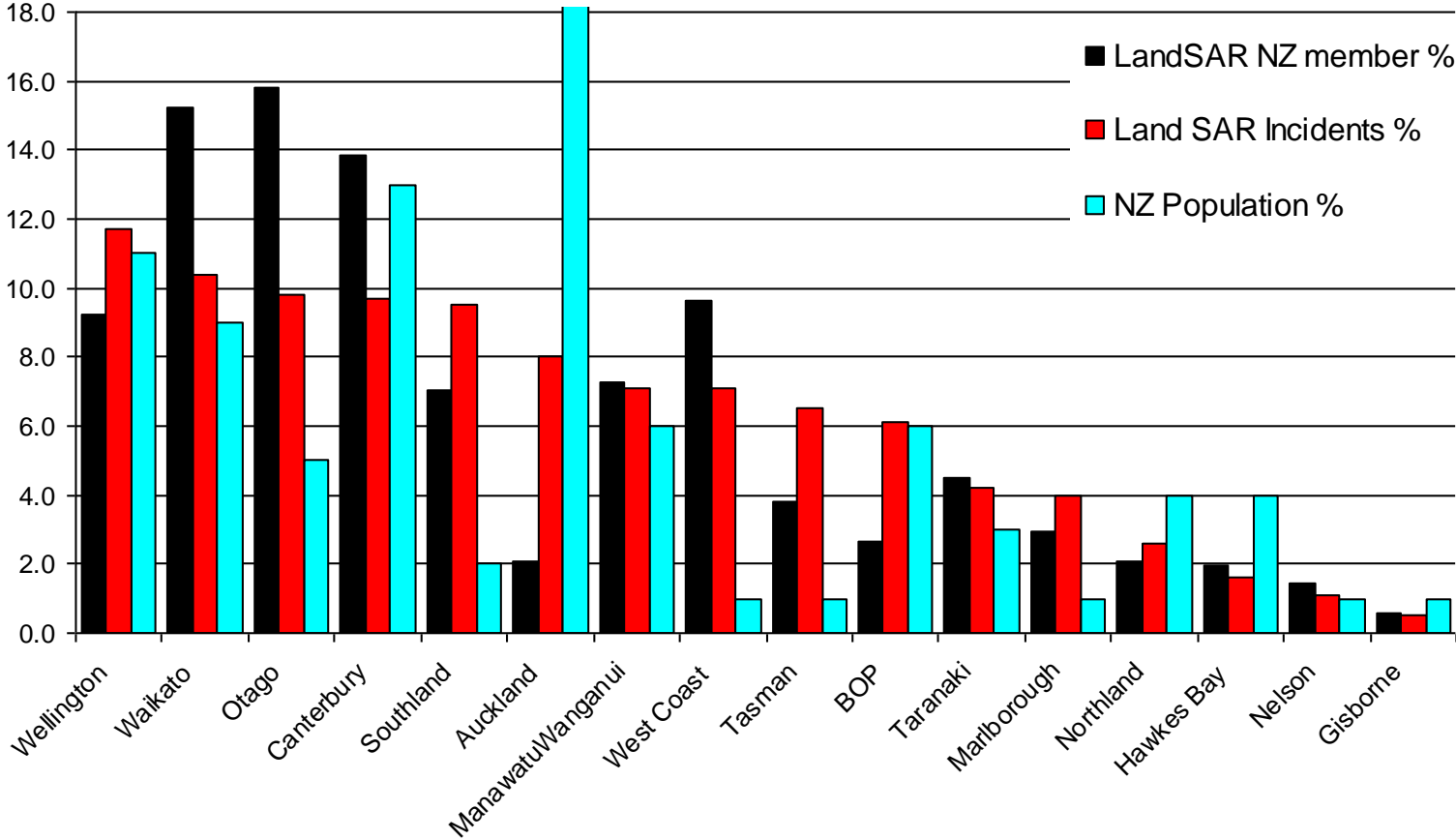
EXAMPLE: LANDSAR

Supply – LandSAR members distribution
