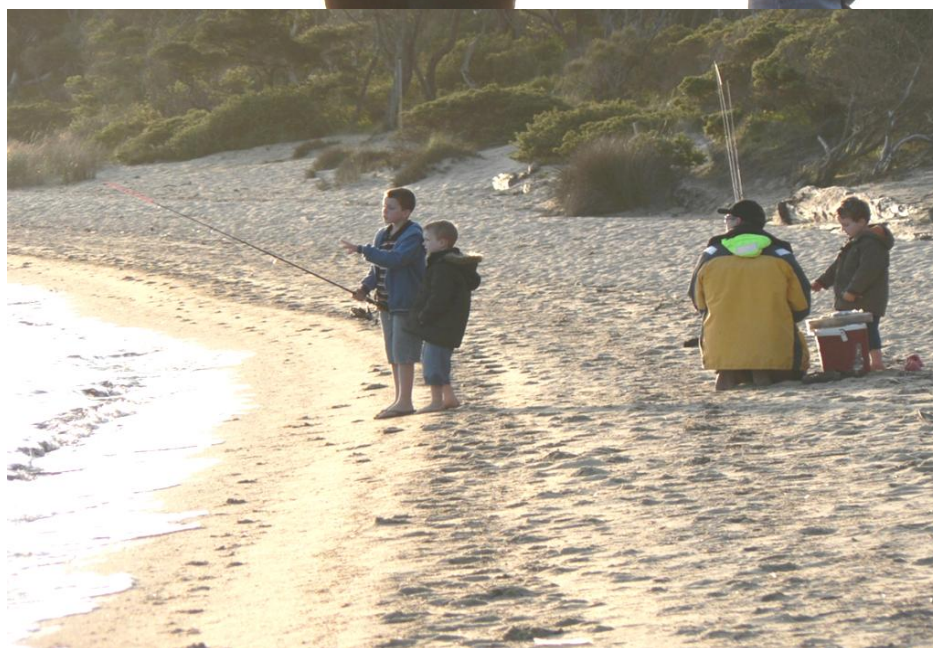


# Identifying the health and well-being benefits of recreational fishing

*Prof A. McManus, Dr W. Hunt, J. Storey, J. White*



Australian Government  
Fisheries Research and  
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## Report No. 2011/217

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## 1. NON TECHNICAL SUMMARY

**2011/217**      **Identifying the health and well-being benefits of recreational fishing**

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### **OBJECTIVES:**

1. Identify current research activities and programs in Australia relating to recreational fishing and health or well-being.
2. Investigate the impact of recreational fishing on the health and well-being of Australian society.

### **OUTCOMES ACHIEVED TO DATE**

1. The outcomes of this research pertain to the positive response to this scoping study received from Australian recreational fishing stakeholders. Responses and input were received by many more stakeholder representatives, from each Australian state and territory, than was initially conceptualized.
2. A media release about this scoping study was met with great interest. PI Prof. Alexandra McManus has conducted seven radio interviews and the West Australian newspaper will run a story on recreational fishing in January or February 2012.
3. It has been established that there is a dearth of formal research into the health and well-being benefits of recreational fishing, both within Australia and internationally.
4. There are a considerable number of programs and resources promoting recreational fishing in Australia. Individuals involved in running the programs have significant anecdotal evidence of health and well-being benefits.
5. It is hoped that as an outcome of this scoping study, further research will be conducted to explore and quantify the health and well-being benefits of recreational fishing.
6. Emergent areas of health benefit have been identified in: mental health, recreation for the disabled, outdoor recreation for youth, antisocial behaviour deterrents, outdoor recreation for seniors and intergenerational transfer of knowledge and skills.

Recreational fishing is a popular form of outdoor recreation enjoyed by Australians. Participation rates have been extrapolated to show that approximately 25% of Australian households consist of at least one member who participates in recreational fishing; and on average each of these households contains two recreational fishers (Henry & Lyle 2003). Recreational fishing is one of the few forms of nature-based recreation that can be enjoyed throughout childhood, adolescence, adulthood and into the senior years. Of recreational fishers aged 50 years and over, 75% have been fishing for longer than 30 years amassing a wealth of skills, techniques and knowledge build over the years of participation.

A major health concern in Australia is that the level of physical activity in children and adolescents is decreasing, with electronic media and other sedentary behaviours replacing outdoor activities. One study revealed that 37% of children aged 10 to 12 years spend less than half an hour a day playing outside after school and 43% spend more than two hours a day using electronic media (Wen, Kite et al. 2009). The lack of physical activity associated with the replacement of outdoor play with electronic leisure, places children at a greater risk for obesity and related adverse health effects. Research has shown that there is an urgent need to provide outdoor social opportunities and activities for children aged up to five years to encourage habitual healthy behaviours. Furthermore, parental (or adult) encouragement, supervision and participation are essential for long-term behaviour change (Cleland, Timperio et al. 2009).

Providing opportunities for fishing at a young age, as a family activity, or as part of school physical education programs, is vital to cultivating recreational fishing as an interest for tomorrow's adults. Children that participate in recreational activity with their parents or adult carers are more likely to participate later in life. Successful promotion of fishing to Australian youth can maintain the future of the recreational fishing industry. Concurrently, promoting outdoor recreation throughout life can improve lifelong health for participants. To date however, the health benefits associated with recreational fishing have been difficult to quantify. The primary reason people partake in outdoor pursuits such as recreational fishing is to relax and unwind. With clear evidence supporting physical activity and a healthy diet high in seafood as beneficial to health and the prevention of chronic conditions (McManus and Newton 2011; McManus. A., White. J. et al. 2011; Newton and McManus 2011), it is both logical and intuitive that recreational fishing could offer substantial health benefits.

The first stage of this scoping study was to conduct an extensive review of literature and online resources to determine what research or activities had taken place with a focus on the health and well-being benefits associated with recreational fishing. An extensive database of 20,386 journal articles was systematically analysed and only 131 found to be directly related to recreational fishing. Only three articles had a primary focus on health, well-being and recreational fishing. The second stage of this research project was to investigate the health and well-being benefits of recreational fishing to the Australian society. Given the lack of published literature in this field an extensive online search was conducted. Also, with the help of the industry advisory group, a database of key Australian stakeholder organisations and individuals was constructed. Stakeholders were personally contacted in order to gain access to the corporate memory of key individuals and related anecdotal evidence. The response to this phase of the research was overwhelmingly positive.

An initial contact list of 29 key stakeholders was extended to 48 as further contacts were added and, on some occasions, unsolicited responses received. As a result, a large body of emergent evidence for the health and well-being benefits of recreational fishing was identified (although it should be noted that not all of this evidence is published).

The study found the strongest areas of evidence related to youth development, breast cancer recovery, positive mental health outcomes, recreation for the disabled and participation as a sport. There were programs and events run throughout Australia allowing children the opportunity to fish. Each of these initiatives focussed on education and environmental awareness. Classroom materials and lessons were also available to support learning outcomes. In many cases, fishing was used as an incentive to deter antisocial behaviour with excellent results. Recreational fishing gave children who did not find classroom social dynamics easy, the opportunity to shine and to form friendships outside their own school. For example, older children had the opportunity to mentor younger children which increased their own self-efficacy and self-confidence. Of great interest are the findings that hyperactive children were seen to sit quietly by the water for long periods of time and uncommunicative children vocally expressed that they want to fish.

Volunteer-led recreational fishing activities were also popular outside of the school setting. This report provides many examples from all over Australia. Skills developed over a lifetime not only provided health benefits for seniors but put them in a unique position for intergenerational transfer of recreational fishing knowledge. Also, children and adults with disabilities were able to partake in fishing largely due to a large base of volunteers and funding from organisational bodies.

Beyond the large body of anecdotal evidence supporting relaxation and stress reduction, a clear benefit has been noted for women recovering from mastectomies or related surgeries. The action of fly fishing is an excellent way to recover upper body function and maintain or extend range of motion, in a supportive and social environment.

Based on the evidence amassed, a questionnaire was developed to further assess the role that recreational fishing has to play in promoting good health and well-being in Australian society. The questionnaire instrument was tested for reliability and piloted with a small sample of fishers. This research tool can now be used (and further tested) in larger studies.

In summary, this study found that considerable health and well-being benefits can be gained through involvement in recreational fishing. Encouraging young children, youth, adults and families to fish offers a cost effective and healthful outdoor recreational activity that can be enjoyed throughout life. Benefits were evident for individuals and groups. Recreational fishing was also noted to provide significant benefits to children and youth with behavioural and mental health issues. Finally, educational strategies that focus on how to minimise the environmental impacts of recreational fishing can ensure today's and tomorrow's recreational fishers are aware of sustainable fishing practices.

**KEYWORDS:** recreation, fishing, angling, health, well-being.

## 2 ACKNOWLEDGMENTS

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Pam Elliot	Woodbridge Marine Discovery Centre
Peter Gibson	NSW Council of Freshwater Anglers
Rebecca Hubbard	Environment Tasmania
Robert Green	Fishcare Victoria
Rod Pearn	Fishcare Victoria
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Stephen Sutton	James Cook University
Steve Williamson	Professional Fishing Guides and Instructors Association
Sue Kilpatrick	Deakin University
Tony Steiner	Australian National Sportfishing Australia



## **3 BACKGROUND**

Fishing is an activity that is suited to people of almost any age and across a large range of physical abilities. Outdoor nature-based activities provide social, physiological and psychological benefits. This research explored the health and well-being benefits associated with recreational fishing. It is estimated that 3.5 million people participate in recreational fishing in Australia each year. It is further estimated that recreational fishers drive an enormous industry sector that spends \$650 million on tackle, \$2.5 billion on boats plus additional funds on general fishing expenses (Fisheries Research and Development Corporation 2010).

In Western Australia in 2004, approximately 600,000 people engaged in recreational fishing which was double the number of people fishing in 1987 (Department of Fisheries 2004). Based on this rate of growth, it is estimated that 20 million recreational fishing days will occur in 2020 (Department of Fisheries 2004). Understanding the true value of recreational fishing to Australian society is integral to the future of recreational fishing in Australia.

### **3.1 Australian angler profile**

Approximately 25% of Australian households consist of at least one member who participates in recreational fishing. On average each of these households contains two recreational fishers (Henry and Lyle 2003).

Fishing effort, measured by the number of fishing days, revealed that just 15% of recreational fishers account for 50% of fishing effort while at the other end of the scale 60% of fishers account for only 20% of fishing effort (Henry and Lyle 2003). These figures are strongly influenced by the 3% of recreational fishers that fish for more than 25 days per year. Comparison between states reveals that Western Australia had the highest average number of fishing days at 6.94 days per annum. A study of Queensland recreational fishers found that 85% of fishers had more than 10 years fishing experience with 50% fishing with families, 40% with friends and 10% alone (Ormsby 2004).

Australian recreational fishers are twice as likely to be male with the greatest number of recreational fishers located in New South Wales, Victoria and Queensland (Henry and Lyle 2003). As a proportion of the population, recreational fishing is greatest in Western Australia, Tasmania and the Northern Territory. Figures for recreational fishing by age (Australia and Western Australia) are provided in Table 1. Males are well represented across all age groups for recreational fishing (Henry and Lyle 2003). Female participation is high in the younger age groups then steadily declines with age (see Table 1)

Table 1: Australian and Western Australian recreational fishing participation by age

Age	Australian Males (%)	WA Males (%)	Australian Females (%)	WA Females (%)	Australian Population (%)	WA Population (%)
5-14 years	33.2	45.2	22.8	30.8	28.1	38.2
15-29 years	27.0	37.0	12.7	20.8	19.9	29.0
30-44 years	30.7	42.2	14.9	22.8	22.8	32.4
45-59 years	25.9	36.6	9.7	15.5	17.8	26.2
60-74 years	17.7	25.3	4.5	10.1	11.0	17.6
75+	7.2	10.3	0.9	2.5	3.5	5.8

(Source: Henry and Lyle 2003, p 155)

Children find the development of skills and the perceived skill associated with fishing as important motivators for participation. Girls in particular value the support of family and friends, as a result, fewer girls than boys fish alone (Kuehn 2005). Female fishing rates appear to drop during adolescence which may be due to reduced interest in fishing without company or not being permitted to fish alone. Female fishing rates are strongly influenced by the support of friends and family (Kuehn 2005).

There are a number of highly specialised skills associated with recreational fishing. Table 2 shows that 75% of recreational fishers aged over 60 years had more than 30 years experience. Providing opportunities to fish at a young age, as a family activity or as a part school physical education programs, is vital to cultivating recreational fishing as an interest for tomorrow's adults. Research shows that children who participate in a recreational activity with their parents are also more likely to pursue the same activity into adulthood (Kuehn 2005). It is also important to involve seniors in programs as many have excellent skills to impart and the time and patience to pass them onto younger generations. Recreational fishing also provides significant health benefits to seniors through physical activity, vitamin D acquisition and social interaction.

Table 2: Recreational fishers' years of fishing experience by age

Age	Years of Fishing Experience				Total
	< 5 years	5–9 years	10–29 years	> 30 years	
15 - 19 years	23.8	23.8	52.3	-	100
20 – 29 years	9.1	24.2	66.7	-	100
30 – 39 years	3.4	9.5	61.5	25.7	100
40 – 49 years	3.6	5.0	32.9	58.6	100
50 – 59 years	1.7	3.4	15.5	79.3	100
> 60 years	3.3	6.6	14.8	75.4	100

(Source: Ormsby 2004, p 22)

### 3.2 Motivations for recreational fishing

The strongest motivations for Queensland recreational fishers were rest and recreation, to enjoy nature and to be outdoors (Ormsby 2004). Ratings of recreational fishing motivations are provided in Table 3 and 4.

Table 3: Importance rating to Australian recreational fishing motivations

Motivation	Importance Rating			
	Very	Quite	Not Very	Not at All
Relax and unwind	63	27	8	2
To be outdoors	58	33	7	2
For solitude	19	23	35	24
To be with family	39	30	19	13
To be with friends	32	41	17	10
Fishing competitions	2	3	11	84
Fish for sport	48	34	21	5
Fish for food	33	28	25	14

(Source: Henry and Lyle 2003, p 98)

Table 4: Primary motivations for recreational fishing by state

Motivation	% Respondents								
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Total
Relax and unwind	40	43	39	32	28	31	29	41	37
To be outdoors	15	15	9	10	11	13	32	15	13
For solitude	1	1	3	3	3	2	4	2	2
To be with family	13	12	16	17	20	19	11	9	15
To be with friends	4	7	3	9	6	3	10	2	5
Competitions	0	0	0	0	0	0	0	0	0
Fish for sport	21	15	18	15	18	16	9	27	18
Fish for food	5	6	9	12	11	8	2	3	8
Unsure	2	1	4	2	3	7	4	1	3

(Source: Henry and Lyle, 2003, p 99)

While 70% of Queensland fishers believe that catching fish is an important part of recreational fishing, 77% believe that a fishing trip can be successful even when no fish are caught (Ormsby 2004). In a Minnesota USA study, primary motivators for participation were similar to those of Australians being: achievement, appreciation, personal development, affiliation and health. Primary constraints were cost, crowds, discomfort, safety, planning required, physical ability, access and other commitments (Schroeder and Fulton 2008).

