



Australian Government

Department of Agriculture, Fisheries and Forestry  
ABARES

# A socioeconomic evaluation of three eastern Australian game-fishing regions

Peter Ward, Kasia Mazur, Nyree Stenekes, Rob Kancans,  
Robert Curtotti, Rupert Summerson, Cheryl Gibbs, Nic Marton,  
Andy Moore & Justin Roach

Research by the Australian Bureau of Agricultural  
and Resource Economics and Sciences

Report to client prepared for the Fisheries Research and  
Development Corporation  
August 2012



© Commonwealth of Australia 2012

**Ownership of intellectual property rights**

Unless otherwise noted, copyright (and any other intellectual property rights, if any) in this publication is owned by the Commonwealth of Australia (referred to as the Commonwealth).

**Creative Commons licence**

All material in this publication is licensed under a Creative Commons Attribution 3.0 Australia Licence, save for content supplied by third parties, logos and the Commonwealth Coat of Arms.



Creative Commons Attribution 3.0 Australia Licence is a standard form licence agreement that allows you to copy, distribute, transmit and adapt this publication provided you attribute the work. A summary of the licence terms is available from [creativecommons.org/licenses/by/3.0/au/deed.en](http://creativecommons.org/licenses/by/3.0/au/deed.en). The full licence terms are available from [creativecommons.org/licenses/by/3.0/au/legalcode](http://creativecommons.org/licenses/by/3.0/au/legalcode).

This publication (and any material sourced from it) should be attributed as: Ward, P, Mazur, K, Stenekes, N, Kancans, R, Curtotti, R, Summerson, R, Gibbs, C, Marton, M, Moore, A & Roach, J, A socioeconomic evaluation of three eastern Australian game-fishing regions, ABARES report to client prepared for the Fisheries Research and Development Corporation, Canberra, August 2012. CC BY 3.0.

**Cataloguing data**

Ward, P, Mazur, K, Stenekes, N, Kancans, R, Curtotti, R, Summerson, R, Gibbs, C, Marton, M, Moore, A & Roach, J. A socioeconomic evaluation of three eastern Australian game-fishing regions, ABARES report to client prepared for the Fisheries Research and Development Corporation, Canberra, August 2012.

ABARES project: 43154 FRDC project: 2010/050

**Internet**

*A socioeconomic evaluation of three eastern Australian game-fishing regions* is available at [daff.gov.au/abares/publications](http://daff.gov.au/abares/publications).

**Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)**

Postal address GPO Box 1563 Canberra ACT 2601

Switchboard: +61 2 6272 2010|

Facsimile: +61 2 6272 2001

Email: [info.abares@daff.gov.au](mailto:info.abares@daff.gov.au)

Web: [daff.gov.au/abares](http://daff.gov.au/abares)

Inquiries regarding the licence and any use of this document should be sent to [copyright@daff.gov.au](mailto:copyright@daff.gov.au).

The Australian Government acting through the Department of Agriculture, Fisheries and Forestry represented by the Australian Bureau of Agricultural and Resource Economics and Sciences, has exercised due care and skill in the preparation and compilation of the information and data in this publication. Notwithstanding, the Department of Agriculture, Fisheries and Forestry, ABARES, its employees and advisers disclaim all liability, including liability for negligence, for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying upon any of the information or data in this publication to the maximum extent permitted by law.

**Acknowledgements**

This study was funded by the Department of Agriculture, Fisheries and Forestry (DAFF) and the Fisheries Research and Development Corporation (FRDC).

Numerous recreational anglers, game fishers, charter boat operators, local business staff and community members assisted the study by providing information and data.

The Game Fishing Association of Australia (GFAA), the Australian National Sportfishing Association (ANSA), New South Wales Game Fishing Association and Queensland Game Fishing Association provided advice on activities and facilitated cooperation with tournament organisers and clubs. Geoff Lindrea, Paul Blacka, John Burgess, Pat Jones, Don Goswell, David Jones, Nathan Douglass, Sue Douglass, Dawn Earle, Graeme Devin, Sanchia Glaskin and Kim Hobday were especially helpful in this regard.

Appendix B lists ABARES staff involved in the study. An advisory committee reviewed strategic issues, activities and study results. Advisory committee members included Gavin Begg (formerly ABARES now SARDI), Crispian Ashby (FRDC), Danielle Ghosn (New South Wales Department of Primary Industries [NSW DPI]), Shane Griffiths (CSIRO), Belinda Hack (DAFF), Lorraine Hitch (DAFF), Julian Pepperell (Pepperell Consulting), Grahame Williams (GFAA), Phil Bolton (NSW DPI) and Bryan Van der Walt (NSW DPI).

Bill Sawynok (Recfishing Research) and Kate Brooks (FRDC Social Sciences Research Coordination Program) provided advice on survey designs for this study. Phil Bolton (NSW DPI) and Adam Welfare (NSW DPI) provided charter boat logbook and tagging data, advice and information on tagging procedures and data issues. Doug Zahmel (Queensland Department of Employment, Economic Development and Innovation) provided Queensland charter boat logbook data. Two anonymous reviewers provided comments on a draft of this report.

# Contents

Non-technical summary.....	1
1 Introduction .....	4
Background.....	4
Need.....	4
Objectives .....	5
Regional centres .....	5
Valuing recreational activities .....	9
2 A description of the eastern Australian game-fishing sector .....	10
Definitions and scope .....	10
Fishing platforms .....	11
Fishing methods .....	11
The game-fishing sector's structure .....	12
3 Value to game fishers.....	28
Game-fisher survey .....	28
Catches and targeting practices of game fishers.....	36
Social values and demographic characteristics of game fishers.....	41
Economic value to game fishers .....	60
4 Value to regional communities and businesses .....	76
Background.....	76
Methods .....	76
Results and discussion .....	79
5 Discussion .....	99
Social and economic evaluation of game fishing.....	99
Benefits and adoption.....	103
Further development.....	103
Planned outcomes.....	106
6 Conclusions.....	107
Appendix A: Intellectual Property .....	108
Appendix B: Staff .....	109
Appendix C: Social and economic profiles of key game fishing areas in eastern Australia.....	110
Introduction .....	110
Individual regional centres .....	111
Appendix D: The travel-cost method .....	143
Non-market valuation of recreational activities .....	143
The travel-cost method.....	144
Technical framework.....	144



Appendix E: The distribution of game fishing off eastern Australia as indicated by tagging data .....	146
Summary.....	146
Introduction .....	147
Distribution of tag-releases.....	153
Appendix F: Survey forms and supporting information .....	194
Gamefisher survey information sheet.....	195
Tally Sheet.....	205
Community and business survey information sheet.....	206
References.....	214



# Non-technical summary

Understanding the value of fishing activities and fish resources is fundamental to fisheries management and policy development. This study identified the social values and quantified the economic value of recreational game fishing. It involved surveys of game fishers, local businesses and community members at three eastern Australian sites (Mooloolaba, Port Stephens and Bermagui) between December 2010 and May 2011. Game fishers completed over 400 survey questionnaires; and businesses and community members completed over 150 questionnaires. Survey results, combined with information on charter boat activities, releases of tagged game fish, game-fishing tournaments, fishing clubs and profiles of regional centres, provide insights into the value of game fishing to regional communities.

Game fishing for large marlin, tuna and pelagic sharks has a long history in eastern Australia. It involves anglers who occasionally target game fish as part of other fishing activities through to those that go game fishing many times each year. Game fishers include local residents and individuals who travel large distances to go game fishing. In eastern Australia about 7000 individuals are members of game-fishing clubs and thousands participate in around 60 game-fishing tournaments each year. Eighty-five per cent of the survey responses were from game-fishing tournament participants. However, many members of sportfishing clubs and other fishing clubs also target game-fish species. The sector also involves shore-based game fishing, bluewater spearfishing and charter boats. A significant—though unquantified—number of game fishers are not members of game-fishing clubs and do not participate in organised events. A previous national survey indicated that game-fishing club members comprise a very small proportion (<1%) of the recreational fishing population, highlighting problems for obtaining representative samples of the game-fishing sector using traditional survey methods.

The surveys showed that most game fishers are motivated by the challenge of catching (i.e. retaining or tagging) large fish, relaxing with friends and other game fishers, and viewing marine wildlife. Most game fishers, especially those involved in tournaments, aspire to catching marlin. However, reported catch rates are, on average, low. Many game fishers believe that game fishing is central to their lives and that it contributes to their personal health and wellbeing. Many game fishers support tag-and-release and biological research programs and they are keen to learn about the marine environment. These insights into the motivations for game fishing will be important considerations for future management plans and resource access arrangements. There may be further potential for government agencies to involve game fishers in marine conservation, research and monitoring programs, although such programs need long-term support and funding.

Game fishing increases economic activity by attracting visitors to coastal communities. This can be important to small regional centres that have low economic diversity and rely on accommodation and food service industries for employment. Expenditure by game fishers can be considerable, although game-fishing activity levels fluctuate considerably both within fishing seasons and from year-to-year. Many game fishers travel great distances to areas where game fish are traditionally abundant or where recent reports indicate high catch rates. For example, survey respondents travelled an average of 464 km (one-way) to go game fishing in Bermagui.



Game-fishing boats commencing a tournament (Leatherbarrow, ABARES)

Game-fishing boats range from small trailer boats (<6 m in length) to substantial cruisers worth millions of dollars. Trailer boats are popular game-fishing platforms in areas, like the far south coast of New South Wales, that are considerable distances from metropolitan centres and where the continental shelf is narrow. Boat equipment and fishing gear dominate expenditure during game-fishing trips. Local businesses and communities need to be aware that game fishers tend to spend more on their sport than on other items, such as food and accommodation.

The tournament game fishers surveyed at Mooloolaba averaged 13 game-fishing trips to Mooloolaba amounting to 15 days per year. Those at Port Stephens averaged 6 trips (9 days) and those at Bermagui, 4 trips (11 days) per year. On average they spent \$4625 for a tournament trip to Port Stephens, \$2698 per trip to Bermagui and \$2378 per trip to Mooloolaba. The high individual expenditure on tournament trips to Port Stephens is due to longer trips and a greater investment in the sport by game fishers at that site (e.g. larger boats, more fishing equipment). Total expenditure was higher for Port Stephens than the other sites because of this high individual investment and the large number of participants at the Port Stephens tournament (743 participants). Estimates of the economic value of game fishing are indicative of each site during survey periods, but they cannot be transferred to other regional centres over a full year or used to extrapolate to national assessments. Not all of the expenditure reported here occurred within the study area during game-fishing trips ('on-site'). Expenditure on fishing equipment and boat equipment could be either on-site, off-site or a combination of both. Nevertheless, other major items of expenditure, such as accommodation, food and boat fuel, are largely on-site.

The estimates of expenditure are higher than those of past studies of game fishing at Bermagui (Pepperell 1992) and Port Stephens (Pepperell 2002). This is likely due to increasing household incomes, participation rates, fishing equipment costs and inflation in the years since those studies.

The net economic value of game fishing was also estimated. This is the 'use value' (non-financial) that individuals place on a game-fishing trip, in addition to their actual expenditure. Survey respondents travelled greater distances to experience game fishing in Bermagui. The net economic value from a trip to Bermagui (\$124 per individual per trip) was substantially higher than that of Port Stephens (\$67). Those values are similar to estimates for other recreational activities, including recreational fishing trips to the Great Barrier Reef and Queensland dams. The estimates for Bermagui are higher than estimates of the net economic value of game fishing for southern bluefin tuna in Portland, Victoria (Ezzy & Scarborough 2011). The higher net economic value of trips to Bermagui is probably due to the short distance from port to game-fishing grounds, accommodation and port facilities, Bermagui's history and, importantly, its reputation for game fishing, including good prospects of encountering prized game fish.

Businesses and community members verified many of the social and economic benefits of game fishing. Businesses in large regional centres, like Port Stephens, tend to be less dependent on game fishing because of their diverse customer base. Small regional centres like Bermagui, which have low economic diversity, are more dependent on large events like game-fishing tournaments, as these events attract large numbers of participants, their friends and families.

Results of this study may inform decisions on investment in work to manage sustainable harvesting of species that are important to game fishing. They also allow the value and benefits of game fishing to be considered alongside those of other users of the resources, such as commercial fisheries, although comparable valuation methods need to be developed if the economic value of game fishing and commercial fishing are to be directly compared. The importance of game fishing to local communities goes beyond the generation of income and employment. Game fishing, especially tournaments, contributes to social vitality by bringing people together for special events and enhancing community identity.



Sailfish are a popular game-fishing species (Julian Pepperell, Pepperell Research & Consulting)

# 1 Introduction

## Background

This study was undertaken in response to the June 2010 announcement by the Australian Government for socioeconomic research on the contribution of game fishing to regional coastal communities. The study evaluated social and economic aspects of the recreational game-fishing sector in three eastern Australian regions and compiled descriptions or 'profiles' of eastern Australian game-fishing activities. The study also involved intensive case studies in key game-fishing sites, including Bermagui, Port Stephens and Mooloolaba. Information on the value of the sector to those communities will inform policy development, fisheries management, marine bioregional planning and other issues from a recreational fishing perspective.

The funding application was developed through consultation with Department of Agriculture, Fisheries and Forestry (DAFF) staff about the information needs for managing tuna and billfish stocks for all resource users. It addressed feedback from three independent experts on earlier versions of the application as well as input from *Recfishing Research*. The final study design and evaluation was informed by an expertise-based Advisory Committee that included state and Commonwealth fisheries scientists, Fisheries Research and Development Corporation (FRDC) staff and game-fishing experts.

## Need

Placing a value on fishing activities is fundamental to fishery management. A fishery sector's value, for example, determines priorities for the distribution of management, monitoring and research resources. Importantly, valuing the released and retained catch is crucial for addressing resource allocation issues; it provides information on the merits of spatial management options and regulating catches of particular sectors.

The Commonwealth Eastern Tuna and Billfish Fishery (ETBF) interacts with several key game-fishing species. Measures of the value of commercial fishing are available to the ETBF, such as gross value of production (GVP) and net economic returns. However, there is little socioeconomic information on the value of the same tuna and billfish stocks to recreational fishers, or the value of game fishing to the wider community. This information is becoming increasingly important to fishery management and policy that must consider the interests of all resource users.

The need for socioeconomic research is supported by Recfish Australia and the Recreational Fishing Advisory Committee (RFAC). The list of national recreational fisheries research priorities described in the *Recfish Research Business Plan* (Recfish Australia 2011) identifies social, health and economic benefits of recreational fishing as a high priority. FRDC recognised that there is limited knowledge of social effects on the fishing industry, including the recreational fishing sector, by establishing the Social Sciences Research Co-ordination Program.

## Objectives

The study's objectives were to:

- 1) compile a socioeconomic profile of the recreational game-fishing sector in eastern Australia
- 2) estimate the value of game fishing to several key east Australian regional centres.

## Regional centres

Game fishing attracts recreational anglers and their families to many small regional centres along the eastern Australian seaboard. This study focuses on regional centres partly because game fishing is expected to be particularly important to those centres and partly because regional centres provide an opportunity to test methods for surveying game fishers and estimating economic values. Game fishers are difficult to survey because they represent a very small proportion of the wider population and because game-fishing activity is sporadic. It is difficult to survey game fishers at large cities like Sydney that have multiple access points (boat ramps, wharves, marinas and moorings). The estimation of expenditure and application of the travel-cost method, which we used to estimate the value of game fishing, are easier to apply to geographically separated sites that require dedicated trips.

In general, regional centres have low economic diversity and may be more dependent on activities like game fishing than are larger cities and industrial centres. Appendix C summarises the characteristics of 16 regional centres where game fishing occurs along the eastern Australian seaboard, including the three game-fishing sites where this study surveyed game fishers, businesses and community members (Mooloolaba, Port Stephens and Bermagui). These profiles provide insights into demographic and economic characteristics of regional centres where game fishing occurs and are used in our evaluation of the importance of game fishing to coastal communities.

Table 1 and Table 2 compare characteristics of the three survey sites and other eastern Australian regional centres. The survey sites vary significantly in population size. Bermagui is a small town while Mooloolaba and Port Stephens are highly developed urban areas. Bermagui has a significantly older population, with a median age of 51 years. It also has a higher proportion of Indigenous persons. Bermagui has a significantly higher unemployment rate (10 per cent) than Port Stephens or Mooloolaba and in comparison with the national average rate. Accommodation and food services are the biggest employment industries in Bermagui, whereas the retail industry is the biggest employer in Port Stephens and Mooloolaba.

According to the Hachman Index, Bermagui has a much lower economic diversity than Port Stephens and Mooloolaba (Table 1). Dominant industries in Bermagui—where there are relatively more people employed—include accommodation and food services (22 per cent), retail (17 per cent) and agriculture, fisheries and forestry (8 per cent). These industries account for lower proportions of employment in Port Stephens and Mooloolaba.



Table 1 Community characteristics of surveyed sites (Usual Residents, 2006)

Characteristic		Bermagui	Port Stephens	Mooloolaba	Australia
Australian Standard Geographical Classification		UC/L	LGA	Sunshine Coast statistical region	National
Population	Population (no.)	1 298	60 485	276 267	19 855 288
	Proportion female (%)	51	51	51	51
	Median age (years)	51	40	41	37
	Proportion 19 years or younger (%)	22	28	26	27
	Proportion greater than 60 years (%)	36	23	23	18
	Proportion between 20 and 60 years (%)	42	49	51	55
Indigenous	Indigenous persons (%)	4.5	2.9	1.2	2.3
Education	Proportion aged 15 years and over who completed Year 12 or equivalent (%)	27.6	28.4	39.5	42.2
Labour force	Labour force participation (%)	30.7	42.5	45.9	48.3
	Employed full-time (%)	42.6	55.0	54.5	36.6
	Employed part-time (%)	39.3	31.6	33.9	16.9
	Unemployment rate (%)	10	7.1	5.8	5.2
	Largest employment sector	A	R	R	R
Income	Median weekly individual income for persons 15 years and over	\$304	\$388	\$428	\$466
Country of birth	Residents born outside of Australia (%)	19.2	16.5	24.4	29.1
Hachman Index <sup>a</sup>	Employment distribution	0.60	0.93	0.91	1.00

Note: A = accommodation and food services; R = retail trade; LGA = local government area; UC/L = urban centre/locality.

<sup>a</sup> The Hachman Index measures how closely the employment distribution of a subject region (e.g. Port Stephens) resembles that of a reference region (e.g. Australia). The more closely a subject region's economy reflects the reference region's employment mix, the higher the value of the Hachman Index (Moore 2001). The Hachman Index has a maximum value of one when the subject region's employment mix is exactly the same as the reference region's employment mix.

Data source: ABS (2006a, 2006b).



Table 2 Characteristics of 16 game-fishing centres (Usual Residents, 2006)

Location	No. of game-fishing tournaments	Name of geography	Population (no.)	Female (%)	Median age (years)	<20 years of age (%)	>60 years (%)	20–60 years (%)	Indigenous (%)	>14 years and Year 12 (%)	>14 years in the labour force (no.)	Full-time employment (%)	Part-time employment (%)	Unemployed (%)	Largest employment sector	>14 years median weekly income (\$)	Residents born outside of Australia (%)	Hachman Index <sup>a</sup>
Cairns	5	LGA	127 434	50	35	29	13	58	7.8	41.9	65 523	63.9	25.6	4.3	R	530	27.9	0.90
Innisfail	1	UC/L	8 261	50	39	29	22	49	13.3	25.5	3 359	60.8	26.3	6.2	R	394	23.0	0.87
Hervey Bay	2	UC/L	41 225	52	44	25	29	46	2.6	29.8	15 446	53.9	31.2	8.6	R	348	22.1	0.85
Mooloolaba	6	Statistical region	276 267	51	41	26	23	51	1.2	39.5	126 929	54.5	33.9	5.8	R	428	24.4	0.90
Southport	4	SLA	24 098	51	38	20	23	57	1.3	43.6	11 220	56.3	31.0	6.9	A	410	42.0	0.91
Lord Howe Island	1	UC/L	349	50	44	18	23	59	0.0	43.6	219	54.8	32.4	1.4	A	549	18.9	0.28
Port Macquarie	1	UC/L	39 218	53	45	24	30	46	2.6	30.5	15 990	52.0	33.7	8.4	R	377	17.8	0.80
Port Stephens	4	LGA	60 485	51	40	28	23	49	2.9	28.4	25 712	55.0	31.6	7.1	R	388	16.5	0.93
Broken Bay	11	LGA	54 158	51	41	26	21	53	0.3	54.1	28 021	58.8	32.8	2.7	P	653	28.1	0.87
Wollongong	1	LGA	184 213	51	37	26	20	54	1.7	36.8	83 548	56.9	16.5	7.5	M	391	27.9	0.95
Shoalhaven	5	LGA	88 405	51	44	26	28	46	3.7	27.2	34 479	50.6	33.9	9.2	R	349	18.8	0.92
Bermagui	3	UC/L	1 298	51	51	11	36	42	4.5	27.6	399	42.6	39.3	10	A	304	19.0	0.60
Merimbula	4	State suburb	3 207	51	49	21	33	46	0.9	32.3	1 430	50.6	37.2	7.5	A	392	19.7	0.61
Port Welshpool	1	State suburb	198	44	49	22	39	39	0.0	17.1	60	50.0	43.3	6.7	R	328	18.2	0.47

Location	No. of game-fishing tournaments	Name of geography	Population (no.)	Female (%)	Median age (years)	<20 years of age (%)	>60 years (%)	20–60 years (%)	Indigenous (%)	>14 years and Year 12 (%)	>14 years in the labour force (no.)	Full-time employment (%)	Part-time employment (%)	Unemployed (%)	Largest employment sector	>14 years median weekly income (\$)	Residents born outside of Australia (%)	Hachman Index <sup>a</sup>
St Helens–Stieglitz	2	UC/L	2 049	53	49	22	34	44	3.6	20.9	667	45.4	37.8	9.1	R	296	19.4	0.68
Eaglehawk Neck	2	UC/L	269	48	50	16	23	61	3.3	29.6	123	54.5	31.7	2.4	A	373	20.1	0.44
Australia	81	National	19 855 288	51	37	27	18	55	2.3	42.2	9 607 987	36.6	16.9	5.2	R	466	29.1	1.00

Note: A = accommodation and food services; M = manufacturing; P = professional, scientific and technical services; R = retail trade

UC/L = urban centre/locality; LGA = local government area.

<sup>a</sup>The Hachman Index measures how closely the employment distribution of a subject region (e.g. Port Stephens) resembles that of a reference region (e.g. Australia). The more closely a subject region's economy reflects the reference region's employment mix, the higher the value of the Hachman Index (Moore 2001). The Hachman Index has a maximum value of one when the subject region's employment mix is exactly the same as the reference region's employment mix.

Data source: ABS (2006a, 2006b).

## Valuing recreational activities

When natural resources are used for fishing—whether commercial or recreational—economic value is generated and can be measured. Estimates of the economic value generated of commercial fishing are usually based on market signals (e.g. the price of fish caught and the cost of resources used to catch the fish). These market prices and the observed quantities harvested can be used to calculate economic value—the 'net economic value' of commercial fisheries.

The economic value of using resources for recreational activities, including game fishing, is more difficult to quantify because the implicit prices and quantities involved are non-market in nature and not readily observed. The value derived from recreational fishing is classified as a 'use value'. There is also an economic 'non-use' value associated with using fish resources. This reflects the value that individuals derive from the satisfaction of knowing that the resources exist and are maintained (Perman et al. 1999). Both use and non-use values are embodied in the concept of total economic value (OECD 1995, Perman et al. 2003). Non-use values are not considered in the present study.

While the activity is non-market in nature, the demand for recreational fishing can be related to actions in the marketplace. This is because the decision to participate in recreational fishing can be linked to the expenditure incurred by anglers participating in the activity. These expenditures include travel to the site of the activity, income foregone and expenditure on accommodation, meals, boat equipment and fishing tackle during the trip.

Many studies have assessed the economic value of recreational fishing activity in Australia and elsewhere. Australian studies include Shrestha et al. (2002), Prayaga et al. (2010), Hailu et al. (2011) and Ezzy and Scarborough (2011). Most studies have focused on measuring the economic use value of recreational fishing activity at particular sites using standard non-market valuation techniques—techniques that are applicable when the goods being valued are non-market in nature (Appendix D). The techniques have been developed by economists over the past fifty years, predominantly to estimate the economic value society derives from using natural resources in activities where no actual financial transactions occur; for example, using public resources such as national parks for recreational pursuits (Haab & McConnell 2002).

Recreational activities also have benefits beyond economic-use values. Investigating the range of values placed on game fishing by those who engage in the activity and how intensely these values are held can provide insights into behaviour in relation to an activity. This in turn can inform strategies for improving policy and fisheries management.

In valuing game fishing, this study estimated actual expenditure, used the travel-cost method to estimate economic value (Appendix D) and collected information on social values associated with game fishing.

## 2 A description of the eastern Australian game-fishing sector

### Definitions and scope

Game fishing is a specialised form of recreational fishing, where participants target large, surface-dwelling pelagic species in the open ocean. These 'game fish' include billfish (e.g. black marlin, blue marlin, striped marlin and Pacific sailfish), tuna (e.g. yellowfin tuna, southern bluefin tuna and longtail tuna) and sharks (e.g. mako shark and blue shark). For point-scoring in tournaments, game fishing and sportfishing associations also recognise many other fish species (e.g. yellowtail kingfish and broad-barred Spanish mackerel). However, our definition of game fish is limited to those large pelagic species that are the responsibility of the Australian Government (listed in Table E1, Appendix E). In this report they are referred to as 'key game-fish species'. Scientific names of key gamefish and other fish species referred to in this report are provided in Table 3.

**Table 3 Common and scientific names of game-fish species referred to in this report**

<b>Common name</b>	<b>Family or species name</b>	<b>Common name</b>	<b>Family or species name</b>
<b>Billfish</b>	Family Istiophoridae, Xiphiidae	<b>Mackerel</b>	Family Scombridae
Broadbill swordfish	<i>Xiphias gladius</i>	Australian bonito	<i>Sarda australis</i>
Black marlin	<i>Makaira indica</i>	Mackerel tuna	<i>Euthynnus affinis</i>
Blue marlin	<i>Makaira nigricans</i>	Blue mackerel	<i>Scomber australasicus</i>
Pacific sailfish	<i>Istiophorus platypterus</i>	Grey mackerel	<i>Scomberomorus semifasciatus</i>
Shortbill spearfish	<i>Tetrapturus angustirostris</i>	School mackerel	<i>Scomberomorus queenslandicus</i>
Striped marlin	<i>Kajikia audax</i>	Shark mackerel	<i>Grammatorcynus bicarinatus</i>
<b>Tuna</b>	<i>Thunnus</i> species	Spanish mackerel	<i>Scomberomorus commerson</i>
Albacore	<i>Thunnus alalunga</i>	Spotted mackerel	<i>Scomberomorus munroi</i>
Bigeye tuna	<i>Thunnus obesus</i>	<b>Sharks</b>	
Dogtooth tuna	<i>Gymnosarda unicolor</i>	Australian blacktip	<i>Carcharhinus tilstoni</i>
Dolphinfish	<i>Coryphaena hippurus</i>	Blue shark	<i>Prionace glauca</i>
Longtail tuna	<i>Thunnus tonggol</i>	Bigeye thresher	<i>Alopias superciliosus</i>
Kingfish	<i>Seriola lalandi</i>	Common thresher	<i>Alopias vulpinus</i>
Skipjack tuna	<i>Katsuwonus pelamis</i>	Longfin mako	<i>Isurus oxyrinchus</i>
Southern bluefin tuna	<i>Thunnus maccoyii</i>	Mako sharks	<i>Isurus</i> species
Wahoo	<i>Acanthocybium solandri</i>	Pelagic thresher	<i>Alopias pelagicus</i>
Yellowfin tuna	<i>Thunnus albacares</i>	Shortfin mako	<i>Isurus paucus</i>
		Tiger shark	<i>Galeocerdo cuvier</i>
		Whaler sharks	<i>Carcharhinus</i> species
		Whitetip reef shark	<i>Triaenodon obesus</i>

The objective of game fishing is rarely to catch fish for food; instead, most game fishers are attracted to the sport of catching large or challenging fish, sometimes as part of organised competitions and tournaments. In recent years there has been a shift from landing fish as trophies, to tagging and releasing live fish (Pepperell 2010). In this report we use the term 'catch' to refer to fish that are tagged, released, landed, weighed or kept.

Appendix E presents information on the historical trends and the geographical distribution of game-fishing activity based on tag-release data. The current study focuses on game-fishing activities off eastern Australia for tropical and subtropical pelagic species, such as striped marlin and yellowfin tuna. The study area stretches from north-eastern Queensland to south-eastern Tasmania, including Lord Howe Island. Game-fishing activities for temperate species, including southern bluefin tuna (SBT), often overlap activities for tropical species off south-eastern Australia during winter. This study does not address game-fishing activities for southern bluefin tuna.

## Fishing platforms

Game fishers usually operate from boats of 4.5 m in length or larger. The majority of game-fishing activity takes place on powered private boats with significant activity levels also reported from chartered boats ('charter boats'). Charter and private boats operate from within a few kilometres of the shore to hundreds of kilometres offshore. Near-shore locations, such as those around Bermagui, can be accessed with relative ease by boats that are transported, launched and retrieved each day from trailers ('trailer boats'). Many dedicated game-fishing boats are larger than trailer boats and may be fitted with a kitchen, bathroom and sleeping berths. These larger 'cruisers' are able to withstand larger swell. They have bigger engines and greater range than trailer boats (Trailerboat Fisherman 2010). The capital costs of cruisers are large and they are expensive to run. While a trailer boat may have a single 115–225 horse power (HP) outboard motor and use around 30–50 litres of fuel per hour (LPH), cruisers may run twin, inboard 800 HP diesel engines which can use over 200 LPH while underway (Polson Enterprises 2008).

Equipment on cruisers may include a game-fishing 'fighting chair', spotting towers to locate game fish and outriggers. Outriggers, which are also used by trailer boats, allow multiple lines to be set away from the boat's propeller turbulence and also to prevent tangling with other lines (Fishing World 2008, Strang 2011). Game-fishing boats usually have modern navigation and fish-finding devices, including GPS, sounders and radar. This electronic equipment and fishing gear may cost many thousands of dollars, placing game fishing among the most expensive recreational activities. It is worth noting, however, that game fish can also be caught with a relatively modest financial outlay (Trailerboat Fisherman 2010).

While most game-fishing activity takes place from boats, there are several locations off south-eastern Australia where it is possible to catch game fish from the shore (e.g. around Jervis Bay [NSW]). Additionally, there are some game fishers who target game fish from kayaks or in the water using spearguns.

## Fishing methods

The primary method of game fishing involves rod-and-reel, with a lure or bait trolled behind the boat at speeds of around 9 knots. Bait may be alive or dead. When using live bait, boats may drift or they may cruise at up to three knots. Artificial lures may be set with or without a hook. Baits

and lures are selected to appear as lifelike as possible and entice the fish into taking the bait or lure (Fishing World 2010). The game fisher may 'strike' when the hook is in the fish's mouth, pulling the rod back with the intention of setting the hook into the fish. Striking may not be necessary when trolling a lure or a bait because drag pressure on the reel will usually set the hook. The fish is played until it tires and can be brought alongside the boat.

A 'teaser' is a lure without a hook that is used to attract fish. As there is no hook in the teaser, the fish will not be put off by the hook as they attack the teaser. As the fish gets more excited, a bait with a hook is manoeuvred towards the fish and the teaser is removed. In theory the fish will be excited and then aggressively attack the bait enabling the hook to be set. This method is called 'switch baiting'.

Some game fishers use fly-fishing techniques to catch species such as striped marlin, either by casting to surface-feeding fish or presenting the fly to fish attracted by bait ('switch-baiting').

Some fish are caught from drifting boats and are attracted with food; either by 'cubing' or with berley. Berley is often used when targeting sharks, whereas cubes are used when targeting tuna. When cubing, lumps ('cubes') of fish are dropped over the side at regular intervals leaving a consistent trail of bait through the water column to attract fish to the boat. A cube with a baited hook is then dropped into the trail of cubes. In berleying, the aim is to attract fish or sharks through the odour of the berley alone, rather than the added visual stimulus of cubing. The berley may include ground-up fish frames, tins of cat food with holes punched in them or commercially available berley pellets (Bishop 2011).

Technological developments have progressively improved the efficiency of fishing equipment. Improved boat technology and increased size have provided access to waters beyond the continental shelf. The introduction of lighter breaking-strain line class categories to tournaments has cultivated increased levels of skill. Combined, these technological advances are likely to have increased the efficiency or 'fishing power' of game fishers.

Spearfishing for game fish is often referred to as 'bluewater spearing'. Fishers may attract fish to the boat using similar methods to rod-and-reel anglers or they may seek floating objects, such as marker buoys or debris where baitfish and game fish aggregate. Spearfishers use spearguns that are powered by rubber or compressed air. Compressed air guns are generally more expensive, but can be easier to load and are quieter than rubber driven spearguns. The advantages of rubber driven spearguns are that they are generally cheaper, easier to maintain and can give more power.

