

Rock fishers' practice and perception of water safety

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Abstract

Context

Fishing from rocky shorelines is one of New Zealand's most dangerous pastimes with 63 fatalities in the 16 years from 1980-1995. However, little is known about the rock fishing fraternity, their demographic make up, their water safety knowledge, attitudes and their behaviour when fishing at hazardous rocky, coastal locations.

Method

Four high-risk, land-based fishing locations on Auckland's rugged west coast were selected as sites to conduct a survey and safety campaign during the summer months of 2005-06. All rock fishers either on-site or in transit to the sites were asked to complete a self-directed, written questionnaire that sought information on fishing practices and beliefs.

Results and Discussion

In terms of survival ability, one third (n = 81; 32%) of fishers estimated that they could swim 25 m or less non-stop and one third (n = 79; 32%) estimated that they could swim 100 m. Most fishers reported limited/no ability to perform a deep water rescue (n = 191; 76%) or CPR (n = 155; 62%).

In terms of risky behaviours, almost one half (n = 120; 48%) had gone to the water's edge to retrieve a snagged line and one fifth (n = 50; 20%) had consumed alcohol while fishing from rocks.

Most fishers agreed that always wearing a lifejacket made fishing a lot safer (n = 177; 71%) and that turning their backs to the waves was very dangerous (n = 229; 92%). However, almost three quarters (n = 180; 72%) of fishers admitted that they never wore a buoyancy aid and almost half (n = 103; 41%) had reported turning their backs to the waves. This gap between what rock fishers think and do with regards to their safety suggests that entrenched risky practices persist even when participants are aware of the danger.

Implications

Many fishers have limited safety skills and an overly optimistic view of their survival skills in a high-risk fishing environment. Many take unnecessary risks when fishing from rocks. While most recognized the need for safety precautions such as the wearing of buoyancy aids, few practiced this precaution. Further on-site safety education is recommended with the emphasis on the wearing of buoyancy aids especially around isolated coastlines where rescue services are not immediately available.

1. Introduction

Rock fishing is one of New Zealand's most dangerous pastimes with 63 people having lost their lives while engaged in land-based fishing in the 16 years from 1980-1995 (Davies, 1996). From 1999-2005, 11 drowning fatalities occurred on a 50km stretch of Auckland's rugged west coast, the five most recent fatalities leading up to the summer season of 2005-06 creating a great deal of concern among both rescue and water safety groups and the public at large (Moran, 2006).

However, in spite of the persistence of rock fishing fatalities on Auckland's west coast, little is known about the rock fishing fraternity, their demographic structure, their fishing safety knowledge, their perceptions of associated risk of drowning, or their water safety behaviours when fishing at hazardous west coast locations. Because so little is known about these risk factors, previous attempts to promote water safety messages have been difficult to target specific groups. In addition, no direct attempt has been made to advise west coast fishers of safety issues when they are actually engaged in fishing activity.

A previous study of Auckland's west coast rock fishers found that the sample population was almost exclusively male, of diverse ethnicities and aged between 18-45 years (Davies, 1996). The study recommended continued surveying of rock fishers so that at-risk attitudes and behaviours could be identified. The study also recommended that educational material and multilingual signage were ways to reach at-risk groups. In Australia, a recent study of coronial files of rock fishing fatalities in New South Wales also found that it was one of that country's most dangerous pastimes with an increase in fatalities of 45% from 1992-2000 (Jones, 2003). The study noted that, in terms of region of origin, Asian groups were over-represented in rock fishing drowning fatalities (Asian-born, 36%; Australian-born, 22%). It also found that three-quarters of victims were classified as swimmers (77%) and had worn no personal protection equipment (77%). This study concluded that education campaigns targeted at the at-risk groups, promotion of personal floatation devices and improved search and rescue procedures were options to address rock-fishing safety. Other options included signage, angel ring provision at known 'black spots' and a volunteer code of practice.

While many of the recommendations of previous studies have been adopted in national water safety promotions, rock fishers continue to drown, especially on

Auckland's west coast. To address the public concerns raised by the spate of rocky shoreline fishing fatalities, a west coast fishing safety project that piloted an on-site rock fishing safety education promotion was initiated in October, 2005. The purposes of this study are twofold: 1) to report on the demographics, beliefs and behaviours of Auckland's west coast rock fishers and 2) to make recommendations for future rock fishing safety promotion based on the information obtained.