Fishing provides nature-based recreation suited to people with disabilities. It also provides social, physiological and psychological benefits; while disabled people may face more constraints than their more abled counterparts, motivators for fishing are the same for both groups (Freudenberg and Arlinghaus 2009).

### 3.3 Recreational fishing and health

The level of physical activity in children and adolescents is declining at an alarming rate (Cleland, Timperio et al. 2009) resulting in what has been termed as a '*physical inactivity epidemic*' (as opposed to an obesity epidemic). There are many examples of increased sedentary behaviour in children. For example, it is estimated that one third of Australian children aged 5 to 12 years use electronic media such as television, computer and electronic games for more than two hours every day (Spinks, Macpherson et al. 2007; Wen, Kite et al. 2009). Another study revealed that 37% of children aged 10-12 years spent less than half an hour a day playing outside after school. The lack of physical activity and the replacement of outdoor play with electronic leisure, place children at a greater risk for obesity and related adverse health effects. Increased social opportunities, parental encouragement and parental supervision are required to promote safe outdoor activity (including fishing) to children over 5 years old (Cleland, Timperio et al. 2009).

One of the risks associated with fishing, as with other outdoor water-based activities, is drowning. From 1 July 2009 to 30 June 2011 there were 629 drownings across Australia with the highest rates in New South Wales and Queensland. At least 21% (n=134) of these drownings were associated with fishing. (These data should be interpreted with caution as the 2011 data did not differentiate between the types of activities associated with watercraft drownings).

Most drownings occurred in summer (a factor of exposure) and the age groups most at risk were young children and males aged 18-34yrs. Adult supervision, alcohol misuse, drugs use and watercraft use were significant factors implicated in drowning in Australia (Royal Life Saving Society Australia. 2010; Royal Life Saving Society Australia. 2011).

Recreational fishing provides the opportunity for individuals, groups and families to engage in an outdoor recreational pursuit that they can enjoy regardless of age, with the added bonuses of significant health benefits and opportunities for important social interactions. However, it is essential to consider safety issues when in and around water bodies. Planning for recreational fishing requires careful consideration including safety precautions against injury and drowning.

### 3.4 Fishery resources

Global fishing resources are strained by the growing demand for fish as the global population escalates and increased awareness of the health benefits of seafood (Kearney 2001). Increased technology available to recreational and commercial fishing has also impacted on catch numbers. However, it would appear the majority of fishers are aware of the importance of maintaining, managing and sustaining fishing resources.

Analysis of catch and release data provides insight into the importance recreational fishers place on managing the future of fishery resources. For example, review of the licensed south western freshwater angling fishery in Western Australia during the 2009/2010 season reported that of the 107,800 fish caught, almost one quarter (n=31,200) were released (Fletcher and Santoro 2011) A second example is that of the release rates of Murray cod caught within the Murray River basin which were estimated to be 77% of total catch (Henry and Lyle 2003).

Research examining novel ways to meet the requirements of competing fishing industry sectors. A recent study in the Mediterranean examined the influence of minimum hook sizes on recreational fishing (Cerda, Alos et al. 2010). The total number of fish caught decreased, yield in weight was maintained and recreational fishers caught larger, more valued fish. Slot rather than minimum size fish guidelines is another initiative that could protect breeding stock.

Recreational anglers often assume a natural right to fish although bag limits and defined seasons for certain seafood exist in Australia (Kearney 2001). Recreational fishers have invested in equipment, have built considerable knowledge about target species and locales, and have frequently developed social networks around this recreational pursuit. Participation in recreational fishing may also define a chosen lifestyle. Whether the right to fish is assumed or not, recreational fishers aim to protect their fishing rights. Despite the many positive examples of recreational anglers supporting fisheries management, it remains clear that management of commercial fishing alone is unlikely to be adequate without control of factors associated with recreational fishing including the mortality rate of discarded catch (unwanted species) and the taking of juvenile seafood (McPhee, Leadbitter et al. 2002).

Compliance with fishing regulations is high within the recreational sectors. In 2008/2009 in the Western Bioregion there were 739 infringement warnings and 318 infringement notices issued out of almost 40,000 field contacts by fisheries officers for recreational fishing (Department of Fisheries. 2009). Difficulties in changing the behaviour of the minority of non compliant anglers include: messages about the impact of fishing on conservation and biodiversity not reaching the general public, the belief that an individual's actions will have only a minor impact, and finally conflicting messages and attitudes from angling groups. Despite evidence that the majority of fisheries are sustainably managed, consumer perceptions show some concern by the general public.

A survey conducted by the Fisheries research Development Corporation (FRDC) in 2011 (Horvat and Sparks 2011) revealed that the sustainability practices in the aquaculture and recreational fishing sectors were highly regarded by consumers. However, only one quarter of respondents in this study (n=27%) agreed that current practices within the commercial fishing were sustainability (see Table 5).

It should be noted that although the results of the FRDC study related to perceived not actual sustainability practices, these public perceptions have not changed over the past decade (Aslin and Byron 2003).

Table 5: Perceived sustainability of fishing sectors

	Percent of Respondents Agree Fishery is Sustainable	
	2003	2011
Fish farming / aquaculture	77	78
Traditional fishing by indigenous Australians	64	60
Recreational fishing	56	67
Commercial fishing	27	27

## **4 NEED**

Recreational fishing provides physiological, psychological and social benefits to the community. These benefits, while widely recognised, are inherently difficult to quantify. This project has collated research efforts, initiatives and programs that are currently underway in Australia around the topic of recreational fishing, health and well-being. This investigation will increase understandings of the health and well-being benefits derived from recreational fishing for a variety of community sectors and stages of life.

Determination of the health and well-being benefits to communities from recreational fishing must be considered in allocation of resources. As an outdoor pursuit that can be enjoyed throughout life, it is important that the recreational fishing sector is recognised for its' promotion of health and well-being. Specific benefits include: a positive impact on mental health; perceived well-being; prevention of chronic disease; and reductions in health care burden. These and other factors need to be considered as part of the true value of recreational fishing.

Recreational fishing is one of the few outdoor recreational activities that can be enjoyed at almost any age regardless of skill, experience or disability. This scoping study represents the first step in consolidating the value of recreational fishing across Australia.

## **5 OBJECTIVES**

There were two main objectives of this study:

1. To identify current research activities and programs in Australia and internationally relating to recreational fishing and health or well-being.
2. To investigate the impact of recreational fishing on the health and well-being on Australian society.

### **6.1 Literature review**

A review of literature pertaining to the health and well-being benefits associated with recreational fishing was conducted. The comprehensive search of evidence utilised the following databases for credible sources of original research, reviews and commentaries: Archive of Life Sciences; Proquest; Pub Med; Science Direct; Taylor and Francis; The Cochrane Collaboration; Web of Knowledge; Web of Science; and Wiley InterScience. Boolean expression terms included: recreational fishing; recreational angling; outdoor recreation; family recreation; outdoor physical activity; health benefits; well-being (as well as wellbeing and well being); and antisocial behaviour. For each database 22 searches were conducted using the advanced setting with no further limitations applied. All search results were exported into an Endnote library and duplicates were removed. Further to this, all search results published prior to 2000 were removed. This gave a total of 27,414 references (originally 156,776). A search was also conducted in Google and Google Scholar using the Boolean expression terms mentioned above and relevant articles pertaining to the health and well-being of recreational fishing were added to the database of references. This brought the total number of references to 27,466. These references were transferred to an excel database, limited to journal articles only, and classified into relevant categories which gave researchers a working database of 20,386. Categorisation of the references was completed by two researchers and a paired sample t-test was conducted in order to determine the inter-rater agreement. The test provided a p-value of 0.849 which enabled the researchers to conclude that, based on the sample (n=50), there was no significant difference between the categorisation techniques of the researchers.

Other published literature reviewed was sourced from: national and international seafood-based databases, seafood industry websites or databases, major national and international academic libraries; electronic sources of information (e.g. Google; Google Scholar; international health websites); Departments of Health within Australia; and educational institutions. The same search criteria and Boolean terms were used for this extended search. As advised by Diana Blackwood, Curtin University's Robertson Library Senior Librarian, each search was discontinued when search results lost relevance to recreational fishing, health and well-being. The results of this search formed the basis of the international audit of recreational fishing, health and well-being.

### **6.2 Australian audit**

Australian recreational fishing bodies were approached to determine current research or programs relating to health and/or well-being. Research, programs and resources linking recreational or physical activity to health and well-being were explored. The Australian audit was conducted during August, September and October 2011. Prominent organisations and individuals from around Australia operating in support of, or research into, recreational fishing were emailed a notification of the commencement of the FRDC 217/2011 scoping study into Recreational Fishing, Health and Well-being was also included in the email. The request was for information, evidence or anecdotes about activities relating recreational fishing to health and well-being. All parties were then contacted by telephone. In many instances those contacted suggested other people that could contribute information.

As a final count, 48 organisations and contacts were approached for information about programs and activities conducted, research outcomes, anecdotes and personal perspectives on the importance of recreational fishing to health and well-being. Representatives were included from industry associations, governments, peak bodies, consultancies and volunteer groups. Recreational fishing activities included inland (freshwater), coastal (marine), fly-fishing, sports fishing and even surfcasting which typically does not involve water or the harvest of fish. Appendix 13.1 provides the full contact list developed.

### **6.3 International audit**

International research relating to recreational fishing, including trends, and health and well-being benefit, was reviewed. The international review stemmed from the extended search conducted in the first part of this project.

### **6.4 Pilot survey**

A questionnaire was developed to assess the relationship between health, well-being and recreational fishing. The questionnaire included an international standard evaluation tool for health and quality-of-life, plus questions about physical activity in general, the level of outdoor recreational activities and recreational fishing effort. The perceived influence of an interest or effort in recreational fishing on health, well-being, as well as consumption of seafood, was also included. The development of the questionnaire consisted of four stages – development of questionnaire items; ethics submission and approval; test and retest study; and pilot study. Figure 1 gives a summary of the stages of the pilot study.

#### *Step 1. Development of questionnaire items*

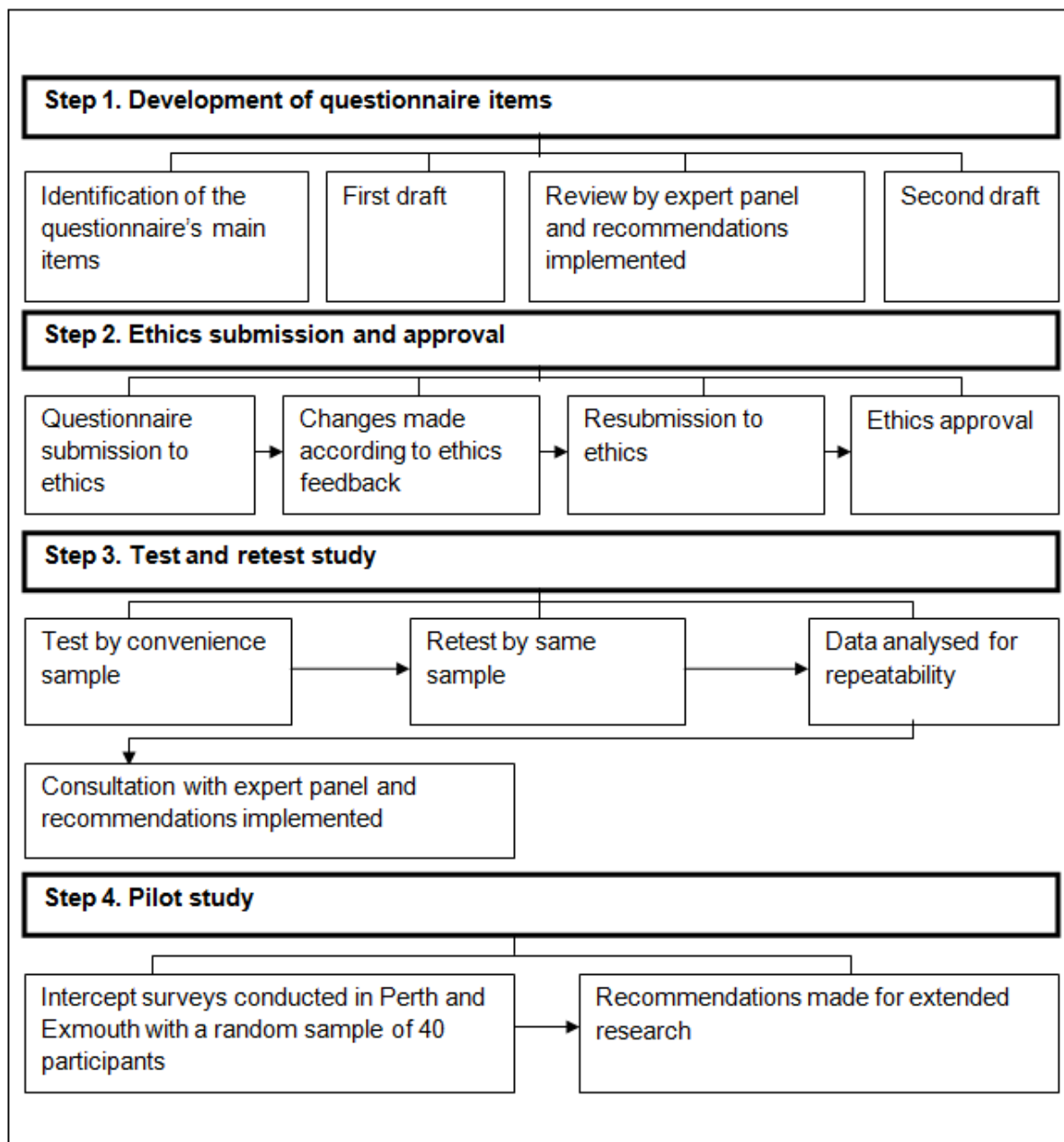
A survey instrument was developed for the preliminary research study which focused on the influence of recreational fishing on health and well-being. The survey included measures of physical activity, outdoor activity participation, recreational fishing effort, seafood consumption, health and well-being, and quality of life. Question styles included multiple-answer, binary, 5-point Likert scale, and open questions. A first draft consisting of 92 items was reviewed by an expert panel to ensure content and face validity. Recommendations made by the expert panel were then implemented and a second draft was produced, consisting of 110 items.