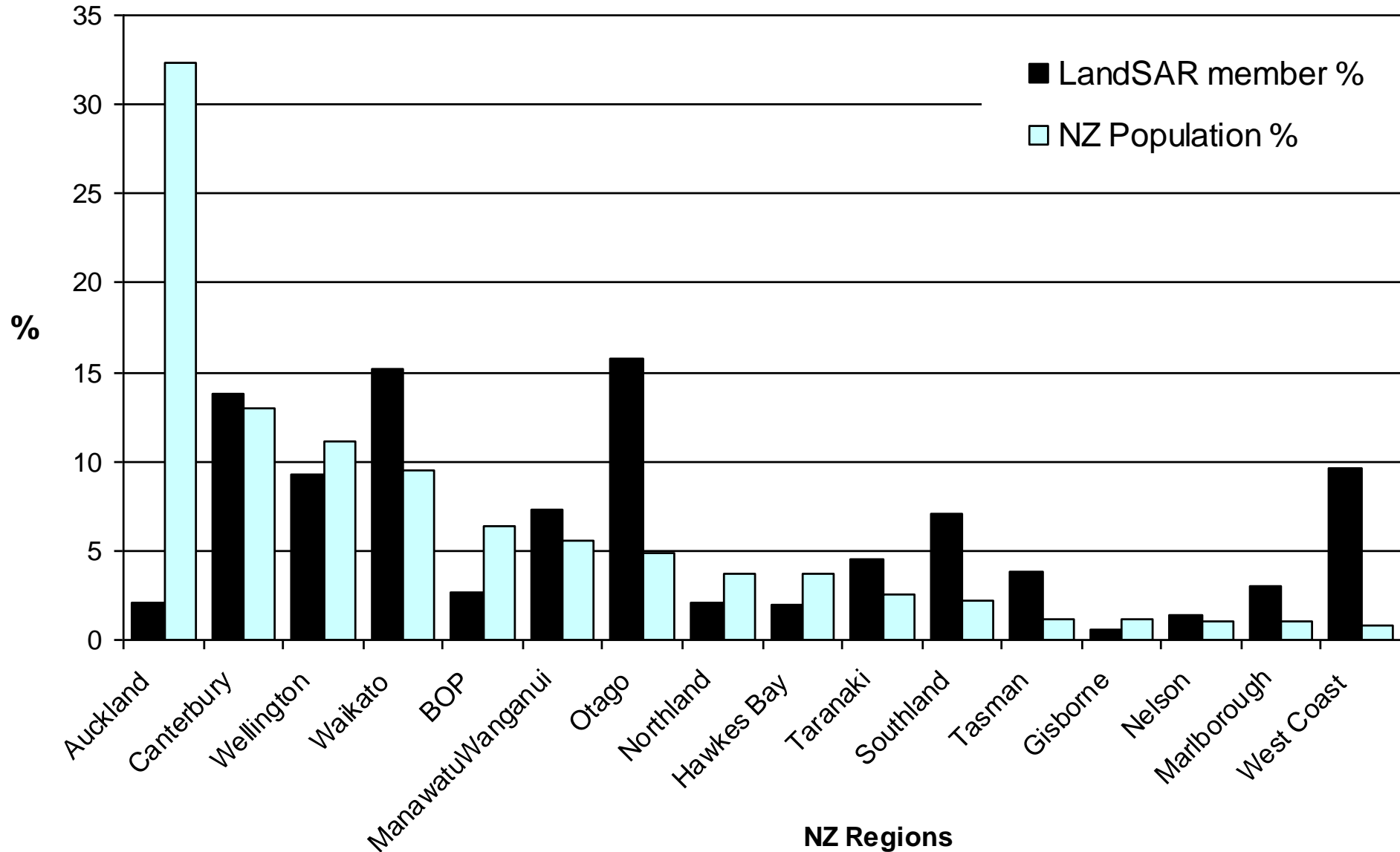
LandSAR Members % > Incidents % – good?