2. Method

Four well-known black spots for rock fishing fatalities, Whatipu, Karekare, Piha and Muriwai, were identified as key locations for disseminating safety advice and surveying fishers. The water safety promotion and survey data gathering took place during 8 weekends between February and April in the summer of 2006. Several peak holiday weekends were included in this timeframe and it was anticipated that this period would reach many of the west coast fishing population. Static displays of fishing safety, written material and verbal advice from the trained field officers were the educational tools deemed most appropriate for on-site promotion of fishing safety.

A safety advice/research team ($n = 4$) was trained to conduct all aspects of the fieldwork from education to data collection. The field officers worked in pairs and were randomly allocated to one of the four sites each weekend. The participants in the survey were all those who were either fishing from the chosen sites or in transit to and from the sites. Rock fishing was defined as not only fishing with rod and reel but also activities using others devices such as baskets or hand lines as well as those gathering shellfish from the rocks.

Because of the anticipated difficulty of obtaining accurate information from an expected large population of Chinese fishers who did not have English as their first language, the questionnaire was produced in English and Mandarin. To further assist non-English speaking Chinese, the field officers used in the data gathering process were fluent in both English and Chinese. Potential adult participants over 16 years of age were approached by the field officers and asked to voluntarily participate in an anonymous written survey on fishing safety. To promote rock fishing safety and encourage participation in the survey, potential respondents were also invited to take part in a draw to receive inflatable lifejackets and other safety equipment.

A cross-sectional survey using a written, self-completion, anonymous questionnaire, designed to be completed on site and take a maximum of 10 minutes to

complete, was the research tool used to gather information from fishers. The questionnaire consisted of 11 questions that sought information on: frequency of fishing from rocks, swimming and water safety competencies, past fishing behaviours and perceived likelihood of drowning.

Data from the completed questionnaires were entered into Microsoft Excel X for statistical analysis using SPSS Version 13.0 in Windows. Descriptive statistics such as means and proportions were used to describe the baseline characteristics of the population. Frequency tables were generated for all questions and, unless otherwise stated, percentages are expressed in terms of the number of respondents to each survey question within groups. Data were analysed using a number of socio-demographic variables including gender, age and ethnicity. While recognizing the limitations of agglomerating several peoples into one category (Rasanathan, Craig & Perkins, 2004), for the purpose of comparisons by ethnicity, ethnic groupings were broadly based on Statistics New Zealand classification and included European, Maori, Pasifika, Asian and a category for those who self-identified as of 'other' ethnicities than those specified. Full details of the survey were presented in a report entitled *Water safety and Auckland's west coast rock fishers* (Moran, 2006) available in PDF format at: <http://www.watersafe.org.nz/page.asp?page=342>

3. Results

All rock fishers at the selected sites were invited to take part in the survey but several declined. The number of fishers who declined to take part was not recorded at one site but at the other three sites, 149 fishers agreed to take part in the study while 17 declined out of a total of 166 that were approached, giving a response rate of 89.8%. A total of 255 questionnaires were returned and, of these, 5 (0.2%) were considered invalid because of illegibility/incorrect completion and were excluded from the data analysis. Thus, the final database for this study included 250 adults who were interviewed while participating in rock fishing activity at four popular locations on the west coast of Auckland during the summer of 2006.

3.1. Demographic Characteristics of Rock Fishers

Analysis of respondents' age, gender, length of residency, and ethnicity indicated that the demographic structure of the rock fishing population was quite different from

population norms. As Table 1 shows, the sample consisted of ten times as many males than females and more than half (56.8%; $n = 142$) were in the 25-44 year age group. Almost one half (42.0%; $n = 105$) of those surveyed were of recent residency (< 4 years). Proportionally more Asian peoples (49.2%; $n = 123$) were included in the study whereas proportionally less European (33.2%; $n = 83$) and Maori (9.6%; $n = 16$) New Zealanders were included.

Table 1. *Demographic Characteristics of Fishers*

Demographic Characteristic		<i>n</i>	%	Total
Gender	Male	229	91.6	250 (100%)
	Female	21	8.4	
Ethnicity	European	83	33.2	250 (100%)
	Maori	16	6.4	
	Pasifika	24	9.6	
	Asian	123	49.2	
	Other	4	1.6	
Age group	15-24 years	58	23.2	250 (100%)
	25-44 years	142	56.8	
	45-64 years	46	18.4	
	65 years+	4	1.6	
Length of residency	<4 years	105	42.0	250 (100%)
	5-9 years	44	17.6	
	>10 years	101	40.4	

Further analysis of the ethnicity of respondents revealed a diverse range of backgrounds. Those that were broadly identified in Table 1 as Pasifika peoples self-identified as Samoan (3.2%), Tongan (1.6%), Cook Islander (1.2%) and from other unspecified Pacific Islands (3.6%). Those that were categorised as of Asian ethnicity (49.2%), self-identified as Chinese/Taiwanese (38%), Korean (6.4%), Indian (3.2%) and Filipino (1.6%). A further indication of the current prevalence of Chinese or Taiwanese New Zealanders among Auckland's rock fishing population was the number of participants ($n = 59$; 24%) who chose to respond to the Chinese language version of the questionnaire.