#### *Step 2. Ethics submission and approval*

The questionnaire and an ethics application form were submitted to the Curtin University Human Research Ethics Committee in August 2011. Ethics approval (RD-25-2011) was received in September 2011 which allowed for the test-retest study and piloting of the questionnaire to commence.



Figure 1: Summary of stages for questionnaire development.



**Step 3. Test and retest study**

A test-retest study was conducted to assess the reliability of the survey instrument, that is, the extent to which the questionnaire was able to produce the same results on repeat administration. A convenience sample of 21 participants aged 18 years and over was invited to complete the questionnaire on one occasion and then two weeks later. Data analysis was aided by the Statistical Package for Social Sciences (SPSS Version 19.0), and consisted of paired sample t-tests to measure the reliability between the test and retest and kappa statistics for questions with categorical responses. Consultation with the expert panel confirmed that the results received from the test-retest study were appropriate.

A final review of the questionnaire was completed by the expert panel. The panel recommended the adoption of a national tool for the measurement of physical activity instead of the International Physical Activity Questionnaire which significantly reduced the length of the questionnaire. Questions about outdoor recreation participation and recreational fishing effort were refined, and further questions about health and well-being were added. These amendments resulted in an 86 item questionnaire which was used for the pilot study.

#### *Step 4. Pilot study*

A pilot study was conducted in both metropolitan and regional locations to determine whether the questionnaire was appropriate for the target group. In the metropolitan area, the questionnaire was piloted among staff and students at Curtin University, which has a population of 34,000 students and 3,000 staff (Curtin University 2010). Data were collected via intercept at the main campus in Bentley.

The questionnaire was also piloted in Exmouth, a town located approximately 1,270 kilometres north of Perth with a population of 2,400 residents (Shire of Exmouth 2011). The questionnaire was administered via intercept methods at the Exmouth Boat Harbour and a local tackle store. The questionnaire, accompanied by an information sheet, was given to a random sample of 40 participants. People aged 18 years and over were invited to complete the questionnaire on intercept or complete at a later time and return it in a reply-paid envelope. A total of 29 valid surveys were returned.

Quantitative data was analysed using Statistical Package for Social Sciences (SPSS Version 19.0). Qualitative data were analysed thematically using an inductive data reduction method to assess any trends or themes that emerged.

Note: The aim of this preliminary study was to develop a valid and reliable survey instrument that could be administered Australia-wide. It should be noted that although the resultant measurement instrument could be administered nationally, the results from the trial cannot be generalised beyond those participants included in the study. It is expected that if conducted on a nationally representative and significant sample size, the use of this survey instrument would enable perceived quality of life and specific areas of health benefits to be revealed. Additionally, the role of recreational fishing in providing additional seafood for consumption would also be revealed. There are known health benefits associated with seafood consumption for general health and the prevention and management of chronic conditions including, coronary heart disease, rheumatoid arthritis and other inflammatory conditions, mental health and some cancers.

## 7 RESULTS AND DISCUSSION

### 7.1 Literature review

The results of the literature review confirm that there had been little research into identifying and quantifying the health and well-being benefits of recreational fishing. The analysis of the constructed database of 20,386 references revealed that 705 pertained to health, well-being and outdoor activities. Table 6 shows the number of health and well-being articles classified by the main category / focus of each article.

Table 6. Classification of health and well-being articles reviewed.

Categories	Number of articles (n)
Family/ children/ youth	260
Physical activity	174
Disability/ disease	121
Seniors	61
Recreation	55
Nature/ greenspace	43
Outdoors	34
Sport	31
Antisocial behaviour	15
Recreational fishing	3
Seafood consumption	2
<b>Total</b>	<b>705</b>

Within the 20,386 reference database developed as part of this project, 103 articles mentioned recreational fishing. Table 7 shows the main focus or foci associated with recreational fishing within the 103 articles. (Note: more than one category was mentioned in several articles hence the number of associated topics exceeds the number of articles) The results show that only three published articles discussed the health and well-being aspects of recreational fishing.

The three articles referring to recreational fishing and health and well-being did not reveal the data required to support specific health or well-being benefits. Two were very specific relating to cardiac alterations induced by a fish-catching diving competition and perceptions of recreational fishing boat captains (with regard to fish consumption advisories). The article most closely related to the theme of this scoping study was a European study detailing the benefits and constraints of outdoor recreation for people with physical disabilities (inferences from recreational fishing). In this paper Freudenberg and Arlinghaus (2009) revealed that despite the additional constraints that may confront disabled anglers, the motivations for recreational fishing were the same as those for non-disabled anglers.

Other articles of interest, though not directly related to the scope of this study, included the allocation urban activity spaces and how this may influence adolescent emotion health and drug use, safety of consumption of recreationally caught fish (specifically contamination with polybrominated diphenyl ethers (PBDE)), and compliance to consumption advisories. The vast majority of articles that referred to recreational fishing were concerned with stock assessments, allocations, sustainability, potential for tourism, and even recreational fishing techniques.

Examples of some of these are: fish welfare: a challenge to the feelings-based approach, with implications for recreational fishing; swallowing the bait: Is recreational fishing in Australia ecologically sustainable?; impact on indigenous species biodiversity caused by the globalisation of alien recreational freshwater fisheries; recreational pursuits on marginal farm land: a discrete-choice model of Irish farm commonage recreation; the effect of shoreline recreational angling activities on aquatic and riparian habitat within an urban environment: implications for conservation and management; fishing in the neighbourhood: understanding motivations and constraints for angling among Minneapolis-St. Paul, Minnesota metro residents; contrasting pragmatic and suffering-centred approaches to fish welfare in recreational angling; economic valuation of inland recreational fisheries: empirical studies and their policy use in Norway; and socioeconomic implications of recreational shore angling for the management of coastal resources in a Mediterranean marine protected area.

Table 7: Main topics linked with recreational fishing in published articles

<b>Categories</b>	<b>Main topics linked with recreational fishing(n)</b>
Marine or fish	45
Commercial or other fishing	37
Recreation	24
Nature/ green space	23
Health and well-being	3
Physical activity	3
Sport	3
Seafood consumption	3
Outdoors	2
Disability/disease	2
Family /children/ youth	1
Antisocial behaviour	1
<b>Total</b>	<b>147</b>

Articles that had a health and well-being focus covered a wide range of topics ranging from outcomes after oncology treatment to childhood and obesity. Articles included: swapping car for bike reaps health benefits; go play outside: to promote health, parents should push children into outdoor activities this summer; physical activity, cardio respiratory fitness, and obesity among Chinese children; outdoor activities improve mental and physical health; optimising exercise in the over 60s: targeting both bone and heart health?; effect of a 4-year workplace-based physical activity intervention program on the blood lipid profiles of participating employees: the high-risk and population strategy for occupational health promotion (HIPOP-OHP) study; outdoor exercise reduces the risk of hypovitaminosis D in the obese; health-enhancing physical activity and sedentary behaviour in children and adolescents; and aerobic resistance, functional autonomy and quality of life (QoL) of elderly women impacted by a recreation and walking program.

One article that tried to make a connection with outdoor recreation states that ‘the presence of living things makes us feel good’ (Petty 2004). The author described three levels of involvement as looking at nature, having nature close by and finally interacting with nature. All three were linked to health benefits although interacting with nature involving physical activity included the additional benefit of improved cardiovascular health.

In summary, while there is little published research looking at the link between recreational fishing and health and well-being, an extended search into outdoor and nature based recreation revealed some areas that may benefit from further investigation. Physical activity and exercise are known to have health benefits including the management of body weight. When physical activity is carried out outdoors Vitamin D is obtained from the sun. Furthermore, there is often an implied mental health benefit from interacting with nature, it is identified as 'making us feel good'. Any other extrapolation would need to factor in the unique nutritional benefits of consuming seafood and the role of recreational fishing in provision of dietary seafood.

## **7.2 Results of Australian audit**

The results of the Australian audit reflect the personal communications held with numerous industry representatives. Every reasonable effort was made to contact key stakeholders around Australia.

The following discourse highlights the main benefits of recreational fishing. While these are difficult to quantify, a clear emergent body of evidence is seen in the areas of youth development, mentorship and the role for seniors. Evidence also supports recreational fishing as a beneficial physical activity for the prevention and management of some medical conditions, for those with disabilities and for good mental health. Throughout most of the activities and programs discussed there is strong support from volunteers and the resultant building and sustaining of communities.

### **7.2.1 The public interface**

Within the recreational fishing space there are many media communications about recreational fishing for the general public. A vast range of public interest supports programs ranging from *Deadliest Catch* and *Extreme Fishing* to state or locally based programs. Many mainstream weekend newspapers have fishing sections and there are also a range of magazines with a recreational fishing theme. John Curtin of The Australian Anglers Association (WA Division), is an example of an individual providing regular mainstream media contact promoting recreational fishing. Peter Gibson of the New South Wales (NSW) Council of Freshwater Anglers coordinates an electronic newsletter of all the latest news and special interest articles for recreational fishing with a readership of over 3,000 recipients in Australia. Professor Alexandra McManus from the Centre of Excellence for Science Seafood and Health (CESSH), Curtin University, has broad experience in media health messages and during the course of this research study has been interviewed many times for print and radio media promotions. These national communication approaches are critical in the transfer of knowledge between the many recreational fishing groups around Australia and importantly to the general public.

## 7.2.2 Outdoor recreation for children

A number of programs for youth were identified in the systematic review. Christopher Makepeace of the Amateur Fishermen's Association in the Northern Territory summed up very well the common drivers for youth identified in the review as: health, well-being and diversionary programs. Several examples are listed below.

The *Hey Kids Let's Go Fishing Program* was used within schools in a wide range of applications including:

- Outdoor education program
- Previous Fishcare program
- Marine studies course
- Learning Skills – IT, reading, writing
- Social skills and community need
- Positive behaviour program reward
- Connection to local environment
- Life Skills
- Passing on own skills and interests
- Enhancing existing mentor program
- Opportunity to involve whole school, feeder school and wider community
- Alternative to competitive sport
- Activity for 'special education' kids
- Water awareness leading up to Christmas.



Figure 2: Hey Kids Let's Go Fishing.

*The students first joined Mr. Waters and a group of students in the Marine Studies room for a lesson on fishing knots, techniques, safety, ethics and fishing for fun. They were then issued with Shakespeare Rods, Abu Garcia Reels and Berkley Lures, hats, stickers and other fishing paraphernalia courtesy of Pure Fishing, NSW Fisheries and Fishing Tackle Australia.*

*The buzz of excitement was clearly evident as all would be fishers walked down to the river where the High School students and Primary students all mixed together and enjoyed an afternoon of angling pleasure. Andrew Hughes (yr 9), Jess Wilkes (yr 9) and Douglas Robinson (yr 7) were particularly helpful netting fish and retying new rigs for the younger ones.*

*Written by: Tony Waters, Marine Teacher, Macksville High 2011*

Results of a school summary survey conducted on the *Hey Kids Let's Go Fishing Program* were generously provided by Doug Joyner, Australian Fishing Trade Association (AFTA). The survey yielded 118 responses from 40 high schools, 72 primary schools, one K-12 school and 5 other organisations. All responses agreed that the program was rewarding and enjoyable and 100% of those that completed the program agreed it made children aware of responsible fishing practices. The feedback received was overwhelmingly positive (see Figures 2 and 3).



Figure 3: Hey Kids Let's Go Fishing.

*The school staff has been surveyed to gauge their views about the success of the program and future directions that could be taken. All staff that responded were enthusiastic for the program to continue next year. Ideas for other activities using the equipment have also been suggested. These include class outings linked to classroom studies; interest groups; a girls program; rewards for 100% behaviour point achievers; camping program; Father's day activity; regular sport day activity; and peer support groups.*

*We are grateful for the opportunity that the 'Hey Kids Let's Go fishing!' program has given our school and we look forward to future activities using the equipment.*

*Written by: Debra Sharpe and Michele Doyle 2011*

Based on the feedback received from *Hey Kids Let's Go Fishing*, a program entitled *Fishing 4 Friends* (see Figure 4) was run within a school environment. The following school report quote provided further insight into the potential of recreational fishing to develop mentorship and deter antisocial behaviour.

*'Fishing 4 Friends' was initiated as a student welfare program for our school after a submission to the AFTA 'Hey Kids Lets Go Fishing' project was successful and we received 30 fishing rods and reels plus hooks, sinkers and tools.*

*With two teachers ready to operate the program and several staff supporting them, the program was put into place. 10 boys identified with welfare needs were chosen to participate. Another 10 boys identified as excellent role models were chosen as their fishing friends. The students had to show significant improvements in their classroom and playground behaviours to attend each fishing trip. Their progress is tracked via the schools RISC data collection software as well as display charts and regular meetings. The 'friends' also help keep the boys on track with their encouragement and support.*



Figure 4: Fishing 4 Friends.



Outside the school environment building peer relationships, providing behavioural incentives and building self-esteem were outcomes regularly reported by course coordinators. RecfishWest, for example, run fishing clinics within a school environment or as class sessions labelled 'Brainstormers' where children address marine issues in groups assigned to either positive or negative outcomes. Other programs such as the 'Runts of the Litter' program are specifically designed to allow children that may be struggling at school, to shine. 'Youth at Risk' groups are aimed at building the self esteem of youth aged around 15 years who have been identified as 'at risk'. Frank Prokop, RecfishWest, noted the benefits of peer mentorship, a breakdown of gender stereotypes and the importance of grandparents, grandmothers in particular, in passing along fishing skills and knowledge. Christopher Collins (VRFish) echoed the same message of intergenerational knowledge transfer. The following feedback from the Fishing 4 Friends program highlights the importance of these relationships.

*The wider community has also been involved in the fishing trips. We have the president of the local RSL Fishing Club join us for each trip to provide expert help to the boys. He gives his time freely and has been an excellent male role model for them. Our P&C president has also helped out on several occasions providing us with a free sausage sizzle and an extra pair of hands. Another parent has helped on occasions. The local Nursing Home joined us on one trip and the boys helped the elderly residents cast out and enjoy an afternoon by the river.*

*Fishing 4 Friends*

There are annual recreational fishing events held in many states. In Moreton, Sunfish Queensland holds school fishing trips which involve around 150 children. These are used as incentives for student behaviour and promote the ability to make friendships outside school. They also allow seniors to pass on skills to students and encourage community engagement. Judy Lynne of Sunfish says "It's all about getting out and being active combined with the consumption of catch being a healthy food choice". Tasmania runs the Take a Kid Fishing program derived from a national program modified by Mark Nikolai.