## The game-fishing sector's structure

The game-fishing sector can be separated into three main components: (i) organised game fishing, which includes anglers who are fishing club members or participate in competitions or tournaments, (ii) non-organised game fishing, which is comprised of anglers who are not members of a club and do not participate in tournaments, and (iii) charter boats, involving licensed commercial operators who service anglers who may be part of the organised or the non-organised component of the game-fishing sector.

### Organised game-fishing activities

#### Clubs

Many game fishers are members of fishing clubs, which often organise fishing tournaments, competitions and other club activities. There are four primary bodies relevant to the organised component of game fishing in Australia: (a) the Game Fishing Association of Australia (GFAA),

(b) the Australian National Sportfishing Association (ANSA), (c) the Australian Anglers Association (AAA) and (d) the Fishing Clubs Association (FCA).

The GFAA maintains a hierarchy of structures from the national body (GFAA), to state associations (e.g. the NSW Game Fishing Association), affiliated clubs (e.g. Bermagui Big Game Anglers Club) and club members. There were 63 GFAA-affiliated clubs in eastern Australia (Queensland, New South Wales, Victoria and Tasmania) in 2009–10 with almost 7000 members (Table 4). Reported fishing activity levels vary among members, with some members fishing many tournaments and days outside tournaments through to social members who may not actively fish.

**Table 4 Summary of membership and the number of GFAA-affiliated clubs in eastern Australia, 2009–10**

State	No. of clubs	Adult (>16 yr)		Junior (11–16 yr)		Small fry (<11 yr)		Total
		male	female	male	female	male	female	
Queensland	19	1330	281	143	66	0	0	1820
New South Wales	24	2892	282	209	58	84	42	3567
Victoria	16	588	94	19	11	24	19	755
Tasmania	4	387	45	20	6	12	7	477
<b>Total</b>	<b>63</b>	<b>5197</b>	<b>702</b>	<b>391</b>	<b>141</b>	<b>120</b>	<b>68</b>	<b>6619</b>

Note: The GFAA Member Database is limited to members who opt to receive the GFAA journal. There may be only one subscription for households with multiple GFAA members.

Data source: GFAA Member Database (Grahame Williams, pers. comm., 10 March 2011)

**Table 5 Summary of membership and the number of ANSA-affiliated clubs in eastern Australia, 2010–11**

State	Clubs	Members
Queensland	37	1123
New South Wales	33	1116
Victoria	14	352
Tasmania	1	28
<b>Total</b>	<b>85</b>	<b>2619</b>

Data source: John Burgess, pers. comm., 13 December 2011

The GFAA maintains lists of species for point-scoring in tournaments and for the recognition of records. These include 55 recognised saltwater game-fish species or species groups for capture and 47 game-fish species or species groups for tag-and-release (GFAA 2011).

The ANSA has a broader range of point-scoring species; fishers involved in ANSA tournaments may target large game fish, including marlin, and also other marine species (e.g. dusky flathead) and freshwater species (ANSA 2011). There are currently 85 ANSA-affiliated clubs in eastern Australia with several thousand members in total (Table 5).

The AAA and FCA clubs are often linked to local sports and social clubs and tend to be less competitive than GFAA and ANSA clubs. The AAA and FCA club activities rarely involve game fishing. There are currently over 34 FCA clubs and more than 345 AAA clubs in eastern Australia.

Based on a postal survey of eastern Australian fishing clubs in 1988–89, West (1990) estimated that GFAA clubs accounted for the majority of game-fish catches, with ANSA clubs also taking significant numbers (Table 6). It is not known how these ratios for club-based activities may have changed in subsequent years.

**Table 6 Distribution of selected game-fish species or species groups that were caught, boated and recorded in eastern Australian fishing club events, 1988–89**

<b>Affiliation</b>	<b>Yellowfin tuna (%)</b>	<b>Albacore tuna (%)</b>	<b>Marlin (%)</b>	<b>Other billfish (%)</b>
GFAA	72	61	80	91
ANSA	24	36	17	9
FCA + AAA	4	3	3	0
<b>Total (no.)</b>	2887	494	618	54

Note: AAA = Australian Anglers Association; ANSA = Australian National Sportfishing Association; FCA = Fishing Clubs Association; GFAA = Game Fishing Association of Australia  
Data source: West (1990)

The National Recreational Fishing Survey (Henry & Lyle 2003) estimated that 3.36 million Australian residents fished at least once in the 12 months prior to May 2000. Fishing club members comprised only 4.3 per cent of those surveyed. From Henry and Lyle's data, we estimated that 10.7 per cent of those fishing club members were members of a game-fishing club, which equates to more than 14 000 game-fishing club members or 0.4 per cent of Australia's angler population. This estimate does not include game fishers who are members of sports or other fishing clubs or are not club members (non-club game fishing is considered in the 'Non-organised activity' section of this report). The small proportion of game-fishing club members (and presumably non-organised game fishers) in the wider angler population presents challenges for obtaining representative data on the game-fisher population and their activities through on-site and off-site surveys.

Using a combination of online diaries, time–location sampling and access point surveys across northern Australia, Griffiths et al. (2010a) estimated that 15.7 per cent of sport fishers were fishing club members. The differences in fishing club membership rates estimated by Griffiths et al. (2010a) and Henry and Lyle (2003) (10.7 per cent) might be due to the areas or years surveyed, interview techniques; alternatively, the difference may be due to the survey methods, which were designed to specifically target sport fishers. For example, the National Recreational Fishing Survey did not specifically ask a question on fishing club membership, but recorded this information when interviewees offered it.

## **Tournaments**

Over 60 GFAA-affiliated tournaments are held each year in eastern Australia, mostly between the New South Wales towns of Eden and Port Stephens and in south-eastern Queensland (Figure 1). These two concentrations of game-fishing tournaments align with the major population centres of Sydney and Brisbane, and are also in close proximity to the edge of the continental shelf where game fish tend to concentrate. By contrast, there are few game-fishing tournaments around Melbourne because game-fish species are rarely encountered in the relatively shallow, cold waters of Bass Strait. The ANSA also support several major fishing tournaments, which target a variety of species, including key game fishing species that are the focus of this report.



Most tournaments are held over several days at about the same time each year, coinciding with weekends and public holidays. Australia's largest game-fishing tournament, NSW GFA's Interclub, is held over two weekends in February and March with associated competitions and social activities during the intervening week. Game-fishing tournaments are currently held in most eastern Australia coastal cities as well as 16 regional centres (Appendix C). Multiple game-fishing tournaments are held each year at several centres (e.g. three tournaments are held each year at Bermagui: the Blue Water Classic, Tag and Release and Annual Yellowfin).

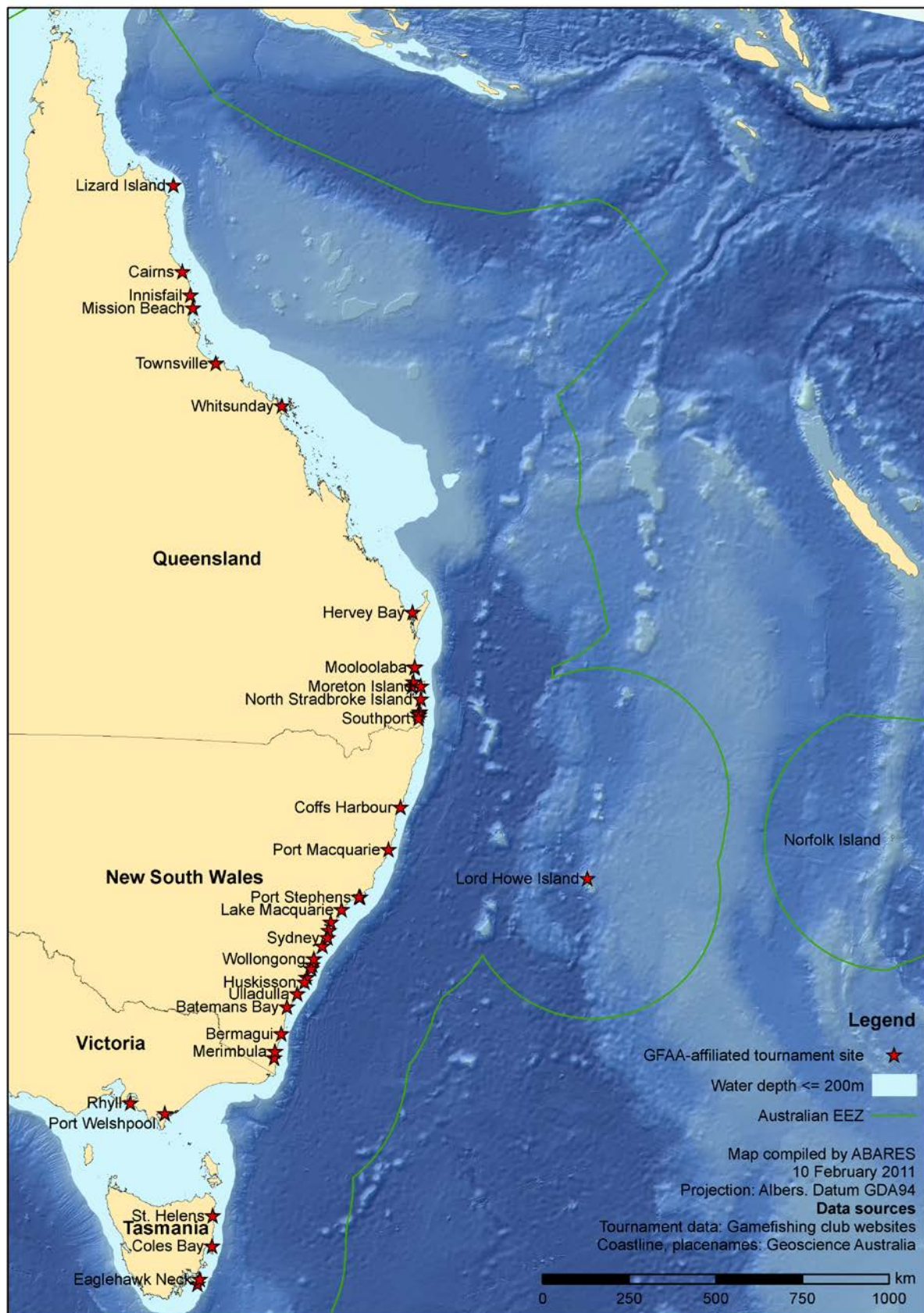
The New South Wales Department of Primary Industries (NSW DPI; formerly NSW Industry and Investment) has run the Gamefish Tournament Monitoring Program since the early 1990s (Ghosn 2012, Park 2007). The program utilises tournament radio schedules (referred to as 'scheds'), interviews and boat ramp surveys. All game-fishing tournaments conduct radio schedules that record the location, number of anglers and catch of participating boats at regular intervals during tournament fishing days. The NSW DPI program also involves on-site boat ramp surveys that directly observe catch and collect detail information on fishing practices and gear.

Participation levels in tournaments range from fewer than ten boats or 40 participants to several hundred boats and over 700 participants. Participation levels vary from year to year, with local weather conditions, abundance of game fish, prizes and tradition being important determining factors. An average of 41 boats participated in game-fishing tournaments monitored by NSW DPI in 2010, with an average of 4.3 persons per boat (Table 7). Note that friends, family members and other non-participants often accompany tournament participants, so the number of persons on board is often larger than the number of participants. In addition to tournaments, fishing clubs may organise other events, contests and outings for club members.



Game fishers fighting a blue marlin (Ward, ABARES)

Figure 1 Location of GFAA-affiliated tournaments in eastern Australia, 2010



Data source: GFAA Member Database (Grahame Williams, pers. comm., 10 March 2011)



**Table 7 Summary statistics for game-fishing tournaments monitored by the NSW Game Fish Tournament Monitoring Program, 2010**

Year	Tournament days	Average boats per day	Total boat days	Average persons per boat	Total person days
2010	62	41	2569	4.3	10 977

Note: These data do not cover all game-fishing tournaments held in New South Wales in 2010; for example, a Victorian club is known to have held at least one game fishing event in New South Wales in 2010. Several other game-fishing tournaments were cancelled due to bad weather in 2010.

Data source: NSW Game fish Tournament Monitoring Program (Danielle Ghosn, pers. comm., 5 October 2011)

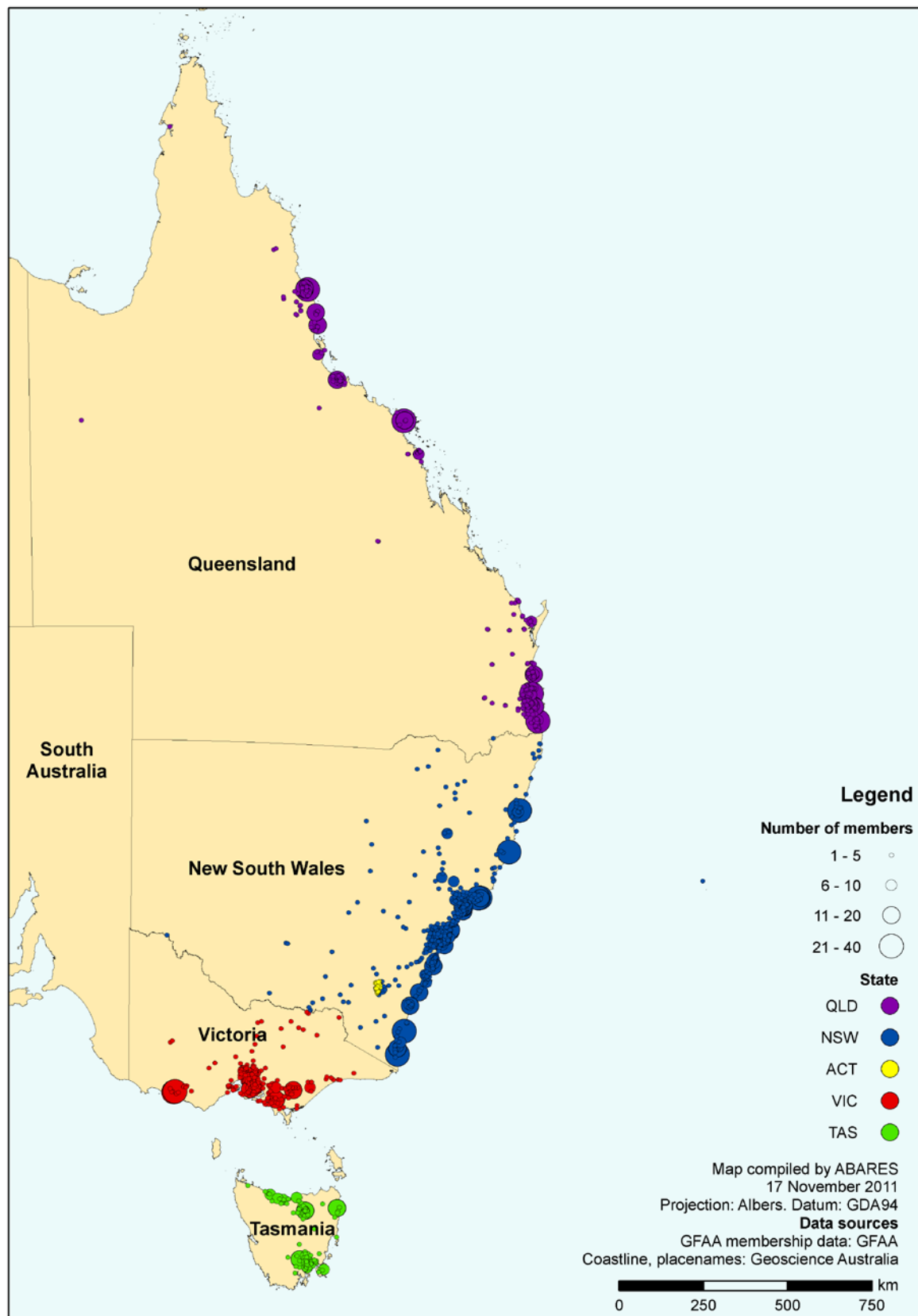
Tournaments are generally only open to members of game-fishing clubs, but occasionally non-members or temporary members are permitted. Tournaments will often have awards for the largest marlin, tuna and shark, the most capture (retained) points (based on fish species, size and lines class) and most tag-and-release points. Gear and equipment prizes along with a trophy or certificates are usually awarded for each category. Game-fishing tournaments are occasionally run by private businesses or individuals. Some tournaments offer substantial prize money. For example, the Luhrs Billfish Shootout in Port Stephens offers \$10 000 for the largest marlin over 150 kg and another \$10 000 for the winning tag-and-release team. Most tournaments, however, do not offer monetary prizes. Instead, participants compete for perpetual trophies and donated prizes.

The species targeted during game-fishing tournaments vary with location and season. For instance, yellowfin tuna is more prevalent off the southern NSW coast in April–May and are consequently targeted at tournaments in this area at those times. Likewise, black marlin is available off the north Queensland coast later in the year and there are several tournaments in September and October targeting black marlin.



Game-fishing boats carry multiple fishing rods, each worth thousands of dollars (Ward, ABARES)

**Figure 2** Distribution of the mailing addresses of members of GFAA-affiliated clubs in eastern Australia, 2010

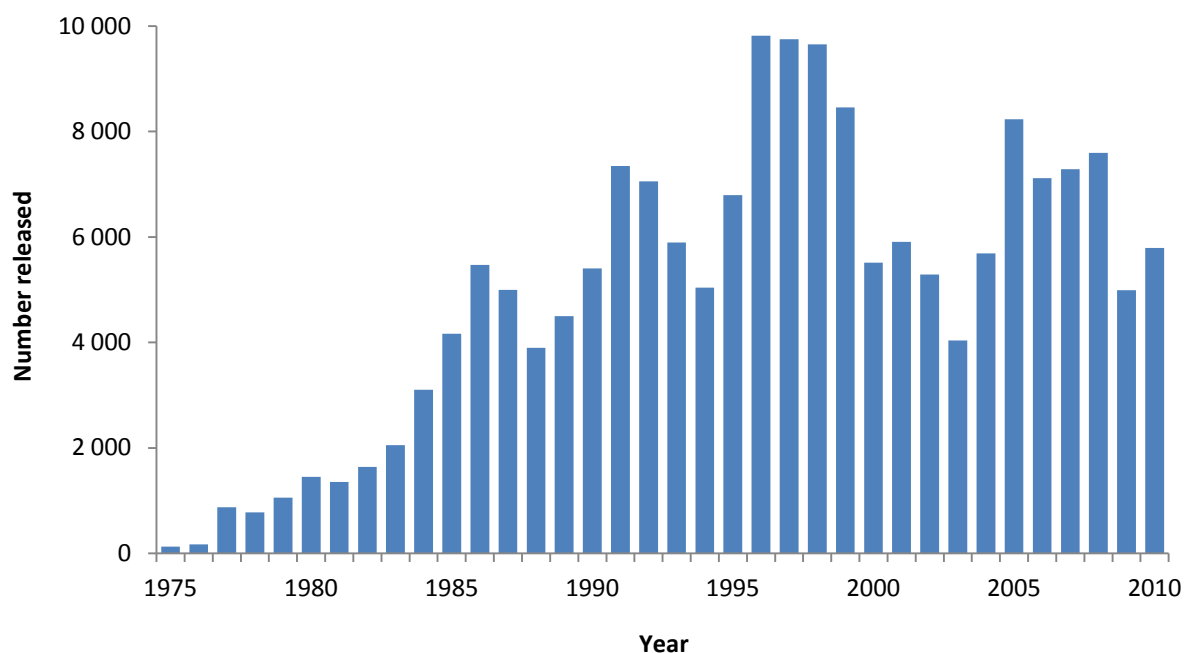


Data source: GFAA Member Database (Grahame Williams, pers. comm., 10 March 2011)

The introduction of tag-and-release as part of game fishing in the 1970s affected the nature of game-fishing tournaments. More fish are now tagged and released rather than weighed. All large, marine sport and game-fishing tournaments currently held in Australia are either tag-and-release only (none are weighed) or have large tagging components within them. Fish are generally only retained and weighed if it is believed that a record has been broken or there is potential to win the applicable category of the tournament. It is common for clubs to set minimum size limits on weighable fish during tournaments, so that there is less incentive to retain smaller fish as they will not be accepted at weigh stations and are tagged instead.

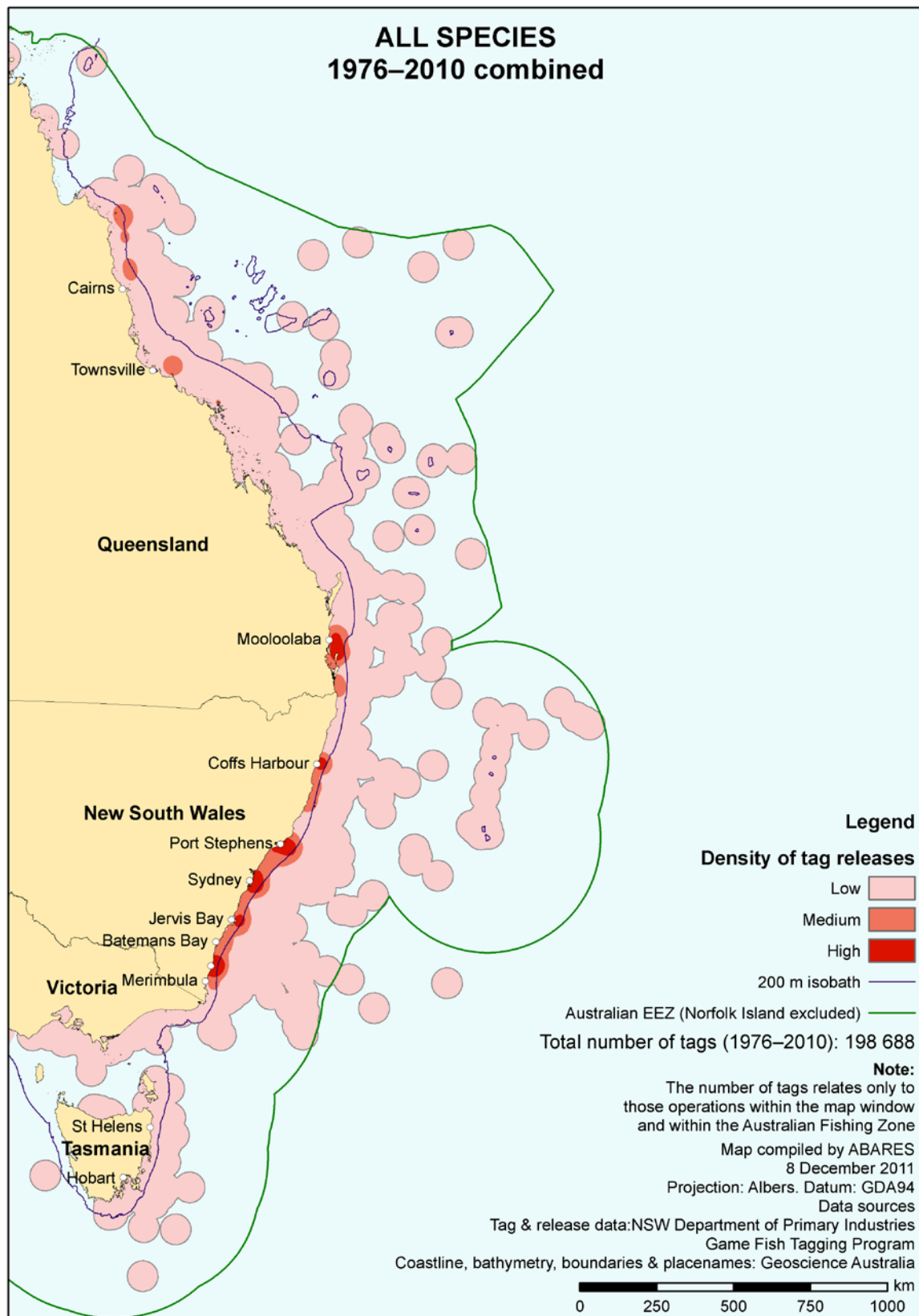
The number of tag-releases of key game-fish species peaked at over 10 000 in the mid-1990s (Figure 3). The 222 011 tag-releases during 1976–2010 were broadly distributed from Horne Island off the tip of Cape York to south of Tasmania (NSW Gamefish Tournament Monitoring Program; Figure 4). Releases were concentrated in coastal waters between Port Stephens and Eden, Coffs Harbour – Port Macquarie and the Sunshine Coast. Game fishers reported moderate numbers of releases from Lizard Island – Cairns and Townsville. Lower levels extended into oceanic waters of the Australian fishing zone, especially around reefs, seamounts and islands, including Lord Howe Island. Game fishers reported fewer releases from Bass Strait or inside the Great Barrier Reef Marine Park. Seventy-two per cent of tag-releases were from coastal waters (<200 m; Figure 4). Appendix E is a compendium of detailed maps and graphs of tag-releases for species and species groups, with notes on their interpretation.

**Figure 3 Annual number of key game-fish species reported tagged and released off eastern Australia, 1976–2010**



Data source: NSW DPI Game Fish Tagging Program

Figure 4 Distribution of tag releases for all key game-fish species combined, 1976–2010



Data source: NSW DPI Game Fish Tagging Program

## Charter boats

Charter boat operations range from dedicated game-fishing charters to general fishing charters that occasionally target game fish, as well as dive charters and various tourist and sightseeing activities, including whale watching. Boat size ranges from small trailer boats to large cruisers. Small trailer boats are commonly used in Victoria and Tasmania, whereas large cruisers are more common in Queensland. Licensing is mandatory for boats that accept paying customers. However, jurisdictions vary in the classification of the types of charter operations and information that operators must provide (DAFF 2000). For example, charter boat logbooks do not currently exist in Victoria or Tasmania. Many of the charter boats that specialise in game fishing move between ports to follow the fish or to support tournaments. Some move between states and might be double-counted in state logbook and licensing databases. A related activity involves fishing guides, who are engaged by anglers to advise on fishing locations, gear, bait and fishing methods.

## Queensland

The key sites for charter boat game fishing in Queensland are Cairns, Townsville, Mooloolaba, Brisbane and the Gold Coast (Pepperell & Henry 1997). Some charter boats are reported to follow the north–south migration of black marlin and participate in various tournaments along the coast (DAFF 2000).

The oldest and best-known game-fishing charter operations are those off North Queensland, where large black marlin are targeted adjacent to the Great Barrier Reef between Lizard Island and Cairns. Those operations occasionally link to larger ‘mother ships’ moored near fishing grounds. However, most operate as live-aboard charters with guests accommodated over periods ranging from days to weeks. Charter boat fishing off Cairns developed in the early 1960s (DAFF 2000). Competition for black marlin between the Japanese commercial longliner fleet and recreational game fishers in this area resulted in the exclusion of Japanese longliners in a larger area off Cairns – Lizard Island (Ward 1996). This area was extended to cover the area south of Townsville in 1991 and is now referred to as ‘Area E’ in the Eastern Tuna and Billfish Fishery (DAFF 2000). The Cairns fishery is now among the best recreational fisheries worldwide for large marlin, and generates millions of dollars annually in international tourism (DAFF 2000).

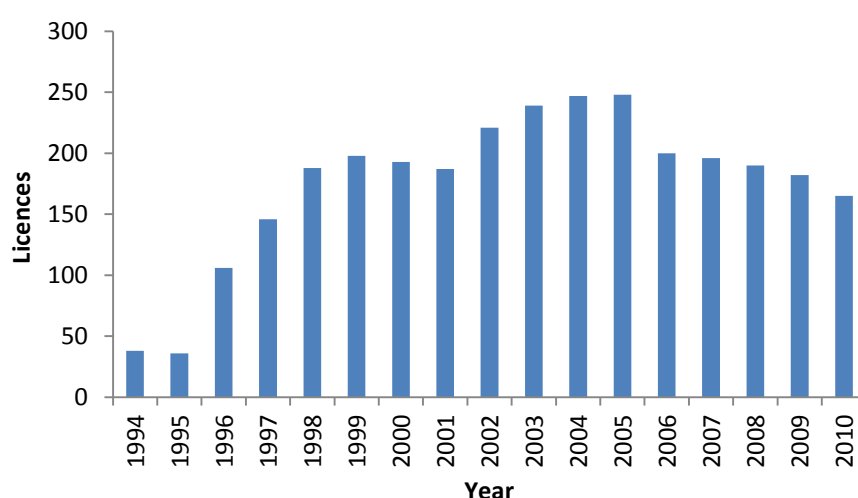
Charter operations also developed in the 1980s and 1990s in Townsville and further south, including Hervey Bay, the Sunshine Coast (Mooloolaba) and the Gold coast. They typically target black marlin, blue marlin, Pacific sailfish, tuna, mackerel and dolphinfish. Charter boats are often involved in annual game-fishing tournaments held in various locations, including Cairns, Dunk Island, Townsville, Mooloolaba, Bribie Island and the Gold Coast.

The number of charter fishing licences in Queensland increased from 36 in 1995 to 248 licences in 2005. This increase may be linked with the substantial increase in population size in south-eastern Queensland over this period, combined with increased interest in recreational fishing. Charter boat numbers subsequently declined, with 165 charter licences issued in 2010 (Figure 5). This decline may be linked with changes in licence requirements in 2006 for charter operators in Queensland, where only charter operators fishing offshore required a licence. The price of diesel also increased substantially in 2005–06, peaking in 2007–08. Changes to the management plans and zoning for the Great Barrier Reef were introduced in 2008, which may have also impacted charter operations. Fishing effort followed the number of licences, increasing from 288 days in 1994 to a peak of 5374 days in 2005 then decreasing to 4487 days in 2010 (Figure 6).

Since 1994, Queensland has required commercial charter operators to maintain logbooks of their fishing activities ('Queensland Charter Boat Logbooks'). The most commonly retained game-fish species (by weight) during 1994–2010 in Queensland were Spanish mackerel, black marlin and other mackerel (Table 8; Table 9). The landed game-fish catch reported in Queensland Charter Boat Logbooks increased from 5 t in 1994 to 126 t in 2005, then declined to 97 t in 2010 (Figure 7).

Queensland Charter Boat Logbooks also collect data on 'releases', which include fish that are tagged and released, and also released fish that are not tagged as well as those that are discarded. Charter boat releases of game fish have ranged from less than 1 t in 1994 to 183 t in 2006 (Figure 8). The most frequently released game-fish species for the same period were billfishes such as black marlin, blue marlin, Pacific sailfish and Spanish mackerel (Queensland Charter Boat Logbooks; Table 8).

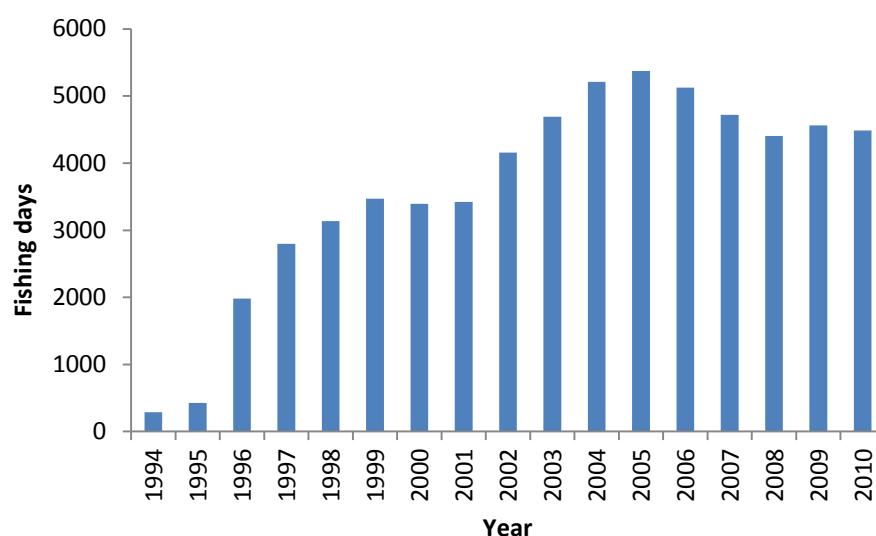
**Figure 5 Number of charter boat licences issued in Queensland, 1994–2010**



Note: Only offshore charter boats were required to be licensed after 2006 (pre-2006 data include all charter boat licences).