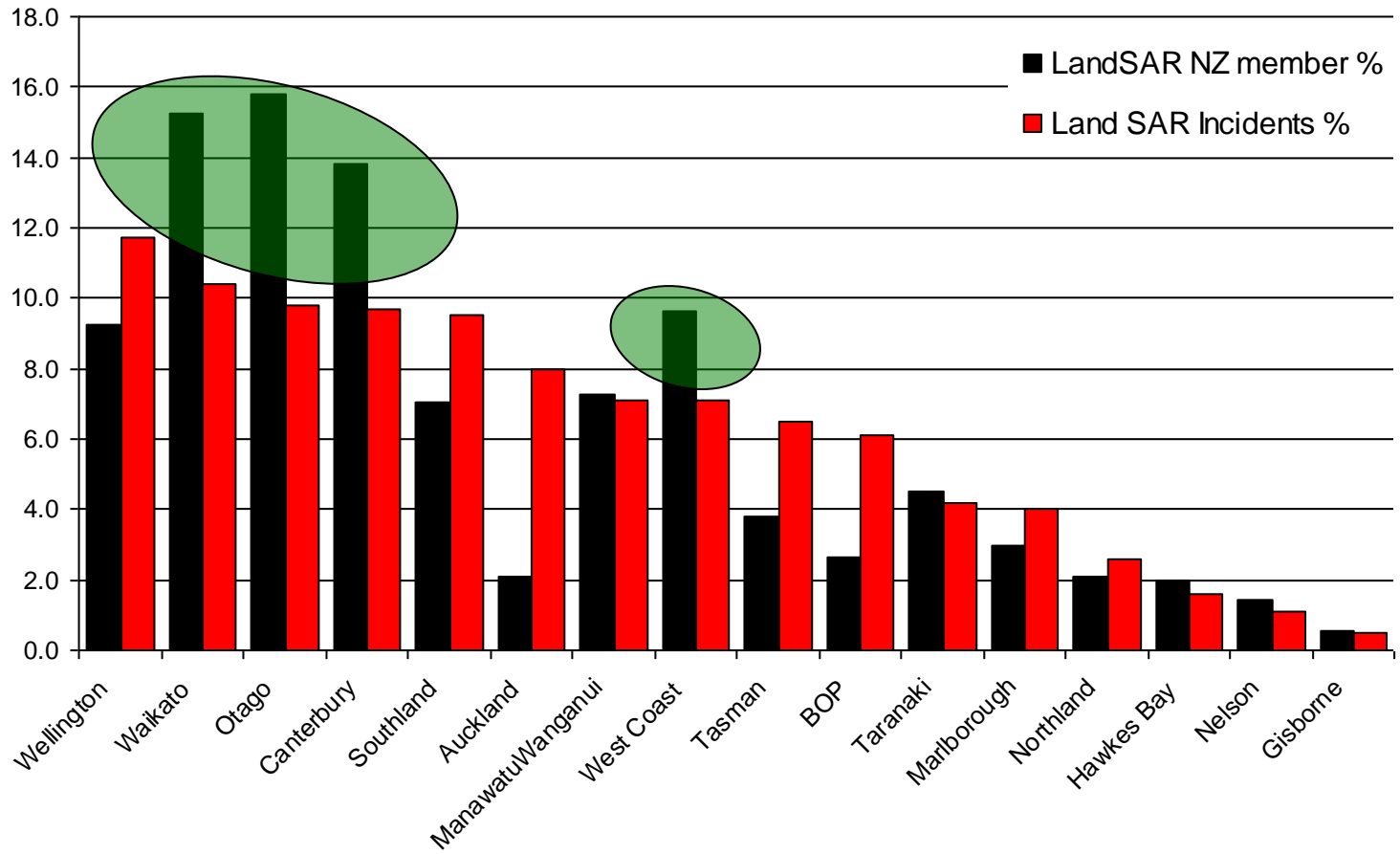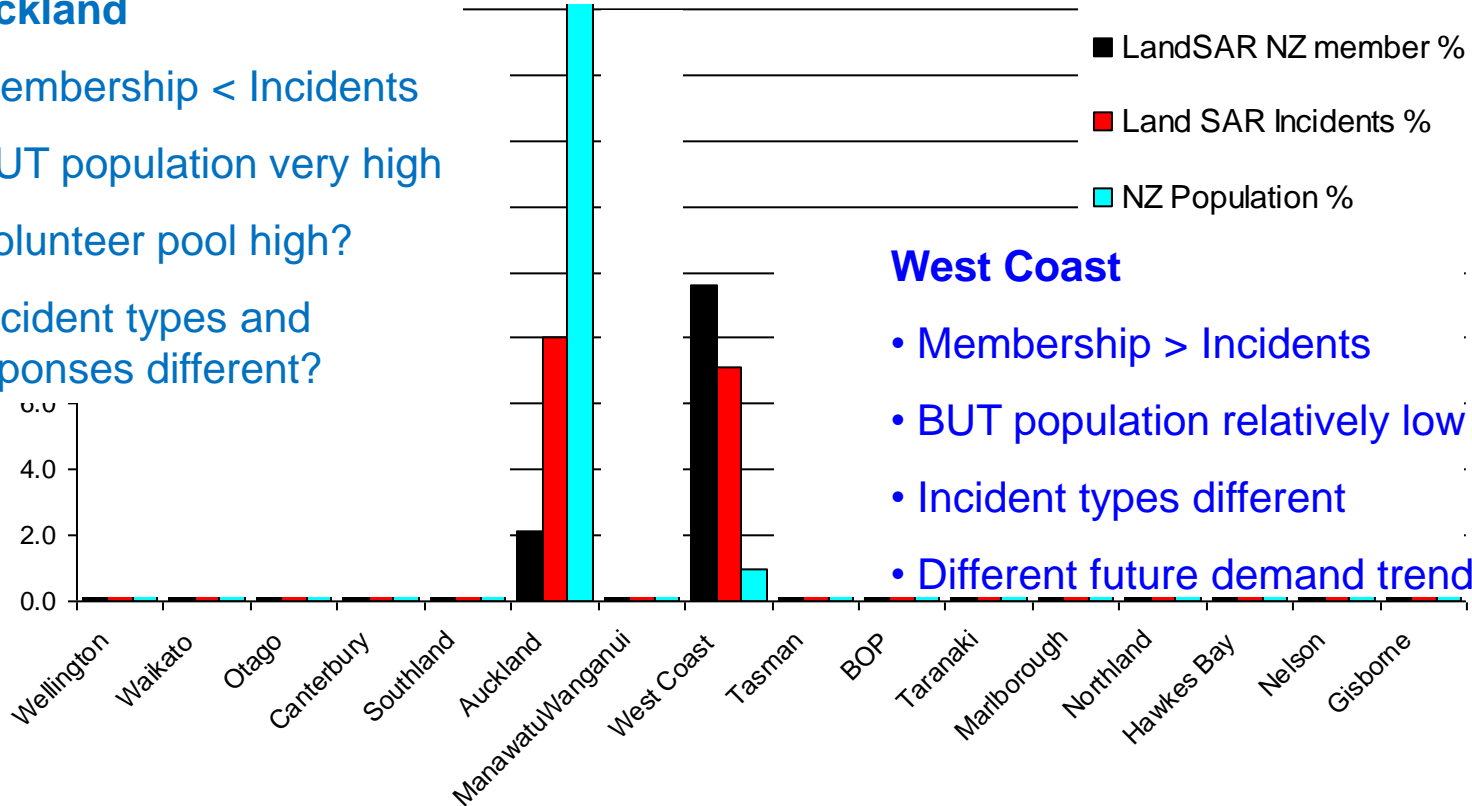
LandSAR members vs Incidents – bad?