Townsville's Annual Children's Fishing Classic (see Figure 5) is an event attracting 300 to 600 kids each year and provides education in fishing and initiatives including:

- How to Fish (under instruction by ANSA and other volunteer members)
- How to Care for Your Catch
- How to Measure and Handle Fish and Crabs
- How to Catch and Release
- How to Share the Experience with Others
- Responsibility for the Environment
- Dangers of Environmental Neglect and Abuse
- How to Have Fun while doing all of the above.

Trevor Fuller and Ron Poole, both Townsville Sportfishing Club and Australian National Sportfishing Association (ANSA) members, are responsible for the organisation of the annual event. Thousands of dollars of infrastructure and prizes support these very enthusiastic children and their minders in experiencing recreational fishing in a responsible, enthusiastic and caring manner. Catch and release is strongly promoted and over 90% of all captures are released in spite of prizes for legal fish kept and weighed. Prizes are also given for cleanup efforts to promote care of the beach environment. The success of this event is based on ANSA concepts, combined with a changing and caring attitude of responsible recreational fishing, which includes environmental awareness and support.



Figure 5: Townsville Annual Fishing Classic.

The communication of key messages is extended through the Townsville Fish Stocking Society. Fish stocking of various species throughout Australia is not new however in Townsville the stocking of Barramundi (*Lates calcarifer*) has opened a new range of initiatives. With all fish used in stocking tagged by ANSA members, the dispersal and growth of these fish demonstrates the range and replenishment the program delivers to the region (see Figure 6).

This program has attracted considerable recreational participation plus participant from the James Cook University (JCU) who are researching and monitoring the program in collaboration with the Australian Institute of Marine Science (AIMS) projects.

JCU programs related to fish stocking include:

- Environmental analysis of urban flow regimes
- Pollution control, levels of impact on fish
- Food chain impact and regeneration
- Stocking levels, growth rates
- Heavy metal impacts on the environment
- Fish quality, dispersal trends.



Figure 6: Townsville Restocking Society.

Fishcare Victoria runs regular events that educate people on sustainability, compliance with regulations and also support selected community groups such as the disabled and seniors. A one-day fishing trip exclusively for women is currently being planned. Most recreational fishing clinics and events rely heavily of the support of volunteers and as such play an important role in building community awareness.

In addition to the clinics and events detailed herewith, there are many opportunities for families and children to learn to fish and build their skill base with the help of professional fishing instructors and guides. Steve Williamson, of the Professional Fishing Instructors and Guides Association, provides insight into the enormous numbers of children that are learning to fish through these channels. One member of the association taught 300 children to fish in just one week of January 2012. Within a carnival environment, it is not unusual to teach 100 children the basics in one day. Professional instructors play an important role in teaching children to fish that may not have access to an adult who can pass on fishing skills and knowledge. Furthermore, these provide a service to people who want to learn to fish outside of structured programs or community events.

Many of the stakeholders in teaching fishing, whether volunteer or professional, note that 'it's not just about fishing; it's about being with nature'.

### 7.2.3 Additional educational programs

Pam Elliot, of Woodbridge Marine Discovery Centre, is the central contact for the Marine Discovery Centre Network of Australia. These Centres include: Henley Beach Marine Discovery Centre (SA), Queenscliff Marine Discovery Centre (VIC), Bondi Beach Marine Discovery (NSW), Dolphin Discovery Centre (WA), Ballina Marine Discovery Centre (NSW), Hastings Point Environments Field Study and Resource Centre (NSW), Sapphire Coast Marine Discovery Centre (NSW), Thursday Island Marine Discovery Centre (QLD), Central Coast Marine Discovery Centre (NSW), Reef HQ Aquarium (QLD) and the Naturaliste Marine Discovery Centre (WA).

These Centres interface with the general public and provide reputable information and resources.

The Naturaliste Marine Discovery Centre (NMDC) in WA has a suite of resources available on the NMDC website. The Beachcombers Education Kit is available both online and in hard copy. The Marine Waters Teacher Education Resource Suite is available online and has a sustainability focus with lesson plans including the impact of plastic on waterways, managing a fishery, sustainable shores, planning a safe fishing trip, and hook line and sinker which makes specific reference to the economic and social benefits of recreational fishing. Lesson plans are supported with a range of posters, articles and presentations. A magazine style guide 'Get Hooked on Fishing' is available online for young fishers. The WA Department of Fisheries develops bioregion guides for recreational fishing and runs a 'Send us your skeletons' program whereby recreational fishers can aid fishery researchers to determine the health of fish stocks.

The Woodbridge Marine Discovery Centre in Tasmania has also developed educational resources with approximately 800 students taking part in these programs each year:

- Sustainable fisheries for Grade 7 and 8 students: with practical activities in the Centre and at sea students explore different fishing techniques such as how to be safe at sea and find out about past and current fisheries management practices. Students discuss the need for sustainable management of our recreational and commercial fisheries as well as the role of science in this decision-making.
- Food from the Sea for Grade 7 and 8 students: examines commercial and recreational fisheries around Tasmania and how we use the products from the sea not only for food but in medicines, sun cream, aquaculture food and fertilizers.

The Centre of Excellence for Science, Seafood and Health (CESSH) a national centre located within Curtin University has primary, secondary and vocational educational resources. Primary resources have a recreational fishing theme in the form of an online fishing game where children fish for their omega-3 essential fatty acids requirements.

#### **7.2.4 Health and well-being**

It is established that the primary motivation for Australians to partake in recreational fishing is to relax and unwind (Ormsby 2004). Recreational fishing reduces stress and has a profound influence on long term health outcomes. One Australian program aimed specifically at positive health outcomes is the Pink Fly Fishers (PFF). The PFF is a national program instigated by Recfish Australia and funded by the FRDC that aims to help women who have had mastectomies or related surgeries. The muscles and related soft tissue affected by mastectomy-type procedures, (typically due to cancer) benefit from the casting action used during fly fishing. RecfishWest provided the pictures presented in Figures 7 and 8 of Pink Fly Fishers on the Swan River.



Figure 7: Pink Fly Fishers on the Swan River.



Figure 8: Pink Fly Fishers on the Swan River.

RecfishWest noted during the running of the program, participants had the opportunity to interact socially before, during and after fishing.

It should be noted that fly fishing is popular worldwide and is currently the most popular form of post breast surgery recreational therapy in the United States of America (Prokop, 2011).

In Australia, dragon boat racing is another common form of recreational therapy for women recovering from breast surgery or related treatments that impact on the musculature and other soft tissues of the upper body. The participants, known as the The Amazons, interact socially before and after racing.

## **7.2.5 Sport and physical activity aspects of recreational fishing**

Recreational fishing provides valuable outdoor activity. Often long walks along a stretch of coast or over rocks are required to reach an optimal location. Game fishing can take enormous physical stamina as large fish can take many hours to land. Grahame Williams of the Game Fishing Association of Australia noted that participants need to be very fit to participate in this sport. The same benefits of family bonding and competition are realised however as in many recreational fishing events. Both game and recreational fishing enthusiasts note that strategy and tactics play an important role in planning a trip. The selection of location, bait, and timing are all based on understanding the target species of fish.

## **7.2.6 Seniors: Recreation and knowledge transfer**

Scenarios developed by the Australian Bureau of Statistics (ABS) estimate that the proportion of the population aged 65 years and over will increase from 13% to 29%-32% by the end of the 21st century. The ABS notes that 'a largely healthy, independent older population can also form a valued social resource, for example in providing care for others, sharing skills and knowledge and engaging in volunteer activities.'

There are a number of highly specialised skills associated with recreational fishing. One study showed that 75% of surveyed recreational fishers aged over 60 years had more than 30 years experience (Ormsby 2004). Many of the recreational fishing programs around Australia stress the important role that volunteers play. The role of grandparents and senior volunteers in the generous contribution of time teaching youth to fish was noted. Anecdotally, grandmothers in particular are important in helping a novice angler bait hooks, untangle lines and remedy snags rather than casting in a line of their own (Prokop, 2011).

It is not uncommon in Australia for people to say that one day they will retire and go fishing. Seniors have many aged-related health and well-being concerns that would benefit from recreational fishing including the improved Vitamin D status (sun is the best natural source, fish is the best food source). Not only does recreational fishing provide a healthful outdoor recreation that uses skills and knowledge built over a lifetime but it also provides seafood for consumption. Seniors have specific nutritional requirements including the need for easily digestible protein sources and foods that are readily bio-available such as seafood.

## **7.2.7 Recreational fishing and disability**

Recreational fishing is one of the few forms of outdoor recreation that can be enjoyed regardless of age or disability. Fishing 4 Therapy is a program run by Tony Steiner in Centennial Park in Sydney's eastern suburbs with Harvey, Neil Kemp and Alyce Ehret from the Centennial Park Trust. They run fishing sessions for people in care facilities, with cerebral palsy or down syndrome, the visually impaired, people with acquired brain injury and their families, and those with hyper active tendencies or minimal motor skills. Sometimes just the act of holding a fishing rod and attempting to turn the reel handle can be a major therapy accomplishment. With a background in building, the Fishing 4 Therapy team is able to construct and create innovative supports to allow severely disabled and paralysed people to participate.

*“We are seeing those with nervous twitches and hyper activity holding a fishing rod and relaxing to the point of calmly standing there watching the birds in the trees or ducks and swans swim in front of them. They find two to three hours of peace and a relaxing joy that seems to stay with them till their next visit, when we are always greeted with handshakes and hugs and requests where we have hidden the rods as they want to catch the big one.*

*Recently we were able to teach one of the Autistic attendees to feed the local birds by hand. We taught him how to hold the bread and slowly move it toward the bird. He accomplished this with a slow steady hand; sounds simple but you need to know that part of his Autism is nervous uncontrollable twitches. These seem to vanish when he is relaxed with the birds or when holding the fishing rods.”*

*Tony Steiner*

The Fishing 4 Therapy program is supported by the Australian National Sporting Association (ANSA). Currently, it has more interest than can be accommodated. The program has many positive outcomes that include positive feedback on a catch and time spent calmly sitting outdoors.

*Our first visit with this group has seen our team make the promise to never turn anyone away with a disability regardless of how restricting it may be. An example of this is a gentleman who after a brain aneurism, lost use of the left side of his body. When he heard of the fishing outing he was happy to attend but was not able to hold or use a rod due to his disability.*

*On arriving that day we were greeted with a nice but quietly withdrawn man who felt he could only sit and watch the others. We explained to him that he had to also participate and that we needed his help in testing our new custom made rod and reel for the disabled. What he did not know was that one of our volunteers, Neil Kemp & I, had used our trade backgrounds to build a prototype outfit that allowed him to cast and retrieve the line with only one hand. Over the next few hours we taught him how to cast and wind it back. He started to find that he could do it on his own and within a short time his confidence had grown to casting and fully fishing on his own.*

*This eventually led to him catching a carp of around 2kg that saw him stand tall and straight with pride and then – a few tears of joy. He explained that since his aneurism he has not been able to play an active role in his children’s physical activities, other than as a spectator and he finds it hard as they are both under 9 years of age. We took many photos of him with his catch so the family could enjoy his new found passion of fishing later than evening.*

*One of the extra non funded sessions we will be holding shall be for this man and his family to attend the Park privately so he can take his children fishing and teach them something they will never forget. This will be one of the only sporting activities he can share in a hands on role with his children.*

*Tony Steiner*

The outcomes outlined from the *Fishing 4 Therapy* program are supported by others around Australia.

### 7.2.8 Stress and mental health

Motivations for recreational fishing vary however the social aspects plus the ability to relax and unwind remain the main reasons why Australians partake in recreational fishing. Stress is a major factor in most chronic conditions. The health benefits of reductions in stress and anxiety are evident in the literature however few studies explore the direct link between recreational fishing and chronic condition management and fewer still attempt to quantify these benefits. There is however, ample anecdotal evidence linking recreational fishing to mental health benefits.

*My eldest son suffers from schizophrenia. It has been my observation that angling (mostly beach and estuary fishing) is one of the few activities that seems to bring him any unqualified happiness and peace. I often buy him fishing tackle. It doesn't last long because he's hopeless at being organized and looking after things. But the activity is so beneficial that I now regard gifts of rods, reels etc as consumables, to be valued for their therapeutic value, while they last.*

*Don Barton*

Jeremy Lyle, from the Tasmanian Aquaculture and Fisheries Institute at the University of Tasmania, noted that recreational fishing may be an expensive form of recreation for some. Furthermore, as fish become harder to catch and restrictions greater, Jeremy raised the issue that the factors most highly rated by recreational fishers do not necessarily include consumption. However, it is unknown at what stage (if any) the low likelihood of catch begins to outweigh other reasons for fishing?

Throughout the consultation, stakeholders commonly discussed the changing culture of fishing and its' relationship to environmental issues. Rebecca Hubbard of Environment Tasmania is embarking on a discourse analysis which will capture the stories of fishermen, past and present.

Don Ellis, Metropolitan Anglers Association, provided a concise summary that highlighted many of the outcomes and opinions echoed by stakeholders across Australia during the audit discourse conducted as part of this study.



*I took up recreational angling in order to preserve my physical and mental well being.*

*Whilst in the main my comments are directed towards anglers from organised angling groups, much of the information also applies to individual unaffiliated anglers.*

*This is a popular pastime for people of all age groups because of the following reasons:*

- It is enables people to divorce their minds away from every day pressures of life;*
- It provides a wide range of physical demands on participating anglers; e.g. freshwater fishing requires wading in streams and walking along river banks which can be strewn with obstacles;*
- Surf fishing along beaches requires much physical activity in casting and fish retrieval;*
- Salt water bay and estuary fishing can be physically demanding in regards to boat launching and handling;*
- It provides mental stimulus to all participants by involving them in planning and organising fishing activities;*
- It is an activity that encourages the Australian concept of mateship and working towards common goals;*
- It provides friendship and support to anglers who have lost loved ones through death etc;*
- It enables anglers to appreciate and respect the environment and the beauty of nature. Note: It is unfortunately not widely recognised that anglers are amongst the most environmentally conscious people in the general community;*
- It provides mental stimulation to retired and aged persons in the community;*
- It is a basically safe pastime without anti social behavioural offshoots;*
- It offers an opportunity for disabled persons to participate in a sporting activity.*

*Don Ellis*

### 7.3 Results of the international audit

An audit was conducted using Google search engine to determine international research, resources and programs pertaining to the health and well-being benefits of recreational fishing. Results were entered into a database and categorised as either Australian or international. Summary tables of these findings are provided in Appendices 4 and 5. Findings indicated that research primarily focused on physical activity and outdoor recreation, and their associated benefits. These benefits encompassed community, social, environmental and economic benefits. The focus of this audit was on the health benefits provided by these activities. Further analysis revealed that children and families were the focal point for many of these references, particularly in terms of family cohesion and child development.