To determine how familiar rock fishers were with the site that they were currently fishing, respondents were asked how often they had fished at the site where they were interviewed. For more than one third (36.4%) of respondents, it was the first time at the site. Cumulatively, more than two thirds (69.2%) of rock fishers had fished at that location less than 5 times, four fifths (79.6%) had fished there less than 10 times and only one fifth (20.4%) had fished at that location more than 10 times.

3.2. Water Safety Skills of Rock Fishers

To determine how well rock fishers might be able to cope with an unintentional immersion or an emergency rock fishing situation involving fellow fishers, respondents were asked to self-estimate their swimming, rescue and resuscitation abilities. Table 2 shows that one third (32.4%; n = 81) of fishers estimated that they could currently swim non-stop for 25 m or less, with one in ten fishers (12.0%; n = 30) describing themselves as non-swimmers and a further one fifth (20.4%; n = 51) estimating they could only swim 25 m. Almost one third (31.6%; n = 79) estimated that they could currently swim 100 m and one quarter (24.4%; n = 61) were confident that they could currently swim 400 m non-stop. When analysed by ethnicity, more Pasifika and Asian fishers than European and Maori fishers thought that they could swim less than 25 m (33.4% and 44.5% compared with 19.5% and 12.5% respectively). In contrast to this, one third (33.3%) of European New Zealanders thought that they could swim 400 m.

Swimming ability did not differ markedly by age group. Slightly more of the older 45-64 year age group than the 15-29 or 30-44 year age groups estimated that they could only swim 25 m or less (41.3% compared with 34.5% and 28.9%). Slightly fewer of the younger 15-29 year age group than the 30-44 and 45-64 year age groups thought they that could swim 400 m (17.2% compared with 26.1% and 28.3%). When analysed by length of residency, rock fishers of recent residency (< 4 years or 4-9 years) estimated lesser swimming ability than those who had lived in New Zealand for 10 years or more (35.3% and 47.7% compared with 22.8%). In contrast to this, slightly more long-term residents (>10 years) than those of recent residency (< 4 years or 4-9 years) estimated they could currently swim 400 m (26.7% compared with 24.8% and 18.2%).

Table 2 also shows that more than half (57.6%; n =144) of rock fishers reported no ability to perform a deep-water rescue and one fifth (18.8%; n = 47) estimated poor rescue ability. Cumulatively, three quarters of fishers (76.2%) were unlikely to be able to effectively assist in the case of an unintentional immersion requiring in-water assistance. Furthermore, less than 10% (9.6%; n = 24) of fishers thought that they had excellent rescue skills. Most fishers (62.0%) also had limited or

no ability to perform CPR with one third estimating no knowledge of CPR and a more than one-quarter (26.8%) estimating poor ability. As was the case with rescue ability, only one in ten fishers (13.2%) thought that they had excellent CPR skills with current qualifications.

Table 2. *Self-estimated Swimming, Rescue and CPR Abilities*

How far can you currently swim non-stop?	<i>n</i>	%	<i>Cumulative%</i>
Cannot swim	30	12.0	12.0
25 m	51	20.4	32.4
100 m	79	31.6	64.0
200 m	28	11.2	75.2
400 m	61	24.4	99.6*
Could you perform a deep-water rescue?			
No ability	144	57.6	57.6
Poor skill level	47	18.8	76.4
Confident about skill level	34	13.6	90.0
Excellent skill level	24	9.6	99.6*
Could you perform CPR on a drowning victim?			
No ability	88	35.2	35.2
Poor skill level	67	26.8	62.0
Confident about skill level	62	24.8	86.8
Excellent skill level	33	13.2	99.6*

* Note: 1 (0.4%) missing value where respondent failed to answer question

When analysed by ethnicity, more Asian than European, Maori and Pasifika fishers thought that they could not perform a deep-water rescue (75.0% compared with 43.7%, 37.5% and 37.5%) or perform CPR (53.8% compared with 14.9%, 6.3% and 33.3%). In contrast to this, more European, Maori and Pasifika than Asian fishers thought they had either good/excellent rescue skill (32.1%, 43.8% and 37.5% compared with 11.0%). More European and Maori than Pasifika and Asian fishers thought that they had good/excellent CPR skills (62.1% and 68.8% compared with 37.5% and 16.0%). Little difference was found in rescue ability when analysed by age group, although the older 25-44 and 45-64 year age groups were more confident of their rescue ability and their CPR skills than the younger 15-29 year age group.