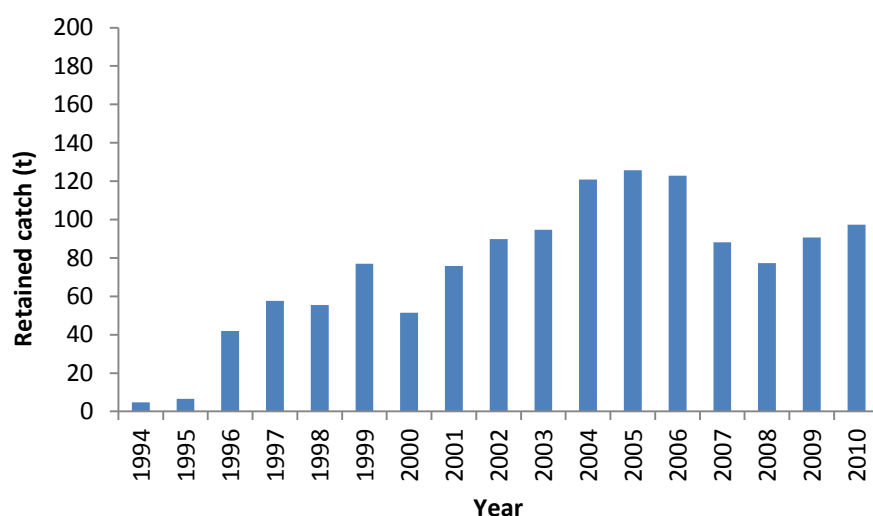
Data source: Queensland charter boat logbook data

**Figure 6 Annual fishing effort reported by charter boats in Queensland, 1994–2010**

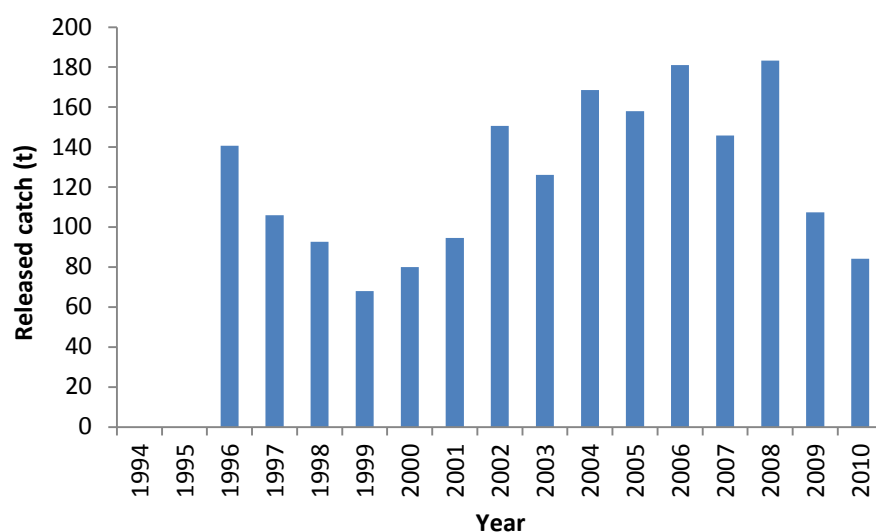




Data source: Queensland charter boat logbooks

**Figure 7 Annual retained catch of game fish reported by charter boats in Queensland, 1994–2010**

Data source: Queensland charter boat logbooks

**Figure 8 Annual released catch of game fish reported by charter boats in Queensland, 1994–2010**

Data source: Queensland charter boat logbooks

**Table 8 The game-fish species most frequently retained and released by charter boats in Queensland, 1994–2010**

Species group	Retained catch (t)	Released catch (t)	Species group	Retained catch (t)	Released catch (t)
Spanish mackerel	268	76	Shark mackerel	44	–
Black marlin	170	1194	Mackerel tuna	40	–
Mackerel (unspecified)	94	–	Pacific sailfish	–	73
Dolphinfish	66	–	Blue marlin	–	45
Marlin unspecified	46	279			

Data source: Queensland charter boat logbooks

**Table 9 Total weight for each species group retained by charter boats, 1994–2010**

<b>Species group</b>	<b>Retained catch (t)</b>
Tuna	946
Mackerel	465
Billfish	255
Sharks	11

Data source: Queensland charter boat logbooks

**Table 10 Other game-fish species reported by charter boats, 1994–2010**

<b>Species group</b>	<b>Species group</b>
Australian blacktip shark	School mackerel
Australian bonito	Skipjack tuna
Bigeye tuna	Spotted mackerel
Blue mackerel	Wahoo
Dogtooth tuna	Whaler shark
Grey mackerel	White-tip reef shark
Longtail tuna	Yellowfin tuna
Mako shark	

Data source: Queensland charter boat logbooks

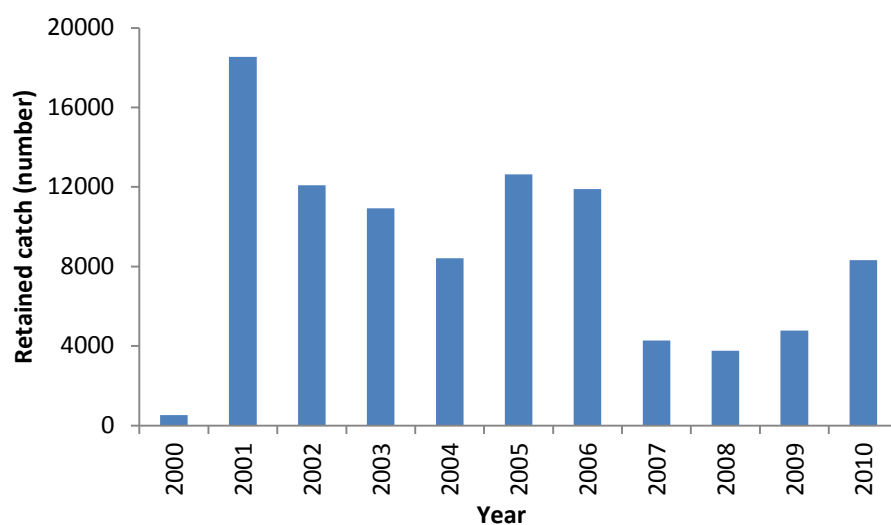
## New South Wales

Of the 160 charter boats registered in New South Wales, 129 indicate game fishing as at least one of their fishing activities (NSW Charter Vessel Monitoring Program). The main sites for game-fishing charter operators in New South Wales are Tweed Heads, Macleay – Southwest Rocks, Port Stephens, Broken Bay, Sydney Harbour, Botany Bay, Port Hacking, Wollongong, Kiama, Nowra, Ulladulla, Batemans Bay, Narooma, Bermagui and Merimbula. Charter boats are known to travel between ports to service various tournaments, with boats known to travel from as far afield as Cairns (DAFF 2000).

New South Wales has supported a charter boat logbook program since 2000, although compliance is reported to have been around 50 per cent in recent years (Pepperell & Henry 1997). The most frequently retained game-fish species (by number) in 2000–2010 were dolphinfish, Australian bonito, skipjack tuna, yellowfin tuna and mackerel tuna (Table 11 and Table 12). The total retained catch of game fish decreased from a peak in 2001 (Figure 9). The decline is largely attributed to reduced logbook reporting by charter boat operators, particularly for game fish that are released. Other contributing factors include several major operators leaving the industry and the discontinuation of a dedicated game fishing logbook after 2006 (Phil Bolton, pers. comm., 30 November 2011).

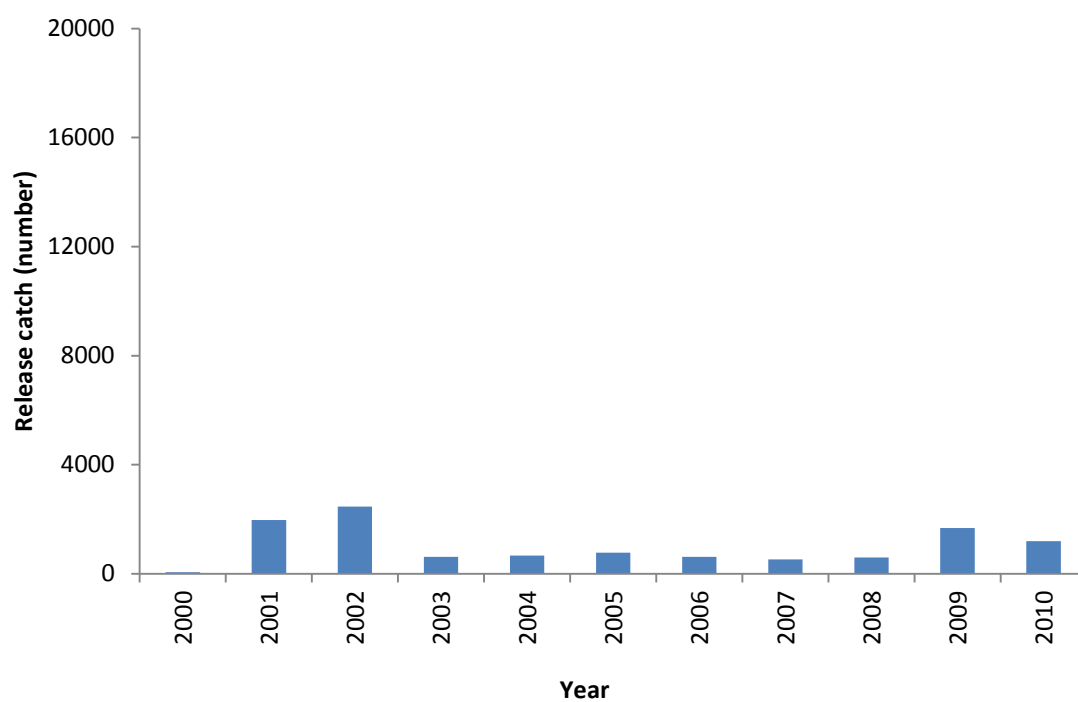
The main species released over the past decade were dolphinfish, striped marlin, yellowfin tuna, Australian bonito and black marlin (Table 11), with peak releases occurring in 2002 (Figure 10). Catches of southern bluefin tuna have been reported by game fishers off southern New South Wales in recent years, with several charter boats involved in those activities.

**Figure 9 Total retained catch of game fish (number of fish) reported by charter boats in New South Wales, 2000–2010**



Data source: NSW Charter Vessel Monitoring Program

**Figure 10 Total released catch of game fish (numbers of fish) reported by charter boats in New South Wales, 2000–2010**



Data source: NSW Charter Vessel Monitoring Program

**Table 11 Most frequently retained and released game-fish species (by number) reported by charter boats in New South Wales, 2000–2010**

Species	Retained catch (no.)	Released catch (no.)
Dolphinfish	59 797	3143
Australian bonito	15 407	864
Skipjack tuna	8330	–
Yellowfin tuna	5189	1982
Mackerel tuna	2044	–
Striped marlin	–	2433
Black marlin	–	852

Data source: NSW Charter Vessel Monitoring Program

**Table 12 Total retained numbers of game-fish species reported by charter boats in New South Wales, 2000–2010**

Species group	Retained catch (no.)
Tuna	32 310
Sharks	1 053
Billfish	838

Data source: NSW Charter Vessel Monitoring Program

## Victoria

Charter boats are not licensed in Victoria and there is no charter boat logbook program in place. Game-fishing activities directed at southern bluefin tuna occur off Victoria's west coast from ports including Portland, Warrnambool and Port Fairy, which is outside our eastern Australian study area. Those activities include substantial numbers of trailer charter boats. Game-fishing charter boats are not known to be active off eastern Victoria, although Lakes Entrance and Mallacoota may hold potential if boat ramps are upgraded (Simon Conron, Vic. DPI, pers. comm., 28 June 2011).

## Tasmania

Charter boats are not licensed in Tasmania. Voluntary logbooks were completed by some operators in the past, but data are incomplete and not ongoing (Jeremy Lyle, University of Tasmania, pers. comm., 28 June 2011).

## Non-organised activity

A significant amount of game fishing occurs outside organised club events and charter boat operations. 'Non-organised' activity involves anglers who are not members of clubs as well as fishing club members fishing outside of organised club or tournament activities. It has been difficult to quantify the level of non-organised activity because of problems in sampling this group.

West (1990) surveyed 21 specialist fishing tackle stores at eastern Australian game fishing ports (1988–89) to estimate the relative proportions of game fish caught by fishing club and non-club clients (excluding charter boat clients). He reported that tackle store owners and staff

consistently reported that club anglers accounted for about 90 per cent of recreationally retained billfish. They also reported that club anglers accounted for about 70 per cent of recreationally caught yellowfin tuna. There appeared to be little regional variation in estimates of catch proportions, other than a suggestion that non-club anglers were responsible for a much higher proportion of billfish catches off far north Queensland.

Conducted in 2000–2001, the National Recreational and Indigenous Fishing Survey (NRIFS) provided an Australia-wide estimate of 232 350 tuna and bonito retained and 121 000 released (Henry & Lyle 2003). Twenty-eight per cent of the retained tuna and bonito were reported by members of fishing clubs or associations. Survey results indicated that only 17 per cent of the anglers who caught tuna and bonitos were club or association members, indicating slightly greater levels of tuna capture by this group. Many bonito and the smaller tuna would be taken as a bycatch of angling that targets other game-fish species. Nevertheless, the results indicate that a large number of non-organised anglers are involved in game fishing in eastern Australia.

Sixty-one per cent of tuna and bonito catches in the NRIFS were reported from New South Wales. Queensland (18 per cent) and Tasmania (5 per cent) contributed a smaller proportion of the Australian recreational catch of these species. Club members accounted for 31 per cent of the tuna retained in New South Wales, but in Queensland only 12 per cent were caught by club members. In Tasmania, half of the tuna were caught by club members. The differences in estimates between West (1990) and the NRIFS are likely due to the broader species groups; for example, the NRIFS estimates include all tuna, small tuna and bonitos whereas West (1990) refers to yellowfin tuna.

The NRIFS results provide an estimate of 46 500 anglers who captured (retained or released) tuna or bonitos off eastern Australia between May 2000 and April 2001. Most of these anglers (75 per cent) were not members of fishing clubs or associations. This estimate may be considered indicative of game-fishing participation levels in eastern Australia, although many of these anglers might not consider themselves game fishers.



The d'Albora marina, Nelson Bay, Port Stephens (Marton, ABARES)

## 3 Value to game fishers

### Game-fisher survey

#### Background

The study surveyed tournament and non-tournament game fishers at three sites during December 2010 – May 2011, which coincided with the eastern Australian game-fishing season for tropical species such as striped marlin and yellowfin tuna. The three sites (Bermagui, Port Stephens and Mooloolaba) were selected to represent a diverse range of game-fishing activities, social and demographic characteristics and geographical locations. Social and demographic profiles (Appendix C) show that Bermagui is a small town while Port Stephens and Mooloolaba are highly developed urban areas. Bermagui has less diversity of industries when compared to Port Stephens and Mooloolaba. Accommodation and food services are the biggest employment industries in Bermagui, whereas the retail industry is the biggest employer in Port Stephens and Mooloolaba.

Mooloolaba and Port Stephens are less than 200 km by road to major population centres (Brisbane, and Sydney and Newcastle, respectively). Bermagui is a considerable distance from population centres such as Canberra (250 km), Sydney (400 km) and Melbourne (800 km). Our surveys showed that trailer boats dominated game-fishing activities in Bermagui, whereas most game fishing in Mooloolaba and Port Stephens involved large cruisers.

Bermagui, Port Stephens and Mooloolaba are important game fishing destinations in eastern Australia. The three sites have high levels of game-fishing club membership (Figure 2) and maps of tag-releases indicate that they are adjacent to important game fishing hotspots (e.g. Figure 4). Mooloolaba is well-known for billfish game fishing, especially for sailfish, blue marlin and black marlin. Bermagui and Port Stephens are traditional hotspots for many game fishing targets, including striped marlin, yellowfin tuna, black marlin and blue marlin. Sharks, such as tiger shark and mako sharks, are also a popular target of game fishers off Bermagui and Port Stephens.

The surveys did not cover game-fishing activities directed at southern bluefin tuna. Those activities are widespread across southern and south-eastern Australia, including Bermagui during the winter. Nevertheless, game fishers who responded to our surveys included those who may fish for southern bluefin tuna at other times of the year.

#### Methods

##### Questionnaire

The game fisher questionnaire was designed to collect information from individual game fishers on their expenditure and the non-market values that they attach to game fishing (Appendix F). The survey was not administered to a representative sample of the population of game fishers in eastern Australia, as the resourcing of the project did not allow the development of a sample frame for the population of game fishers. The results of the survey should thus be considered broadly representative of game fishers for the specific periods and sites surveyed by the study. Griffiths et al. (2010c) discusses potential sampling strategies for difficult-to-reach populations, including game fishers.

Part A of the questionnaire gathered information on the costs of the game fisher's current trip (e.g. expenditure on transport, accommodation and fishing gear). It collected the same information on the previous game-fishing trip that the game fisher may have made to the same

site in the past 12 months. Part B collected information about game fisher attitudes and values. The questionnaire also collected information on sought-after species ('targeting') and recent catches of each game-fish species.

The questionnaire was designed to be completed in about 10–15 minutes. It was tested on staff who were recreational anglers and on several game fishers, both in its written form and as a telephone interview.

Questionnaires were customised to the site (e.g. Mooloolaba). There were four colour-coded versions of the questionnaire that were distributed according to whether the game fisher was registered in a current game-fishing tournament and whether they were a visitor to the area (Table 13).

**Table 13 Summary of the four versions of the game fisher questionnaire used in the study**

<b>Version</b>	<b>Target</b>
Tournament—Visitor	Game fishers visiting the area who were registered in a current game-fishing tournament; expenditure during the current trip and the game fisher's most recent non-tournament trip to the same site.
Tournament—Local	Tournament game fishers who would return to their usual residence that day; expenditure during the current trip and the game fisher's most recent non-tournament trip to the same site.
Non-tournament—Visitor	Game fishers visiting the area who were not registered in a game-fishing tournament; expenditure during the current trip and the game fisher's most recent tournament trip to the same site.
Non-tournament—Local	Game fishers who were not registered in a game-fishing tournament and who would return to their residence that day; expenditure during the current trip and the game fisher's most recent tournament trip to the same site.

## **Tournaments**

The surveys covered the Port Stephens Interclub Tournament (March and April 2011), the Bermagui Bluewater Classic, the Canberra Game Fishing Club Annual Yellowfin Tournament (referred to as the 'Bermagui Yellowfin Tournament' in this report) and the Mooloolaba Billfish Bonanza.

The approach to surveying tournament game fishers was based on the method described by Pepperell (1992). With the support of GFAA and relevant state game fishing associations, game fishers were informed of surveys through club and association newsletters, media releases, material included in registration packs and announcements during pre-tournament briefings.

ABARES staff distributed questionnaires to tournament participants at pre-tournament briefings. Skippers who attended the briefing were provided with a survey pack that included background information about the study and a questionnaire to give to each game fisher on their boat. Staff recorded the boat's name, number of participants and one person's contact details (usually the skipper) in tally sheets (Appendix F). During tournaments, staff at access points (boat ramps, marinas and wharves) distributed questionnaires to game fishers who had not received questionnaires through the pre-tournament briefing. Staff did not distribute questionnaires to game fishers who had previously received questionnaires during the tournament or who had completed a questionnaire for a previous game-fishing trip or tournament.

During tournaments, participants were reminded to complete the questionnaire by staff at access points and through tournament radio scheds. Tournament participants were instructed to hand completed questionnaires to staff at the tournament presentation or at access points toward the end of the tournament. Where possible, staff checked completed questionnaires for missing fields and discussed any problems that might have been encountered.

Staff recorded the number of completed questionnaires against each boat's name in the tally sheet. The contact person for boats that did not return any questionnaires was contacted within two-weeks after the tournament to enable a questionnaire to be completed over the telephone or to gather information on reasons for not completing questionnaires. These follow-up interviews were limited to participants who had provided valid contact details (usually one person per boat) and who responded to telephone calls. The potential for recall bias is likely to have increased for these individuals, but could not be corrected for in the analyses.

On the last day of the Port Stephens Interclub and Bermagui Yellowfin tournaments, participants who had not completed their questionnaire were provided with pre-paid envelopes for posting completed questionnaires to ABARES.

### **Non-tournament game fishers**

ABARES staff surveyed non-tournament game fishers on a selection of days during the game-fishing season (Table 14, Table 15 and Table 16). This included tournament days and non-tournament days.

The distribution and retrieval of non-tournament questionnaires was similar to that described for tournament questionnaires. It involved staff approaching game fishers at access points from dawn, when the first boats departed, and when they returned throughout the day until dusk or later. Staff identified game fishers by asking anglers whether they were involved in game fishing or fishing for game-fish species and by observing the boat's size and type of fishing equipment. Game fishers were handed questionnaires when embarking and their details recorded in tally sheets.

Staff requested completed questionnaires from non-tournament game fishers as they returned to the access point at the end of the fishing trip. Non-responding game fishers were contacted within two weeks after the tournament to enable completion over the telephone or to gather information on reasons for not completing questionnaires. Game fishers were provided with pre-paid envelopes towards the end of surveys in Port Stephens (April) and Bermagui (May).

### **Non-game fishing anglers**

Staff used tally sheets (Appendix F) to record data on whether boats were game fishing (tournament or non-tournament) or were involved in other recreational activities and, where appropriate, reasons for not accepting questionnaires.



## Response rates

Tournament game fishers returned 361 (28 per cent) of the 1276 questionnaires distributed to tournament game fishers. The return rate was higher at small tournaments (e.g. Mooloolaba Billfish Bonanza), perhaps because of high ratios of staff to game fishers. Game fishers participating in the Port Stephens Interclub Tournament returned the largest proportion of questionnaires by mail (21 per cent). The delay between the activity and reporting might have affected the reliability of respondents reporting specific details (e.g. expenditure) about the game-fishing trip.

Non-tournament game fishers returned 62 (29 per cent) of the 221 questionnaires distributed to non-tournament game fishers (Table 17). This return rate was almost identical to the return rate for tournament questionnaires. This is surprising, given the greater opportunities for staff to promote the survey with tournament participants and the strong support indicated by tournament organisers and game fishing associations. The result might be explained by participants on large cruisers, which dominated the Port Stephens tournament, being less likely to return questionnaires because of an assumption that their questionnaire would duplicate information already provided by the many other participants on their boat.

**Table 14 Summary of recreational, non-tournament and tournament boats surveyed at access points**

Site	Tournament Information			Boat Days			Total
	Start date	Finish date	Total days monitored	Non-game fishing	Non-tournament	Tournament <sup>a</sup>	
Bermagui (n-t)	11/12/2010	11/12/2010	1	20	5	0	25
Bermagui (t)	22/01/2011	25/01/2011	4	90	33	212	335
Bermagui (n-t)	12/05/2011	13/05/2011	2	4	4	0	8
Bermagui (t)	15/05/2011	16/05/2011	2	18	14	252	284
Port Stephens (t)	26/02/2011	6/03/2011	3	134	45	516	695
Port Stephens (n-t)	18/04/2011	20/04/2011	3	85	9	0	94
Mooloolaba (n-t)	21/04/2011	22/04/2011	2	351	12	0	363
Mooloolaba (t)	23/04/2011	24/04/2011	2	127	9	28	164
<b>Total</b>			17	829	131	1008	1968

Note: All categories include charter boats. n-t = survey outside of tournament; t = survey during tournament

<sup>a</sup> We assumed that all tournament boats fished on all tournament days, so this value is the total number of tournament boats multiplied by the number of tournament days.

Table 15 Summary of tournament participants and boats surveyed by the study, including the number of questionnaires distributed and returned

Tournament information						Participants (no.)						Questionnaires		
Tournament name	Survey site	Start date	Finish date	Tournament days	Boats (no.)	Male	Female	Junior female	Junior male	Small-fry	Total	Distributed (no.)	Returned (no.)	Returned (%)
Blue Water Classic	Bermagui	22/01/2011	25/01/2011	4	53	155	12	0	18	4	189	151	97	64%
Annual Yellowfin	Bermagui	15/05/2011	16/05/2011	2	126	378	24	2	18	3	425	330	69	21%
Interclub	Port Stephens	26/02/2011	6/03/2011	3	172	653	60	*	*30	*	743	747	164	22%
Billfish Bonanza	Mooloolaba	23/04/2011	24/04/2011	2	14	41	6	1	0	0	48	48	31	65%
<b>Total</b>				11	365	1227	102	*3	*66	*7	1405	1276	361	28%

\* The Junior male participants column for the Interclub and Billfish Bonanza includes all Junior and Small-fry participants, of which about 28 were male juniors.

Data source: The breakdown of participants was obtained from the organisers of each tournament; numbers of questionnaires are from tally sheets completed by ABARES staff.

Table 16 Summary of recreational anglers, non-tournament game fishers and tournament participants intercepted at access points

Tournament information				Fisher days				Questionnaires by non-tournament game fishers		
Survey site	Start date	Finish date	Total days monitored	Non-game fishing angler	Non-tournament game fisher	Tournament game fisher	Total	No. distributed	No. returned	% returned
Bermagui (n-t)	11/12/2010	11/12/2010	1	28	18	0	46	7	4	57%
Bermagui (t)	22/01/2011	25/01/2011	4	232	108	756	1096	92	29	32%
Bermagui (n-t)	12/05/2011	13/05/2011	2	9	11	0	20	11	0	0%
Bermagui (t)	15/05/2011	16/05/2011	2	38	34	850	922	30	7	23%
Port Stephens (t)	26/02/2011	6/03/2011	3	463	144	2229	2836	32	8	25%
Port Stephens (n-t)	18/04/2011	20/04/2011	3	218	21	0	239	21	5	24%
Mooloolaba (n-t)	21/04/2011	22/04/2011	2	781	44	0	44	21	7	33%
Mooloolaba (t)	23/04/2011	24/04/2011	2	320	16	96	1231	7	2	29%
<b>Total</b>			17	2089	396	3931	5984	221	62	28%

Note: n-t = survey outside of tournament; t = survey during tournament; Qs = questionnaires

We assumed that all tournament participants fished on all tournament days, so this value is the total number of participants multiplied by total days. All categories include charter boats

Although we tend to treat tournament and non-tournament game fishers as separate groups, in reality they are not independent. About one-third of non-tournament respondents were members of a game-fishing club and a small proportion of respondents who completed a non-tournament questionnaire reported other trips involving game-fishing tournaments (Table 17). Tournament game fishers are likely to undertake trips at other times that are not for game-fishing tournaments. About half of the game-fishing trips reported by tournament respondents were for game-fishing tournaments and the other half of trips were not associated with tournaments.

**Table 17 The percentage of game-fishing trips in the past 12 months that were for game-fishing tournaments**

<b>Site</b>	<b>Boat owners (%)</b>	<b>Non-boat owners (%)</b>
Tournament respondents		
Port Stephens	57	54
Bermagui	50	47
Mooloolaba	35	33
Non-tournament respondents		
Port Stephens	6	9
Bermagui	8	15
Mooloolaba	9	30

Like other respondent-completed surveys, an avidity bias (the disproportionate representation of avid anglers) is likely in our data because of disproportionately high return rates from supportive and enthusiastic game fishers. During surveys, 1.4 per cent of tournament and 8.9 per cent of non-tournament game-fishing boats indicated that they would not complete the questionnaire. Common explanations included: 'I do not do surveys', 'I do not trust the government' and 'whenever we provide information, governments use it against us to establish marine parks in our favourite fishing spots'. There would be an unknown proportion of game fishers who shared those sentiments, but chose not to express them to staff while accepting questionnaires. These might be reflected in the large number of incorrect phone numbers and unanswered calls (Table 18).

Table 18 provides insights into some of the reasons for not completing questionnaires that staff recorded during telephone follow-up after each survey. The results are dominated by incorrect phone numbers and calls with no response. About 4 per cent of all game-fishing boats did not provide staff with contact details for recording in tally sheets. There are likely to be various other reasons for not returning completed questionnaires, including 'not enough time—I'll return it tomorrow (or try to post it)', inadequate English skills, 'rarely go game fishing or new to game fishing and therefore not qualified to complete the questionnaire', 'duplication of information already provided by other participants on the same boat' and concerns over confidentiality.

**Table 18 Summary of telephone interviews with game fishers who did not return questionnaires (tournament and non-tournament game fishers combined)**

<b>Explanation</b>	<b>Blue Water Classic</b>	<b>Interclub</b>	<b>Billfish Bonanza</b>
Completed questionnaire over phone	2	3	3
Previously completed (questionnaire located)	4	3	0
Claim to have completed (questionnaire not located)	1	1	0
Uncooperative	1	0	1
Incorrect phone number	4	2	1
Did not answer phone calls or respond to messages	10	9	4
<b>Total respondents</b>	<b>22</b>	<b>18</b>	<b>9</b>

The disproportionately high level of boat owners returning completed questionnaires may also raise questions regarding the representativeness of the game-fisher survey data. Forty per cent of the 423 game fishers who returned questionnaires had a majority share in the boat that they were on, which we refer to as 'boat owners'. Tally sheets indicate an average of 3.64 game fishers per game-fishing boat. In contrast to the 40 per cent response rate for owners, the expected response rate is one owner per 3.64 game fishers or 27 per cent of game fishers if the proportion of owners returning questionnaires was representative. We used estimates of the average number of tournament and non-tournament game fishers per boat from each site to correct for boat-owner bias in our estimates of expenditure. Note that this adjustment assumes only one owner per boat, so that respondents with less than a 50 per cent share are treated as non-owners.

A total of 54 game-fishing tournaments were held during 2011 (Table 19). Apart from the Billfish Bonanza, the tournaments that we surveyed tended to be larger than most tournaments in 2011. The three tournaments represented about 20 per cent of all registered boats and participants.

**Table 19 Comparison of tournaments surveyed by the study and all game-fishing tournaments held in eastern Australia, 2011**

<b>Component</b>	<b>GFAA tournaments</b>	<b>Game fisher surveys</b>
Number of tournaments	54	4
Number of boats	1829	365
Number of participants	6728	1405
Average participants per tournament	125	351

Data source: GFAA data provided by Grahame Williams (pers. comm., 29 November 2011)

The following issues were raised by respondents to the game-fisher survey:

- Some respondents felt the survey was too long and believed a more concise survey would result in better quality responses from game fishers.
- One of the respondents felt the definition of 'trip' was ambiguous. For example, there was confusion as to whether one trip constituted the entire time spent at one game-fishing site (e.g. one week in Bermagui) or whether one trip was each time a respondent left the marina over the time at one site (e.g. seven trips during a one-week stay in Bermagui).

## Catches and targeting practices of game fishers

### Background

This section evaluates game-fisher survey results on the species that respondents targeted, the success of targeting and differences in targeting between sites and among tournament and non-tournament respondents.

### Methods

The questionnaire collected information on catches and targeting during the current game-fishing trip and, separately, during the previous 12 months (Appendix F). It defined 'caught' as game fish that were tagged, released, landed or weighed. The questionnaire listed 18 common game-fish species or species groups and respondents were also able to report game-fish species that were not listed.

Analyses involved summing reported catches and counting nominations of target species. In this evaluation, each nomination of a target species is treated independently; there is no consideration of how many species each respondent nominated. The responses were combined, so the count of yellowfin tuna for example, included responses from game fishers who nominated only one species (yellowfin tuna) as a target and responses from game fishers who nominated yellowfin tuna along with many other species as targets.

We present results for tournament respondents for each survey and also non-tournament respondents for the Bermagui Bluewater Classic and Port Stephens Interclub Tournament, where adequate numbers of questionnaires were obtained. Our evaluation of targeting concentrates on data from the current trip because it was almost identical to targeting over the previous 12 months.

### Results

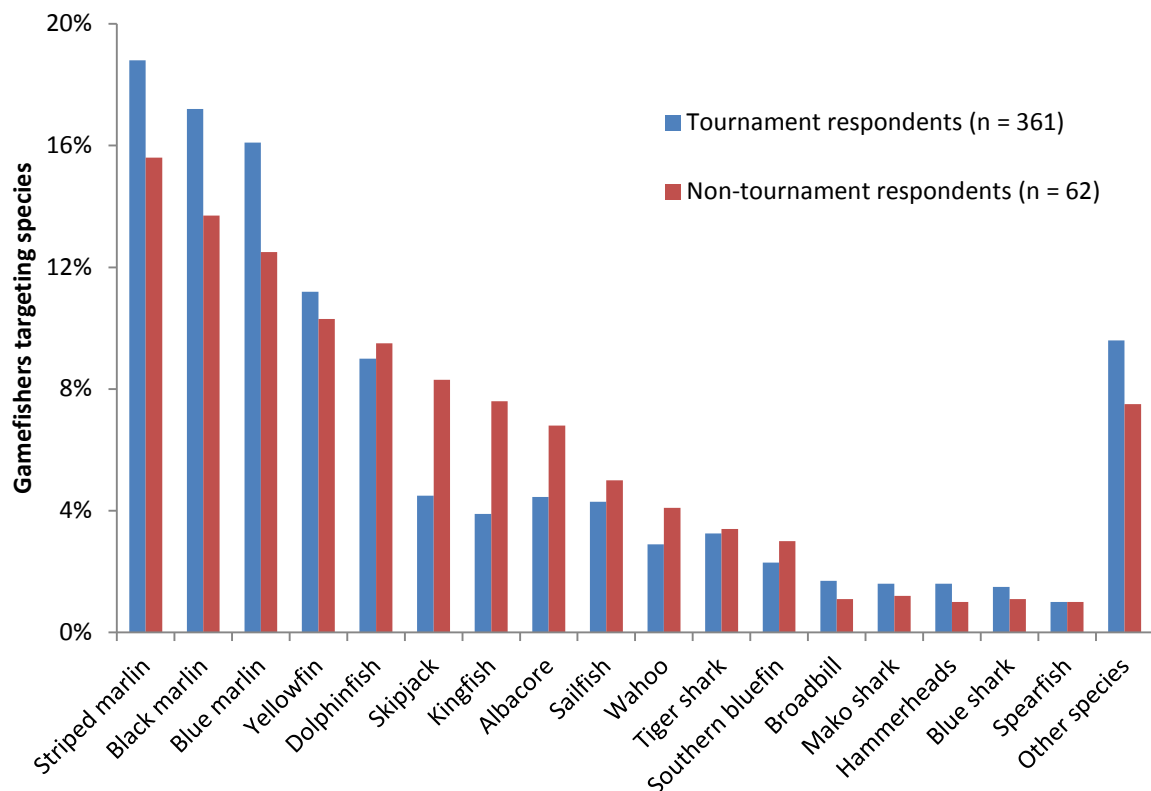
The section of the questionnaire on catches and targeting for the current fishing trip was completed by 370 respondents. The average catch of tournament visitors in the current fishing trip (4.01 game fish) was highly variable and not significantly different to that of tournament locals (2.60 game fish).