LandSAR Members % vs Incidents % – Pop'n

LandSAR Members % vs Incidents & - cases

Auckland

• Membership < Incidents

• BUT population very high

• Volunteer pool high?

• Incident types and responses different?

West Coast

• Membership > Incidents

• BUT population relatively low

• Incident types different

• Different future demand trends

■ LandSAR NZ member %

■ Land SAR Incidents %

□ NZ Population %

6.0
4.0
2.0
0.0

Wellington, Waikato, Otago, Canterbury, Southland, Auckland, ManawatuWanganui, West Coast, Tasman, BOP, Taranaki, Marlborough, Northland, Hawkes Bay, Nelson, Gisborne

Implications for agencies

▸ Tension and imbalance of supply vs.demand in certain regions
▸ Projections have implications
  ◦ Best addressed through retention/recruitment and adaptive response
    • Cross training suitable candidates
    • Providing alternative one-SAR career paths across multiple agencies

▸ Recap:
    • LandSAR older and smaller #s
    • Surf younger and larger #s
    • Cross pollinate?
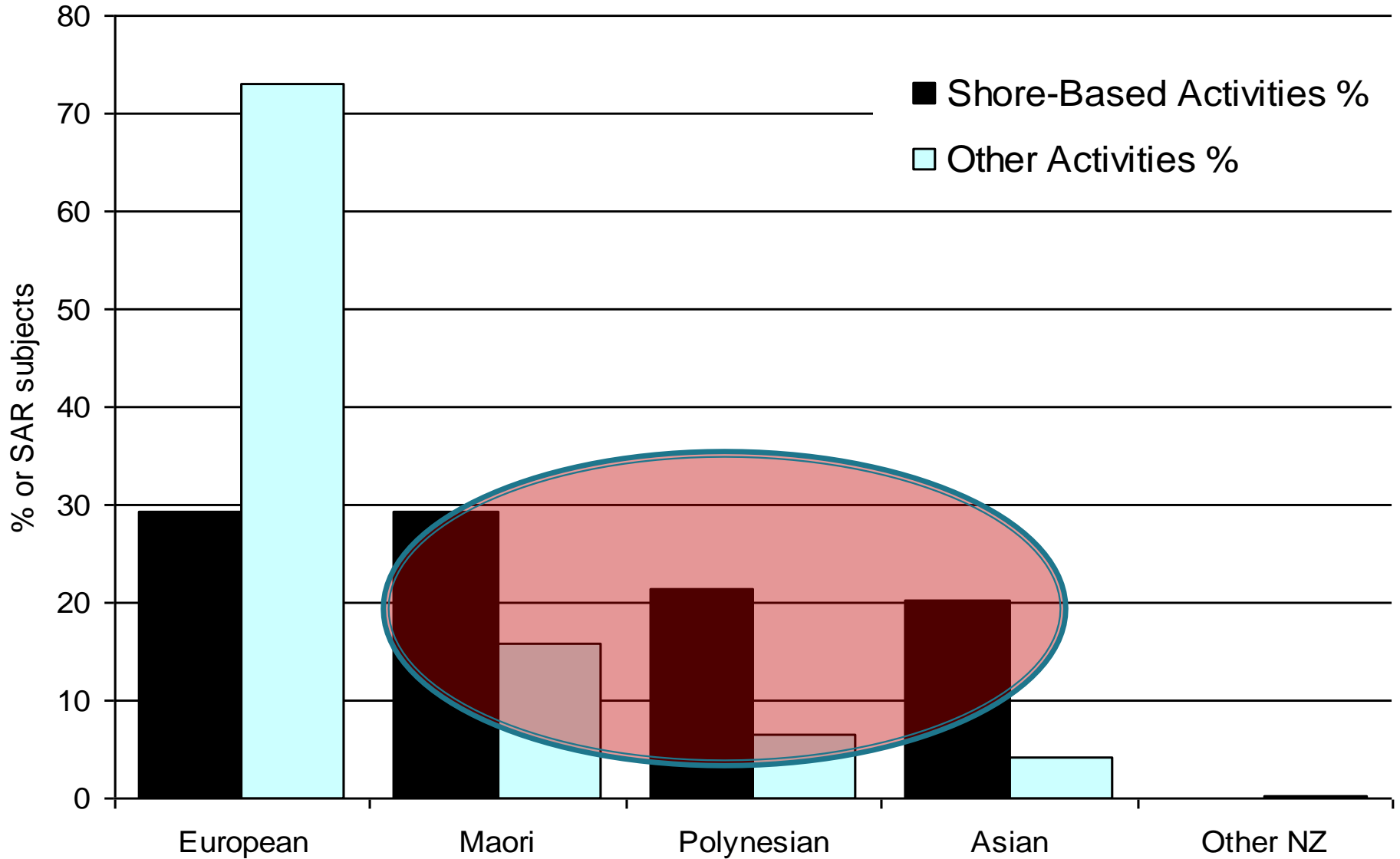
Incident type profiles