Outcomes of the audit that were directly related to recreational fishing varied in the type of information provided. Several websites provided general recreational fishing information such as information about fishing events, fishing tips, recreational fishing regulations and fishing products, with some incorporated resources for children. Other audit results were more specific, predominantly focusing on recreational fishing programs provided to communities. Some of these programs are offered to the whole population and aim to provide recreational fishers with the necessary skills to participate in this leisure activity – whether for fishing novices or the more experienced recreational fisher.

Other programs were developed for specific target groups, such as people with disabilities. Most of these programs originated in the United Kingdom (UK) and were then adopted by other countries including Australia. For example, the Albrighton Trust which runs fishing programs for people with disabilities. The purpose of these programs is to provide an opportunity for enjoyment in a safe and secure environment to those with significant sensory or physical impairments, learning difficulties or with complex and challenging behavioural needs (Albrighton Trust 2011).

Some fishing programs were developed specifically for youth. These programs aim to help underachieving young people by increasing their confidence, re-engaging them with learning and challenge antisocial behaviour such as crime and drug misuse. One example is the *Get Hooked on Fishing* program which was established in 2000. Within its first five years, *Get Hooked on Fishing* attracted 806 young people of whom 425 were on final warnings from educational institutions or on reprimand from correctional institutions. Since attending this program, there have been no reports of reoffending or involvement in antisocial behaviour by any of the program participants. There was also a 75% reduction in truancy from school in those participating in the program (Get Hooked on Fishing 2011).

## 7.4 Results of pilot questionnaire

A survey instrument was developed and validated as part of this project. It was then piloted to assess the usability in practice. A total of 29 valid surveys were received on completion of the pilot study. More than half of respondents were female (55.6%, n=15), and the majority of respondents were aged from 18 to 35 years (51.9%, n=14). Most participants were born in Australia (62.1%, n=18) and 13.8% (n=4) were born in Indonesia. The majority of respondents resided in Exmouth (62.1%, n=18) in Western Australia, a popular recreational fishing destination. Almost two thirds of the respondents (62.1%, n=18) lived in a household consisting of two adults. More than half of the respondents had no children living at home (57.9%, n=11).

### 7.4.1 Physical activity levels

Most participants said that they were either moderately active or active (72.4%, n=21), while 24.1% (n=7) said they were not very active. The majority of respondents (62.0%, n=20) had walked up to seven times in the previous week and most (57.6%, n=15) had participated in moderate physical activities up to seven times in the previous week. However, 42.3% of respondents (n=11) had not participated in any moderate physical activity in the previous week. More than half of the respondents (55.5%, n=15) had participated in vigorous physical activities one to seven times in the previous week, however 37% (n=10) had not participated in any vigorous activity in the previous week. Almost two thirds of respondents (63.0%, n=17) considered themselves to be of acceptable weight, while 29.6% (n=8) considered themselves overweight.

More than half of respondents (57.1%, n=16) indicated that most of their days were spent sitting or standing, while 39.3% (n=11) spent most of their days walking. More than two thirds of respondents (71.5%, n=20) spent up to three hours watching television on week days, 14.3% (n=4) watched 4-6 hours, 3.6% (n=1) watched 7-9 hours, and 10.7% (n=3) watched 10 or more hours of television on week days. In comparison, 57.2% of respondents (n=16) watched up to 3 hours of television on weekends, 32.1% (n=9) watched 4-6 hours, 3.6% (n=1) watched 7-9 hours, and 7.2% (n=2) watched 10 or more hours of television on weekends.

Respondents were asked how much time they spent using a computer for work during week days. Almost a third of respondents (28.7%, n=8) spent up to 3 hours, while 25.0% (n=7) spent 4-6 hours, 17.9% (n=5) spent 7-9 hours, and 28.6% (n=8) spent 10 or more hours on a computer for work during week days. On weekends, almost three quarters of respondents (73.0%, n=19) spent up to 3 hours on their computers for work, while 7.7% (n=2) spent 4-6 hours, 3.8% (n=1) spent 7-9 hours, and 15.2% (n=4) spent 10 or more hours on a computer for work at weekends.

Participants also indicated the amount of time they spent using a computer for pleasure on week days and weekends. Most respondents (84.0%, n=21) spent up to 3 hours on the computer for pleasure during week days, while 8.0% (n=2) spent 4-6 hours, 4.0% (n=1) spent 7-9 hours, and 4.0% (n=1) spent 10 or more hours. Similarly, on weekends the majority of respondents (84.0%, n=21) spent up to 3 hours on the computer for pleasure, while 12.0% (n=3) spent 4-6 hours, and 4.0% (n=1) spent 7-9 hours.

## 7.4.2 Recreation and recreational fishing effort

More than three quarters of respondents (76.9%, n=20) usually spent more than 50% of their recreation time outdoors, with 19.2% (n=5) spending 100% of their recreation time outdoors. The majority of participants indicated that they had been fishing sometime in their life (85.2%, n=23) and 73.9% (n=17) said they had been recreationally fishing in the past 12 months. The majority of respondents (91.1%, n=21) had their first fishing experience before the age of 16 years, with more than a third having their first fishing experience before six years of age (34.7%, n=8). Respondents most often went fishing more than once a week (26.1%, n=6), while 21.7% (n=5) indicated that they had not been fishing in the past 12 months.

Participants were asked to indicate how much of their leisure time was spent recreationally fishing. More than a quarter of respondents (26.1%, n=6) said they spent none of their leisure time fishing recreationally, while 26.1% (n=6) spent a little of their time, 26.1% (n=6) spent a moderate amount of their time, 17.4% (n=4) spent most of their time, and 4.3% (n=1) spent all of their leisure time recreationally fishing.

Respondents indicated that being outdoors (91.3%) was an important (or very important) reason for going recreationally fishing, followed by being with friends (73.9%), experiencing the catch (73.9%), relaxing and unwinding (65.2%), being with family (65.2%) and for health reasons (52.2%). Table 8 summarises the importance of different motivations for recreational fishing. Participants list work commitments and unfavourable weather conditions as the main impediments to going fishing as much as they would like.

Table 8. Importance of motivations in going recreationally fishing

	Very important (%)	Important (%)	Neither important or unimportant (%)	Somewhat important (%)	Unimportant (%)
To be outdoors	34.8	56.5	-	-	8.7
To relax and unwind	30.4	34.8	8.7	8.7	17.4
Being with family	26.1	39.1	13.0	8.7	13.0
Being with friends	26.1	47.8	8.7	4.3	13.0
Health reasons	26.1	26.1	4.3	17.4	26.1
Experiencing the catch	21.7	52.2	8.7	4.3	13.0
Enjoying solitude	17.4	26.1	30.4	8.7	17.4
Self supply with fresh fish	17.4	30.4	17.4	8.7	26.1
Fish for sport	13.0	26.1	4.3	13.0	43.5
Fishing competitions	8.7	13.0	17.4	13.0	47.8
Getting to know other people	-	30.4	21.7	17.4	30.4

### 7.4.3 Health and well-being

Participants indicated that there were several social, physical, mental health and well-being benefits to be gained from recreational fishing, with a particular emphasis on relaxation and stress release. When asked what health and well-being benefits families can gain from recreational fishing there was a significant focus on familial bonding.

More than half of respondents (55.1%, n=16) indicated that they had no health or medical conditions that impacted on their ability to fish or go fishing.

More than a third of respondents (37.0%, n=10) ate seafood twice or more a week, 25.9% (n=7) ate seafood once a week, and 18.5% (n=5) ate seafood once a fortnight. When asked what percentage of seafood consumption was sourced via recreational fishing, 19.2% (n=5) said 95% was sourced in this way, while 50.0% (n=13) indicated that recreational fishing contributed to 20% or less of the seafood they consumed.

### 7.4.4 Quality of life

Almost all respondents rated their quality of life as good or very good (96.3%, n=26) and more than three quarters of respondents (77.8%, n=21) indicating that they were satisfied or very satisfied with their health. Almost half of respondents (n=13) indicated that physical pain did not prevent them from doing what they needed to do, while 29.6% (n=8) indicated that physical pain prevented them a little from doing what they needed to do. Almost two thirds of respondents (63.0%, n=17) did not need any medical treatment to function in their daily lives.

Almost all respondents (96.3%, n=26) indicated that they enjoyed life very much or an extreme amount, and when asked to what extent they felt their life to be meaningful 77.7% (n=21) responded with 'very much' or 'an extreme amount'. The majority of respondents (51.9%, n=14) answered 'how well are you able to concentrate?' with 'very much', followed by 29.6% (n=8) who responded with 'moderately'. When asked about how safe participants felt in their daily life, most respondents (88.9%, n=24) answered with 'very much' or 'an extreme amount'. Similarly, when asked about the health of their physical environment the majority of respondents (85.2%, n=23) answered with 'very much' or 'an extreme amount'.

When asked about having enough energy for everyday life most respondents (70.3%, n=19) replied with 'mostly' or 'completely'. The majority of respondents (70.3%, n=19) answered 'are you able to accept your bodily appearance' with 'mostly' or 'completely'. More than a fifth of respondents (22.2%, n=6) indicated that they 'completely' had enough money to meet their needs, followed by 44.4% of respondents (n=12) who answered 'mostly'. The majority of respondents (85.2%, n=23) also indicated that they 'mostly' or 'completely' had information available to them that they needed for their day-to-day life. More than half of respondents (59.2%, n=16) indicated that they 'mostly' or 'completely' have the opportunity for leisure activities, while a third of respondents (33.3%, n=9) answered 'moderately'.

More than half of respondents (51.9%, n=14) indicated that they were satisfied with their sleep, however 25.9% (n=7) answered that they were dissatisfied with their sleep. Almost all respondents said that they were either satisfied or very satisfied with their ability to perform their daily living activities. Moreover, all respondents (100.0%, n=27) indicated that they were either satisfied or very satisfied with the capacity for work. The majority of respondents (92.6%, n=26) also indicated that they were either satisfied or very satisfied with themselves, and 81.4% (n=22) were satisfied or very satisfied with their personal relationships. Almost all respondents (92.6%, n=22) were either satisfied or very satisfied with the support they get from their friends and the majority of respondents (81.4%, n=22) were satisfied or very satisfied with the conditions of their living place.

Only 44.4% (n=12) were satisfied or very satisfied with their access to health services, however 22.2% (n=6) were either dissatisfied or very dissatisfied with their access to health services. Additionally, more than three quarters of respondents (77.7%, n=21) were either satisfied or very satisfied with their access to transport.

When asked how often they had negative feelings such as blue mood, despair, anxiety, or depression, 24.0% (n=6) of respondents indicated that they never have those feelings, 60.0% (n=15) said they seldom have those feelings, and 16.0% (n=4) said they had those feelings quite often.

In summary, three quarters of the sample (74%) had been recreational fishing in the past 12 months with 25% fishing every week. Almost all respondents (91%) had learned to fish as a child (prior to 16 years of age) and 65% of participants ate fish at least once per week. The main reasons for engaging in recreational fishing were: being outdoors (91%); being with friends (74%); catching fish (74%); to relax and unwind (65%); being with family (65%); and for health reasons (52%).

It should be noted that due to the small sample size required to pilot this survey (n=29), the results should be interpreted with caution. The aim of piloting the survey was to assess its' usability in practice thus the pilot was very successful.

## **8 BENEFITS AND ADOPTION**

The benefits of the project are:

Establishing that despite anecdotal evidence of the health and well-being benefits of recreational fishing, there is little research evidence that quantifies these benefits.

The questionnaire developed as a part of this project provides a tool that can be used Australia-wide to identify and quantify the health and well-being benefits of recreational fishing.

This project provides a baseline for future research and identifies key areas for investment.

Future adoption and benefits:

After the submission of the final report a one page summary document of scoping outcomes will be circulated to all project participants. This will be widely disseminated.

For the fishing industry to benefit from this research, results need to be adopted by the health sector and used in the promotion of activities that can be beneficial in the management of health issues including mental health conditions, reduction of stress, reduction of antisocial behaviour and promoting outdoor physical activity.

The health and well being benefits of recreational fishing need to be promoted to fisheries and environmental managers and taken into account when developing management plans and allocating resources.

The health and well-being benefits of recreational fishing need to be promoted to recreational fishers and to the general public. The media exposure and summary document dissemination carried out in the course of this project provide a platform for further promotional communications.

**Key areas for further research into recreational fishing, health and well-being****Improving engagement with the health industry**

Communication of health and well-being benefits associated with recreational fishing to members of the health industry working in the key areas identified such as mental health.

**Quantification of the health benefits of recreational fishing in the key areas identified.**

Further research is required to explore the health and well-being benefits of recreational fishing. A nationally representative investigation to explore the role of recreational fishing on quality of life and health is the next logical step to the considerable anecdotal evidence collated.

**Development of the conceptual links and indicators that could be used to link health and well-being to recreational fishing.**

Promotion of the role recreational fishing can play in quality of life, well-being and health is required to establish the link that at present remains largely intuitive.

**Expansion of the options for future funding of research.**

Specific studies with physiological indicators revealing the measured benefit of recreational fishing for the management of health concerns or improvement of well-being and perceptions are required. Measured impact could then be translated into economic analysis.