Tournament and non-tournament game fishers reported a total catch of 1997 game fish across the surveys; 52 per cent of these were caught during the Port Stephens Interclub Tournament (the largest event surveyed, with the largest number of questionnaires returned). The Port Stephens Interclub Tournament accounted for most of the reported catches of skipjack tuna (45 per cent), black marlin (75 per cent), striped marlin (58 per cent) and dolphinfish (81 per cent). Large catches of skipjack tuna and striped marlin were also reported by respondents involved in the Bermagui Blue Water Classic. The Bermagui Yellowfin Tournament contributed a large proportion (30 per cent) of the skipjack tuna caught. Respondents participating in the Mooloolaba Billfish Bonanza reported the lowest total catch across all sites (7 per cent of the total), probably because of the small number of participants, poor weather and, perhaps, low game fish abundance or availability during this event.

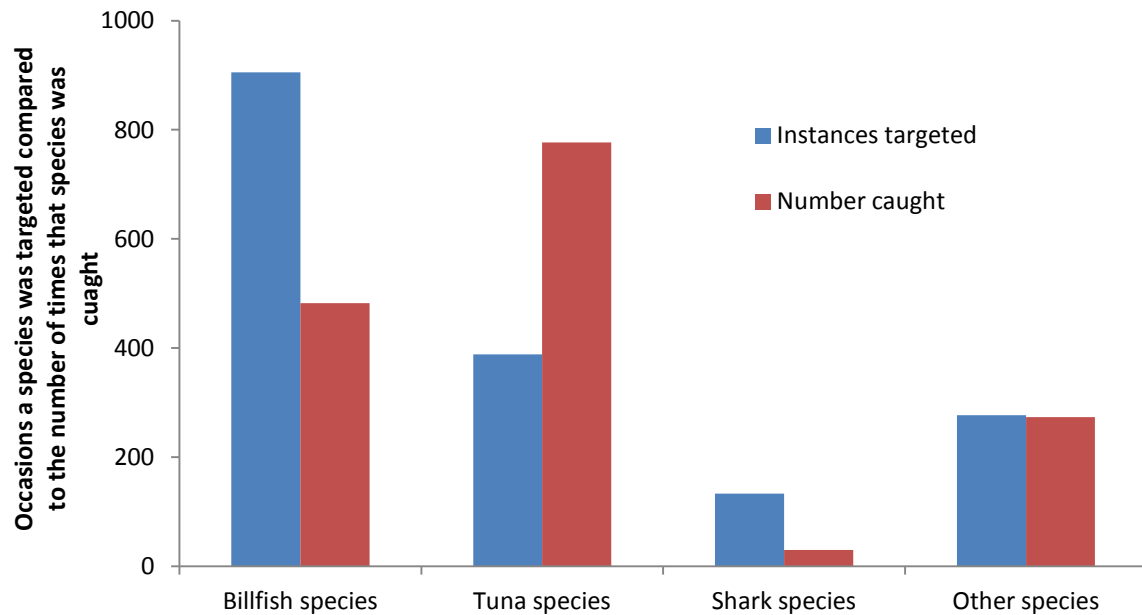
Respondents nominated a total of 31 game-fish species as a target during their current fishing trip (Figure 11); on average respondents targeted 4.3 different species on average. The overall success rate of targeting was 26 per cent (i.e. on average, 26 per cent of respondents reported catching a species that they nominated as a target). For non-tournament respondents, 21 per cent reported catching the species that they had targeted, whereas tournament respondents were 28 per cent successful.

While game fishers aspired to catch a billfish, many did not catch one (Figure 12). Conversely, many respondents caught tuna, but did not target tuna. This may be due to frequent incidental catches of skipjack. Tournament game fishers appeared to be more successful at catching billfish and tuna than were non-tournament game fishers; Tournament game fishers had a success rate of 57 per cent when targeting billfish and 67 per cent when targeting tuna. Non-tournament game fishers had a 28 per cent success rate when targeting billfish and were 47 per cent successful when targeting tuna.

**Figure 11 Targeted species nominated by tournament and non-tournament game fishers during their current trip (all survey sites)**





**Figure 12** Counts of target species compared with the reported catch

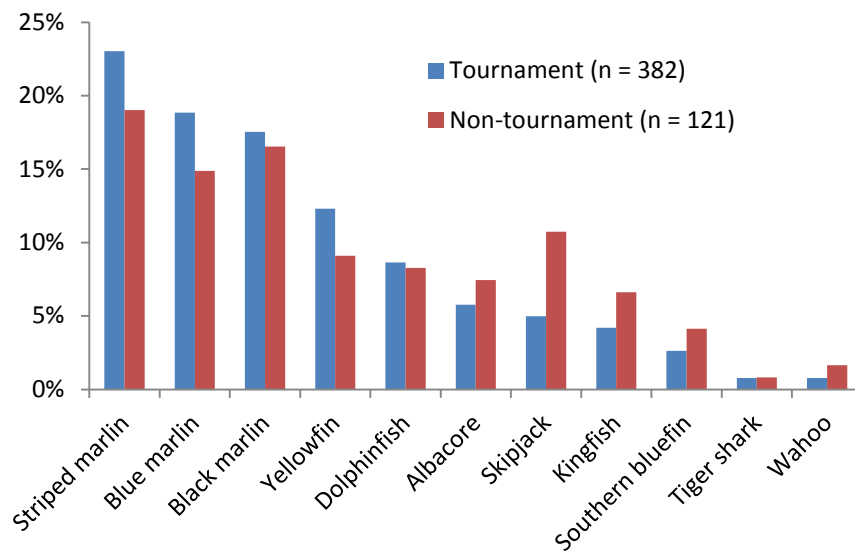
The ranking of target species did not vary greatly between survey sites (Figure 13, Figure 14, Figure 15 and Figure 16). Billfish were the most targeted species group across all survey sites. Fifty-four per cent of respondents nominated at least one billfish species as the target of their current trip. Among billfish, striped marlin was most frequently targeted (31 per cent of respondents who nominated a billfish). Tournament respondents at the Bermagui Bluewater Classic and Port Stephens Interclub Tournament were more inclined to target billfish than were non-tournament respondents. This likely relates to historically high abundances of billfish in these areas, as well as the high point scores awarded to billfish at these tournaments (Figure 13 and Figure 14).

Targeting of tuna was also prevalent across the four sites. Tuna were the second most sought-after species group (21 per cent of respondents indicated that they targeted at least one tuna species). This was evident during the Bermagui Yellowfin Tournament where yellowfin tuna was the most targeted species (Figure 16). This likely relates to the high points awarded for catches of yellowfin tuna during this tournament. Unlike marlin, tuna were targeted more by non-tournament respondents compared to tournament respondents, particularly during the Port Stephens Interclub Tournament and Bermagui Bluewater Classic, where albacore and skipjack tuna were heavily targeted (Figure 13 and Figure 14). Yellowfin tuna was also targeted by non-tournament respondents during the Port Stephens Interclub Tournament (Figure 14). It may be that non-tournament game fishers consider tuna to be easier to catch, or that they require less complex equipment to catch than billfish. This may lead non-tournament game fishers to preferentially select tuna as a target over billfish.

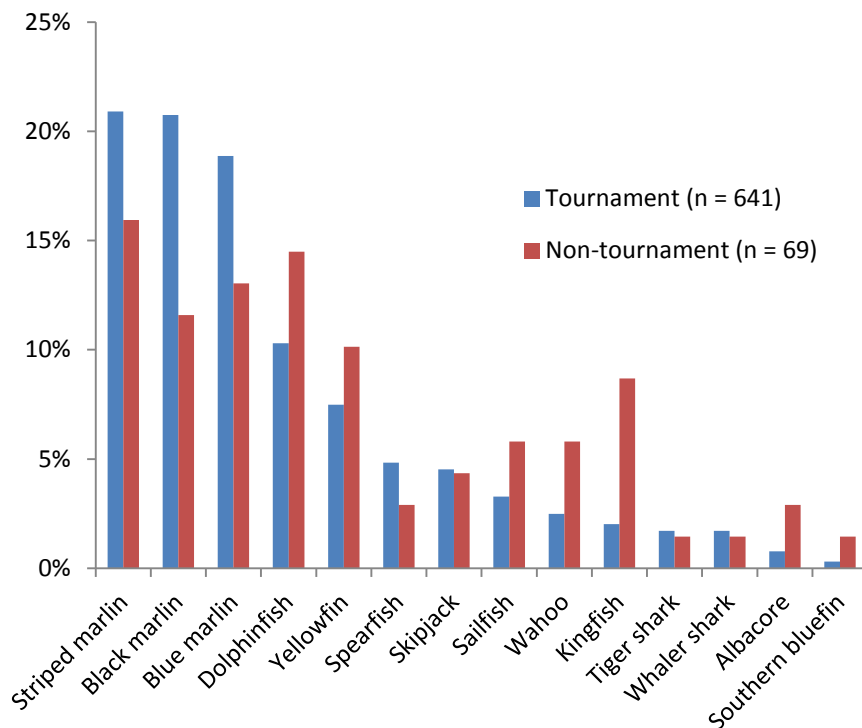
Other species that were targeted by game fishers included kingfish, dolphinfish and wahoo. Dolphinfish were mainly targeted during the Bermagui Bluewater Classic, Port Stephens Interclub Tournament and Mooloolaba Billfish Bonanza (Figure 13, Figure 14 and Figure 15). Wahoo were the third most targeted species during the Mooloolaba Billfish Bonanza (Figure 15).

Sharks were rarely targeted during game-fishing trips. In total, seven shark species were targeted across all sites with 31 catches reported for the current trip. It was mostly tournament respondents who targeted sharks (only one non-tournament respondent nominated sharks as a target) and this is reflected in the reported shark catches (only one non-tournament respondent reported catching a shark). Mako sharks were the most frequently caught species (17 catches reported). Respondents also reported catching 6 tiger and 6 hammerhead sharks.

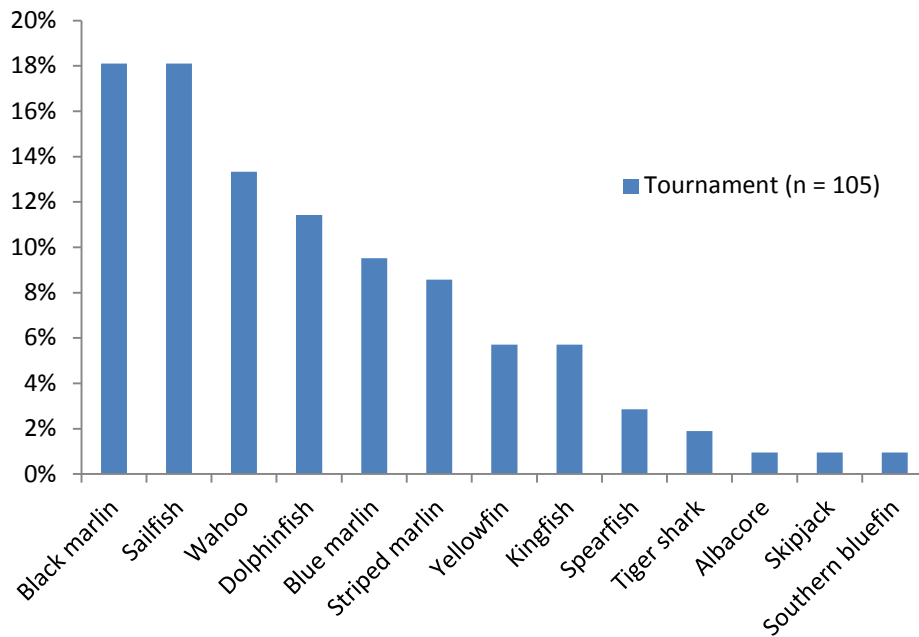
**Figure 13 Comparison of target species nominated by tournament and non-tournament game fishers for their current trip (Bermagui Bluewater Classic)**



**Figure 14 Comparison of target species nominated by tournament and non-tournament game fishers for their current trip (Port Stephens Interclub Tournament)**

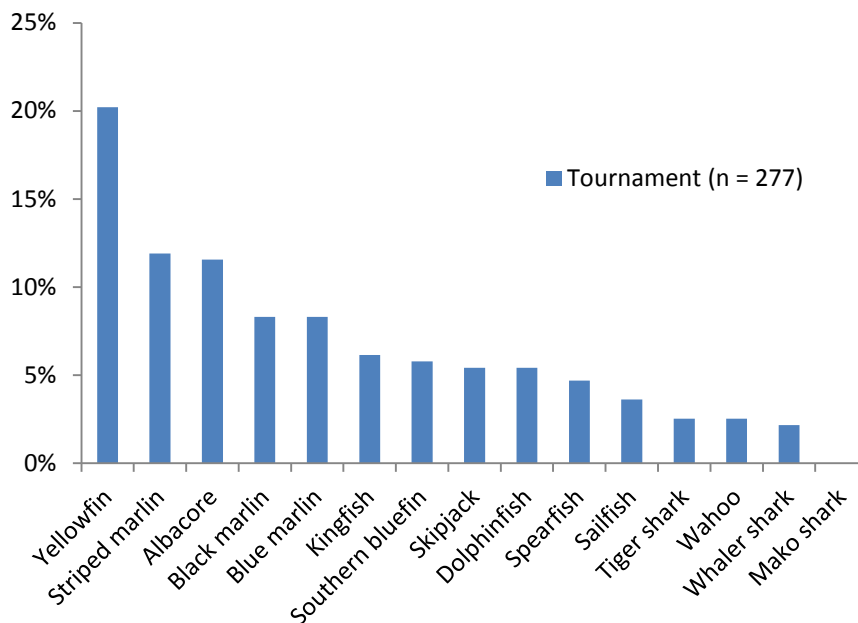


**Figure 15 Target species nominated by tournament game fishers for their current trip (Mooloolaba Billfish Bonanza)**



Note: Non-tournament respondents were not included in the Mooloolaba analysis as a representative sample was not collected.

**Figure 16 Target species nominated by tournament game fishers for their current trip (Bermagui Yellowfin Tournament)**



Note: Non-tournament respondents were not included in the Bermagui Yellowfin Tournament analysis as a representative sample was not collected.

## Social values and demographic characteristics of game fishers

### Background

This section summarises demographic characteristics of respondents to the game-fisher survey at the three sites. It presents findings on the social values that game fishers place on the activity of game fishing. The aim is to provide a greater understanding of the range of non-monetary values that game fishers attribute to game-fishing activities, beyond actual expenditure and net economic benefit derived from the activity.

People participate in game fishing for a variety of reasons. Many of the reasons are intangible, such as for enjoyment, relaxation, as a social pastime and a lifestyle. The reasons for game fishing were initially identified through a brief review of literature on social values and values relating to game fishing and recreational fishing. Key studies include the social assessment of the Marine Scalefish Fishery in South Australia (Schirmer & Pickworth 2005) and a survey of Queensland recreational fishers (Sutton 2006). This review informed the development of survey questions to investigate the social values associated with game fishing in this study.

### Methods

Game fishers were asked directly about the values they place on game fishing through the eight-page questionnaire (Appendix F). The survey development process involved:

- 1) sample frame development with assistance from the project advisory committee and NSW DPI
- 2) development of survey questions and instrument in consultation with the project team and advisory committee, building on the Marine Scalefish Fishery (Schirmer & Pickworth 2005) and recreational fishing survey (Sutton 2006)
- 3) testing the survey instrument with participants within the scope of the sample frame.

Questions were based on four themes that explored values for game fishing: why do you go game fishing, what makes a game-fishing trip successful, perceived personal benefits derived from game fishing and ecocentric values of game fishers. The questions relating to these themes investigated the following values:

- relationship values—contribution of game-fishing activities to the development of social relationships (e.g. between individuals, within families)
- ‘centrality to life’ values—the extent to which a game fisher’s lifestyle and social networks are connected to game fishing (Sutton 2006)
- ecocentric values—how much importance is placed on protecting the environment and on stewardship of the resource
- physical and mental wellbeing values—physical and psychological benefits derived from game-fishing activities
- challenge and competitiveness values—the extent to which game fishing provides a challenge and enables socially competitive behaviour
- consumption values—the level of importance of consuming the fish caught.

Survey results for these questions are presented in the following sections for all survey participants, both tournament and non-tournament, across the three survey sites (Bermagui,

Port Stephens and Mooloolaba). In considering survey results, it is important to keep in mind that tournament and non-tournament game fishers are unlikely to be distinct groups. We labelled respondents as 'tournament game fishers' if they were competing in a tournament during their current fishing trip. At other times of the year, tournament game fishers might go game fishing outside tournaments (as well as compete in other tournaments). Similarly, we labelled respondents as 'non-tournament game fishers' if they were not competing in a tournament during their current fishing trip. At other times of the year, non-tournament game fishers might be involved in game-fishing tournaments.

## Results

### Demographic characteristics of survey respondents

The socio-demographic characteristics of respondents were very similar among survey sites (Table 20). For categorical variables, like age, weighted averages were estimated from the frequency of responses for the mid-point of each category. The average age of respondents was about 44 years and the education level was Year 12. Most respondents were male and most travelled by four-wheel drive vehicle. Their average annual household income was relatively high (over \$100 000 before tax). Most belonged to a game-fishing club, however this may have been because most surveys were during game-fishing tournaments.



A cruiser taking part in a Bermagui game-fishing tournament (Ward, ABARES)

Table 20 Demographic characteristics of tournament and non-tournament respondents

Characteristic	Bermagui		Port Stephens		Mooloolaba	
	Tournament	Non-tournament	Tournament	Non-tournament	Tournament	Non-tournament
Number of respondents	158	35	149	12	32	8
Gender (male)	91%	100%	94%	100%	84%	88%
Average age	44	43	43	43	44	50
Average years of education	12	12	12	13	12	13
Self-employed	36%	34%	52%	58%	28%	25%
Average household income (before tax)	\$104 000	\$94 000	\$126 000	\$104 000	\$108 000	\$116 000
Club member	85%	34%	96%	33%	91%	50%
Game fishing was main reason for travel to this site	97%	86%	96%	83%	100%	88%
Came with friends	55%	43%	49%	67%	31%	75%
Came with family	35%	54%	31%	50%	47%	75%

Note: These statistics were derived from the subset of game fisher survey data used for travel-cost method analyses.

The demographic characteristics of respondents are quite different to the characteristics of residents at those game-fishing sites (cf. Table 1 and Table 20). For example, respondents tended to be younger and have higher incomes compared to residents.

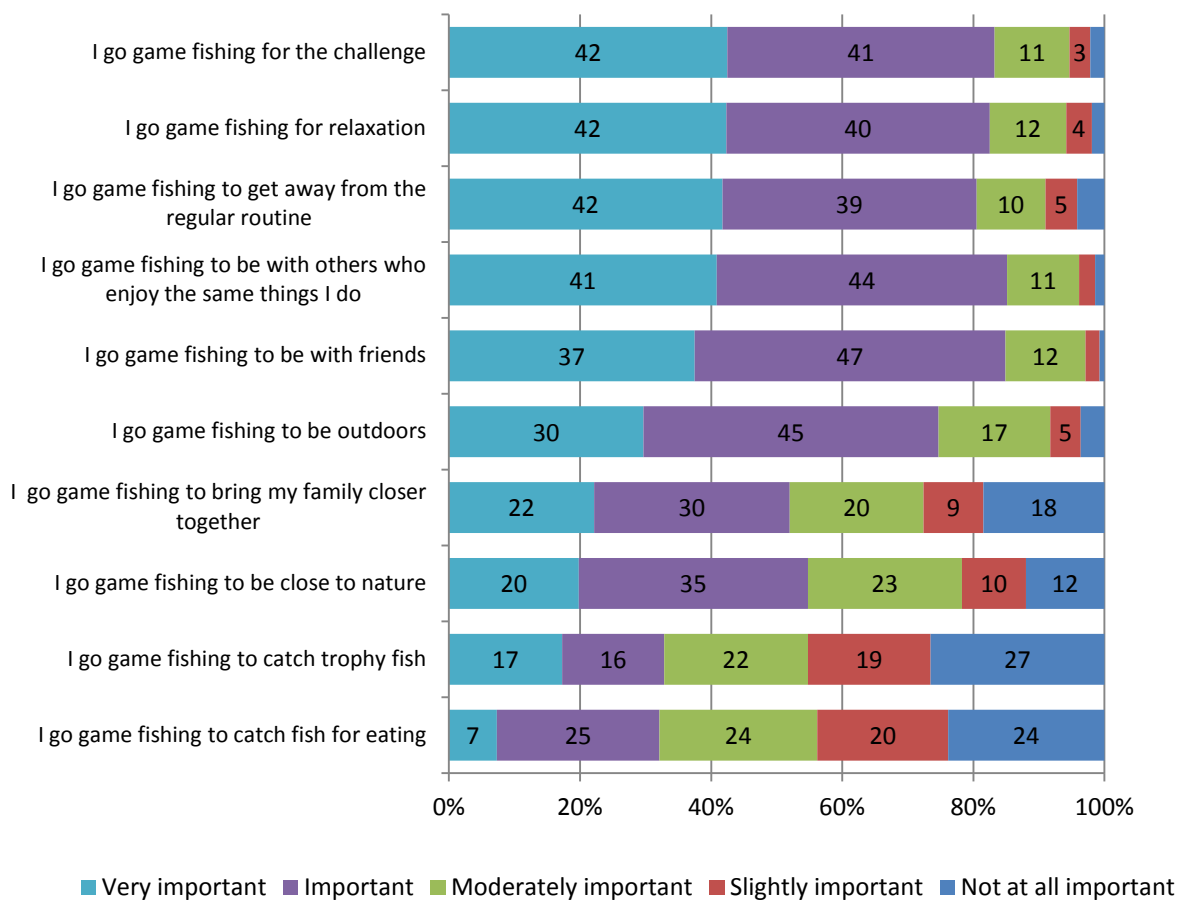
### Why do game fishers go game fishing?

The reasons game fishers go game fishing is a key question in understanding the value that they place on the activity. The results (Figure 17) indicate that respondents highly value:

- being able to spend time with other game fishers (85 per cent of respondents indicated that this was important or very important)
- the challenge presented by game fishing (83 per cent indicated this was important or very important)
- relaxation (82 per cent indicated this was important or very important)
- being able to get away from their regular routine (82 per cent indicated this was important or very important).

Most respondents (more than 80 per cent) indicated that the challenge, relaxation and opportunity to be with friends were important or very important reasons for game fishing. Respondents placed the least value on catching 'trophy' fish and retaining fish for consumption.

Figure 17 Why game fishers go game fishing

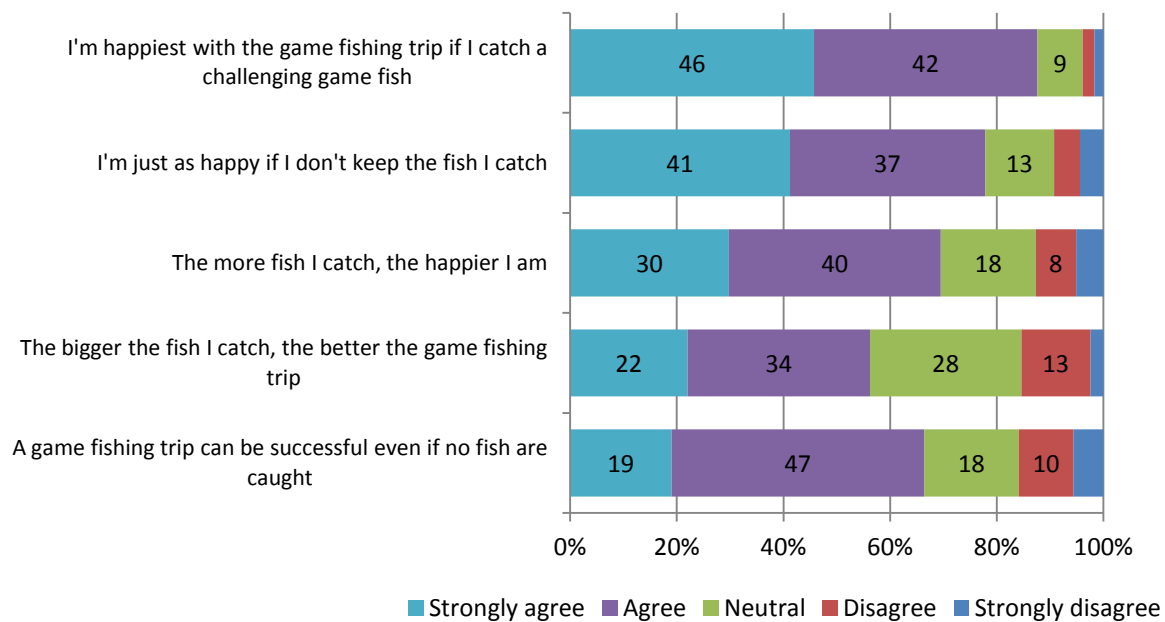




### Indicators of a successful game-fishing trip

Respondents were asked to indicate how strongly they agreed or disagreed with five statements representing indicators of a successful game-fishing trip. Catching (retaining or releasing) a challenging fish was rated highly as a success indicator, as was catching a large number of fish and catching a 'big' fish (Figure 18). Conversely, 66 per cent of respondents agreed or strongly agreed that a game-fishing trip could be successful even if no fish were caught. This indicates that respondents value the activity for a wider variety of reasons beyond catching fish. Many respondents also indicated that keeping the fish they caught was not a factor in the trip being considered successful.

**Figure 18 What makes a successful game-fishing trip**



### Personal benefits of game fishing

Respondents indicated that they were motivated to go game fishing because of the personal benefits they gained from the activity. Personal benefits such as developing friendships and spending time with other game fishers ranked highly.

#### *Mental health and wellbeing*

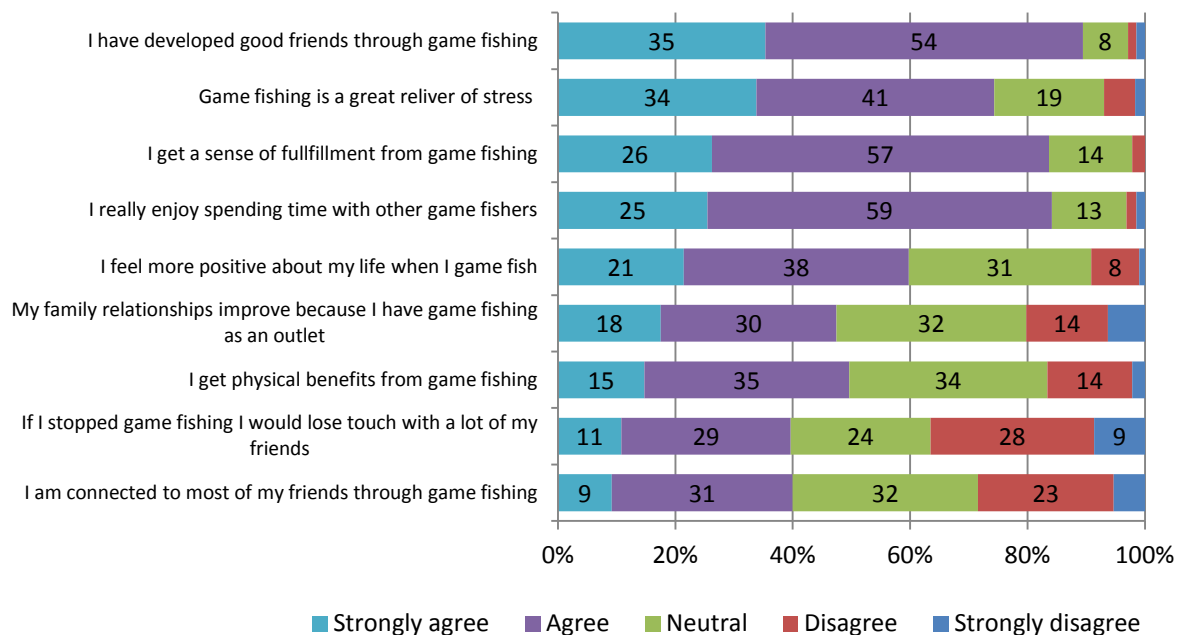
Respondents believe that game fishing provides them with positive mental health and wellbeing. The majority (74 per cent) agreed or strongly agreed that stress relief was an important personal benefit (Figure 19). Similarly, nearly 60 per cent of respondents agreed or strongly agreed that they feel better about their lives when they engaged in game fishing. About half the respondents indicated that they get physical benefits from game fishing, such as strength and physical fitness.

#### *Personal fulfilment and friendships*

Game fishing also provides important opportunities for enjoyment and developing good personal relationships. More than 80 per cent of respondents agreed or strongly agreed that game fishing gave them a sense of fulfilment and an opportunity to develop good friendships

(Figure 19). In terms of centrality to life, 40 per cent of respondents indicated that most of their friends were in some way connected to game fishing and that that they would lose touch with many friends if they ceased game fishing.

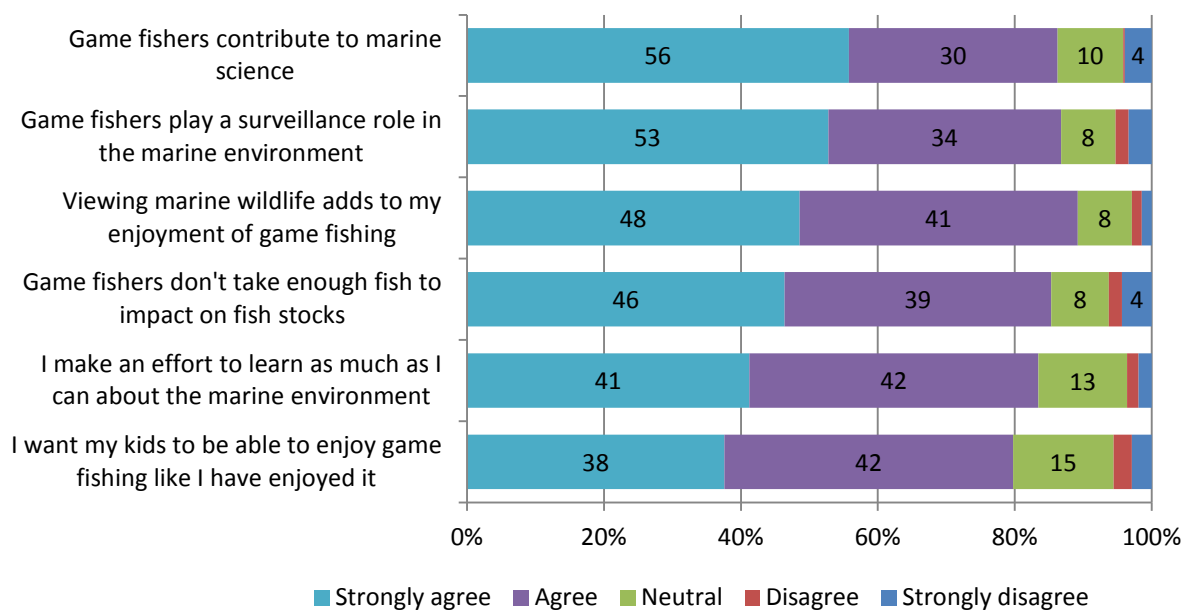
**Figure 19 Personal benefits**



### *Ecocentric values of game fishers*

Most respondents indicated that viewing marine wildlife enhanced their enjoyment of game fishing (Figure 20). The majority felt that they provided surveillance and contributed to marine science. Eighty-five per cent of respondents felt that game fishing does not impact on fish stocks.

**Figure 20 Ecocentric and stewardship values**



### **Comparison of tournament and non-tournament respondents**

The characteristics of game fishers who participate in tournaments (e.g. social values, income, target species, trip length and expenditure) were expected to differ to those of game fishers who are not involved in organised events. In this study, tournament respondents were defined as those who participated in the tournament on the day that the survey was administered. The number of non-tournament respondents surveyed was relatively low in Mooloolaba and Port Stephens. Therefore this comparison was restricted to Bermagui tournament (N = 162) and non-tournament (N = 41) respondents.

In Bermagui, tournament and non-tournament respondents had a similar pattern of responses on most social values. As expected, tournament respondents placed a higher value on the challenge of catching of a record fish. Other differences between tournament and non-tournament respondents are difficult to interpret and included the value placed on being outdoors, being with friends and relaxation. It is noteworthy that it was difficult to make a clear distinction between the social values of tournament and non-tournament game fishers because a proportion of each group may participate in organised game-fishing activities or game fish outside of tournaments at other times of the year.

### **Comparison of demographic characteristics and values among regional centres**

#### *Characteristics of game fishers—regional comparison*

Game fishing occurs from more than 16 regional centres along the eastern Australian seaboard, with each centre having unique physical, social and economic characteristics (Appendix F). We compared the characteristics and values of game fishers surveyed at each site to determine whether those sites also attract different types of game fishers. This informs the design of future surveys and provides insights into whether the results from the three surveyed sites can be extrapolated to other regional centres.