Analysis of rescue and CPR ability by length of residency indicated that those of recent residency (< 4 years) estimated lesser, and those of long-term residency (> 10 years) greater rescue and CPR skills. Almost three quarters (70.2%; n = 74) of recent residents reported no rescue skills and one half (50.5%; n = 53) thought that they could not perform CPR. In contrast to this, one third (34.6%; n = 35) of long-term residents thought that they had good/excellent rescue skills and over one half (60.4%; n = 61) thought they had good/excellent CPR skills.

3.3 Water Safety Behaviours of Rock Fishers

Rock fishers were asked to self-report previous water safety behaviours using four frequencies categories including *never*, *sometimes*, *often* and *always*. Table 3 shows that almost three quarters (72%; n=180) of fishers *never* wore a lifejacket, almost one half had gone to the water's edge to retrieve a snagged line (48.0%; n = 120) or had turned their backs to the sea (41.2%; n = 103), more than a third (36%; n = 90) had worn gumboots or waders, and one fifth (19.6%; n = 49) had consumed alcohol while rock fishing..

Table 3. *Rock Fishers' Water Safety Behaviour*

When rock fishing, do you	Never		Sometimes		Often		Always	
	n	%	n	%	n	%	n	%
Wear a lifejacket or other flotation device	180	72.0	58	23.2	7	2.8	4	1.6
Turn your back to the sea when fishing	146	58.4	90	36.0	6	2.4	7	2.8
Wear gumboots or wader	159	63.6	58	23.2	16	6.4	16	6.4
Drink alcohol when you are fishing	200	80.0	39	15.6	7	2.8	3	1.2
Take a cell phone in case of emergencies	24	9.6	33	13.2	38	15.0	154	61.6
Check weather/water conditions first	11	4.4	40	16.0	54	22.0	144	57.6
Go down the rock to retrieve a snagged line	129	51.6	95	38.0	20	8.0	5	2.0

Note: 1 (0.4%) missing value where respondent failed to answer each statement in the question

Table 3 also shows that, in terms of high frequency risk, some fishers *often* or *always* wore gumboots or waders (12.8%; n = 32) or went down the rock to retrieve a

snagged line (10.0%; n = 25). In addition, more than one third of fishers *sometimes* engaged in the potentially dangerous behaviours of turning their backs to the sea (36.0%; n = 90) or of going down the rock to the water's edge to retrieve a snagged line (38.0%; n = 95). One fifth of fishers *never* or only *sometimes* checked the weather before setting out on a fishing trip (20.4%; n = 51) or take a cell phone with them in case of emergencies (22.8%; n = 57). A small proportion of fishers reported *often* or *always* drinking alcohol when fishing from rocks (4.0%; n = 10), a greater proportion did so *sometimes* (15.6%; n = 39).

When behaviour was analysed by ethnicity, little difference was found in lifejacket use, except that fewer Pasifika fishers *never* wore a lifejacket compared with other ethnic groups. More Asian fishers and fewer European New Zealanders *never* drank alcohol (92.4% compared with 65.5%). Fewer European and Maori than Pasifika and Asian fishers *never* went down the rock to the water's edge to retrieve a snagged line (46.0% and 37.5% compared with 62.5% and 57.1%), whereas more European and Maori fishers *never* wore gumboots or waders (73.6% and 81.3% compared with 50.0% and 57.1%).

Some differences in water safety behaviours were evident when data were analysed by age. More fishers in the 15-24 year age group than the older 25-44 and 45-64 year age groups *never* wore a lifejacket (81.0% compared with 69.7% and 69.6%). In addition, more young fishers reported that they had gone down the rock to retrieve snagged lines (53.4% compared with 48.5% and 41.3%) and turned their backs to the sea (58.5% compared with 39.4% and 26.1%). In contrast to this, more fishers in the 25-44 and 45-64 year age groups than younger fishers in the 15-24 year age group had consumed alcohol when fishing (21.1% and 23.9% compared with 13.8%).