The following are planned **outcomes from this project that have been achieved**

1. Confirmation that there is very little research into the health and well-being benefits associated with recreational fishing.
2. Considerable anecdotal evidence of the health and well-being benefits of recreational fishing was gathered from Australian recreational fishing stakeholders. A very positive response was noted with input received from more stakeholder representatives, from each Australian state and territory, than was initially conceptualized.
3. Increased recognition of the health and well-being benefits of recreational fishing by the fishing and health industries as well as by the general community. The media release about this scoping study was met with great interest. PI Prof. Alexandra McManus has conducted seven radio interviews and a story will be run in the West Australian newspaper in January/February 2012.
4. The outcomes of this research provide an impetus for further research in this field. Key areas identified such as the role of recreational fishing in aiding mental health, antisocial behavior deterrent for youth, recreation for the disabled, outdoor recreation for seniors, reduction of stress and the provision of seafood for consumption need to be further explored and quantified.
5. With the alarming rate of physical inactivity and obesity in the Australian population, recreational fishing should be promoted as an inexpensive social activity that has the potential to positively impact on both these major health related issues.
6. There is a significant proportion of the Australian population aged 60 years and over and this proportion is expected to grow exponentially in the next decade. The role of recreational fishing in promoting good health, social networks and enjoyment for seniors should be recognized as should the role of seniors in mentoring the younger generation by passing on valuable skills and knowledge relating to fishing.

## 11 CONCLUSION

This study found that considerable health and well-being benefits can be gained through involvement in recreational fishing. Encouraging young children, youth, adults and families to fish offers healthful outdoor recreational activity that can be enjoyed throughout life. Benefits were evident for individuals and groups. Recreational fishing also provides significantly benefits to children and youth with behavioural and mental health issues.

The major benefits identified were: youth development; social support; good mental health outcomes, behavioural management, rehabilitation of upper body musculoskeletal injury and reductions in stress and anxiety. Seniors can also gain significant health benefits by continuing to remain active both physically and mentally through this enjoyable, low cost outdoor pursuit. Intergenerational transfer of knowledge and skills from seniors to younger generations is another major benefit that should be exploited by recreational fishing groups.

Further evidence is needed to quantify the health and well-being benefits associated with recreational fishing. This information can now be collected using the validated questionnaire developed as part of this study. Once these benefits have been quantified across Australia, these can be considered when governments and organisations are allocating resources.

## 12 REFERENCES

Albrighton Trust (2011). "Angling at the Albrighton Moat and Gardens." Retrieved 2011 September 14, from <http://www.albrightontrust.org.uk/angling/>.

Aslin, H. J. and I. G. Byron (2003). Community Perceptions of Fishing: implications for industry image, marketing and sustainability. Canberra, Fisheries Research and Development Corporation and Bureau of Rural Sciences.

Cerda, M., J. Alos, et al. (2010). "Managing recreational fisheries through gear restrictions: The case of limiting hook size in the recreational fishery from the Balearic Islands (NW Mediterranean)." Fisheries Research **101**: 146-155.

Cleland, V., A. Timperio, et al. (2009) Predictors of time spent outdoors among children: 5-year longitudinal findings. British Medical Journal

Curtin University (2010). University statistics. Perth, Curtin University.

Department of Fisheries, P. K. R. F. W. G. (2004). Fisheries Management Paper 181. A Five-Year Draft strategy for Managing the Recreational Component of the Catch. P. K. R. F. W. G. Department of Fisheries.

Department of Fisheries. (2009). State of the Fisheries 2008 - 2009, The Western Australian Government, Department of Fisheries.

Fisheries Research and Development Corporation (2010). from <http://frdc.com.au/fishingindustry/recreational-sector>.

Fletcher, W. J. and J. Santoro (2011). State of the fisheries and aquatic resources report 2010/11. (Eds). Perth, Department of Fisheries, Western Australia.

Freudenberg, P. and R. Arlinghaus (2009). "Benefits and Constraints of Outdoor Recreation for People with Physical Disabilities: Inferences from Recreational Fishing." Leisure Sciences **32**(1): 55-71.

Get Hooked on Fishing (2011). "Get Hooked on Fishing." Retrieved 2011 September 14, from <http://www.ghof.org.uk/>.

Henry, G. W. and J. M. Lyle (2003). The National Recreational and Indigenous Fishing Survey. FRDC Project No. 99/158. Canberra, Australian Government Department of Agriculture, Fisheries and Forestry.

Horvat, P. and M. Sparks (2011). Community perceptions of the fishing industry in Australia. Canberra, Fisheries Research and Development Corporation: Ref P4587A, [www.frdc.com.au](http://www.frdc.com.au).

Kearney, R. E. (2001). "Fisheries property rights and recreational/ commercial conflict: implications of policy developments in Australia and New Zealand." Marine Policy **25**: 49-59.

Kuehn, D. (2005). A Discriminant Analysis of Social and Psychological Factors Influencing Fishing Participation. Northeastern Recreation Research Symposium.

McManus, A. and W. Newton (2011). Seafood, nutrition and human health: A synopsis of the nutritional benefits of consuming seafood Perth, Centre of Excellence Science, Seafood & Health, Curtin Health Innovation Research Institute, Curtin University.

McManus, A., White, J., et al. (2011). Community intervention to increase seafood consumption (CIISC). Perth, Australia, Centre of Excellence Science, Seafood & Health, Curtin Health Innovation Research Institute, Curtin University.

McPhee, D. P., D. Leadbitter, et al. (2002). "Swallowing the bait: is recreational fishing in Australia ecologically sustainable." Pacific Conservation Biology **8**: 40-51.

Newton, W. and A. McManus (2011). "Consumption of fish and Alzheimer's Disease." Journal of Nutrition, Health and Ageing **8**(3): 551-552.

Ormsby, J. (2004). Research Publication No. 78. A Review of the Social, Motivational and Experiential Characteristics of Recreational Anglers from Queensland and the Great Barrier Reef. Great Barrier Reef Marine Park Authority. Townsville.

Petty, J. (2004). "How nature contributes to physical activity and mental health." Spirituality and Health International **5**(2): 68-78.

Royal Life Saving Society Australia. (2010). The National Drowning Report 2010. Broadway, New South Wales, Royal Life Saving Society Australia.

Royal Life Saving Society Australia. (2011). The National Drowning Report 2011. Broadway, New South Wales, Royal Life Saving Society, Australia.

Schroeder, S. A. and D. C. Fulton (2008). Fishing in the Neighbourhood: Understanding Motivations and Constraints for Angling Among Minneapolis-St.Paul, Minnesota Metro Residents. American Fisheries Society Symposium 67.

Shire of Exmouth (2011). "Shire of Exmouth." Retrieved 2011 December 5, from <http://www.exmouth.wa.gov.au/>.

Spinks, A. B., A. K. Macpherson, et al. (2007). "Compliance with the Australian national activity guidelines for children: Relationship to overweight status." Journal of Science and Medicine in Sport **10**: 156-163.

Wen, L. M., J. Kite, et al. (2009). "Time spent playing outdoors after school and its relationship with independent motility: a cross-sectional survey of children aged 10-12 years in Sydney, Australia." International Journal of Behavioural Nutrition and Physical Activity **6**(15): 1-8.

Wen, L. M., J. Kite, et al. (2009). "Time spent playing outdoors after school and its relationship with independent motility: a cross-sectional survey of children aged 10-12 years in Sydney, Australia." International Journal of Behavioural Nutrition and Physical Activity **6**(15): 1-8.

## **13 APPENDIX 1. INTELLECTUAL PROPERTY**

There is no significant intellectual property associated with this project.

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- PhD, MPH, PGDipPH, BSc HP (H.Biol), GAICD, MAIFST
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- Professor and Executive, Curtin Health Innovation Research Institute (CHIRI)
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Ms Jessica Storey

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Mr James White

- BSc (Tchng), PGradDip (Psych)
- Graphic designer
- Education Specialist, CESSH

**15 APPENDIX 3. AUSTRALIAN ORGANISATIONS AND REPRESENTATIVES CONSULTED.**

<b>Organisation</b>	<b>Contact Name</b>
RecfishWest	Frank Prokop (Executive Director)
VRFish	Christopher Collins (Executive Officer)
Sunfish QLD	Judy Lynne
TARFish	Mark Nikolai (Chief Executive Officer)
Recreational Fishing Alliance of NSW	Malcolm Poole (Chair/President)
South Australian Recreational Fishing Advisory Council Inc.	Brenton Schahinger (Chairman)
The Amateur Fishermen's Association of the Northern Territory Inc.	Christopher Makepeace (Executive Officer)
The Australian National Sportfishing Association	Ron Poole (Chairman)
Freshwater Fishing and Stocking Association of Queensland Inc.	Les Kowitz
Game Fishing Association of Australia	Grahame Williams (President and Public Officer)
Fishcare Victoria	Jennifer Allit (East Gippsland Fishcare Facilitator)
Naturaliste Marine Discovery Centre (WA)	Michael Burke
Henley Beach Marine Discovery Centre (SA)	Tim Hoile
Queenscliff Marine Discovery Centre (VIC)	Pam Elliot
Woodbridge Marine Discovery Centre (TAS)	Pam Elliot
Bondi Beach Marine Discovery (NSW)	Pam Elliot
Dolphin Discovery Centre (WA)	Pam Elliot
Ballina Marine Discovery Centre (NSW)	Pam Elliot
Hastings Point Marine Environments Field Study and Resource Centre (NSW)	Pam Elliot
Sapphire Coast Marine Discovery Centre (NSW)	Jenny Robb (CEO)
Thursday Island Marine Discovery Centre (QLD)	Pam Elliot
Central Coast Marine Discovery Centre (NSW)	Pam Elliot
ReefHQ Aquarium (QLD)	
Australian Fishing Trade Association (Sydney based)	Doug Joyner (Executive Officer)
Department of Sport and Recreation	
Australian Anglers Association, WA Division	AAA WA Division Secretary Diane President John Curtis
NSW Council of Freshwater Anglers Inc.	Pam Elliot
Metropolitan Anglers Association, Victoria	Don Ellis (President)
Anglers Alliance Tasmania	Mike Stevens (Chairman)
Tasmanian Aquaculture and Fisheries Institute, University of Tasmania	Jeremy Lyle
Environment Tasmania	Rebecca Hubbard
ANSA NSW - Special Projects Officer	Tony Steiner
WA Maritime Museum - Education Team	
Rottneest Island Authority - Education Team	
	Don Barton
NSW Fisheries- Cronulla - Recreational Fishing Manager	Bryan Van Der Walt
Outdoors WA	
JCU	Stephen Sutton
FRDC	Kate Brooks
Seafood Alliance and NT Seafood Council	Katherine Sarneckis
Deakin University	Sue Kilpatrick

Fishcare Victoria	Rod Pearn - Principal Fisheries Management Officer (Recreational Fisheries)
Fishcare Victoria	Robert Green - Fishcare Volunteer Regional Coordinator
Fishcare Victoria	Damian Heran
Professional Fishing Instructors and Guides Association	Steve Williamson
Australian Surfcasting Federation	Chas Riegart



**16 APPENDIX 4. AUSTRALIAN SEARCH RESULTS**

Organisation	Focus	Search Result Title
Angling Victoria	Website	News - restocking of drought affected areas, 16.2 million budget boost; magazine 'fishing and boating' preview, round table forums, regional forums, chat forum (quite 'blokey')
Angling Victoria	Website	Clubs: Greenvale Sport and Gamefishing Club; Preston Northcote Angling Club; Melbourne Online Fishos
Angling Victoria	Website	Links to Native Fish Australia, VR Fish, fishingmonthly.com.au, Victoria DPI
Angling Victoria	Website	Knot of the day and knot guide
Angling Victoria	Website	Tips, guides and articles - not family or newcomer specific
Angling Victoria	Website	Victorian Fishing Guide
Angling Victoria	Website	Victorian Fishing Forum
Angling Victoria	Website	Victorian Fishing News
Angling Victoria	Website	Victorian Fishing Reports
Angling Victoria		Fish-e-Fax   Angling Victoria
Ausfish Australian Angling Forums	Recfishing	Website has products, hints and tips, fishing forum, weather and tides, directory, free stuff (including screen savers and cartoons), links, contact page, free email, home, advertisements, fishing news, blogs
Ausfish Australian Angling Forums	Recfishing	Great extras - becoming a better fisherman, animated knots, how to fillet a snapper or flathead
Ausport	Antisocial behaviour	[PDF] Sport, physical activity and antisocial behaviour in youth
Aussie Educator	PA	Physical Education
Australian Fisheries Management Authority	Commercial and recreational fishing	No health info
Batemans Marine Park		Batemans Marine Park
Bay and Basin Sports Fishing	Fishing tours	Kids page is actually an entire page on nature deficit disorder
Be Active WA	PA	Be Active WA   Physical Activity Taskforce   Resources tagged
Berwick Leader		Cardinia fishing plan is in the bag - Local News - News - Berwick ...
Better Health Channel	Outdoor recreation	Gardening for seniors   Better Health Channel
Bureau of Rural Sciences		[PDF] Description of Commercial, Recreational and Charter Fishing ...
Centre for Tourism Research, University of Canberra	Outdoor activity	PDF report on previous studies addressing the benefits of outdoor activity, and giving an overview of the research being done in Australia
Coast Lifestyle	Fishing	Coast Youth
Commonwealth Government	PA	Recommendations on physical activity for health for older Australians
Cox et al.		[PDF] Effects of Coastal Recreation on Social Aspects of Human Well-being
CSIRO and FRDC		Anglers urged to share tales of long tail tuna (Media Release)
DAFF	National	Recreational fishing in Australia - 2011 and beyond: a national industry development strategy
DAFF	National	The national recreational fishing policy
DAFF	National	Do you want to go fishing - links to state fisheries departments

DAFF	National	National recreational and indigenous fishing survey
DAFF	National	Recreational fishing community grants program
DAFF		[PDF] The National Recreational Fishing Policy - policy document
Department of Education, Tasmania	PA	[PDF] The Tasmanian Curriculum - Department of Education
Department of Environment and Resource Management		Goals and priorities for sustainability relating to recreation
Department of Families, Housing, Community Services and Indigenous Affairs		Part D: Benefits of sport and recreation participation. Outlines benefits for CALD women
Department of Primary Industries		Issue 10 - Department of Primary Industries. Regular newsletter for Victoria anglers.
Department of Sport and Recreation	PDF document	Department of Sport and Recreation DSR Strategic Plan [PDF]
Department of Sport and Recreation		[PDF] Recreation reform strategy
Department of Tourism, Sport and Recreation	PA	[PDF] A community based physical activity program to improve the ...
Diabetes Tasmania	PA	[PDF] Recommendations on physical activity for health for older Australians
Early Childhood Australia	Outdoor recreation	Outdoor play: Does avoiding the risks reduce the benefits? (free full ...
Eurobodalla Shire Council		Fishing Charter Bookings, Licenses & Recreational Fishing Rules ...
Fishing World		Fishing World: Recreational fishing research funded till 2013
Fishingmonthly.com.au	Website	Tournament guide and online results and postings, lists monthly and annual; magazines; fishing reports and feature articles
FishSA	Recfishing	1999 review about fishing licenses
FishSA	Recfishing	Website: has tips for fishing with women, kids and the family; links to SAFRAC the SA peak recreational fishing body; fabulous 'gone fishing' section with fish listed, picture, habitat, tips for catching right up to bait and specific rigs recommended; also has coo
Fishwrecked Reeltime	Site and magazine	Online recreational fishing magazine
Fishwrecked Reeltime	Site and magazine	Site has RecfishWest (Frank Prokop) discussion on protection of drinking water
FRDC	Website / Organisation	Funding body - links to research networks
FRDC	Website / Organisation	All aspects of recreational and commercial fishing
FRDC	Website / Organisation	Strategy for the development of recreational fishing
FRDC		[PDF] BRS_1034 fish book left.indd
FRDC link to Recfish Australia	Ppt, pdf	Desired outcomes of national RD&E framework:
FRDC link to Recfish Australia	Ppt, pdf	1. focused research on sustainability of fish resources
FRDC link to Recfish Australia	Ppt, pdf	2. focused research on social, health and economic benefits of recreational fishing