Across the three survey sites, a large proportion of respondents (35–40 per cent) were aged between 30 and 44 years old. Males dominated the respondents at all survey sites, with the proportion of females in Mooloolaba (17 per cent) slightly higher than the other sites (Table 20). A low percentage of respondents in each region were younger than 30 or older than 60. Mooloolaba and Bermagui had higher proportions of respondents representing older age groups (>60 years) than Port Stephens (Figure 21).

A large proportion of respondents across all survey sites achieved a diploma or certificate as their highest level of education, but more respondents from Port Stephens held a tertiary degree compared with the other survey sites (Figure 22). Most respondents were employed. In Port Stephens, a higher proportion of respondents were self-employed (Figure 23).

Game fishers who responded in Mooloolaba and Port Stephens tended to have a greater household income than Bermagui respondents. Nearly one-quarter of respondents in Port Stephens had a household income exceeding \$180 000 (Figure 24).

The survey was biased towards game-fishing tournaments. Consequently our results show high proportions of game-fishing club membership (Figure 25). A greater proportion of respondents go game fishing alone in Mooloolaba than those in the other sites, while more respondents tend to go game fishing with family and friends in Bermagui than at other sites (Figure 26).

Figure 21 Age—regional comparison

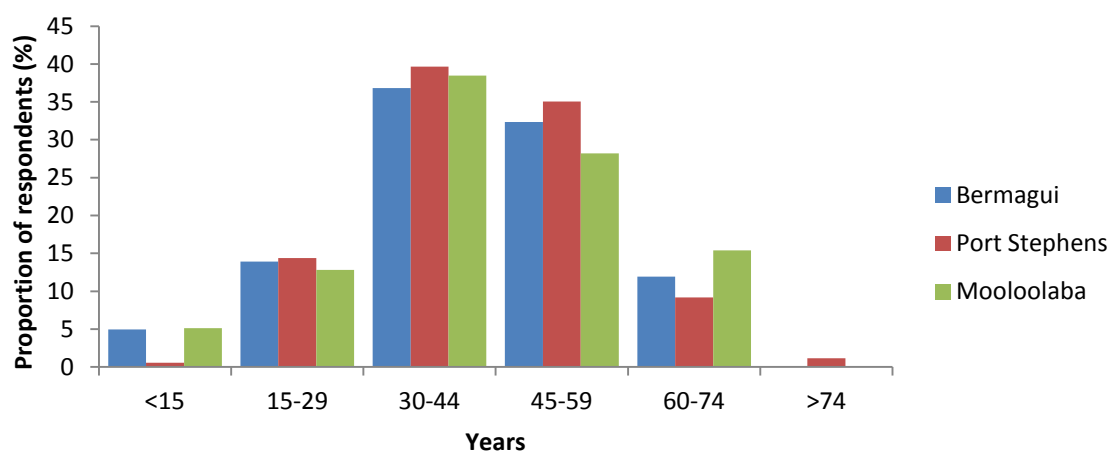


Figure 22 Highest level of education reached—regional comparison

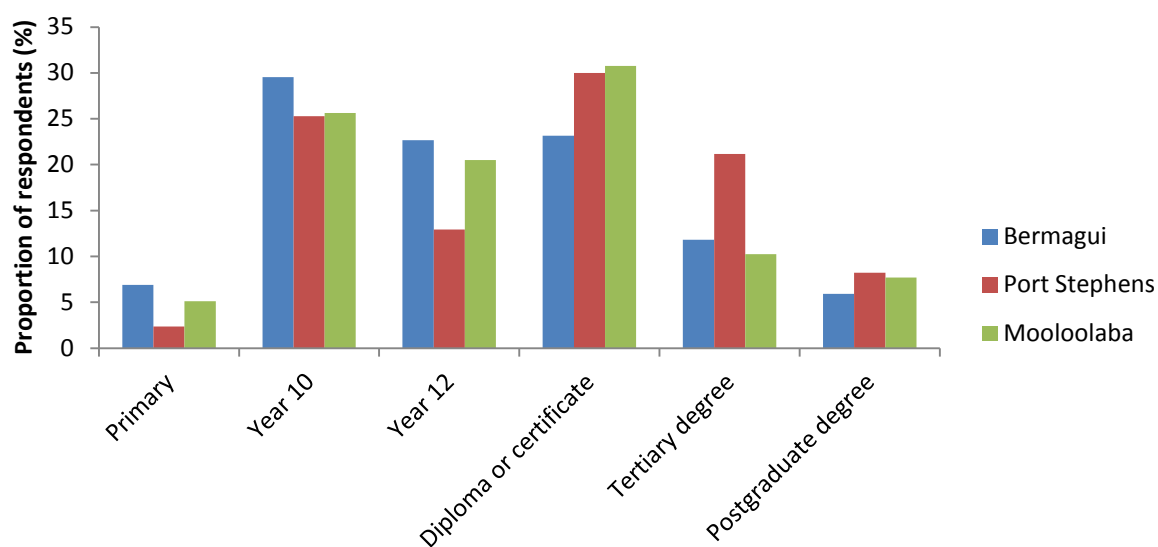
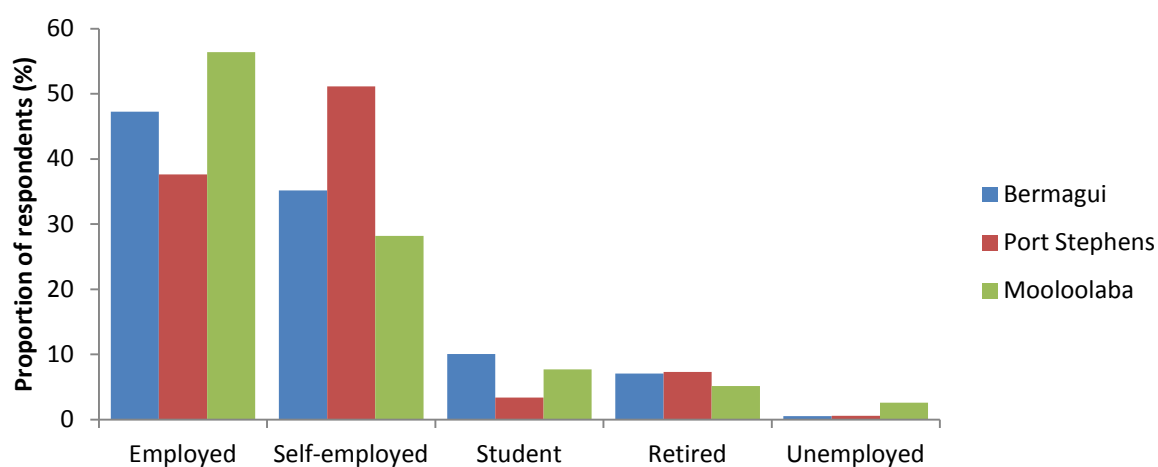
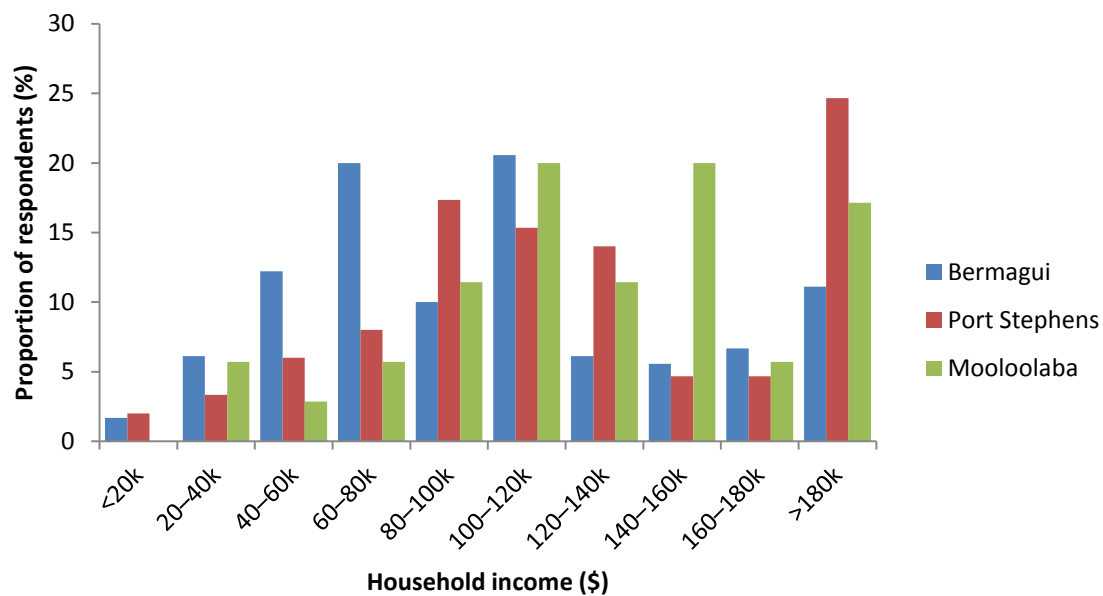
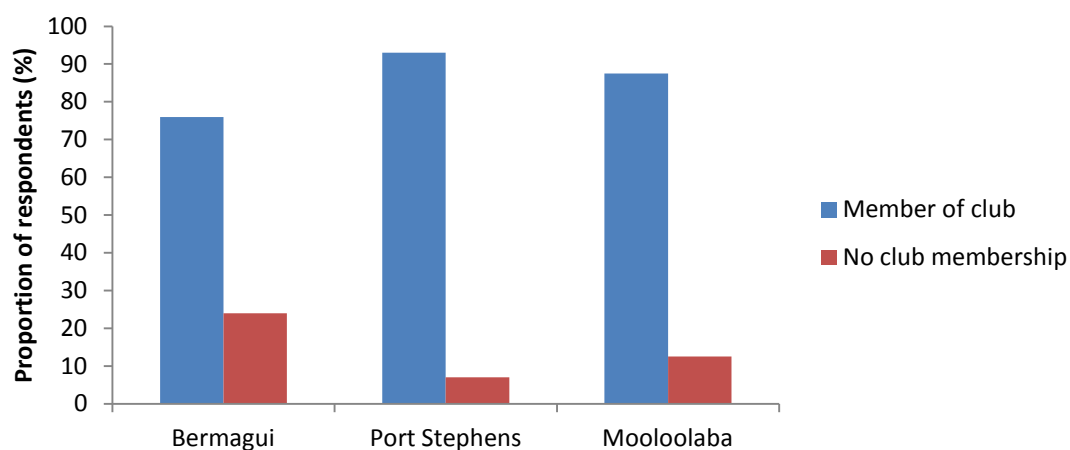
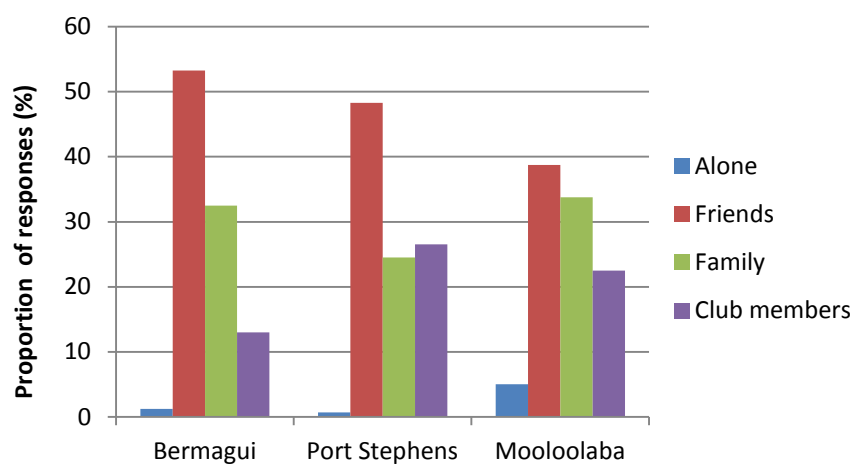


Figure 23 Occupation status—regional comparison



**Figure 24 Pre-tax household income—regional comparison****Figure 25 Game-fishing club membership—regional comparison****Figure 26 'I go fishing with ...'—regional comparison**

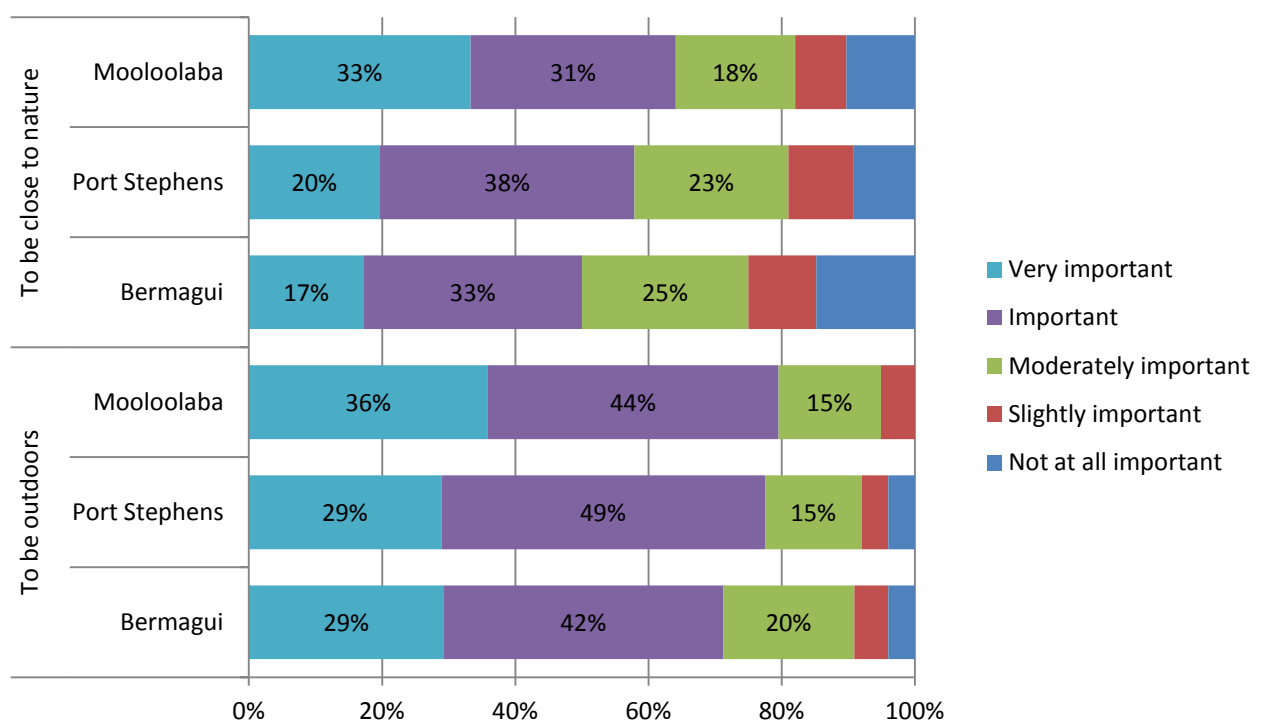
Note: Respondents could choose multiple responses for this question.

## Social values attributed to game fishing—regional comparison

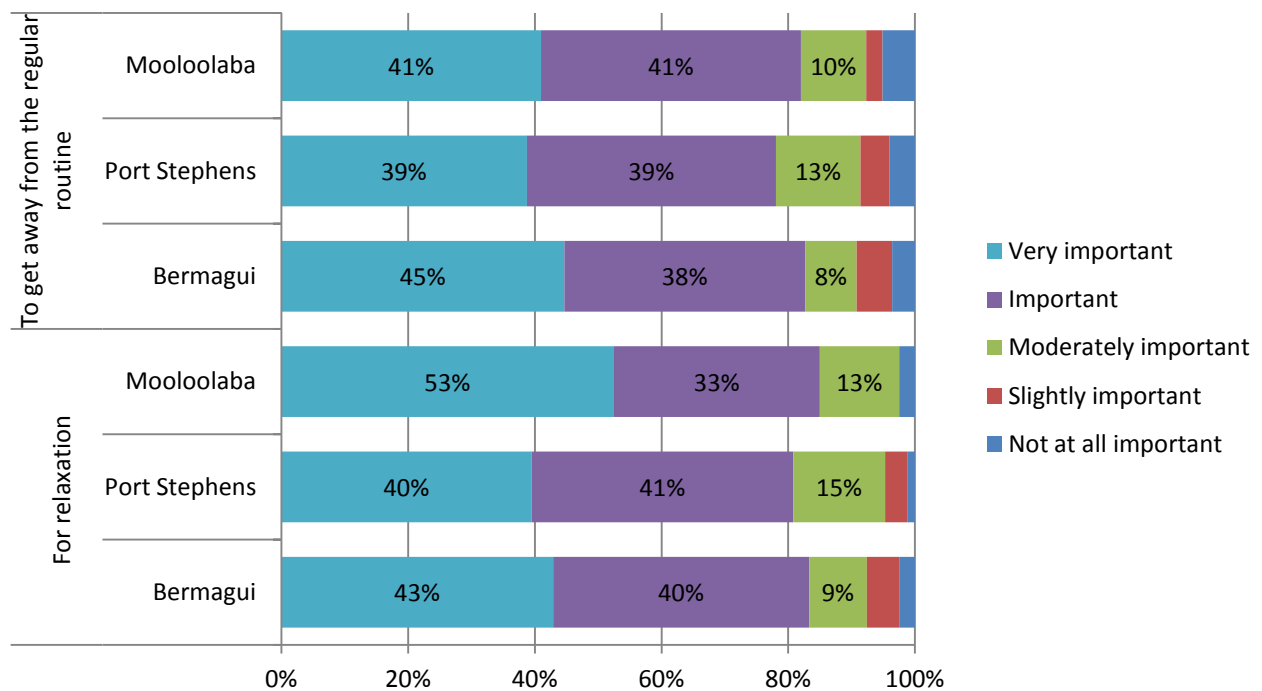
### Why game fishers go game fishing—regional comparison

Across the three survey sites, the majority of respondents placed high value on the opportunity to be outdoors. Being close to nature appeared to be valued to a slightly lesser extent (Figure 27). A higher proportion of respondents in Mooloolaba placed value on 'being close to nature' and 'being outdoors' as reasons to go game fishing than in the other sites. In all three sites most respondents indicated that the relaxation and change from routine offered by game fishing was important or very important to them (Figure 28).

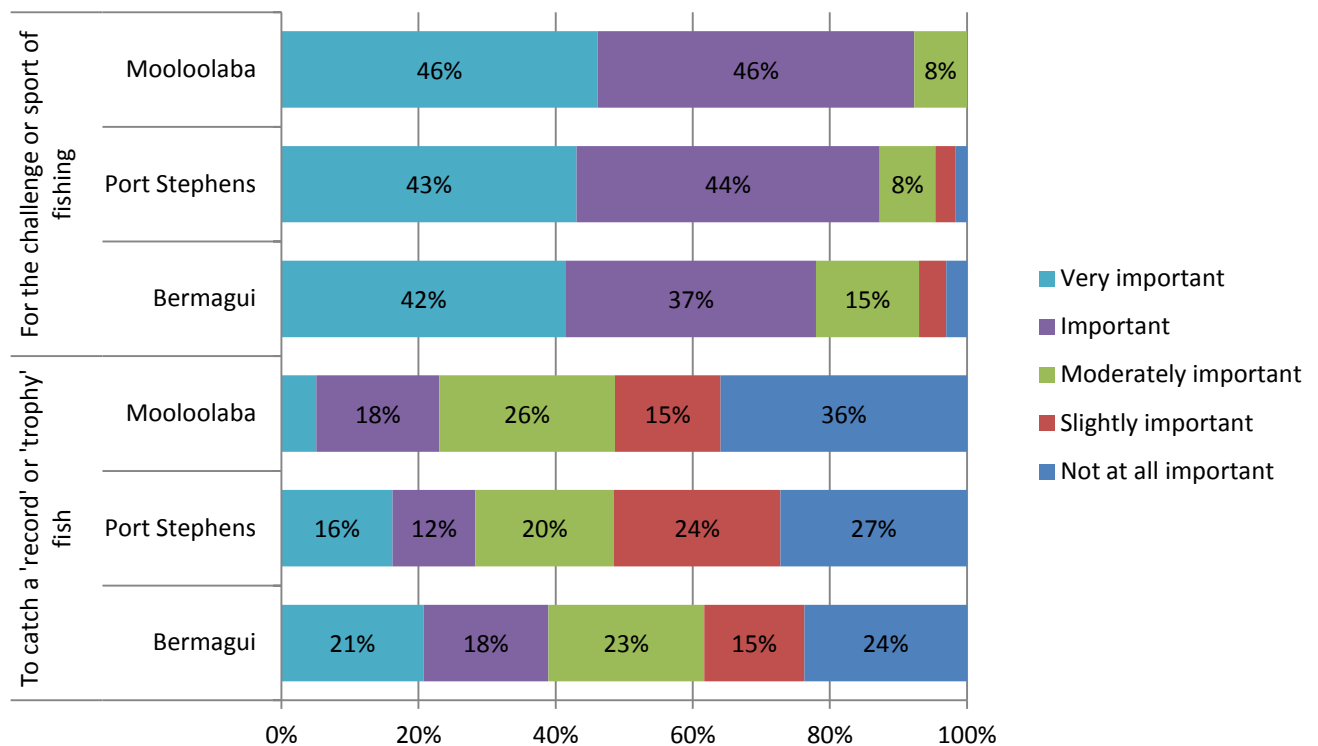
Figure 27 Why go game fishing—nature and outdoors—regional comparison



Game fishers seek black marlin off north-eastern Australia (Ward, ABARES)

**Figure 28 Why go game fishing—relaxation and to get away—regional comparison**

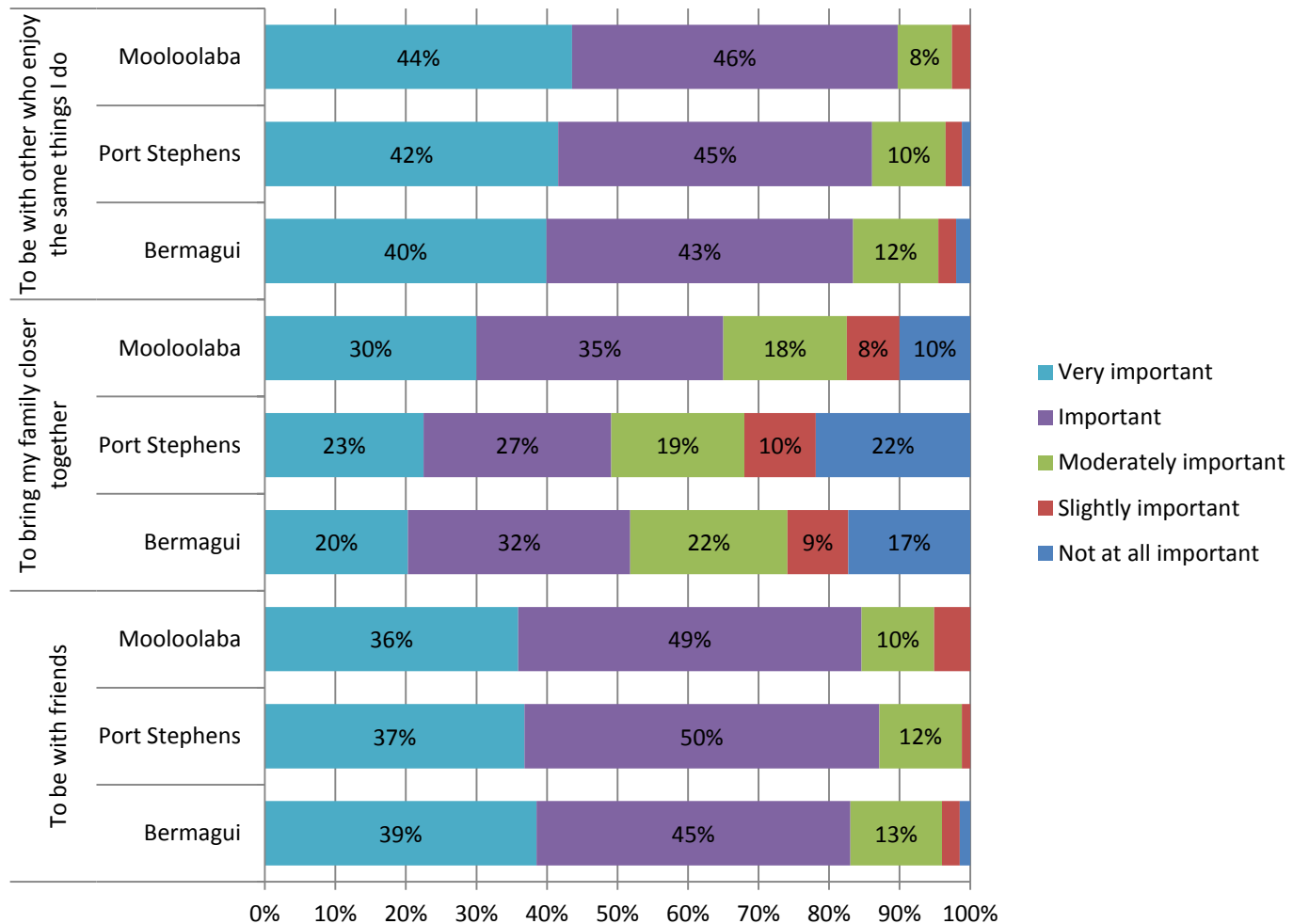
Respondents in the three survey sites valued the challenge of game fishing (Figure 29). Catching (retaining or releasing) a 'trophy' fish was more important to respondents in Bermagui than Port Stephens and Mooloolaba, but overall Bermagui respondents valued the 'challenge of sport fishing' less than respondents at the two other sites.

**Figure 29 Why go game fishing—challenge and trophy—regional comparison**



More than 80 per cent of respondents at each site indicated that being with friends and enjoying the shared activity were important reasons for game fishing (Figure 30). Sixty-five per cent of respondents in Mooloolaba, and roughly 50 per cent of respondents in Port Stephens and Bermagui, indicated that game fishing brought their family closer together.

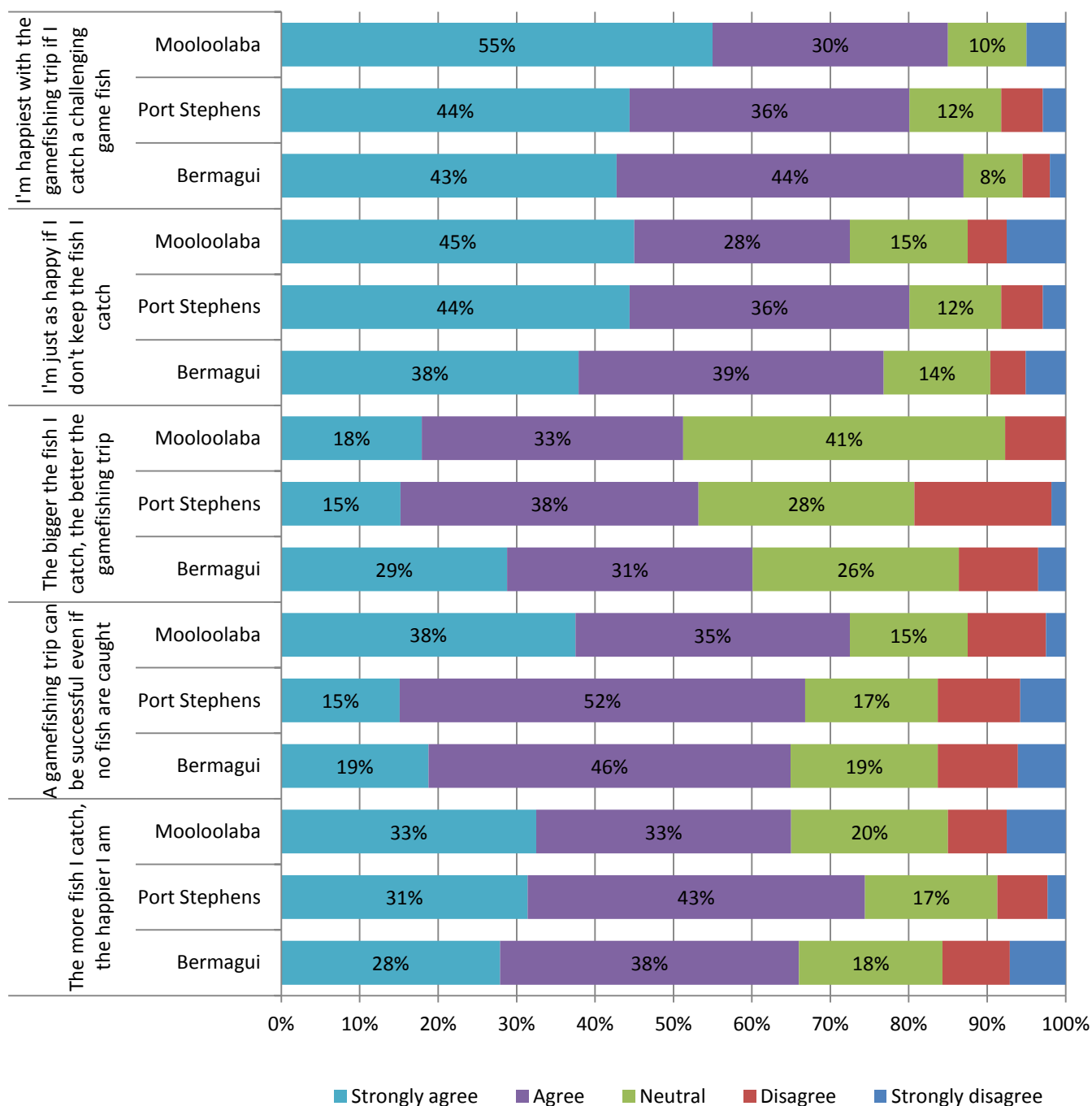
**Figure 30 Why go game fishing—relationships—regional comparison**



### Indicators of a successful game-fishing trip—regional comparison

More than 80 per cent of respondents at the three sites felt that their game-fishing trip was successful if they caught (retained or released) a challenging fish. Respondents at each site indicated that they were happier catching more fish and larger fish, but most respondents (72–80 per cent) did not have to retain fish to feel that their trip was successful (Figure 31).

Figure 31 Indicators of success—regional comparison



**Personal benefits—regional comparison**

Most respondents at each site agreed or strongly agreed that they enjoyed spending time with other game fishers and have developed good friends through the sport (Figure 32). A greater proportion of respondents in Mooloolaba agreed or strongly agreed that game fishing was an important way of developing good friendships. They enjoyed being with other game fishers more so than at the other sites. This suggests that game fishing is central to their lifestyle and that their social networks are connected to game fishing more so than at the other sites.