More short-term (< 4 years) and medium-term residents (4-9 years) than long-term residents (10 years+) *never* consumed alcohol when fishing (88.6% and 90.9% compared with 66.3%). More long-term residents than short- or medium-term residents *never* wore gumboots or waders when rock fishing (74.3% compared with 60.0% and 47.7%), although they were more likely to *sometimes* go down the rock to retrieve a snagged line (50.5% compared with 26.7% and 36.4%).

3.4. Fishers Attitudes Towards Drowning Risk

Rock fishers were asked to respond to a series of 12 statements relating to their perception of the risk of drowning associated with rock fishing. Respondents used a 5-point scale that included the categories *strongly agree*, *agree*, *unsure*, *disagree* and *strongly disagree*. For ease of interpretation, the *strongly agree/agree* and *strongly disagree/disagree* responses were aggregated as can be seen in Table 4.

Table 4. *Attitudes towards Risk of Drowning when Fishing from Rocks*

Do you think that -	Strongly Agree/ agree		Unsure		Strongly Disagree/Disagree	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Getting swept off the rocks is likely to result in my drowning	176	70.2	39	15.6	31	12.4
Rock fishing is no more risky than other water activities	103	41.2	46	18.4	97	38.8
Drowning is a constant threat to my life when rock fishing	126	50.0	45	18.0	75	30.0
I am not concerned about the risks of rock fishing	68	27.2	26	10.4	152	60.4
Others rock fishers are at greater risk of drowning than me	81	32.4	76	30.4	89	35.6
I am a strong swimmer compared with most other people	116	46.4	48	19.2	82	32.8
I avoid fishing in bad conditions to reduce the risk of drowning	21.9	87.8	10	4.0	17	6.8
Always wearing a lifejacket makes fishing a lot safer	177	70.6	20	8.0	49	19.6
Turning my back to the waves when rock fishing is very dangerous	229	91.8	14	5.6	3	1.2
My local knowledge of this site means I'm unlikely to get caught out	127	50.4	46	18.4	73	29.2
My experience of the sea will keep me safe when rock fishing	144	57.8	51	20.4	51	20.4
My swimming ability means I can get myself out of trouble	110	44.0	56	22.4	80	32.0

Note: 4 missing values where respondents failed to answer question

Statements 1-3 related to fishers' perception of the severity of the risk associated with fishing from rocks. Most fishers (70.2%) agreed that getting swept off rocks was likely to result in their drowning, yet a third of fishers thought that rock fishing was no more risky than other aquatic activities (38.8%) or didn't consider drowning as a constant threat (30%). When analysed by ethnicity, age group and length of residency, few major differences were found in perception of the severity of risk posed by rock fishing except that proportionally fewer Maori (44%) thought that they were likely to drown if swept off rocks when fishing and fewer young fishers (15-24 years) thought drowning was a constant threat to their life when fishing. Table 4 also shows that, in response to statements 4-6 on fishers' perceptions of their

vulnerability to drowning, one quarter (27.2%) were not concerned about the risk of drowning, one third (32.4%) felt that others fishers were at greater risk than themselves and almost one half (46.4%) thought that they were strong swimmers in comparison with others. When analysed by ethnicity, age group and length of residency, fewer Asian fishers, young fishers aged 15-24 years and recent residents (< 4 years) thought they were strong swimmers compared with others.

Statements 7-9 sought fishers' perceptions of the efficacy of preventive action in reducing their risk of drowning. Most fishers agreed that avoiding fishing in bad conditions reduced their risk of drowning (87.8%), always wearing a lifejacket made fishing a lot safer (70.6%) and that turning their backs to the waves when rock fishing was very dangerous (91.8%). However, as previously reported in Table 3, many rock fishers admitted that they had never worn a lifejacket (72.0%) and had turned their backs to the waves (41.2%) when fishing. No major differences in perceptions of the efficacy of preventive action were discernible when responses were analysed by ethnicity, age or length of residency.

Statements 10-12 related to fishers' perceptions of self-efficacy of preventive behaviours. One half (50.4%) agreed that their local knowledge of the site meant that they were unlikely to get into difficulty, and more than half (57.8%) thought that their experience of the sea would keep them safe when fishing. It would appear unlikely that this is the case however, given that for one third (36.4%) of fishers, it was the first visit to the site and more than two thirds (69.2%) had visited the site five times or less (see Table 1). Moreover, only one fifth (20.4%) had what could be considered extensive experience of the site by having fished there more than 10 times.