One example:
- Shore based fishing
  - Strong demographic predictor

Shore-based fishing/diving/gathering – age
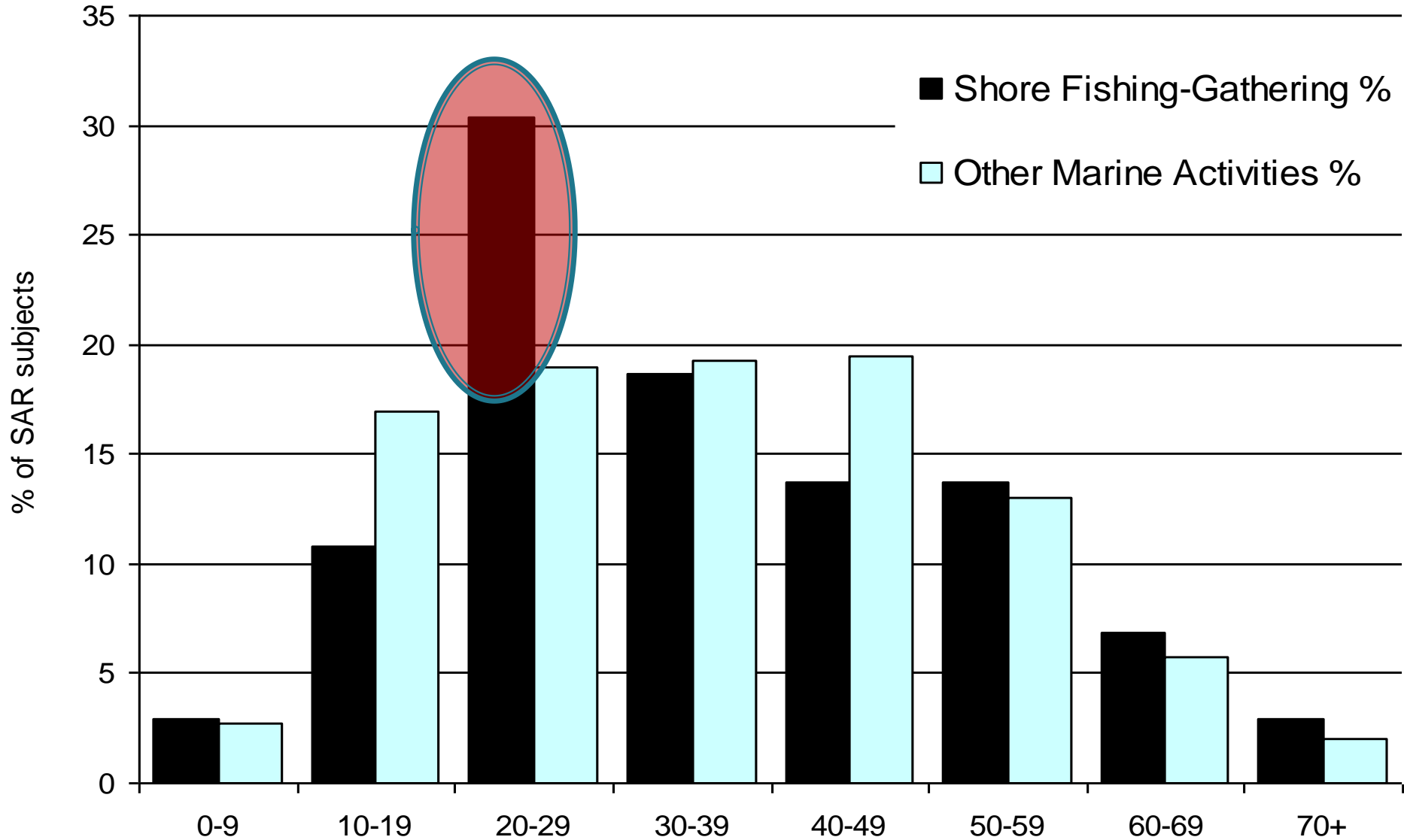
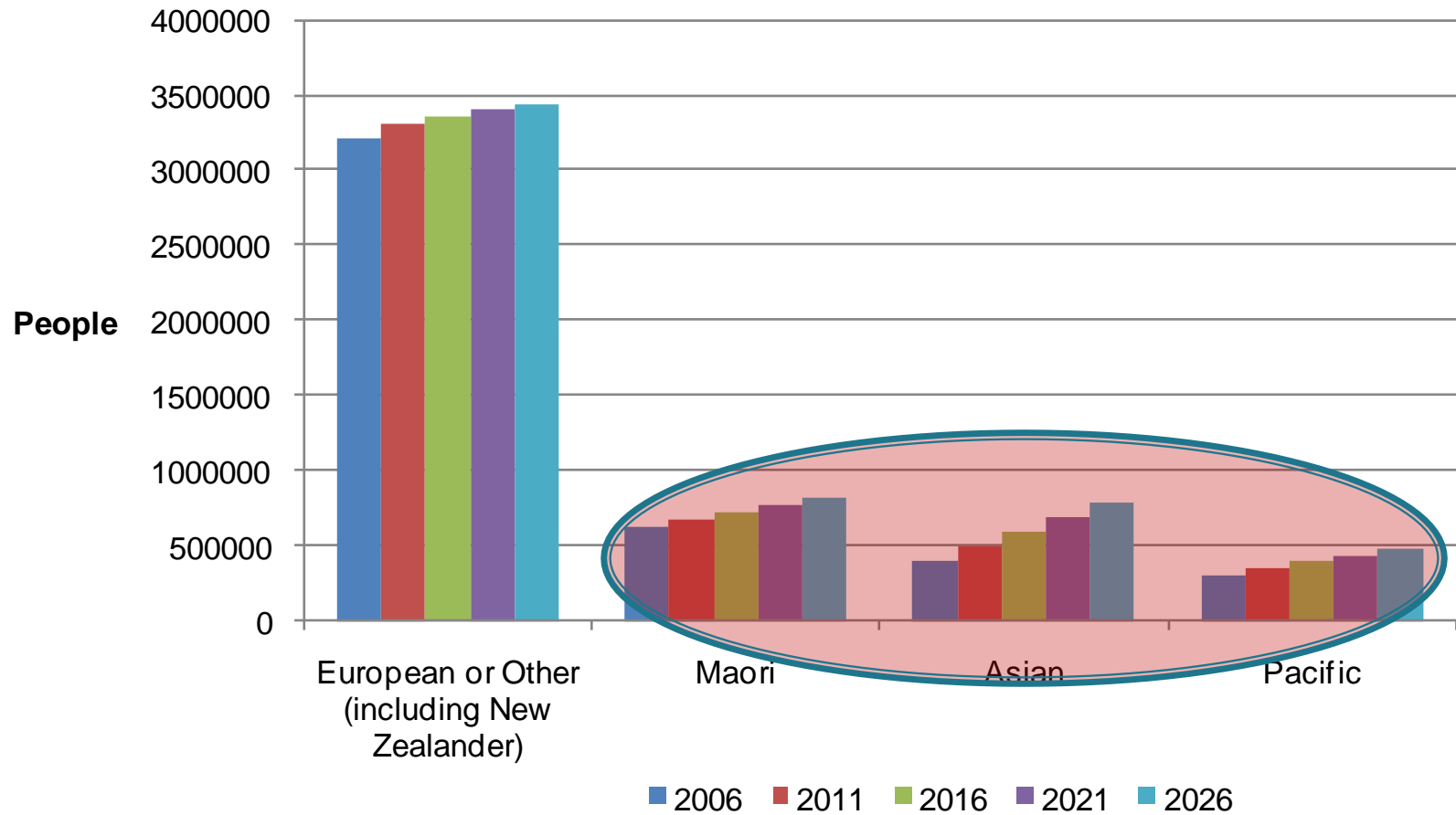Shore–based fishing/diving/gathering – ethnicity