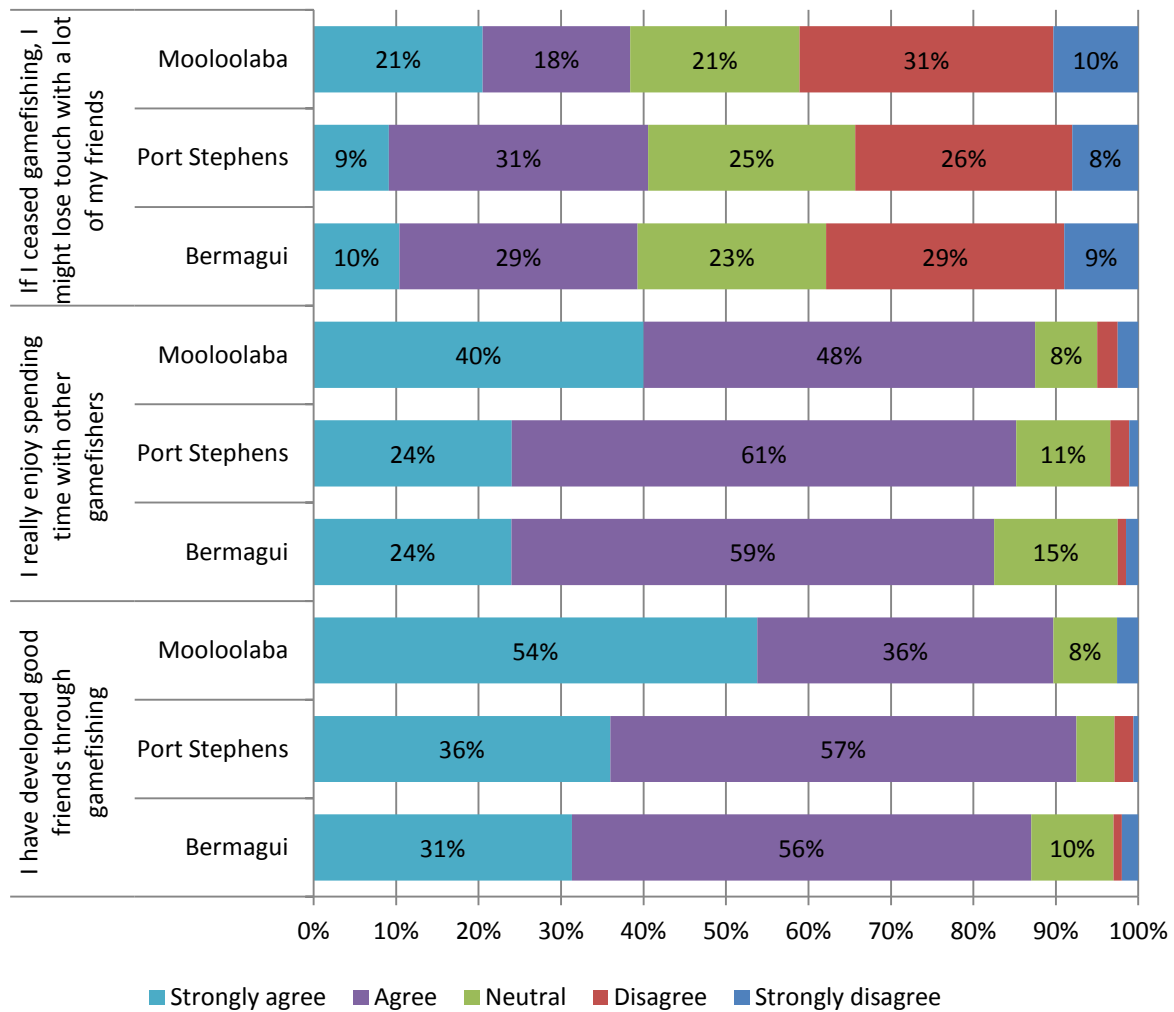
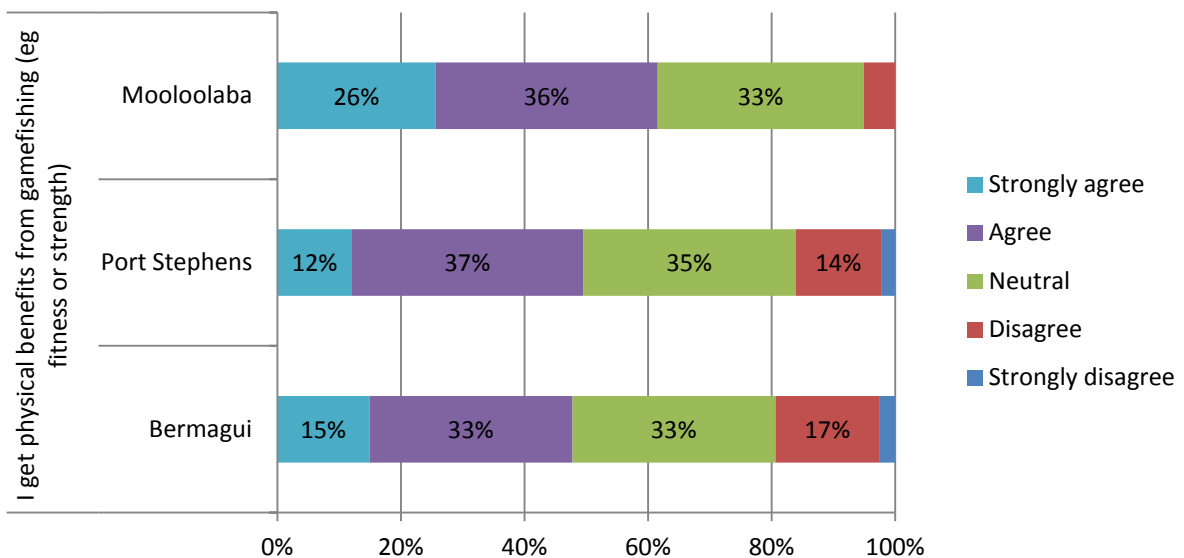
Sixty-one per cent of respondents in Mooloolaba, compared to 49 per cent in Port Stephens and 47 per cent in Bermagui, agreed that there were physical benefits associated with game fishing (Figure 33). Similarly, respondents in Mooloolaba rated the physical and mental health benefits of game fishing more highly than did respondents in the other survey sites.

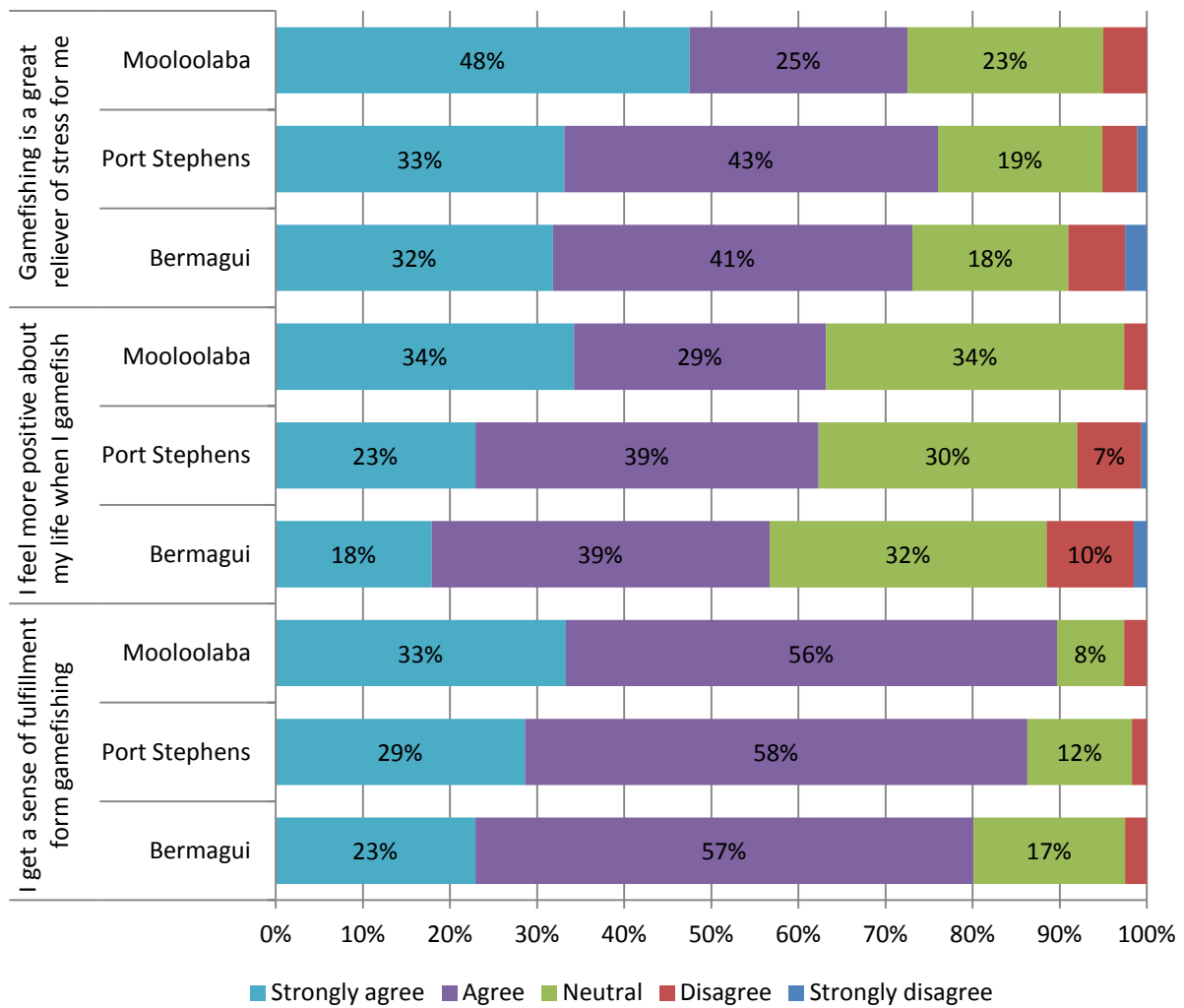
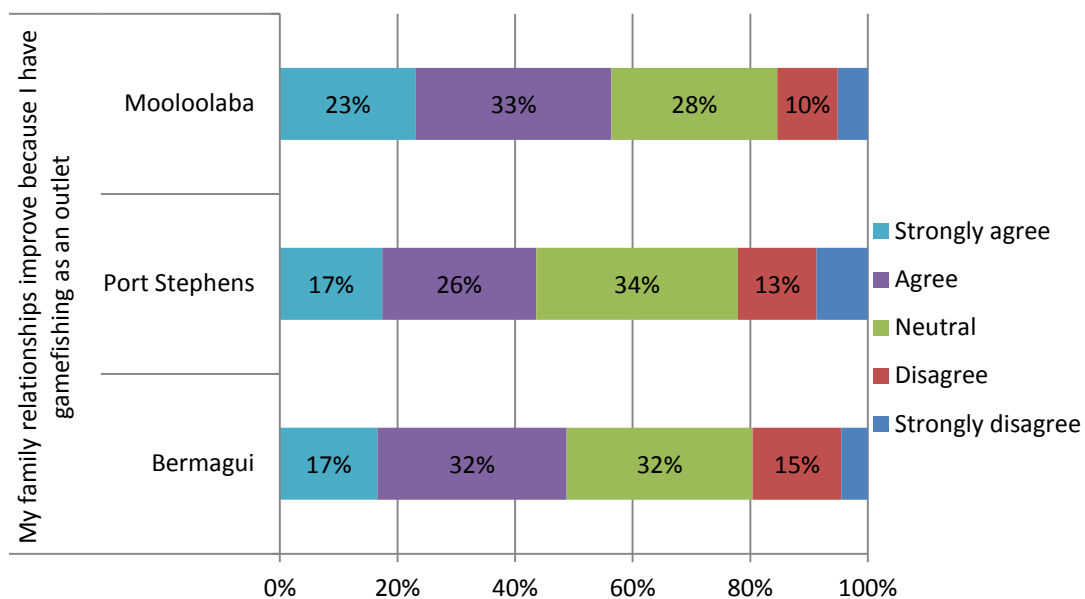
Most respondents (80–89 per cent) in each site indicated that game fishing gives them a sense of fulfilment (Figure 34). In comparison, the stress relief associated with game fishing was valued lowly in all sites.

Approximately half of respondents at each site agreed or strongly agreed that game fishing improved their family relationships (Figure 35). This was valued highest in Mooloolaba (56 per cent).



A cruiser involved in a game-fishing tournament (George, ABARES)

**Figure 32 Relationships and friends— 'centrality to fishing'— regional comparison****Figure 33 Physical benefit—regional comparison**

**Figure 34 Mental wellbeing—regional comparison****Figure 35 Relationships—family—regional comparison**

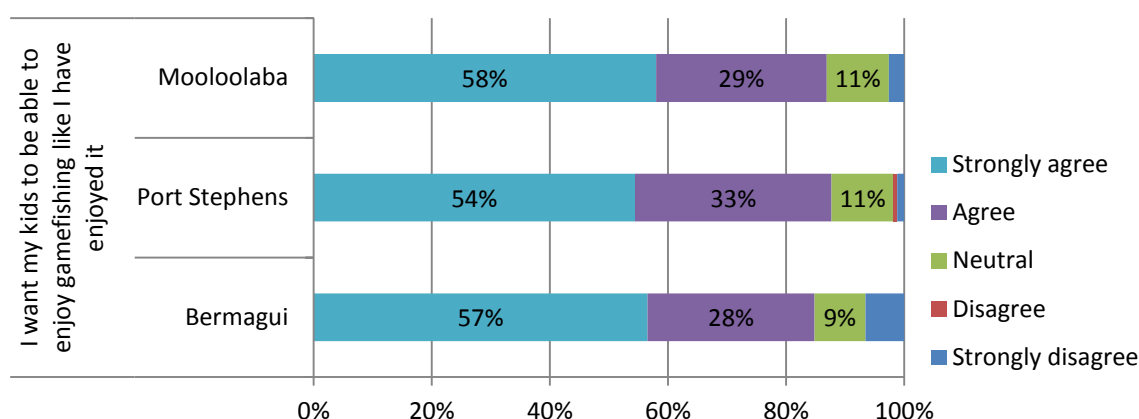
### Environmental stewardship values and beliefs—regional comparison

Results indicated that respondents have strong environmental values and beliefs. In terms of bequest values, 80 per cent of respondents across the three sites agreed that they would like their children to be able to enjoy game fishing like they have enjoyed it. This could indicate that respondents place a high value on ensuring that game fishing is not curtailed by environmental and institutional factors (Figure 36).

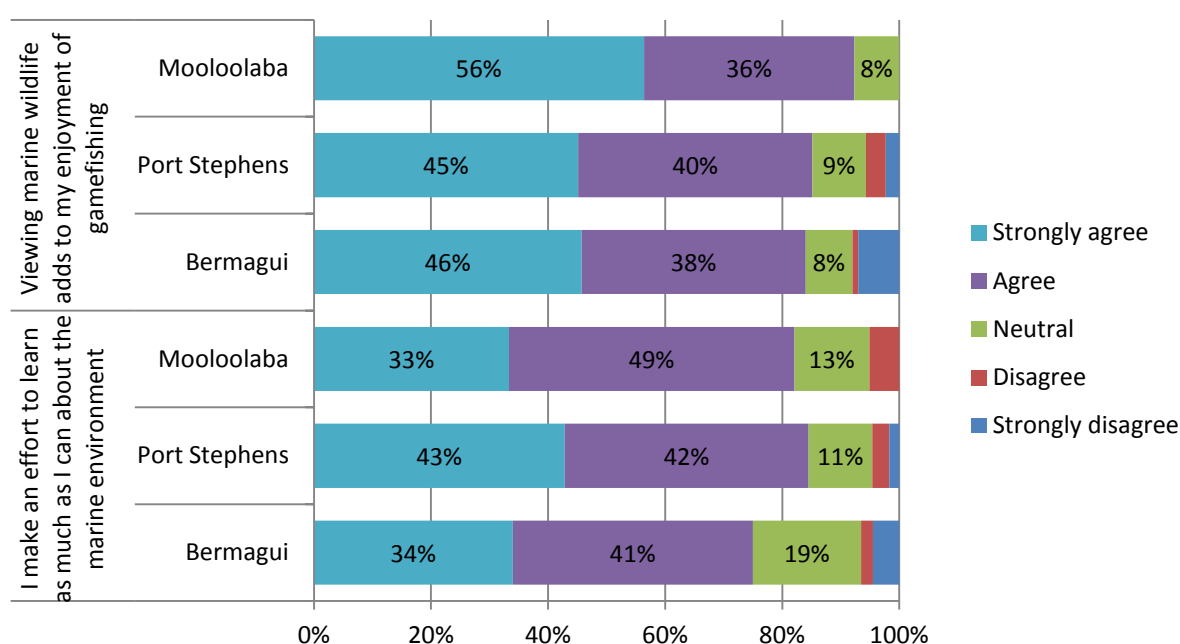
Respondents across the three sites placed similarly high levels of value on their enjoyment in viewing marine wildlife and learning about the marine environment (Figure 37). Most respondents at each site felt game fishing did not take enough fish to affect fish stocks. This sentiment was strongest in Port Stephens (Figure 38).

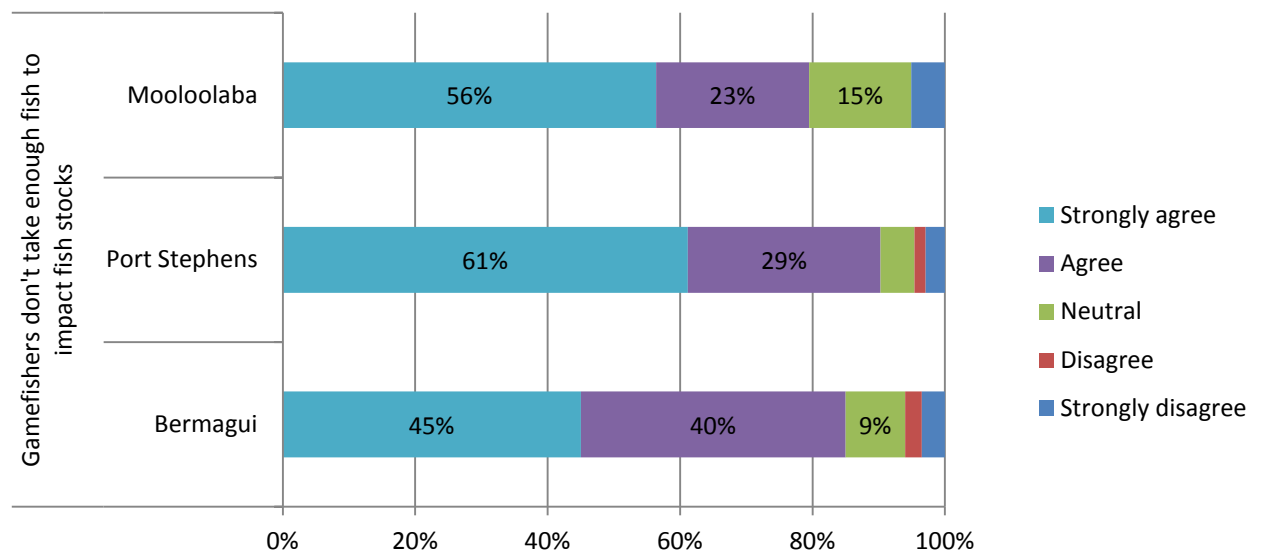
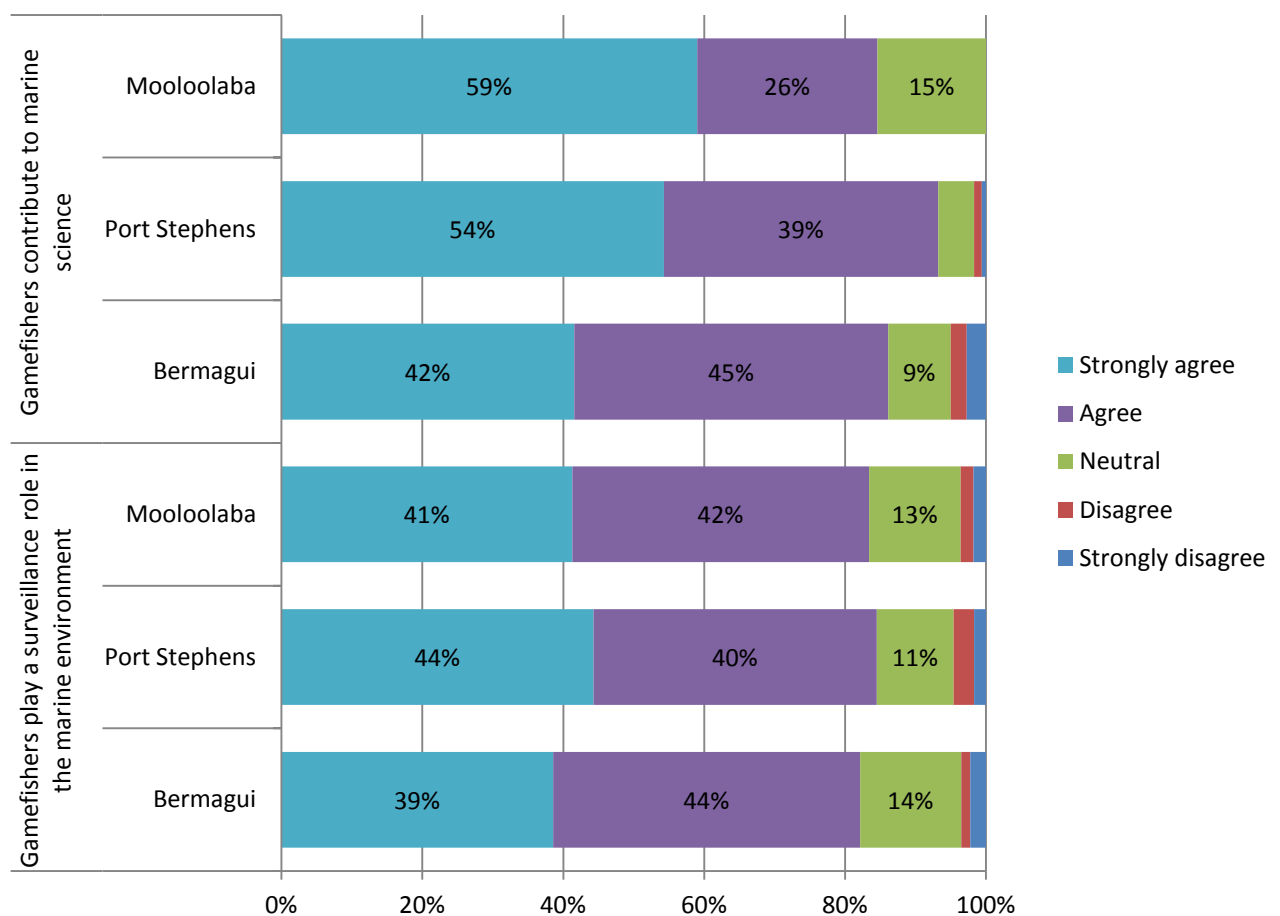
Most of the respondents from the three sites believed that game fishing contributes to marine science and plays a surveillance role in the marine environment (Figure 39).

**Figure 36 Bequest value—regional comparison**



**Figure 37 Marine environment values—regional comparison**



**Figure 38 Impact on fish stocks—regional comparison****Figure 39 Contribution to science and stewardship beliefs—regional comparison**



## Comments volunteered by survey respondents

The following summarises the written comments provided by 116 respondents to the game-fisher survey. Five themes dominated those comments: marine park expansion and their implementation, benefits to regional communities, impact on fish stocks and contributions to science.

### Marine park expansion

Many respondents (23 per cent of the 116 respondents) indicated that the expansion of marine parks and no-take zones are adversely affecting game fishing. They would like to see their needs balanced with the need for conservation.

I agree with the protection of marine fishing grounds but there has to be a balance. The strategic location of marine parks is making it too hard for recreational fishers.

### Marine park implementation

Seventeen per cent of respondents believed that the implementation of changes to Commonwealth and state marine park zoning was poorly managed and game fisher opinions were not taken into consideration. Respondents felt that fisheries management should properly include consultation with game fishers as a part of the overall stakeholders, because they are supportive of protecting fish stocks.

I strongly disagree with the enforcement of marine parks. No consultation was done with fishermen. The decisions were made based on green votes rather than facts.

### Benefits to regional communities

Through participation in game fishing, 14 per cent of respondents indicated that they provide a large economic benefit to coastal communities. They would like to be able to continue supporting these communities into the future.

I invest heavily in my sport and feel my investment contributes to game fishing communities. I'd like that to continue for future generations.

### Impact on fish stocks

Thirteen per cent of respondents felt that their take of fish during tournaments was insignificant compared to that of commercial fishing vessels, especially pelagic longliners. Many respondents relate this to low mortality rates associated with tag-and-release practices promoted by game fishing associations, tournaments, media and peers.

The few game fish that our boat takes does not even touch the sides compared to what is taken by vessels like longliners.

### Contribution to science

Eleven per cent of respondents believe that, partly as a result of tag-and-release, improvements in stock status is evident in several prized species. Additionally, the collection of tag-and-release data is understood to be important in maintaining fish stocks.

One of my greatest attractions to the sport is that all my efforts are focused on research tagging of fish to ensure there is scientific information gained to assist the sustainability of game-fish species.

## Economic value to game fishers

### Background

We estimated two components of the economic value of game fishing: (1) the net economic value and (2) the actual amount paid by game fishers for game-fishing trips ('expenditure'). Several studies have estimated expenditure at Australian game-fishing tournaments (e.g. Port Macquarie [Pepperell 1991], Bermagui [Pepperell 1992] and Port Stephens [Pepperell 2002]). Ezzy and Scarborough (2011) estimated the net economic value as well as expenditure for non-tournament game-fishing trips to Portland for southern bluefin tuna. Using a different approach, Ernst and Young (2004) estimated a total net economic benefit of \$13.4 million for New South Wales recreational anglers fishing for striped marlin in 2002–03. It is difficult to assess the reliability of that estimate without further information on the survey design (including the number of game fishers interviewed), the application of the travel-cost method and how those estimates were applied to obtain an estimate for the entire population of recreational anglers.

The net economic value is the amount, over and above actual expenditure, that individuals would pay to experience game fishing. The net economic value and actual expenditure may be added together to estimate the total economic value of a game-fishing trip. Also termed the 'willingness to pay', the total economic value is the maximum amount that a game fisher would be prepared to pay on average for a game-fishing trip.

### Methods

#### Travel-cost method application

The travel-cost method (Box 1) was used in this study to determine the value of game fishing in two eastern Australian sites (Bermagui and Port Stephens). We estimated the value of game fishing by observing the relationship between travel costs for game-fishing activity incurred by game fishers and the number of trips to the site. The estimates of the net economic value of game fishing in Bermagui and Port Stephens were derived from information collected from surveys of participants at each site in 2011. A third site was also surveyed (Mooloolaba). A summary of Mooloolaba survey responses is provided, but the number of respondents in this area (40) was too low for the application of the travel-cost method.

In this study the frequency of visits to the site (the number of game-fishing trips per year) was selected as the dependent variable for the travel-cost method applied in this study. A one-year period model was used to estimate net economic value obtained from the game-fishing activity. To include resident game fishers, a game-fishing trip was defined as a game fisher travelling to a Bermagui or Port Stephens access point (boat ramp or marina), to spend time game fishing before returning home.

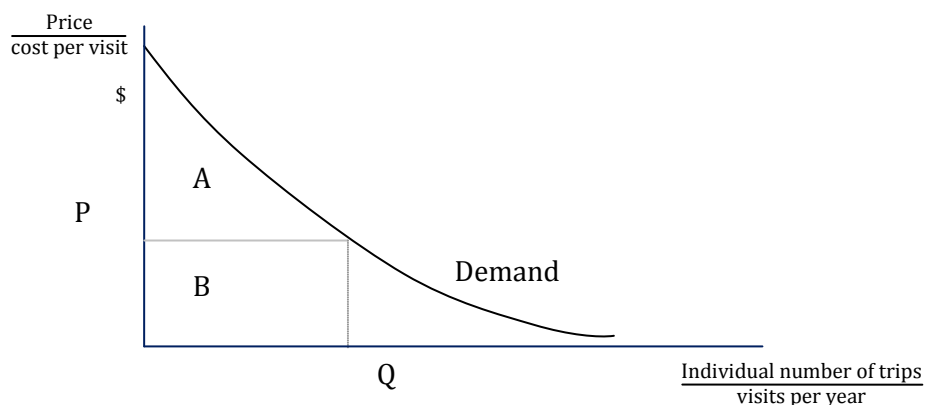
**Box 1 The travel-cost method**

The travel-cost method is a cost-effective approach that is frequently used to estimate the use-value associated with recreational activities, providing relatively consistent and reliable results. It has been used in many non-market valuation studies (e.g. Haab & McConnell [2002], Ward & Beal [2000], Garrod & Willis [1999]). The travel-cost method is a revealed-preference, non-market valuation method for estimating non-market recreational use values. It uses observed consumer behaviour in relation to demand for recreational goods to estimate the non-market benefits that individuals derive from participation in the activity (Ward & Beal 2000). The travel-cost method is based on the assumption that 'the incurred costs of visiting a site reflect the recreational value of the site' (Turner et al. 1994).

The travel-cost method involves collecting data on the number of trips to the site and the expenditure associated with the trip to assess the environmental good, which is used to determine the underlying demand function for recreational activities. The demand function is then used to estimate the net value to 'consumers' from these activities.

For example, the demand curve in Figure 40 represents the willingness to pay for each additional trip (the marginal willingness to pay). The area below the demand curve represents total willingness to pay. 'Q' trips will be undertaken for an average cost per visit of 'P'. Area 'B' represents total expenditure and area 'A' is the net economic value (the maximum amount that consumers are willing to pay over and above their actual expenditure).

**Figure 40 Demand curve**



Bateman (1993) provides three options to estimate travel costs, including: only petrol costs; full car cost that includes petrol, insurance and maintenance; and the perceived costs estimated by respondents. The costs can also include the opportunity cost of time, which is the value of benefits of the best alternative activity forgone by participating in game fishing. Bateman (1993) distinguishes between the opportunity cost of time spent for travel to the site and onsite time.

## Results

### Sample characteristics

A total of 158 valid survey forms were received from game fishers in Bermagui, 149 responses were collected in Port Stephens and 32 in Mooloolaba. During their current game-fishing trip, tournament respondents spent the most days game fishing in Port Stephens (5 days). The fewest days were spent game fishing in Mooloolaba (3 days; Table 21). This trend is reversed for all trips made in the past 12 months; tournament respondents spent more time game fishing in Mooloolaba (15 days on average) compared to Bermagui (11) and Port Stephens (9 days). On average, tournament respondents made more game-fishing trips to Mooloolaba (15) than to Port Stephens (6) and to Bermagui (4 trips) in the past year. This could be explained by the shorter distance travelled to Mooloolaba (95 km one way on average) compared to Port Stephens (282 km) and Bermagui (470 km). This suggests that Bermagui is visited less frequently than Port Stephens and Mooloolaba.

**Table 21 Characteristics of tournament respondents**

Characteristic	Bermagui	Port Stephens	Mooloolaba
Number of respondents	158	149	32
Average days spent game fishing at this site on this trip	4	5	3
Average number of game fishing days at the site in the past year	11	9	15
Average number of game-fishing trips in the past year to that site	4	6	13
Average distance travelled one way (km)	470	282	95
Travelled by four-wheel drive	73%	53%	59%
Travelled by boat to this destination	3%	8%	22%
Share in a boat	44%	42%	38%
Own or part own the boat used on this trip	44%	42%	38%

Non-tournament respondents spent the most number of days game fishing at Bermagui (4 days on average). The fewest number of days spent game fishing occurred at Mooloolaba (1 day) while two days were spent game fishing at Port Stephens (Table 22). During trips made in the past 12 months, non-tournament respondents spent the most number of days game fishing at Mooloolaba (23 days). Fewer days were spent game fishing at Port Stephens (17) and Bermagui (15 days). On average, non-tournament respondents made more game-fishing trips to Mooloolaba (24) than to Port Stephens (12) and to Bermagui (8 trips) in the past year.

In contrast to non-tournament respondents, tournament respondents were often long-distance visitors who made fewer trips. The total net economic value of game fishing was only calculated for tournament respondents. As the total population of game fishers active at each site cannot be identified, the total economic value of game fishing estimated for the study sites in this report are likely to be underestimated.

The surveys included a large proportion of tournament participants, but were unlikely to be representative of the whole game-fisher population. The representativeness of the sample of the game-fisher population in the survey sites could not be tested due to a lack of data on the wider game-fisher population.

**Table 22 Characteristics of non-tournament respondents**

Characteristic	Bermagui	Port Stephens	Mooloolaba
Number of respondents	35	12	8
Average days spent game fishing at this site on this trip	4	2	1
Average number of game fishing days at the site in the past year	15	17	23
Average number of game-fishing trips in the past year to that site	8	12	24
Average distance travelled one way (km)	434	97	40
Travelled by four-wheel drive	74%	83%	100%
Travelled by boat to this destination	0%	0%	0%
Share in a boat	67%	57%	88%
Own or part own the boat used on this trip	57%	67%	88%

The average amount spent by respondents on a trip to each site is presented in Table 23. Expenditure for a game-fishing trip differed between sites. The data was separated by boat ownership to adjust for sampling bias toward boat owners. Overall, 40 per cent of respondents were boat owners and 60 per cent were non-boat owners, whereas the true population distribution was estimated to be about 25 per cent boat owners to 75 per cent non-boat owners. Separate tables of data were created for tournament participants and non-tournament participants and the total values were adjusted for the appropriate distribution of boat owners and non-boat owners (Table 23 and Table 24). The total values were calculated by multiplying the mean value per trip per respondent by the average number of trips made to the site in the past year. About 50 per cent of the trips made in the past year were non-tournament trips. Due to a lack of data on non-tournament game fishing, we assumed that the expenditure on tournament and non-tournament trips was the same.

Expenditure is described for boat owners and non-boat owners at each site in the following sections. In general, tournament participants spent more than non-tournament game fishers (cf. Table 23 and Table 24). As expected, boat owners reported high expenditure on boat equipment and boat fuel and spent more overall on game-fishing trips than non-boat owners (Table 23).