FRDC link to Recfish Australia	Ppt, pdf	3. improving the sector's engagement with governments and other research providers at an early stage
FRDC link to Recfish Australia	Ppt, pdf	4. Improving the sector's ability to undertake its own research, extension and development
Friends of Durras Inc.		[PDF] Friends of Durras Inc.
Get Moving Tasmania	PA	Get Moving Tasmania - Physical Activity Guidelines
Graham et al.		[PDF] FROM MICROBES TO PEOPLE — TRACTABLE BENEFITS OF
Greenwells Fly Fishing Club Inc	Website / Organisation	Home, activities, about us, gallery, members forum, news, stories (including walking trips), links, sponsors and contacts
Kempsey Visitor Information Centre		Macleay Valley Coast Tourism and Visitor Information Centre ...
Martin Salter		[PDF] Fishing
Monash University	PA	[PDF] re(Forming) the 'Physical' in a Curriculum for Health and Well-being
Murdoch University		[PDF] Node 4.5 Socio-Economics of EBFM Professor Malcolm Tull
Native Fish Australia (Victoria) Incorporated	Recfishing	Indigenous and recreational fishing - species and location; extensive report pertaining to Victoria
Nature Play WA	Outdoor recreation	Nature Play WA
Northern Territory Seafood Council		[PDF] Policy 8_Resource Sharing
NSW Department of Primary Industries	Habitat	Weir remediation - benefits to the environment
NSW Department of Primary Industries	Habitat	Fishers for Habitat Page - habitats need help, habitat action grants, improving habitat, habitat make fish happen, fishers for fish habitat forum, find out more..
NSW Department of Primary Industries	Habitat	Resource - booklet - Recreational fishers make fish happen - inspirational tales of everyday fishers making sure there will be fish in their local spots into the future. Steve Starling 2009.
NSW Department of Primary Industries	Habitat	Website sections for: Fish Friendly Councils; Fish Friendly Farms; Fish Friendly Road Crossings; Fishways; Improving Fish Habitats; Fishers for Fish Habitat. Also how you can help.
NSW Government Maritime	Government website	Plenty of information for recreational fishers
NSW Office of Environment and Heritage		Great report on participation in different outdoor activities and barriers
NSW Office of Environment and Heritage		South Coast residents (of NSW) participated in fishing 3.6 million times, 40% of South Coast residents participated in fishing, 33% of South Coast residents have a high interest in participating in fish more frequently, 19% moderate interest, and 48% low
NSW Office of Environment and Heritage		Greater Sydney residents (NSW) participated in fishing 10.8 million times, 32% of residents participated in fishing, 29% of residents have a high interest in participating in fishing more frequently, 21% moderate interest, and 50% low interest (over a 12
NT Curriculum Framework	PA	[PDF] learning areas – Health & Physical Education - Department of Education and Training
Ourcommunity.com.au		Funding - Grant Winners - ourcommunity.com.au

Outdoor Recreation Industry Council	Outdoor recreation	Australian Outdoor Adventure Activity Benefit Catalogue - Report
Outdoor Recreation Industry Council	Outdoor recreation	Details work done overseas and within Australia around the benefits of outdoor activities
Outdoor Recreational Industry Council Conference 2009	Submission	Inquiry into the obesity in Australia May 2008
Outdoor Recreational Industry Council Conference 2009	Associate Professor Mardie Townsend - Outdoor Recreation Industry	Healthy Parks Health People PDF
Outdoor Recreational Industry Council Conference 2009		From Deakin Uni - no mention of fishing!
Outdoor Recreational Industry Council Conference 2009		Website lists good research in this arena ( <a href="http://www.oric.org.au/ResearchProjects/index.htm">http://www.oric.org.au/ResearchProjects/index.htm</a> )
Outdoor Recreational Industry Council Conference 2009		Annual conference
Outdoor Recreational Industry Council Conference 2009		Newsletters
Outdoors Queensland	Subsidiary of Queensland Outdoor Recreation Federation (QORF)	Mention benefits of outdoor recreation - fishing listed
Outdoors Queensland	Outdoor recreation	Benefits of outdoor recreation - economic benefits, environmental benefits, health benefits, social capital benefits
Outdoors Queensland	Outdoor recreation	Definition of outdoor recreation
Parents Jury		Campaign Issues
Parks Victoria	Website	Has a link to fishing and locations in Victoria of where you can go recreational fishing. Also links to some really good reports done both in Australia and internationally.
Parks Victoria		Recreational Fishing Discussion Paper - wePlan Parks Victoria
Patents		Australian Government Grants for Green Building & Regional   Patents
Pelicans Nest Early Learning Centre	PA	Pelicans Nest Early Learning Centre - Physical Activity
Planning Institute Australia		Planning Healthy Communities
Police NSW	PDF document	Article relating to police cracking down on rec. fishers
Port Fairy - Moyne Shire		Visit Port Fairy Moyne Shire   Recreational Fishing   The official ...

Queensland Department of Education and Training		Improving wellbeing in the community
Queensland Government		[PDF] Naturally Queensland 2020 - the master plan for protected areas ...
Raising Children Network	PA	Physical activity for teenagers   Raising Children Network
Ray Page (VRFish)		[PPT] Fish Care
Recfish Australia	Recfishing	Australian Recreational and Sport Fishing Industry Confederation
Recfish Australia	Recfishing	PDF submission to the Caring for Our Country Review: Australia's Natural resource management investment initiative
Recfish Australia	Recfishing	Health mentioned but not emphasised
Recfishing Research	Website / Organisation	Supported by RecFish Australia, infofish and FRDC
Recfishing Research	Website / Organisation	To be a compilation of research papers; projects and organisations
Recfishing Research	Website / Organisation	Business plan
RecfishWest	Website / Organisation	Site includes: home, what's new, become a member, fishing information, fishing clinics, newsletters, policies
RecfishWest	Website / Organisation	Submissions, media statements, RecfishWest board, interesting links, seafood recipes, search, sitemap, contacts, links
RecfishWest	Website / Organisation	Recreational fishing school clinics
RecfishWest	Website / Organisation	Not apparent from site how much work done in this area
RecfishWest		[PDF] CATCH AND RELEASE FISHING
RecfishWest		Fisheries Minister Statement Support for Fishing Education ...
RecfishWest	Fishing	Northern Tour Fishing Clinics, RecfishWest., Archived page
Recreational Fishing Advisory Committee		Recreational fishing in Australia - 2011 and beyond: a national ...
Recreational Fishing Alliance of NSW		About the RFA of NSW - Recreational Fishing Alliance of NSW. Website for peak state body.
Recreational Fishing Alliance of NSW		Safe Fishing About us. Safe fishing information for different fishing methods. Resources include videos and documents in different languages. Also information about safety courses and CPR application for your mobile. Factsheets and free DVD kits about fish
Recreational Fishing Alliance of NSW		NSW Angler Access. Information about a funded project in NSW to ensure Crown Lands and reserves adjacent to important fishing locations are secured, protected and accessible for fishing public in the future. Website is a resource for people involved in or
Recreational Fishing Alliance of NSW		[PDF] INQUIRY INTO RECREATIONAL FISHING
Recreational Fishing Alliance of NSW		[PDF] Select Committee on Recreational Fishing
River Consulting		River Consulting Regional Tourism Conservation, Wardaman ...
SAFRAC	Recfishing	Website: has kids page with stories about why they like fishing

SAFRAC	Recfishing	Links to weather and tidal info; has forms and policies including code of conduct, epirb regulations 2008, handling fish for survival, management strategy, recreational angling - adventures activity standards, recreational fishing licenses, resource sharing in a rock lob
SARFAC		SARFAC :: Press Releases and Media :: 2010 election policies
Seniors.gov.au	PA	seniors.gov.au - Physical activity
South Australian Curriculum Standards	PA	[PDF] R-10 Health and Physical Education
Spoiled		Grey Nurse Sharks by Spoiled - Spoiled.com.au. Forums, reports, species information, competition information and fishing videos.
Sunfish Fraser Coast	Website / Organisation	About sunfish, new flash, the Fraser coast, fishing maps, sponsors, links, fish id, contact us
Sunfish Fraser Coast	Website / Organisation	Aimed at recreational angler - no health / newcomer info
Sydney Angler Forums	Chat Forum	For recreational anglers living in Sydney, contains a thread about fishers getting banned from certain areas due to complaints about anti-social behaviour
Tarfish	Website / Organisation	Pdf doc - recreational fishing in Australia - 2011 and beyond: a national industry development strategy
Tarfish	Website / Organisation	document discusses health and well-being importance of recreational fishing and future strategies and research directions
Tarfish	Website / Organisation	Tarfish - website: association, communications, competitions, policies, projects, related links, research, secure area, sponsors, subscribe, tarfish
Tarfish	Website / Organisation	Site has topical reports - new and facebook links
TARFish		Tasmanian Association for Recreational Fishing (TARFish)
The Anglers Choice Bait & Tackle	Website / Business	Home, contact, photo gallery
The Government of Western Australia Department of Fisheries	Recreational fishing, commercial fishing, pearling and aquaculture, research, the environment, integrated fisheries management	Recreational fishing guide - west coast region - booklet fully downloadable; all legislation regarding licenses, no take zones, periods and species; safety; RecfishWest and mdc adverts; send us your frames program
The Government of Western Australia Department of Fisheries	Recreational fishing, commercial fishing, pearling and aquaculture, research, the environment, integrated fisheries management	Fishing location guide

The Government of Western Australia Department of Fisheries	Recreational fishing, commercial fishing, pearling and aquaculture, research, the environment, integrated fisheries management	Information by regions: state-wide, south coast, west coast, Gasgoyne, Kimberley / Pilbara, licenses, Cocos and Christmas: rules, licenses, catch care, and general info
The Government of Western Australia Department of Fisheries	Recreational fishing, commercial fishing, pearling and aquaculture, research, the environment, integrated fisheries management	Items of interest: latest news and research
The Government of Western Australia Department of Fisheries	Recreational fishing, commercial fishing, pearling and aquaculture, research, the environment, integrated fisheries management	Fact sheets by species - full colour with good range of info - fully downloadable
The Government of Western Australia Department of Fisheries	Recreational fishing, commercial fishing, pearling and aquaculture, research, the environment, integrated fisheries management	Western Fisheries Magazine - moving online - previous issues available - final issue October 2010
The Government of Western Australia Department of Fisheries	Recreational fishing, commercial fishing, pearling and aquaculture, research, the environment, integrated fisheries management	Environment sector lists noxious species with pictures and a 'what you can do' section
The Government of Western Australia Department of Fisheries	Recreational fishing, commercial fishing, etc	Annual reports and A State of the Fisheries and Aquatic Resources Reports

The Great Barrier Reef Marine Park Authority		[PDF] Technical Information Sheet #1
University of Canberra	Research	Faculty of Education : Kathy Mann
University of New South Wales	Outdoor exercise	[PDF] Let's Get Physical: Planning for Outdoor Gyms in
University of Queensland	Outdoor recreation	Benefits of Outdoor Exercise Confirmed - Ageing Mind Initiative at ...
University of Tasmania	H+WB	Education, Health and Wellbeing - Faculty of Education - Research
VIC Department of Primary Industries	Recfishing	RFL Notes: Your Fishing License Fees at Work improving
VIC Department of Primary Industries	Recfishing	Using fishing fees to improve recreational fishing opportunities - includes catch. 2001
VIC Department of Primary Industries	Recfishing	Website: recreational fishing section: 60 abalone days, bushfire recovery, channel deepening - baywide monitoring, clubs and associations, drought recovery, enhanced recreational fishing program, fishing license, fishing locations, fish stocking, freshwater recipe
VIC Department of Primary Industries	Recfishing	Has family fishing lakes and notes of restocking; fishing guides by location, species and bait
VRFish	Website / Organisation	Peak recreational fishing body of VIC
VRFish	Website / Organisation	Site: home, about us, news, projects, VRfish members, juniors, code of conduct, web links, site search, log in, contact details
VRFish	Website / Organisation	Junior page under construction
VRFish	Website / Organisation	Great links page - includes other recreational fishing groups
VRFish	Website / Organisation	Easy to use and clear website
VRFish	Website / Organisation	Have fishing lines magazine
Water Starck	Fishing	Report: The Status, Importance and Future of Australian Fisheries
Water Starck	Fishing	Data on involvement and anecdotal on social benefits, decline in participation and youth in particular.
Worksafe ACT	PA	Physical Activity & Wellbeing   WorkSafe ACT
Young Guns Fishing Adventures	Website / Organisation	Site includes: home, sponsors, venues, upcoming events, Little Mooney Creek Fishing Resort, Young Guns Fishing Queensland, Gift Vouchers, Fishing Lessons and Classes, Fishing Birthday Parties, School excursions, Kids Fishing Club, Corporate events, testimonials
Young Guns Fishing Adventures	Website / Organisation	Gallery, useful links, tips - finding a fishing instructor, luxury harbour package, bucks parties, online fishing equipment store, contact
Young Guns Fishing Adventures	Website / Organisation	Completely geared to kinds - school excursions are free; kids can purchase a membership; commercial opportunity combined with promotion of recreational fishing



**17 APPENDIX 5. INTERNATIONAL SEARCH RESULTS**

Organisation	Country	Focus	Search Result Title
American Academic of Anti-Aging Medicine		Outdoor recreation	Outdoor Activities Promote Well-Being   Worldhealth.net Anti-Aging
Angling in Schools	UK	Fishing	OCN Introduction to Angling and the Environment - Angling in Schools
Angling Trust	UK	Anglers	For rec. Anglers focus on sustainability and the environment
BassMaster	USA		Bass Times: The argument for recreational angling/Bassmaster
BassMaster	USA		Decision making about allocation of resources
BassMaster	USA		Website: news, columns, tournaments, results, tips and gear - suited to experienced and keen anglers
Buzzle.com	US	Website	Health benefits of leisure. Extensive number of links to ideas on how to become more active.
Buzzle.com			Importance of Physical Activity for Children
Caerphilly Observer	UK	News	Youth workers from Caerphilly County Borough Council have been working with the youngsters on the 'Inclusion with Angling' scheme
California State Parks	USA	Recfishing	Web publication - The Health and Social Benefits of Recreation - an element of the California Outdoor Recreation Planning Program
California State Parks	USA	Recfishing	Outline: Chapter 1 Health Benefits of Recreation 1.1 Physical Health Benefits - reduced obesity, diminishes risk of chronic disease (heart disease, diabetes, cancer, osteoporosis), boosts immune system, increases life expectancy; 1.2 Mental Health Benefit
California State Parks	US		Report - health and social benefits of outdoor recreation
California State Parks	US		Includes mental health, youth, and family unity
Campaign for the Protection of Welsh Fisheries	Wales		Mission Statement « Campaign For The Protection Of Welsh Fisheries
Carruthers			Power of the Positive: Leisure and Well-Being,
CDC			Physical Activity and Health At-A-Glance
Cefas	UK		Cefas: Recreational sea angling. Information about sea angling. Biggest English survey on recreational fishing is being conducted in 2012.
Children & Young People Now	UK	Newsletter	Online newsletter for those working with children and families. Deals with issues relating to families and kids
Children and Nature Network	US	PDF	PDF document of annotated bibliographies of research undertaken in the area of children, health and nature.