Shore-based fishing/diving/gathering

- Ethnicity issue identified previously and work has been done to cut # drownings

- Value of targeting

- Escalate response with increased demand

  - Projections are possible

Relevant demographic projection:
Fishing/diving/gathering

Projected ethnic profile - New Zealand

TRENDS

Macro trends

Questions:

- What will be most likely to change in the next 20 years?

- Which trends are considered to be most important?

- Scoping opinions to test against our findings and direct us in the last write-up

- Method: Expert panel assessing 6 trends assessed via online methods

Six Major Trends

1. Increased cost of travel/transport

2. Growth in tourism and recreation activities

3. Aging population structure

4. Increased use of technology

5. Increased population and urbanisation

6. Different funding/resourcing arrangements

TRENDS - How likely?

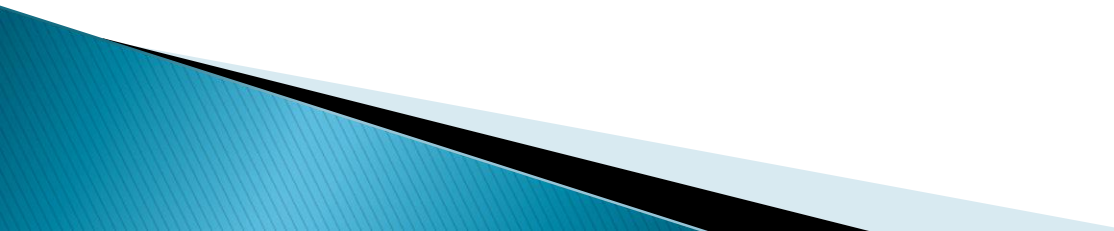| TRENDS	Mean score	SE	95% conf interval
Increased use of technology	4.1	0.18	(3.7 to 4.5)
Aging overall population	3.9	0.17	(3.5 to 4.2)
Increased tourism and recreation activities	3.8	0.16	(3.5 to 4.1)
Different funding/resourcing arrangements	3.4	0.22	(3.0 to 3.9)
Increased population and urbanisation	3.3	0.18	(2.9 to 3.7)
Increased cost of travel/transport	2.5	0.22	(2.1 to 3.0)

TRENDS – How Important?

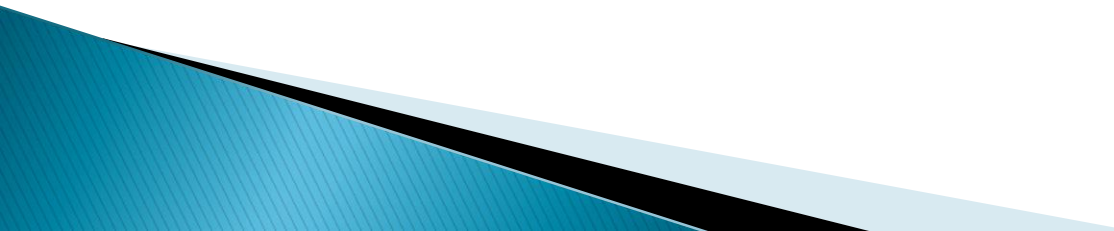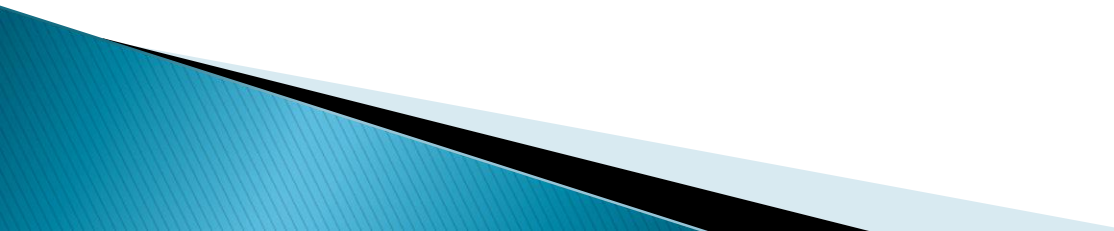| TRENDS	Mean score	SE	95% conf interval
Increased use of technology	4.5	0.10	(4.2 to 4.7)
Increased tourism and recreation activities	4.3	0.11	(4.0 to 4.5)
Aging overall population	4.0	0.15	(3.7 to 4.4)
Increased population and urbanisation	4.0	0.13	(3.7 to 4.2)
Different funding/resourcing arrangements	3.9	0.19	(3.5 to 4.3)
Increased cost of travel/transport	3.0	0.22	(2.5 to 3.4)