In addition to an apparent lack of local knowledge, the confidence of many fishers in their experience of local sea conditions (as seen in Table 4, statement 11) may also be misplaced given that almost half (42.0%) of fishers were of recent residency (< 4 years) and most (59.6%) participants in the survey were not long-term residents (see Table 1). Further evidence of the likely overestimation of their self-efficacy in reducing drowning risk was again apparent in responses to the statement 12 on the protective value of their swimming ability. Almost half (44.0%) of respondents considered that their swimming ability would mean that they could get themselves out of trouble which, as previously pointed out, does not correspond with fishers' low estimates of their swimming ability.

When self-efficacy was analysed by ethnicity, Maori fishers were more confident than other ethnic groups of the protective capacity of their local knowledge and their swimming ability. Older fishers (45-64 years) were more confident than younger age groups of the efficacy of their local knowledge and their knowledge of the sea. As might be expected, fewer recent residents than more established residents were confident of their protective value of local knowledge or their knowledge of sea conditions.

Discussion

This study examined the demographic characteristics and the safety knowledge, attitudes and behaviours of fishers engaged in high-risk fishing activity on Auckland's rugged west coast. The fishers were demographically diverse group that was predominantly male, aged between 25-44 years, mainly of Asian ethnicity and of recent residency, as has been reported in previous studies (Davies, 1996; Jones 2003). The swimming, rescue and CPR skills of participants were equally diverse, with those of Asian ethnicity and of recent residency self-reporting lesser abilities than others, which suggests that they may be at greater risk of drowning in the event of an emergency.

Among the key findings of fishers' attitudes and behaviours, it is a concern that, even though most fishers recognized the value of lifejackets to their survival, more than three quarters reported never using them when fishing. In addition, many presume that their swimming ability will afford them some protection in the event of their sudden immersion – even though many reported limited abilities. Furthermore, fishers' risk of drowning may be exacerbated by a misguided belief in the protective value of their local knowledge and experience, given that for many (36%) it was their first visit to the site where interviewed and many were of recent residency (42%) and thus likely to be unfamiliar with New Zealand sea and weather conditions.

Many fishers perceived that others fishers were at greater risk of drowning than themselves and that they were strong swimmers in comparison with others. These two perceptions are interesting given that only one third (36%) of respondents thought that they could currently swim more than 200 m (see Table 2). It suggests that some fishers may have a lesser sense of vulnerability that could lead to an underestimation of risk and the mistaken belief that they were less at risk than others.

While the results from this study offer robust evidence as to why rock fishers are at great risk of drowning, the results should be interpreted with some caution in light of several methodological limitations. The study did not include those who fished at the dangerous sites on weekdays or outside the summer season. In addition, self-estimation of ability (such as swimming, rescue and CPR ability) and self-reported safety behaviour may not accurately express true measures (Robertson, 1992; Howland, Hingson, Mangione, Bell & Bak, 1996). Further study is required to determine the validity of such measures using swimming proficiency testing and observational studies of fishing safety behaviour. These limitations notwithstanding, this study found evidence of a gap between what fishers think and what they do with regards to their safety when fishing from rocks which suggests that entrenched risky practices persist even when participants are aware of the danger. Further study is required also to determine whether such entrenched safety attitudes can be changed by the type of on-site safety promotion undertaken in conjunction with this study.

Conclusions

In light of these findings, several recommendations are made. These are:

- Retain the rock fishing safety adviser summer campaign for a further two years in order to refine and reinforce the pilot project messages as well as to assess the effect of the programme on misguided beliefs and at-risk behaviours.
- Promote the use of lifejackets among the rock fishing community. Several strategies may achieve this goal. Inducements to purchase lifejackets, joint promotions with fishing tackle shops, fishing magazines and fishing programmes pamphlets and television/radio safety promotion messages could be valuable ongoing reinforcing strategies.
- Target rock fishing safety promotion at rock fishers from among the Asian community and among those of recent residency. Multilingual information via DVD's and videos, community TV and radio programmes, and written material such as posters, pamphlets are some ways to reach this audience. In addition, multilingual signage at all high-risk sites indicating site-specific dangers and emergency instructions may reinforce safety messages to fishers.
- Promote swimming survival and other emergency skills among all fishers, but especially among those with poor or no swimming ability. Free or subsidised

swimming survival and water safety lessons at community pools or through commercial providers may be a way of promoting survival proficiency.

- Given the extensive lack of personal floatation aids used by fishers, angel rings and other appropriate flotation devices should be placed at all high-risk locations and regularly maintained.

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