Children and Nature Network		PA	[PDF] Resurrecting Free Play in Young Children
Children and Young People Now	UK	Fishing	Antisocial behaviour: Reading develops fishing program ...
Coastal Ocean Values Centre	USA		Report
Coastal Ocean Values Centre	USA		Recreational and commercial debate - no mention of health or well-being
Discover Boating	Canada		Boat site
Discover Boating	Canada		Good fishing information including : Fishing with kids: teach children to fish
Discover Boating	Canada		Link to takemefishing. Tips from a pro...
Education Scotland		PA	PE, physical activity and sport - Health and wellbeing
eHow	US	Website	Family sports activities. eHow.com. Describes types of family outdoor activities and references these. Useful references.
eHow		PA	Children & Play Activities   eHow.com
English Outdoor Council			What does the research say about outdoor learning - website based report on literature pertaining to the benefits of outdoor learning – green space, children's learning
English Outdoor Council			What does the research say about Outdoor Learning?
European Anglers Alliance	Europe	PDF	[PDF] Recreational fishing and recreational angling. Useful document providing the definition for different fishing and angling terms.
FAO			FAO Fisheries Department FAO Technical Guidelines for ...
FAO			Forests and human health
Fenichel, Abbott and Huang	US		[PDF] A Literature Review for Management of Recreational Fisheries. Interesting report.
Fisheries.co.uk CASTS	UK	Angling	Angling skills training in Staffordshire, very cost effective and powerful method of tackling present day problems of anti-social behaviour, educational underachievement and youth crime.
Fishing Magic	UK	Fishing	Lib Dem's Say Angling Could Help to Prevent Riots
Fly Fishers Republic	UK	Fishing	Flypost - News and Public Notices
G.Godbey	US		Discussion Paper G.Godbey
G.Godbey	US		Prepared for Outdoor Resources Review Group Resources for the Future Background Study
Get Hooked on Fishing	UK	Fishing	Get Hooked On Fishing Flintshire
Henley Centre Headlight Vision	UK	PDF	Health and outdoor recreation report
Houston Advanced Research Center			HARC - Indicators of Well Being in Fishing Communities

Human Resources and Skills Development Canada			Physical Activity / Health / Indicators of Well-being in Canada
Indiana Department of Natural Resources			DNR: Statewide Comprehensive Outdoor Recreation Plan
Iron Man Magazine		Outdoor recreation	Outdoor Activities and Well-Being   Iron Man Magazine
Lance Armstrong Foundation	US	Website	Information on the protection to health of leisure and recreation, lowers stress and increases productivity
Living Reviews in Landscape Research	UK		Outdoor recreation and nature tourism: a European perspective - report
Manitoba Fisheries	USA		Manitoba Angler's Guide
Manitoba Fisheries	USA		Glossy pdf downloadable booklet
Manitoba Fisheries	USA		What's new for 2011, changes' licenses' general regulations' limits. Divisions and maps, regional regulations, status Indian info, stewardship, common fish species in the area
Manitoba Fisheries	USA		Want to promote recreational fishing in region
Mayo Clinic	US		Organised exercise is great but what you do as a part of your day is great too
Mayo Clinic	US		1. Exercise improves your mood
Mayo Clinic	US		2. Combats chronic disease
Mayo Clinic	US		3. Helps you manage your weight
Mayo Clinic	US		4. Boosts your energy level
Mayo Clinic	US		5. Promotes better sleep
Mayo Clinic	US		6. Can put the spark back into your sex life
Mayo Clinic	US		7. Can be - gasp - fun
Ministry of Education and Culture			OKM - Physical activity and well-being in Finland in the 2010s.
Ministry of Fisheries New Zealand			[PDF] New Zealand Recreational Fishing Sector – Structure, Governance
Morgan	UK		Customary physical activity and psychological wellbeing
Nacro	UK	Fishing	Thames Valley - Services - Nacro, the crime reduction charity
National Trails Training Partnership	US	Website	Health-based benefits of parks, trails, and open space - lists reports/articles relating to this (dated)
New York Recreation and Park Society	USA	Recfishing	Website: great articles on health, economic and environmental benefits of parks: top 10 reasons parks are important, the benefits of parks, parks bring billions to state and millions to local community, economic benefits of land conservation, economic benefits
New York Recreation and Park Society	USA	Recfishing	National and state initiatives listed

New York Recreation and Park Society	USA	Recfishing	Some initiatives aimed at youth and reducing screen time - nothing specific to recreational fishing
North Carolina Recreational Therapy Association	US	Website	Benefits of recreational therapy. Excellent website describing benefits for various demographic groups (referenced)
Ottawa	Canada	Website	City of Ottawa - benefits of recreation. Good information (referenced) about benefits to individual, community, environment and economy
Oughton and Wheelock	UK		[PDF] Abstract for ...
OurBobby.com	UK	Crime	Run by the police for local community's to find out about crime and initiatives in their area
R. Laukkanen		PDF	PDF document on green exercise, physical activity and health - summary of 36 scientific studies related to physical activity, recreation and exercise in connection to nature
Recreational Angling Ireland			Recreational Angling Ireland - Home. An umbrella body representing all angling interests. Provide angling training sessions and one day courses for those who have never tried angling. They also run free angling tuition courses for children/students.
Robert Wood Johnston Foundation	US		[PDF] Parks, Playgrounds and Active Living
Rudd, Folmer and van Kooten			Economic Evaluation of Recreational Fishery Policies (Murray Rudd ...
Sea Anglers Conservation Network	UK		Recent studies on the worth of sea angling
Sea Anglers Conservation Network	UK		Economic Impact of Recreational Sea Angling in Scotland - this report does not factor any health or well being value into the report
Sea Anglers Conservation Network	UK		Fisheries Economics of the US 2006: "Recreational fishing generated its highest economic effect in total sales and jobs generated in Florida (\$7.6 billion sales, 131,000 jobs); Texas (\$2.2 billion sales, 34,000 jobs); California (\$1.9 billion sales, 23,00
Sea Anglers Conservation Network	UK		Any reference to health in this document refers to fisheries and no search results for well-being
Sea Anglers Conservation Network	UK		In January 2007 a pan European Study was published, giving details of the value of Marine Recreational Fisheries throughout the EU.
Sea Anglers Conservation Network	UK		"Recreational fishing constitutes a considerable social and economic activity."

Sea Anglers Conservation Network	UK		Total expenditure on recreational fishing across Europe is believed to exceed €25 billion a year.
Sea Anglers Conservation Network	UK		By comparison, the 1998 value of commercial landings in the 15 EU member states was estimated at €20 billion"
Sea Anglers Conservation Network	UK		(The European Anglers Alliance have also compiled a comprehensive compendium of information relating to the Socio-economic value of angling in Europe which is accessible at: <a href="http://www.eaa-europe.org/index.php?id=19">http://www.eaa-europe.org/index.php?id=19</a> )
Sea Anglers Conservation Network	UK		In June 2006, the EU launched a Green Paper on Maritime Affairs
Sea Anglers Conservation Network	UK		"One important relationship in the context of leisure activities is that between angling and fisheries.'
Sea Anglers Conservation Network	UK		The European Anglers Alliance states that Europe has an estimated 8-10 million recreational anglers at sea with a related industry of € 8 to 10 billion.
Sea Anglers Conservation Network	UK		'There seems little doubt that the value to the coastal economy of a fish caught by an angler exceeds the value of the same fish caught for commercial purposes by a fishing boat.'
Sea Anglers Conservation Network	UK		<a href="http://ec.europa.eu/maritimeaffairs/doc/COMM_NATIVE_COM_2006_0275_5_EN_ACTE2.doc">http://ec.europa.eu/maritimeaffairs/doc/COMM_NATIVE_COM_2006_0275_5_EN_ACTE2.doc</a>
Sea Anglers Conservation Network	UK		A paper produced by Struan Stevenson MEP states
Sea Anglers Conservation Network	UK		"There are an estimated 8 million recreational sea anglers in the European Union Due to their collective expenditure on a whole variety of specialist fishing items, recreational anglers add substantially to the economy. The importance of recreational fish
Sea Anglers Conservation Network	UK		In April 2006 The Environment Agency published 'Fishing for the Future'"2.6 million (6%) of the 43 million people aged over 12 in England and Wales went fishing in freshwaters in the last year. 1.5 million people fished just in the sea. With over 4 million
Sea Anglers Conservation Network	UK		<a href="http://www.environment-agency.gov.uk/homeandleisure/recreation/fishing/38067.aspx">http://www.environment-agency.gov.uk/homeandleisure/recreation/fishing/38067.aspx</a>
Sea Anglers Conservation Network	UK		April 10 - 2006: The Relative Economic Contributions of U.S. Recreational and Commercial Fisheries
Sea Anglers Conservation Network	UK		This 2006 report has no valuation or mention of health or well being

Sea Anglers Conservation Network	UK		Many more quotes of valuations - good economic values especially for tourism - quotes that recreational fishing out values commercial- but no mention of health or well being
Shoreline Housing Partnership	UK	Website	A registered social landlord who also run community initiatives such as "Get Hooked on Fishing"
The Albrighton Trust	UK		Angling at the - Albrighton Trust - Recreation For The Disabled. Fishing program for people with disabilities.
The European Fishing Tackle Trade Association	UK	Traders	Members site for Manufacturers and Wholesalers of sport fishing equipment
The Flintshire Chronicle	UK	Fishing	Success for Flintshire Get Hooked on Fishing scheme - Flintshire ...
The Free Library	UK	Fishing	Angling charity looking for CEO. - Free Online Library
The Scotsman	UK	Magazine	The Scotsman magazine
The Social Enterprise Loan Fund	UK	Fishing	TSELF - North East
The Vegan Forum		Chat Forum	"It's very useful in tackling anti-social behaviour, social exclusion and youth offending, and can also give a great boost to disabled people," said Pete Turner from the Environment Agency
Thompson			Does participating in physical activity in outdoor natural ...
US EPA	USA		Fishing not apparent - search site for fishing
US EPA	USA		Many more listed - recreational fish not the focus
US EPA	USA		Fish consumption advisories/mercury/US EPA
US EPA	USA		Fish advisories/fish advisories/ US EPA
US EPA	USA		Shellfish protection/fish&shellfish/US EPA
US EPA	USA		Great lakes monitoring - fish
US EPA	USA		Great lakes monitoring /great lakes/ US EPA
US EPA	USA		Mercury/region 5 air/US EPA
US EPA	USA		Genetic diversity of fish and invertebrates as indicators
US EPA	USA		About great lakes national program office. Great lakes / US...
US EPA	USA		Surf your watershed / surf your watershed / US EPA
USA Today			Boat & Fishing Safety Tips   Travel Tips - USAToday.com
Vancouver Board of Parks and Recreation	Canada	PA	Website: lists benefits of recreation; divided into regular physical activity, physical activity and youth; and physical activity and seniors. Info taken from World Health Organization.
Vancouver Board of Parks and Recreation	Canada	PA	No specific reference to recreational fishing
West Mercia Police	UK	Fishing	Get Hooked On Fishing To Reel In St Martins Youngsters   News ...

**Media release**

**Approved: Peter Horvat, Alexandra McManus, Wendy Hunt, Frank Prokop  
Curtin University (Andrea Jones, Kristy Jones, Denise Cahill, Pip  
Lapelms)**

**Curtin study to catch health benefits of recreational fishing**

Anyone who has ever gone fishing can tell you that wetting a line is good for you. It just makes you feel better. But have you ever wondered why?

Researchers from the Centre of Excellence for Science Seafood and Health (CESSH) at Curtin University are set to go fishing for answers, and investigate the health and wellbeing benefits associated with recreational fishing.

“The main reason Australian anglers go fishing, apart from catching dinner, is to relax and unwind. And while it seems logical that there are health benefits associated with recreational fishing,” says Professor Alexandra McManus, Director of CESSH, “it seems incredible that we do not fully understand the scale and range of the benefits.” Professor McManus says the researchers “will conduct an extensive review of research activities around the world to identify the benefits of outdoor relaxation, recreational fishing in particular, to health and wellbeing.”

“Basically we want to know what research is out there and how it can be related to recreational fishing in Australia.” says Professor McManus

The CESSH research team is especially interested in the benefits of outdoor recreation for young people.

Mr Frank Prokop, Executive Director of RecfishWest, and a long-standing advocate of recreational fishing said “fishing has been shown to improve community wellbeing and to reduce anti-social behaviour in children.”

“We have run a number of clinics and events where recreational fishing has been the central activity and the results have been very good. It has helped strengthen family bonds and people to connect that otherwise may not have been able”, said Mr Prokop.

The research study starts this month and is due to be completed by the end of the year. The Australian Government’s Fisheries Research and Development Corporation are providing funding to assist with the project.

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**Australian Government**

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**Fisheries Research and  
Development Corporation**