Trends – Likelihood vs Importance
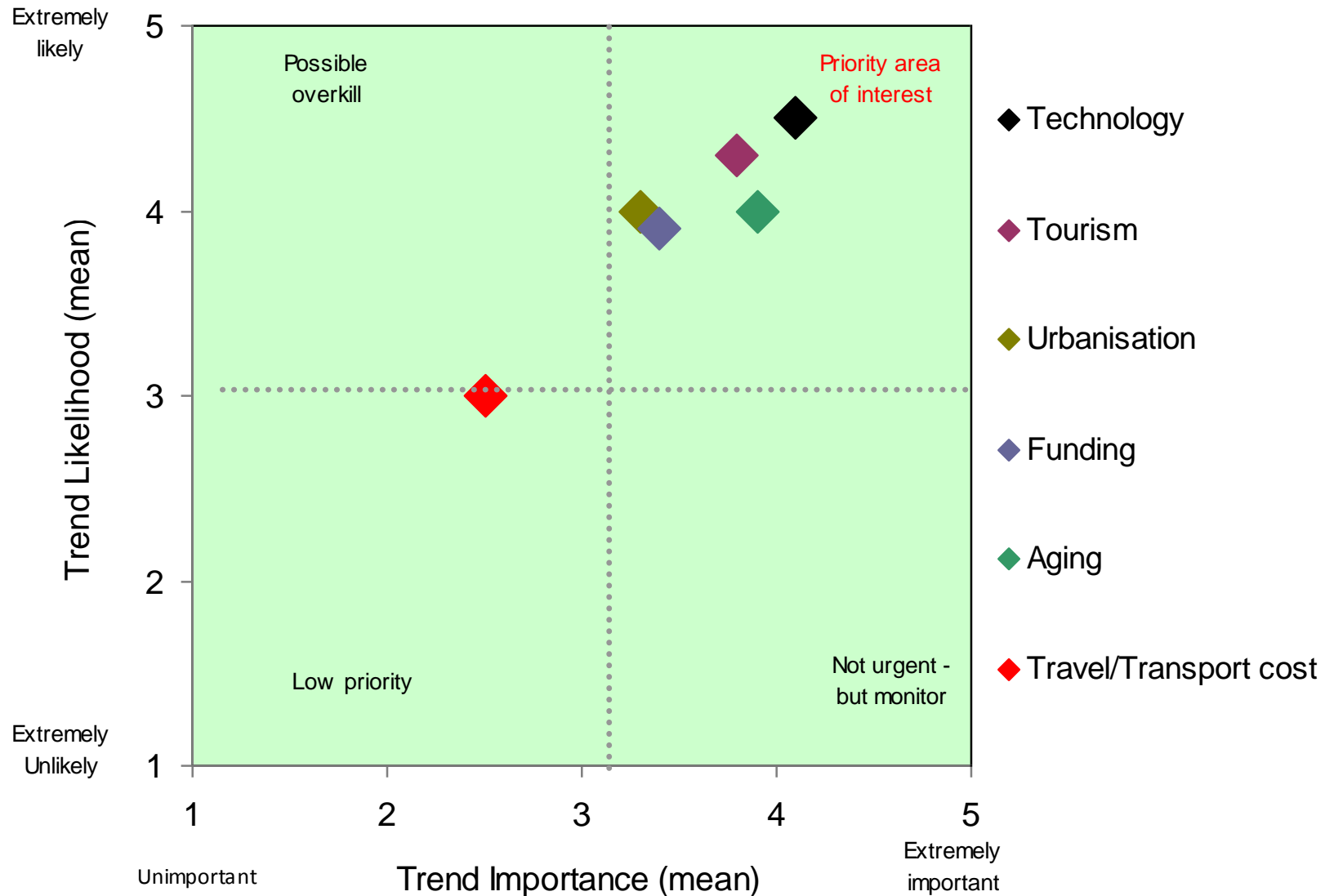
Most likely changes – Technology

- There will be greater public expectations for immediate and successful SAR response (Score = 4.5)

- There will be reduction in the 'search' component of many SAR call-out due to better beacons, communications and location technology (Score = 4.1)

- Some people will put themselves at more risk because of over-dependence on technological devices - resulting in increased SAR callouts (Score = 3.8)
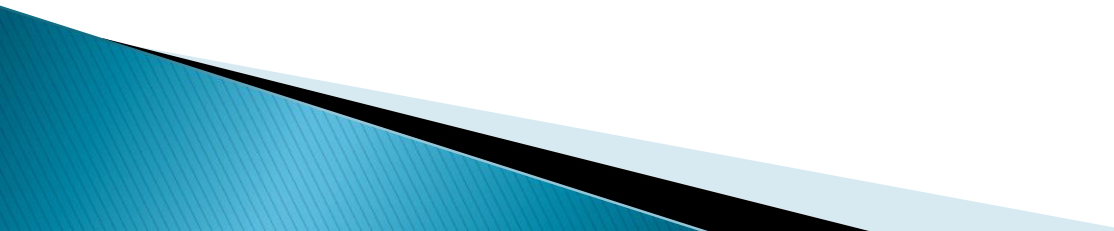
Most likely changes – Tourism