Collecting bait fish before a game-fishing trip (Ward, ABARES)

Table 23 Expenditure reported by tournament respondents at each site

Site/item	Average per respondent per trip			Total per respondent per year to that site			Total for all tournament participants per year to that site <sup>a</sup>
	Boat owners	Non-boat owners	All respondents	Boat owners	Non-boat owners	All respondents	
<b>Port Stephens</b>							
Number of gamefishers	65	84	159	65	84	159	743
Fuel cost for boat	\$2 767	\$1 273	\$1 617	\$17 497	\$6 473	\$9 008	\$6 693 190
Boat equipment	\$1 176	\$309	\$508	\$7 438	\$1 570	\$3 155	\$2 343 915
Fishing equipment and bait	\$1 241	\$431	\$618	\$7 848	\$2 193	\$3 720	\$2 763 980
Accommodation	\$998	\$322	\$477	\$6 308	\$1 635	\$2 897	\$2 152 428
Food and beverages	\$893	\$564	\$640	\$5 649	\$2 868	\$3 619	\$2 688 561
Boat hire	\$46	\$21	\$27	\$292	\$109	\$158	\$117 627
Cost of travel to site	\$136	\$101	\$109	\$860	\$513	\$607	\$450 740
Mooring fees and other marine costs	\$1 171	\$467	\$629	\$7 403	\$2 374	\$3 732	\$2 772 731
<b>Total</b>	<b>\$8 429</b>	<b>\$3 489</b>	<b>\$4 625</b>	<b>\$53 296</b>	<b>\$17 734</b>	<b>\$26 895</b>	<b>\$19 983 171</b>
<b>Bermagui (2 tournaments)</b>							
Number of gamefishers	70	88	158	70	88	158	614
Fuel cost for boat	\$563	\$434	\$471	\$2 155	\$1 771	\$1 882	\$1 155 813
Boat equipment	\$1 539	\$447	\$764	\$5 891	\$1 823	\$3 003	\$1 843 747
Fishing equipment and bait	\$1 026	\$627	\$742	\$3 926	\$2 556	\$2 954	\$1 813 592
Accommodation	\$382	\$304	\$327	\$1 463	\$1 240	\$1 304	\$800 886
Food and beverages	\$451	\$344	\$375	\$1 728	\$1 403	\$1 497	\$919 188
Boat hire	\$6	\$62	\$46	\$22	\$253	\$186	\$114 037
Cost of travel to site	\$207	\$132	\$154	\$792	\$540	\$613	\$376 457
Mooring fees and other marine costs	\$45	\$7	\$18	\$172	\$27	\$69	\$42 503
<b>Total</b>	<b>\$4 218</b>	<b>\$2 356</b>	<b>\$2 698</b>	<b>\$16 148</b>	<b>\$9 613</b>	<b>\$11 509</b>	<b>\$7 066 224</b>

Site/item	Average per respondent per trip			Total per respondent per year to that site			Total for all tournament participants per year to that site <sup>a</sup>
	Boat owners	Non-boat owners	All respondents	Boat owners	Non-boat owners	All respondents	
<b>Mooloolaba</b>							
Number of gamefishers	12	20	32	12	20	32	48
Fuel cost for boat	\$1 080	\$606	\$729	\$16 380	\$7 514	\$9 819	\$471 334
Boat equipment	\$533	\$764	\$704	\$8 089	\$9 467	\$9 109	\$437 231
Fishing equipment and bait	\$1 177	\$300	\$528	\$17 846	\$3 714	\$7 388	\$354 634
Accommodation	\$86	\$77	\$79	\$1 302	\$949	\$1 040	\$49 941
Food and beverages	\$229	\$116	\$146	\$3 476	\$1 442	\$1 970	\$94 579
Boat hire	\$0	\$50	\$37	\$0	\$620	\$459	\$22 022
Cost of travel to site	\$214	\$70	\$107	\$3 253	\$863	\$1 485	\$71 263
Mooring fees and other marine costs	\$13	\$33	\$28	\$202	\$409	\$355	\$17 059
<b>Total</b>	<b>\$3 333</b>	<b>\$2 014</b>	<b>\$2 370</b>	<b>\$50 547</b>	<b>\$24 978</b>	<b>\$31 626</b>	<b>\$1 518 063</b>

Note: <sup>a</sup>Annual estimates of total expenditure to each site are based on the number of registered tournament participants multiplied by average expenditure for boat owners and non-boat owners combined. Those calculations were corrected for the bias recognised in the game-fisher survey.



Table 24 Expenditure by non-tournament respondents

Item	Average per respondent per trip		Total per respondent per year to that site	
	Boat owners	Non-boat owners	Boat owners	Non-boat owners
<b>Port Stephens</b>				
Number of respondents	8	4	8	4
Fuel cost for boat	\$793	\$158	\$10 600	\$1 299
Boat equipment	\$334	\$100	\$4 464	\$825
Fishing equipment and bait	\$446	\$293	\$5 969	\$2 413
Accommodation	\$264	\$0	\$3 528	\$0
Food and beverages	\$308	\$51	\$4 120	\$423
Boat hire	\$5	\$0	\$64	\$0
Cost of travel to site	\$45	\$10	\$605	\$86
Mooring fees and other marine costs	\$276	\$50	\$3 695	\$413
<b>Total</b>	<b>\$2 471</b>	<b>\$662</b>	<b>\$33 043</b>	<b>\$5 459</b>
<b>Bermagui</b>				
Number of respondents	21	14	21	14
Fuel cost for boat	\$457	\$1 160	\$4 877	\$4 972
Boat equipment	\$370	\$697	\$3 942	\$2 988
Fishing equipment and bait	\$280	\$1 230	\$2 992	\$5 271
Accommodation	\$366	\$464	\$3 906	\$1 989
Food and beverages	\$390	\$593	\$4 155	\$2 541
Boat hire	\$0	\$0	\$0	\$0
Cost of travel to site	\$191	\$112	\$2 042	\$481
Mooring fees and other marine costs	\$28	\$11	\$299	\$49
<b>Total</b>	<b>\$2 082</b>	<b>\$4 268</b>	<b>\$22 213</b>	<b>\$18 291</b>
<b>Mooloolaba</b>				
Number of respondents	7	1	7	1
Fuel cost for boat	\$170	\$60	\$4 201	\$1 200
Boat equipment	\$159	\$0	\$3 919	\$0
Fishing equipment and bait	\$574	\$90	\$14 193	\$1 800
Accommodation	\$114	\$0	\$2 824	\$0
Food and beverages	\$191	30	\$4 713	\$600
Boat hire	\$0	\$0	\$0	\$0
Cost of travel to site	\$24	\$1	\$593	\$11
Mooring fees and other marine costs	\$43	\$0	\$1 059	\$0
<b>Total</b>	<b>\$1 275</b>	<b>\$181</b>	<b>\$31 504</b>	<b>\$3 611</b>

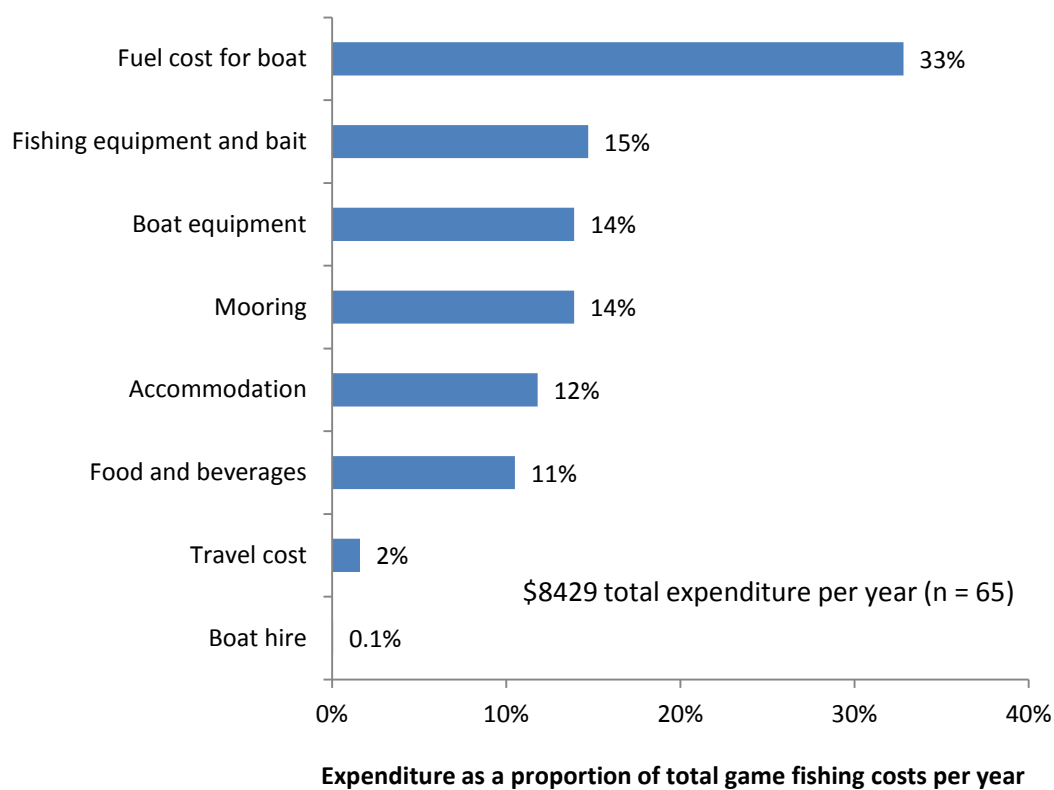
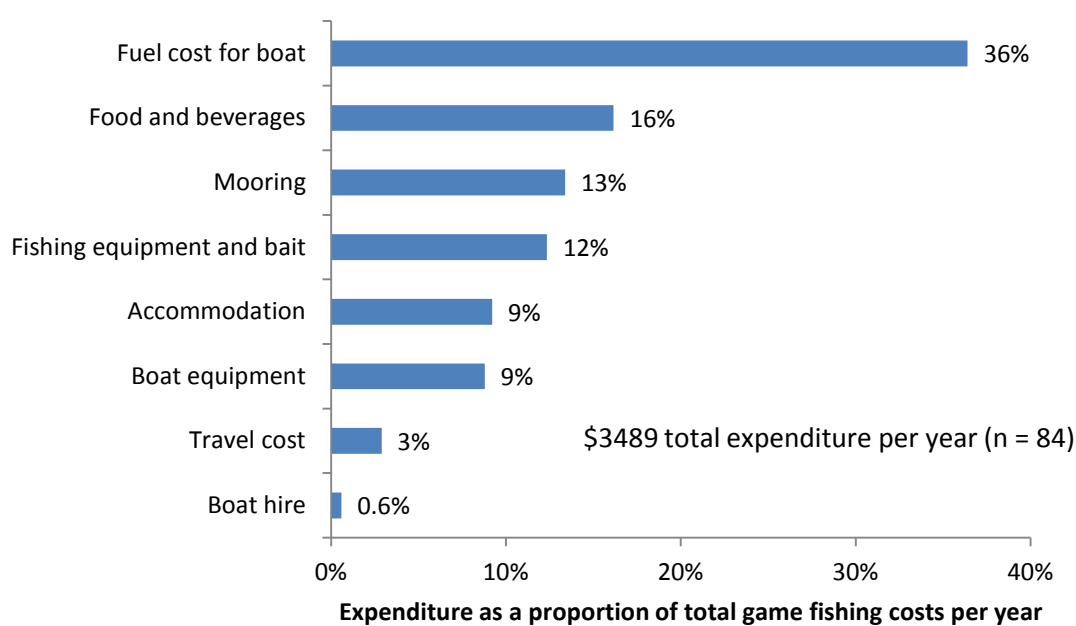
Our estimates of expenditure are higher than those of other game fishing studies. Pepperell (1992), for example, estimated that game fishers spent \$755 on average for trips to Bermagui, compared to \$2698 in our study. Pepperell (2002) estimated an average expenditure of \$1889 by game fishers visiting Port Stephens, compared to \$4431 in our study for locals and visitors combined. The higher estimated expenditure in our study is probably due to inflation and increasing affluence in the 9–19 years since those studies. It is also noteworthy that total expenditure would have increased with the general increase in tournament participation rates over the years (Grahame Williams, pers. comm., 26 March 2012).

A clear distinction cannot be made between expenditure within the study area during game-fishing trips ('on-site') as opposed to expenditure elsewhere before the trip ('off-site'). However, it can be assumed that accommodation, food and beverages and fuel costs for boats largely refer to on-site expenditure. Expenditure on fishing equipment and boat equipment could be either on-site, off-site or a combination of both.

We assumed that the pattern of expenditure for tournament and non-tournament participants is the same. This assumption may have resulted in the annual value for all game-fishing trips being overestimated because tournament trip expenditure was used in this calculation. It is unclear if non-tournament and tournament participants have similar expenditure patterns for game-fishing trips. Several questions were asked in the questionnaire about the expenditure for non-tournament trips, but only a small number of responses were obtained.



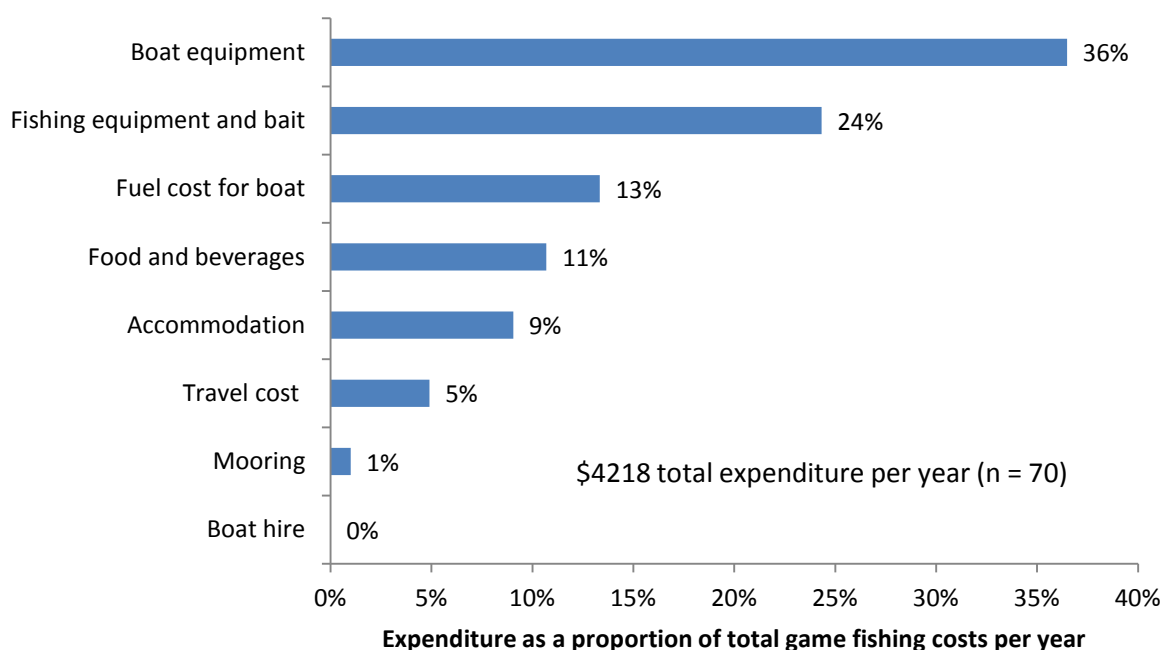
Trailer boats being launched at a Bermagui boat ramp (Ward, ABARES)

**Figure 41 Port Stephens tournament respondent expenditure****(a) Boat owners****(b) Non-boat owners**

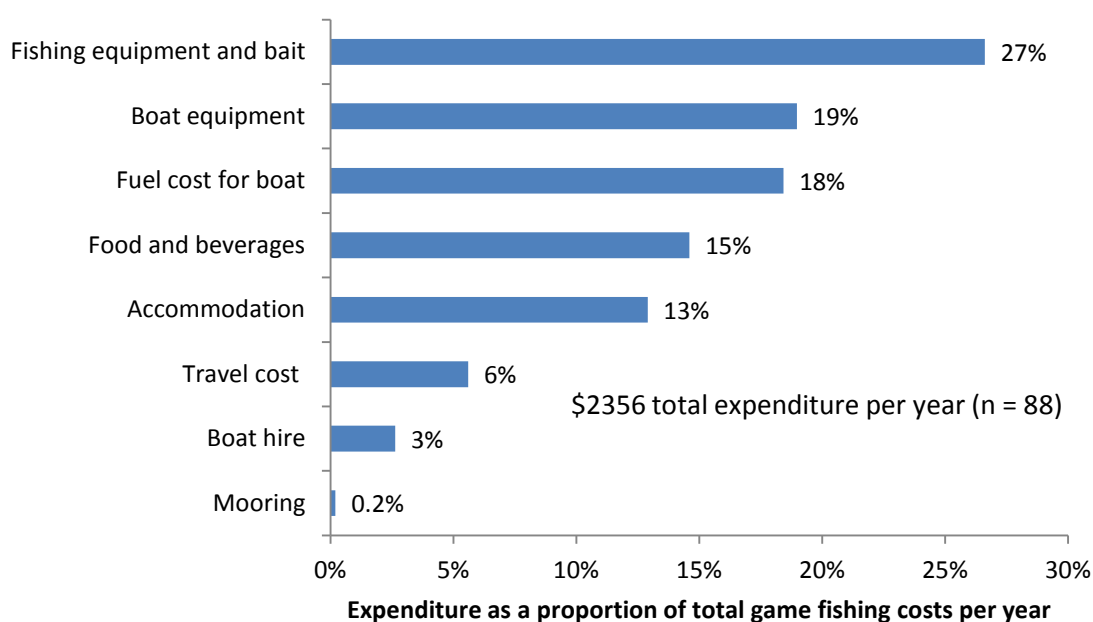
In Port Stephens the higher expenditure per trip was associated with higher boat fuel costs followed by fishing and boat equipment (Figure 41). On average, non-boat owners spent a slightly higher proportion of their game-fishing trip expenditure on boat fuel than boat owners (Figure 41a). However, a higher proportion of the expenditure of boat owners was devoted to boat and fishing equipment. Accommodation and food and beverages accounted for a large proportion of game fisher expenditure in Port Stephens (Figure 41b).

**Figure 42 Bermagui tournament respondent expenditure**

**(a) Boat owners**



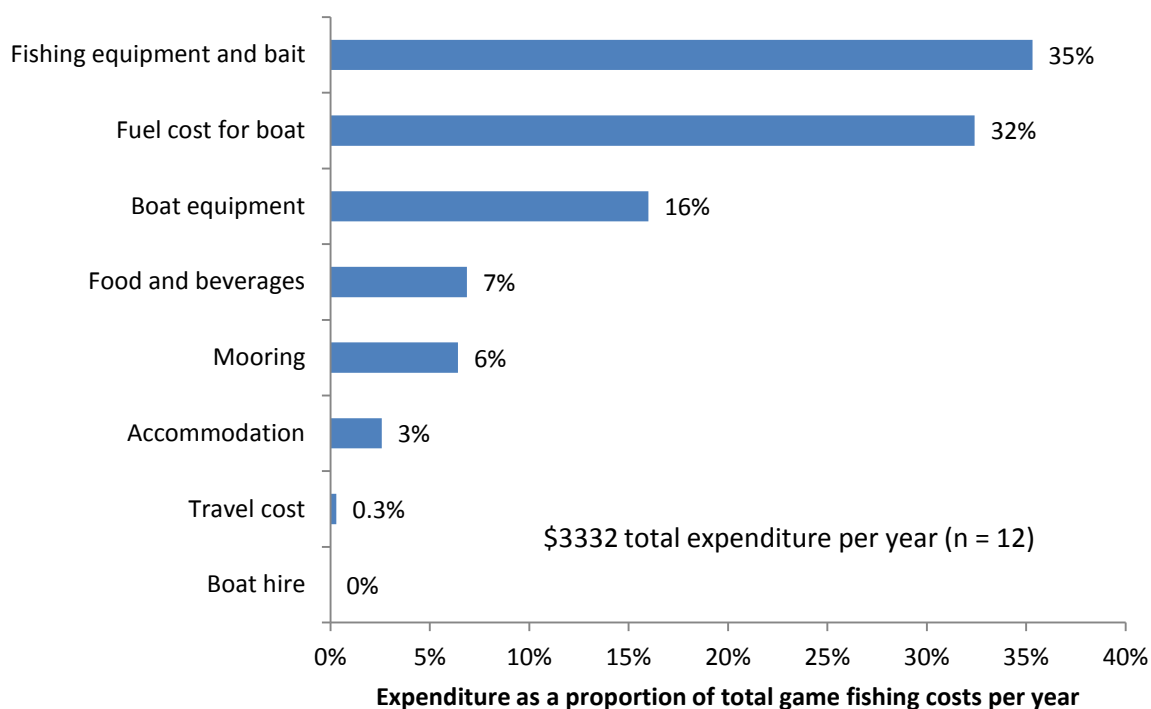
**(b) Non-boat owners**



In Bermagui, boat and fishing equipment expenditure occupied the highest proportion of the game-fishing trip cost (Figure 42a & b). On average, Bermagui boat owners spent a higher proportion of their expenditure on boat equipment (Figure 42a), while non-boat owners spent a higher proportion of their expenditure on fishing equipment, accommodation, food and beverages and boat fuel (Figure 42b).

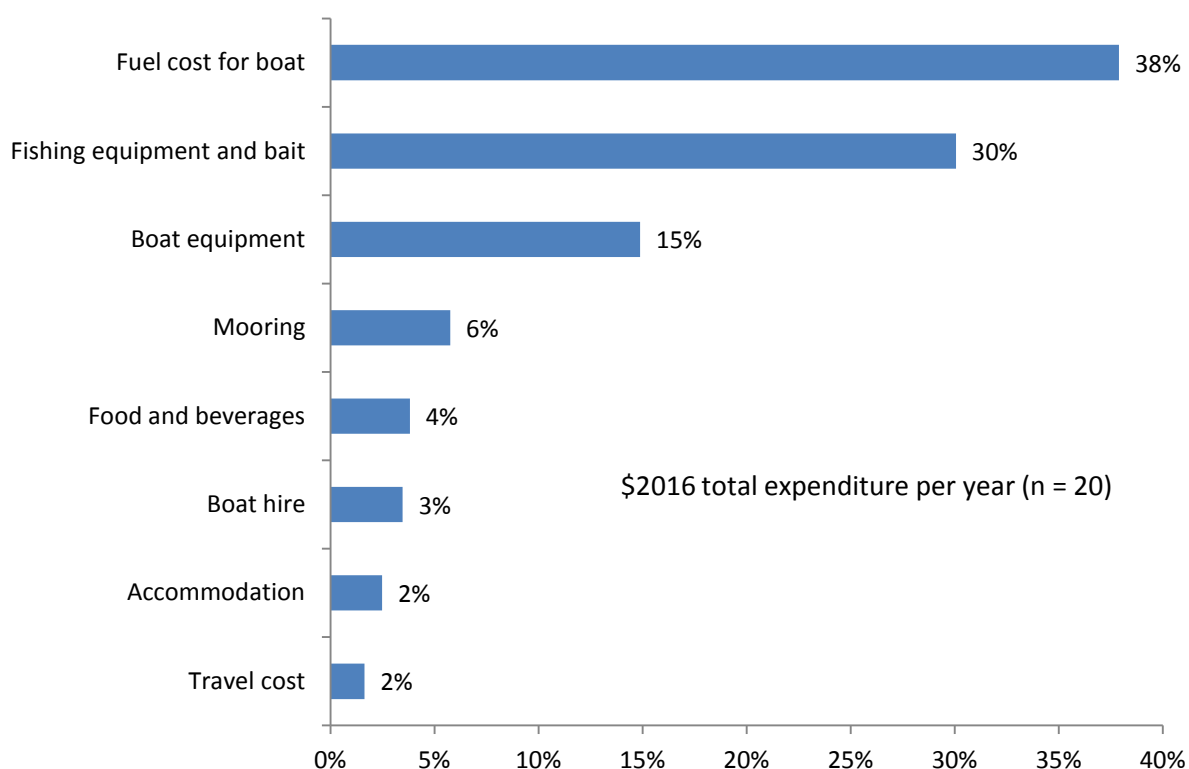
**Figure 43 Average Mooloolaba tournament respondent expenditure**

**(a) Boat owners**



A charter boat involved in a game-fishing tournament (Leatherbarrow, ABARES)

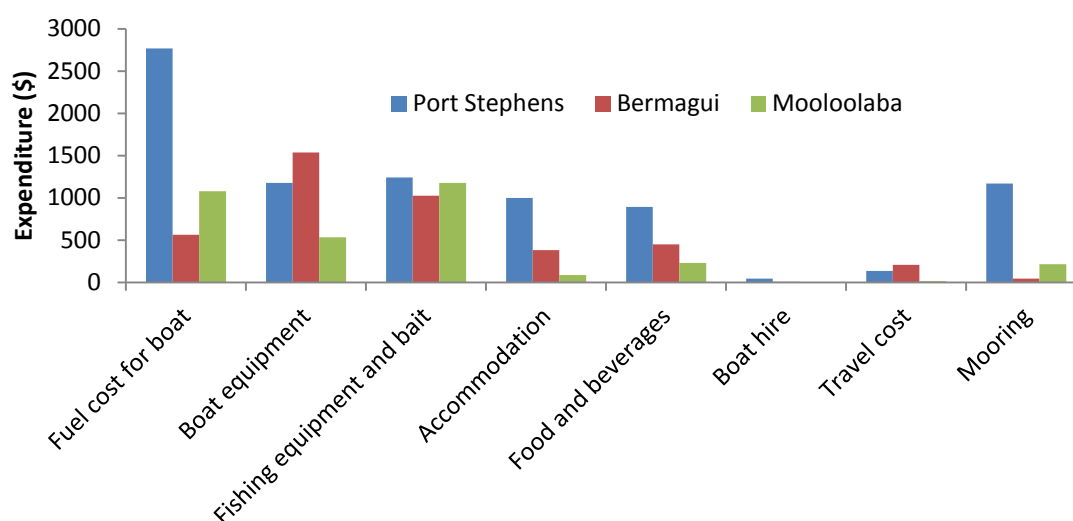


**(b) Non-boat owners**

In Mooloolaba, expenditure on boat fuel and boat and fishing equipment accounted for around 83 per cent of the expenditure on a game-fishing trip. Boat owners generally spent more on fishing equipment (Figure 43a), but non-boat owners spent more on boat equipment (Figure 43b).

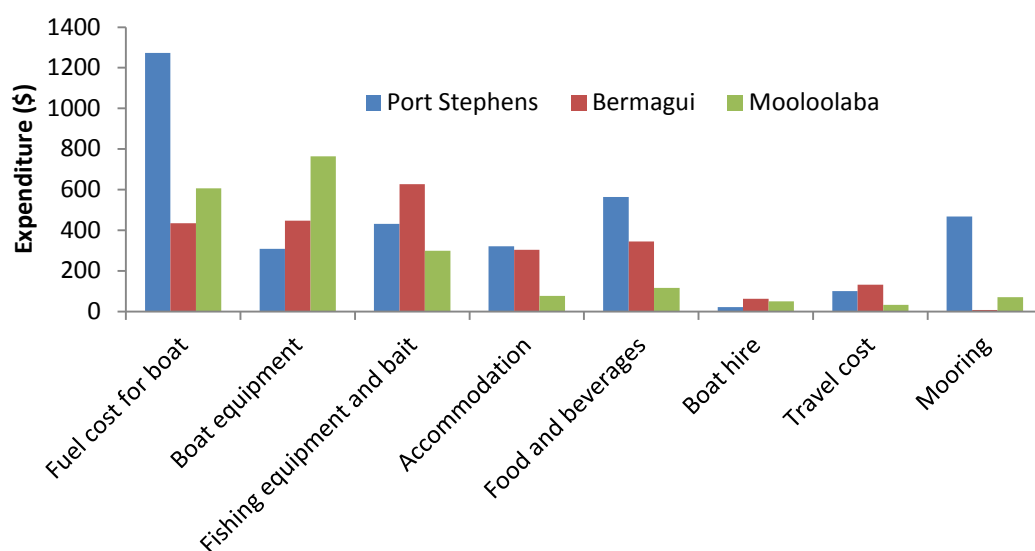


A trailer boat returning to Bermagui harbour (Ward, ABARES)

**Figure 44 Expenditure by game-fishing tournament respondents (boat owners) by site per tournament event**

Boat owners in Port Stephens were the highest spenders on boat fuel, fishing equipment, accommodation, food and beverages and mooring. Bermagui respondents spent the most on boat equipment and least on fuel (Figure 44).

Large cruisers dominated game-fishing activities in Port Stephens, explaining the large expenditure on fuel, fishing and boat equipment there. By contrast, Bermagui game-fishing activities were dominated by smaller trailer boats, explaining the lower expenditure on those items there.

**Figure 45 Expenditure by game-fishing tournament respondents (non-boat owners) by site per tournament event**

Expenditure by non-boat owners in Port Stephens reflected that of boat owners—most of their expenditure was on boat fuel, food and beverages. Non-boat owners at Bermagui spent more on fishing equipment than did non-boat owners at the other two sites. Boat equipment was the biggest item of expenditure for non-boat owners in Mooloolaba (Figure 45).

Boat fuel, boat equipment and fishing equipment expenditure might be overestimated because some respondents might report the overall boat expenditure rather than their own personal expenditure; contributions might not be equally distributed between game fishers in the same party. Some may pay more for boat fuel, while others might cover the boat, fishing equipment or boat equipment costs. This issue is highlighted in Figure 44 and Figure 45, which indicate a substantial expenditure by non-boat owners on boat fuel and equipment.

The expenditure of non-tournament respondents is presented in Table 24. The non-tournament data is dominated by trailer boats (game-fisher surveys intercepted very few non-tournament cruisers). The results show that non-tournament boat owners in Bermagui and Port Stephens spent the most on boat fuel, while Mooloolaba boat owners spent the most on fishing equipment. Non-boat owners in Ports Stephens, Bermagui and Mooloolaba spent the most on fishing equipment. The expenditure of non-tournament respondents was quite different to tournament respondents. However, further comparison between tournament and non-tournament respondent expenditure is not recommended because of substantial differences in sample sizes.

In two separate studies, Pepperell (1992, 2002) also found boat costs to be the highest item of expenditure for game fishers visiting Bermagui and Port Stephens. However, food and beverages was the next most expensive item in those studies, whereas fishing equipment was generally the next most expensive item in our study. The higher expenditure on fishing equipment in our study might be due to the development of more sophisticated (and expensive) fishing gear in the intervening years.

### Travel-cost models

The fuel usage of an adequate mode of transport and the number of kilometres travelled in a return trip to Bermagui or Port Stephens was used in travel-cost models. Based on respondent postcodes, the number of kilometres travelled was verified using Google maps (Table 25). Zero-truncated Poisson and zero-truncated negative binomial models were tested for tournament respondents only and for all respondents combined. Two different versions of the models were compared.

**Table 25 Average expenditure on travel for each site**

Variable	Bermagui		Port Stephens		Mooloolaba	
	Average	SD	Average	SD	Average	SD
Travel distance (km)	470	391	282	672	133	346
Travel time (h)	5.6	4.0	2.8	2.1	1.7	4.1
Travel cost including travel time (\$)	292	177	181	247	152	369
Estimated travel cost per trip (\$)	166	138	116	224	123	363
Adults per vehicle (no.)	2.7	1.5	2.5	1.6	2.3	1.3

SD = standard deviation

As expected, survey results showed that the number of visits tended to diminish as the travel cost rises. However, this relationship is not linear, and the data are characterised by over-dispersion. One observation in the Bermagui sample and three observations in Port Stephens were identified as extreme values for the number of visits and were omitted from the dataset.



The results of various models were compared using Akaike Information Criterion and the Bayesian Information Criterion Log-likelihood test. The count models for Mooloolaba could not be estimated due to the small number of responses. The best models with significant coefficients were selected for Port Stephens and Bermagui. The results reveal that the zero-truncated negative binomial model, which accounts for over-dispersion, outperformed the zero-truncated Poisson model. The results of the best zero-truncated negative binomial models for Bermagui and Port Stephens are presented in Table 26. Based on chi-squared statistics it can be concluded these models are significant.

Coefficients are signed as expected. For example, the number of trips declines as travel costs increase in both models. The Bermagui model indicates that the likelihood of undertaking game-fishing trips increases when respondents are game-fishing club members, if they travel with family and if game fishing is not the only reason for the trip. The Port Stephens model indicates that younger respondents, respondents who travelled with family and who did not use a four-wheel drive for this trip are more likely to undertake a game-fishing trip to this site. The Bermagui and Port Stephens models show significant over-dispersion in the data.

**Table 26 Negative Binomial travel-cost models for Bermagui and Port Stephens**

Attribute	Coefficient	Standard error
<b>Bermagui</b>		
Travel cost per trip (return)	-0.0030***	0.0009
Club member	1.1627***	0.3748
With family	0.7135***	0.2362
Game fishing as main reason	-1.0782**	0.7599
First time	-2.3149***	0.5512
Constant	1.0341***	0.7308
Number of observations	158	–
Log-likelihood	-323.11	–
Chi-squared	41.72	–
Degrees of freedom	5	–
Alpha	1.6510	0.6760
<b>Port Stephens</b>		
Travel cost per trip (return)	-0.0059***	0.0011
Age	-0.0179**	0.0083
With family	0.6448***	0.2554
Travelled by four-wheel drive	-0.5003**	0.2481
First time	-1.9390*	1.1448
Constant	2.6413***	0.4843
Number of observations	149	–
Log-likelihood	-360.08	–
Chi-squared	39.68	–
Degrees of freedom	5	–
Alpha	1.8649	0.6484

\*\*\* = significant at 1% level; \*\* = significant at 5% level; \* = significant at 10% level

### Estimating game-fishing trip value

The net economic value (NEV) of game-fishing trips to Port Stephens and Bermagui was calculated using the travel-cost estimates (Table 25). The net economic value represents the difference in individual willingness to pay and actual expenditure on the game-fishing trip. The mean net economic value for these demand models was estimated using the negative inverse of

the travel-cost coefficient  $1/\beta$  travel cost. The net economic values per trip and confidence intervals are presented in Table 27.