- Increased numbers of people visiting natural outdoor areas and parks (Score = 4.3)

- Increased SAR callouts due to increased numbers of tourists (Score = 4.2)

- Increased numbers of people engaged in marine recreation (Score = 4.1)

- Increased SAR callouts from people in easily accessible natural areas (Score = 4.0)

Most likely changes – Increased population and urbanisation

▸ There will be increasing proportions of non-recreation SAR incidents (e.g. Dementia, Despondent, Missing) (Score = 4.4)

▸ There will be increased diversity in SAR subjects/victims, from greater variety in ethnic and interest groups (Score = 4.0)
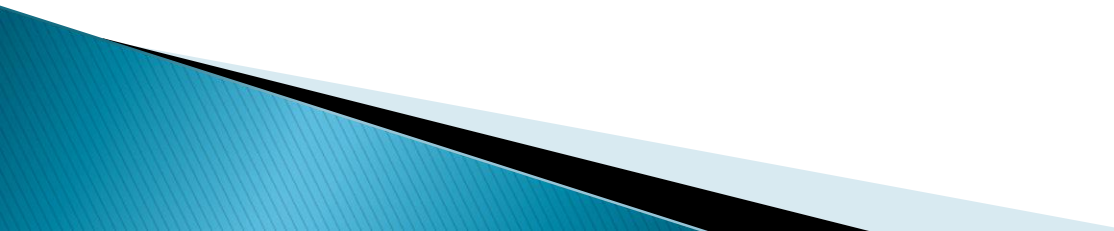
Most likely changes – Aging

- People will live longer and remain more active, with sustained increase in SAR demands in some areas (Score = 4.1)

- There will be increased recreation closer to home and in more accessible areas, with an increase in related SAR demand (Score = 4.0)
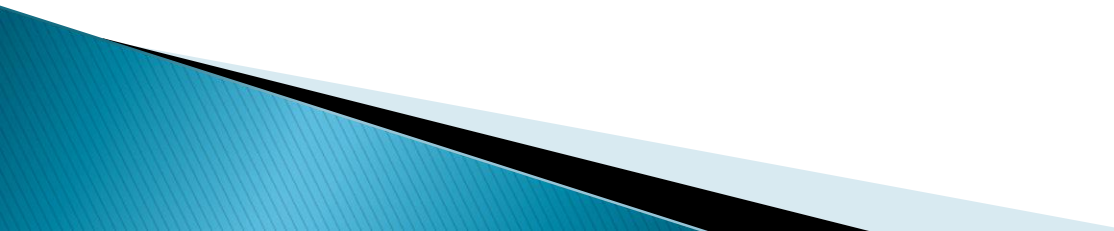
Most likely changes – Funding

▸ Increasing 'professionalisation' of SAR will require increased funding sources (Score = 4.1)

Most likely changes – Travel Cost

- Increased costs for SAR operations, training and support (Score = 4.1)

- Increased costs for volunteers involved in SAR (Score = 4.0)

Most Unlikely changes 1

- There will be decreased recreation in more remote areas, with decrease in related SAR demand (Score = 2.2)

- SAR incidents will decrease overall as people engage in more urban-based recreation types (Score = 2.3)

- Fewer recreation SAR incidents overall as people use the more accessible and less remote areas (Score = 2.4)

Most Unlikely changes 2

- Compulsory 'user-pays' types of insurance systems will be introduced as a requirement for anyone using more remote locations (i.e. backcountry or backwaters) in order to cover SAR costs (Score = 2.5)

- People travel less often for recreation purposes (Score = 2.7)

- There will be increasing reliance on professional SAR response agencies instead of volunteers (Score = 3.0)

SUMMARY

Tension predicted - profiles

Examples:

▸ Dementia (aging projections)
▸ Inshore (ethnicity projections)
▸ Tourism (tourism forecasts)

Plan for:

- Population growth & regional patterns
- Ethnically more diverse populations & more diverse activities
    - Changing SAR incident demands
- Aging population structure
    - Less volunteer capacity/capability in certain hard hit regions (e.g., West Coast) or functions (e.g., Radios – AREC)
- Impact of technology (a two-edged sword?)
- Growth in tourism and recreation demands regionally
- Greater resource competition
- Aligning information needs

Adaptive responses

- Importance of volunteer recruitment and retention
- Role of women & youth
- One-SAR – career paths and training to meet future challenges – cross-sector analysis
- Regional and central resourcing
- Consider going 'up-a-cog' for certain regions in relation to expected growth in demand
- Balancing volunteer and professional roles
- Influencing demand – prevention, education and awareness

Recommendations

- Model provides a useful indicator of the likely future outcome for SAR
- Volunteer capability
  - cross training and career paths
- Information drivers
  - integration and management of data
  - fuel projections & strategies for response
- Opportunities
  - for improving data management and further applied research

Reporting

- Main report delivered to SARINZ in June 2010

- Included detailed profiles across incident types, subjects and on SAR volunteers

Thank you

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