**Table 27 Travel cost estimates of net economic value (NEV)**

Quantity	Bermagui	Port Stephens
NEV per trip	\$334	\$168
95% confidence intervals	\$207–869	\$123–265
NEV per adult /per trip	\$124	\$67
95% confidence intervals	\$77–321	\$49–105
Aggregated NEV	\$302 135	\$279 976
95% confidence intervals	\$187 916–782 139	\$204 759–438 768

The analyses show that the mean net economic value calculated for game-fishing activity was \$334 per trip (\$124 per adult per trip) for Bermagui tournament respondents. The mean net economic value for Port Stephens was \$168 per trip (\$67 per adult per trip). Wide confidence intervals for the Bermagui sample highlight the relatively small sample size combined with the high level of heterogeneity in the types of recreational users and visitation patterns.

The net economic values for the tournament respondents was calculated, but the total number of visits to the survey sites by all game fishers is unknown. The aggregated net economic value per trip was multiplied by the average number of trips undertaken by respondents and multiplied by the total number of all participants in each game-fishing tournament to obtain an aggregated annual net economic value. While the mean net economic value per trip per adult obtained from Bermagui was higher than that for Port Stephens, the aggregated annual net economic value for all tournament participants was similar between the two sites (Bermagui \$302 135, Port Stephens \$279 976). This was due to higher visitation rates in Port Stephens (5.6 trips per year) compared to Bermagui (4.0 trips per year). The estimation of the aggregated annual net economic value for all the tournament participants was based on the assumption that all the passengers in the vehicle were participating in the tournament, which may not be the case.



Cruiser returning from a day's game fishing, Bermagui (Marton, ABARES)

## 4 Value to regional communities and businesses

### Background

This section presents results exploring the value of game fishing to people who owned or managed local businesses or were involved in community services in the three survey sites (Bermagui, Port Stephens and Mooloolaba). The aim was to explore the value of game-fishing activities to businesses and wider community, rather than to the resource users (i.e. game fishers). The surveys captured perspectives on the flow-on benefits of game fishing. The focus is on the value added by tournaments in particular, but also by year-round game fishing. The business and community survey did not seek to determine the exact amount of income received from game fishing (i.e. how much money flows to businesses or beyond). Instead, the aim was to understand qualitatively the difference that game fishing makes to businesses and the wider community.

### Methods

#### Interview questions

A variety of businesses in each site were interviewed to obtain perspectives on the benefits and drawbacks of game fishing (Appendix F). The project advisory committee validated draft survey questions, including the terminology used in these questions and the range of values that they covered. The aim was to interview about 35 businesses and 10 community service providers. Target sample sizes were exceeded at each site.

The business survey focused on the extent to which game fisher clientele and game fishing-derived income was important to businesses. The questions aimed at understanding the importance of tournaments and seasonal game-fishing activities to the businesses. Business respondents were also asked about their views on the merits of game-fishing tournaments to their community. The dependence of businesses on game fishing was measured in several different ways, including:

- the proportion of business clients who were game fishers
- game-fishing tournament effect on sales and income
- proportion of turnover received from game-fishing clientele
- importance of game-fishing tournaments for financial viability
- importance of game-fishing clientele to business throughout the year.

These proportions were estimated by respondent type, i.e. the business owner, manager or a business representative at the premises. Community service providers were also interviewed at each site to obtain views on the importance of game fishing to the broader community. The community survey focussed on benefits and drawbacks of game-fishing tournaments and associated activities for the local community. Some questions were the same as the business version of the survey to facilitate comparison of responses between businesses and community service providers.

**Table 28 Number of respondents to business and community surveys**

Type of respondent	Site			Total number	Per cent of total	Type of business or service provider
	Bermagui	Port Stephens	Mooloolaba			
Fishing related businesses	4	11	16	31	19.9	Tackle and bait, boat and marine services, boat fuel, seafood association
Charter boat operators	3	4	2	9	5.8	Game-fishing charter operators, scuba diving or training operators, cruise boat operators, other boat hire
Food and hospitality	16	36	8	60	38.5	Accommodation, food and beverage
Other services	10	24	7	41	26.3	Local newspaper, newsagents, pharmacy, post office, corner stores, supermarkets, hardware, real estate, liquor, clothes shops, boutiques, gift shops
Community service providers	6	4	3	13	8.3	Council, tourist information, chamber of commerce, library, game-fishing clubs, coast guard
Visitor/tourist	0	1	1	2	1.3	Visitors, tourists
Total returned surveys:	39	80	37	156	100.0	
Refusals (approx.)	0	4	33	37	–	

Topics covered by survey questions included:

- proportion of business clientele connected to game fishing
- proportion of business turnover from game-fishing clients
- the effect of game-fishing tournaments on business sales and income
- level of importance of game-fishing activities to financial viability of business
- respondent views on the benefits and drawbacks of tournaments that occur in the community
- importance of game fishing for community vitality
- profiling information about the business, including type of business, number of employees and length of ownership
- other demographic information (e.g. age, gender).

Response categories consisted of value scales and categorical answers. Respondents were typically asked to give a rating of importance (e.g. 'very important', 'important', 'moderately important') or to indicate to what extent they agreed or disagreed with a series of statements (e.g. 'strongly agree', 'agree', 'neutral').

## Data collection strategy

Business owners or managers and community service providers in each site were identified through Internet searches of commercial directories, community service websites (e.g. councils, chambers of commerce) and through local contacts provided by the project advisory committee.

The survey involved 10-minute, structured face-to-face interviews of respondents during a two-day field trip to each survey site. Field trip dates were chosen to be a week or two after a game-fishing tournament so that the effect of the event was fresh in the minds of respondents. Survey dates and areas were:

- 1) Bermagui, 31 January–2 February 2011. Surveys centred on the main centre of the town, including Lamont and Bunga Streets
- 2) Port Stephens, 14–16 March 2011. Survey activity covered the Shoal Bay, Little Beach, Nelson Bay and Soldiers Point areas
- 3) Mooloolaba, 9–11 May 2011. Survey activity was centred on the Mooloolaba Esplanade, Parklyn Parade and Brisbane Road areas. Staff also covered specific businesses related to game fishing in Minyama and Buddina.

The data collection strategy was not random or statistically representative; it was therefore a mixture of purposive and site-based sampling. It was directed towards businesses that were likely to depend on game fishers by virtue of the type of business (e.g. fishing related) or because they were located in the vicinity of where game fishing occurred or were likely to attract game-fishing clientele. However, attempts were made to target businesses and service providers in each of the categories in Table 28. Response rates are summarised in Table 28 as well as refusal rates (i.e. people who were approached but said they did not want to participate in the survey). The main reasons for non-participation included: they were not aware of a game-fishing tournament and did not feel that they knew anything about game fishing, or that game fishing had little relevance to their business or to the wider community.

Appointments with business owners or managers and community service providers were arranged beforehand where possible and face-to-face interviews were conducted in the field or by phone. A fact sheet and invitation to participate in the survey were emailed to potential respondents (Appendix F). Respondents were assured that the information that they provided would remain confidential and would be reported in aggregated form so they would not be identified. Extensive opportunistic door-knocking of businesses and community members was also undertaken during field trips to locate respondents. Survey forms were occasionally dropped off at business premises and picked up later from respondents, especially for businesses that were busy with customers at the time of the survey visit. Some respondents preferred to complete a written survey, while others were happy to discuss their views on the value of game fishing at length in an extended interview.

## Data analysis

Analyses involved descriptive statistics for relevant survey questions for businesses and community service providers across common questions. Analysis also included comparison between sites. Comments that respondents had written (or were verbally recorded by the researcher) on the survey forms were also summarised.

## Results and discussion

### Characteristics of surveyed businesses and community members

Survey responses were obtained from a total of 127 businesses and 29 community service providers across the three survey sites (Table 28). Eighty-eight per cent of the 156 business and community respondents were aware that there was a game-fishing tournament at the site in the week(s) prior to the survey.

Although the majority of respondents in each site indicated that they hire seasonal staff (Figure 46, Figure 47 and Figure 48), it appears that most businesses do not hire additional staff for game-fishing tournaments (Figure 49). Comments made by business representatives while the survey data was collected suggested that businesses responded to the increased demand by increasing the hours worked by their existing staff and therefore there is likely to be more income earned during game-fishing tournaments. This suggests that the reason most businesses hire additional staff is to manage the overall increase in numbers of visitors during the tourist season (which overlaps the game-fishing season).

Sixty per cent or more of respondents in Port Stephens and Bermagui had family members helping with the business in some capacity (predominantly in paid positions). In contrast, 40 per cent of respondents in Mooloolaba reported family assistance within the business (Figure 50).

Most respondents across the three sites had owned or managed a business for 4–10 years (Figure 51). There was a greater proportion of respondents new to the business in Port Stephens (0–3 years) compared to the other two sites. In Mooloolaba, most respondents had been with the business for more than 10 years. Respondents from Mooloolaba and Port Stephens tended to be younger than Bermagui respondents (Figure 52).



Sharks are often tagged and released by game fishers (Ward, ABARES)

Figure 46 Employees in businesses—Bermagui

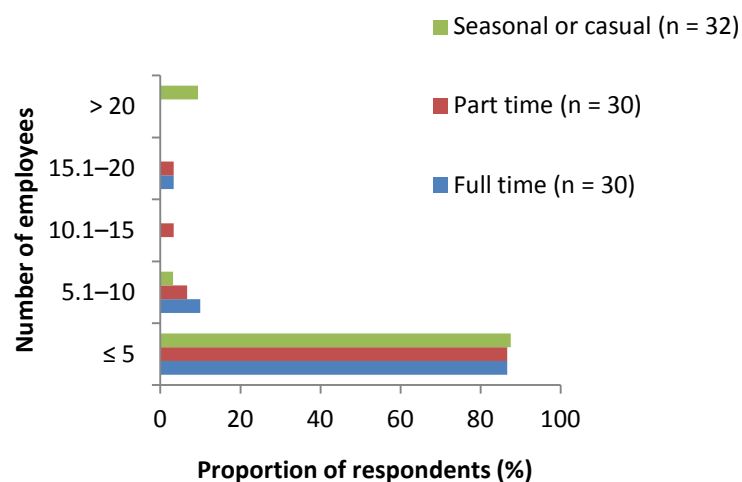


Figure 47 Employees in businesses —Port Stephens

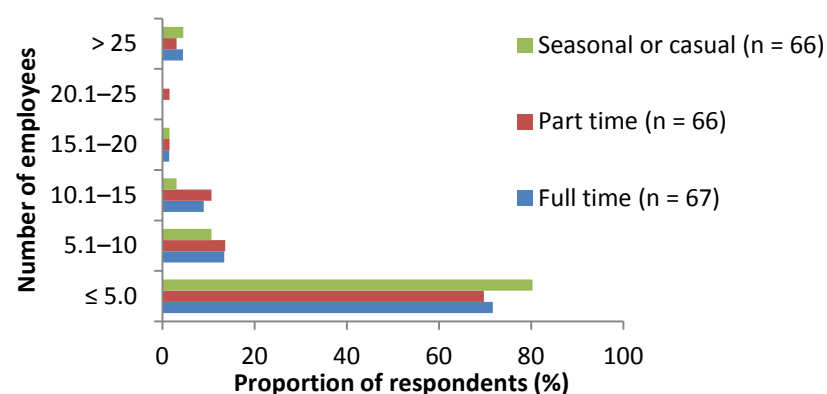


Figure 48 Employees in businesses—Mooloolaba

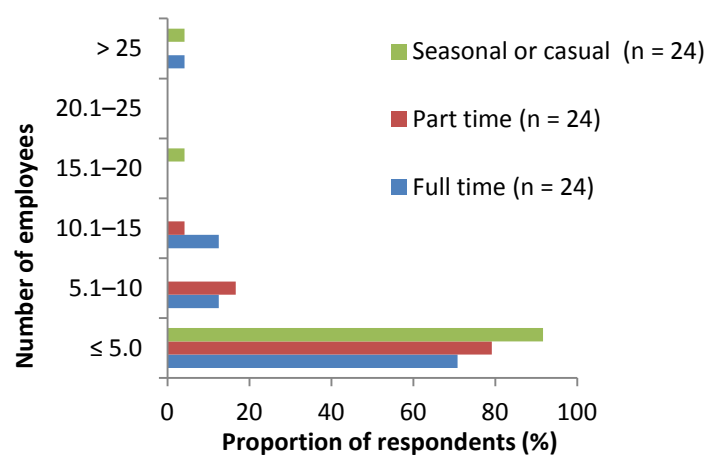


Figure 49 Engaging additional staff during a game-fishing tournament

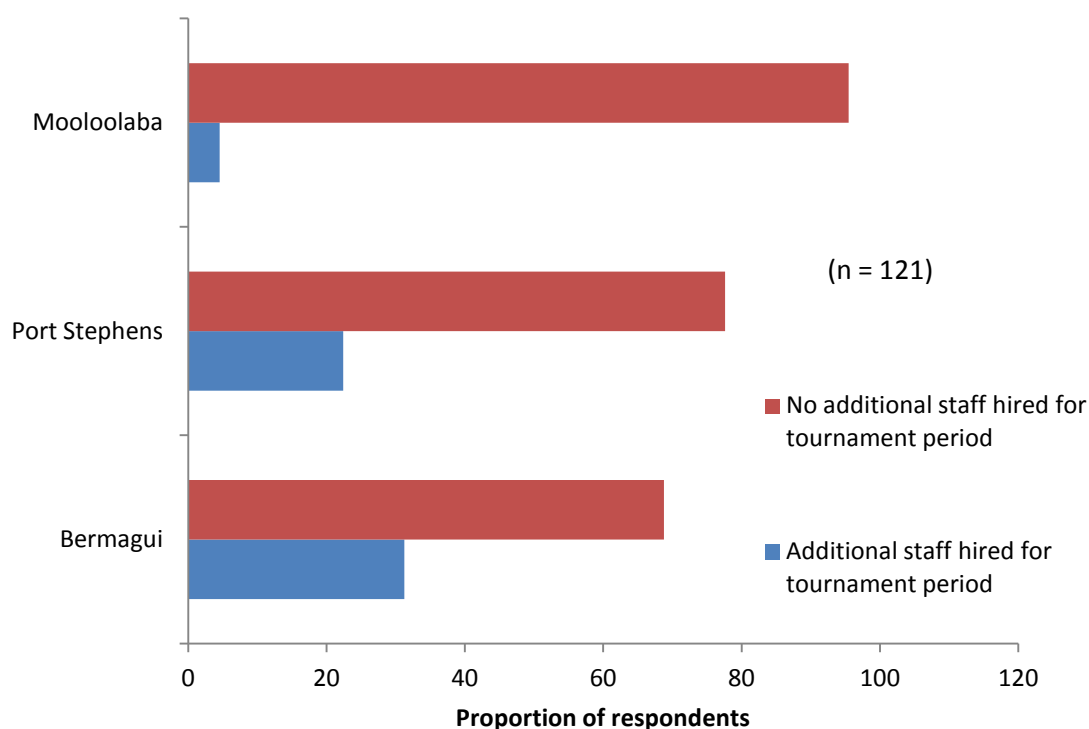


Figure 50 Family members helping with the business

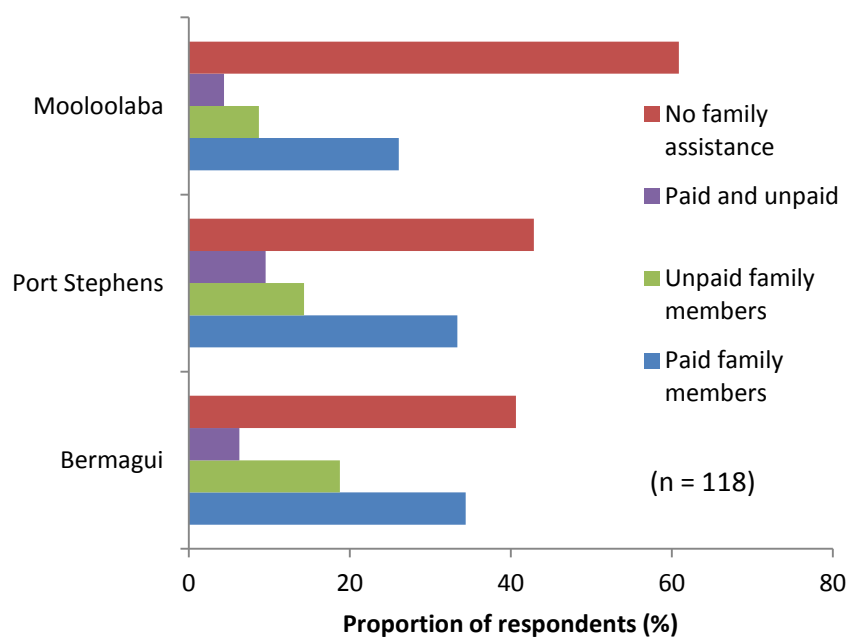




Figure 51 Duration of ownership or managing the business

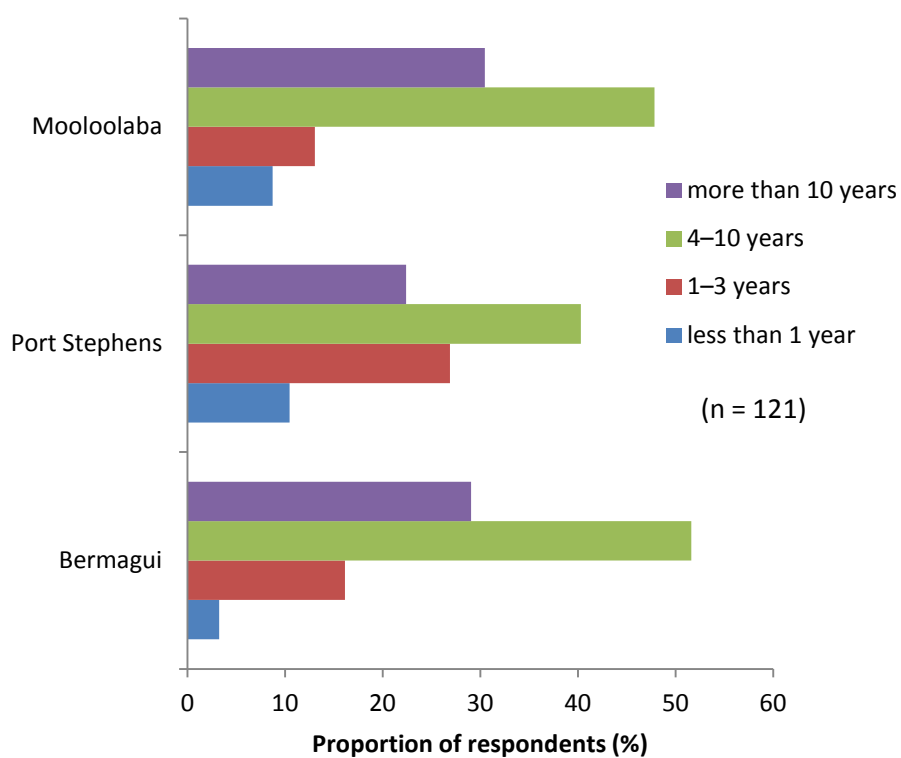
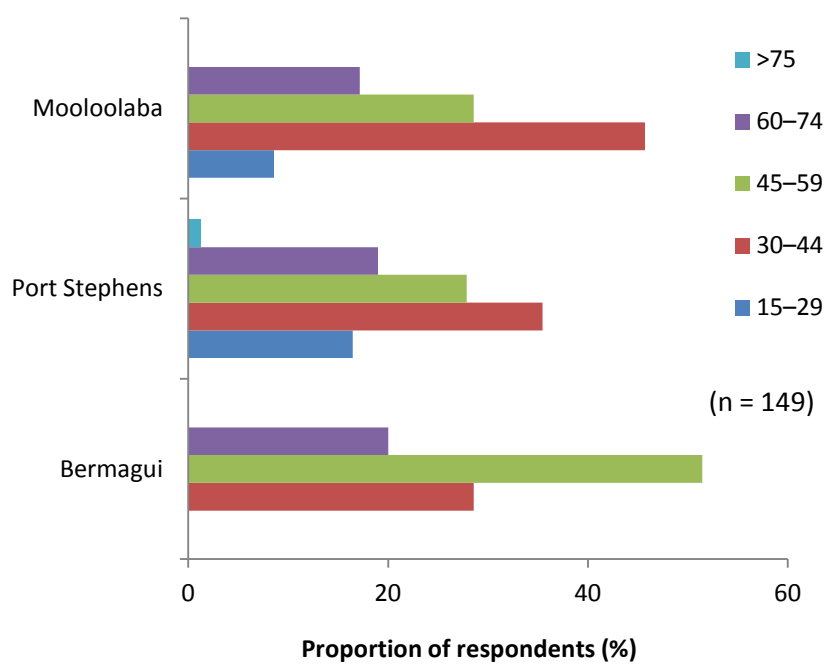


Figure 52 Age group of respondents (business and community members combined)



## Business dependence on game fishing

Most business respondents were involved in food and hospitality industries, followed by 'Other services' (mostly local retailers) and fishing-related businesses (Table 28). More than 20 per cent of business respondents were unsure if their clients were game fishers. This was probably because many businesses could not differentiate their clientele. Game fishers made up 50 per cent or more of the clientele for approximately 20 per cent of business respondents (Figure 53).

Data collected from businesses included their number of employees, engagement of seasonal staff, part-time employees and family members. The majority of respondents (60 per cent) indicated that their business benefitted in some way from game-fishing tournaments. Game-fishing tournaments significantly increased the income of more than 30 per cent of business respondents and slightly increased the income of approximately 35 per cent of business respondents (Figure 54). There were only three respondents who indicated that game-fishing tournaments reduced their business sales and income, including two cooked food outlets and a charter boat operator (Figure 54). About 15 per cent of respondents indicated that more than half of their turnover was derived from their game-fishing customers, highlighting the level of importance of game-fishing activities to these businesses (Figure 55). Most respondents (60 per cent) indicated that they received a smaller but still important proportion of their turnover (i.e. <30 per cent) from game-fishing clients (Figure 55). This was consistent with responses to other questions about business dependence on game fishing. For example, just over 40 per cent of respondents indicated that game-fishing tournaments were important to the financial viability of their business, while the remaining respondents felt it was not important or only slightly important (Figure 56). Similarly, most respondents (61 per cent) indicated game fishing was important to their business just prior to or during a tournament. About half of the respondents from Mooloolaba and Port Stephens felt that game-fishing clientele were important to their business throughout the entire game-fishing season (Figure 57).

For the majority of respondents, game fishing had little or no effect on their business outside the game-fishing season. Comments made by some respondents, however, indicated that income generated during the game-fishing season was important for keeping their businesses viable during the remainder of the year:

*... tournaments provide a boost to get businesses through the winter months after the summer holiday season has finished.*

Comments made by some respondents indicated that, although important, the tourism season over the summer months is more important to local businesses than game-fishing tournaments:

*... it brings a longer tourism season. Most money is made during Christmas but we have loyal locals who come through the year too.*

Some felt their business would continue to operate without the game fishing industry. However, many would have to make cutbacks (to staff or operating hours, for example) if game fishing income was not available:

*... game fishing is huge for us, without it we would have to cut staff.*

Game-fishing activities and tournaments provided welcome extra income for some businesses that provide services directly to game-fishing clients and game-fishing tournament events at all three sites. These providers included boat and marine workshops, parts and maintenance, some fuel outlets, some accommodation and food and beverage outlets (e.g. those hosting game-fishing club tournament events). Some of these businesses said they had a diverse customer base and also provided services to yachting clientele and commercial fishing vessels.

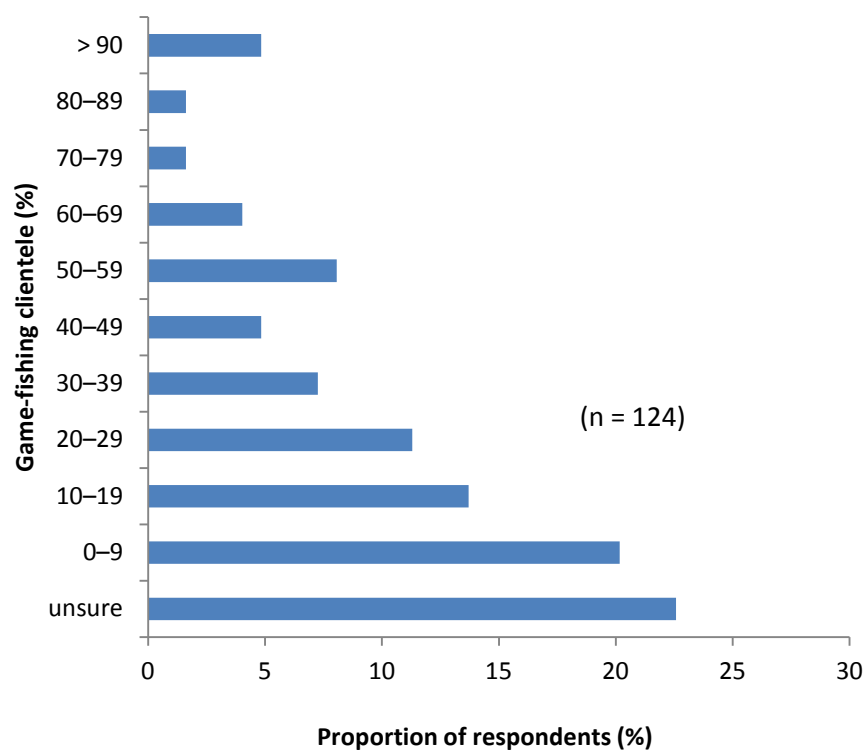
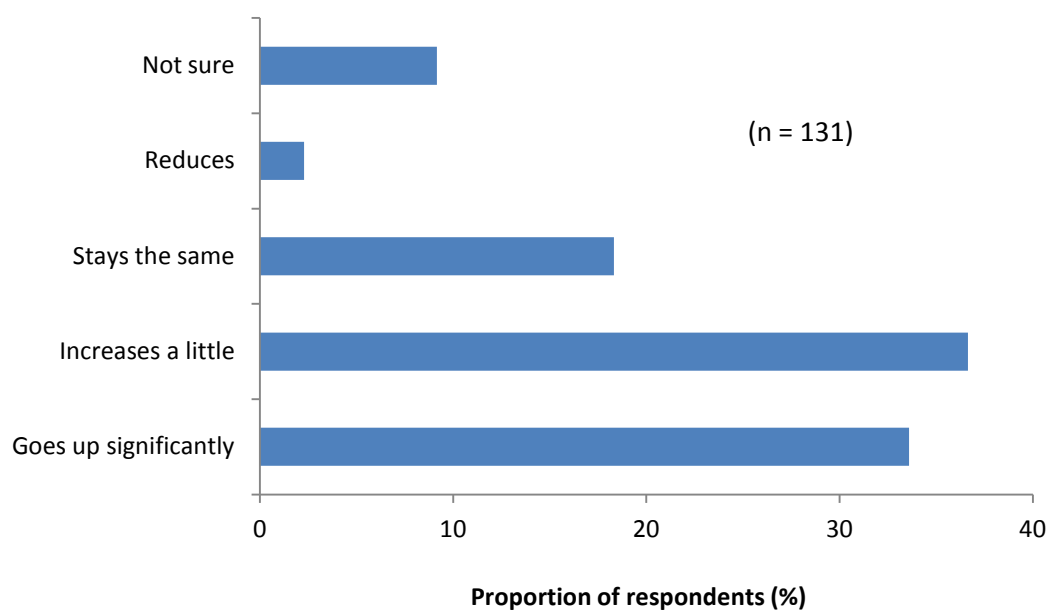
**Figure 53 Proportion of clientele who are game fishers****Figure 54 Sales and income affected by game-fishing tournaments**

Figure 55 Proportion of income received from game-fishing clientele

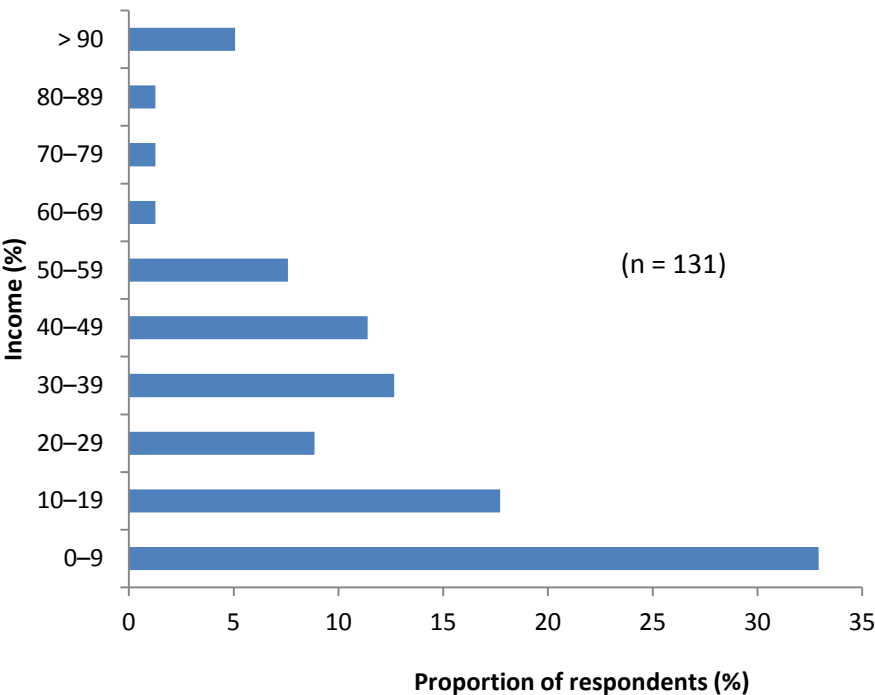
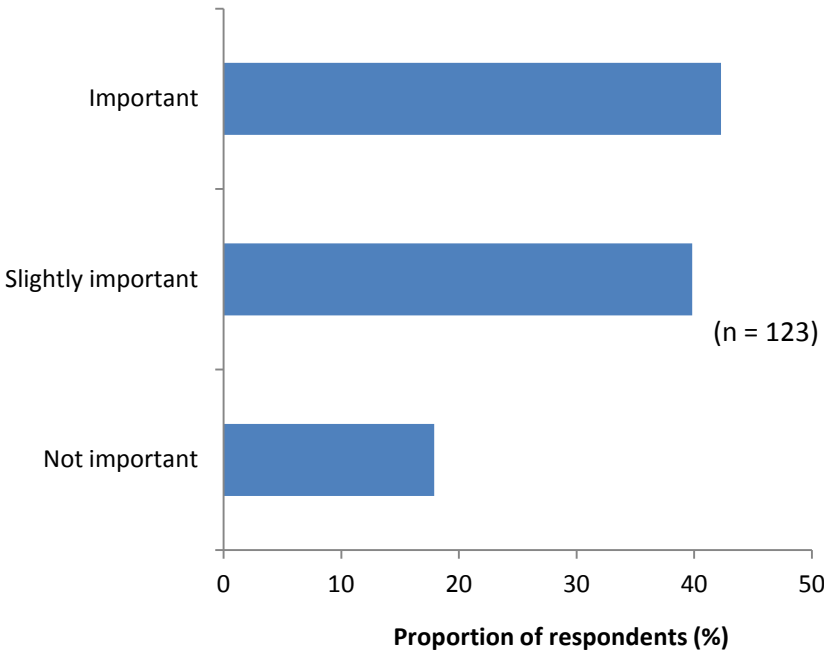
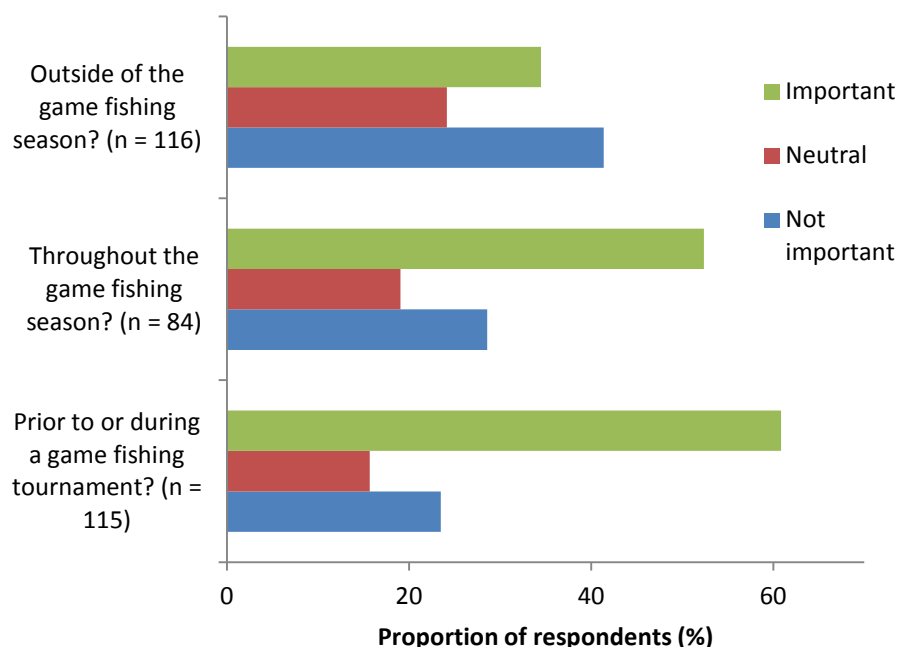


Figure 56 Importance of game-fishing tournaments for financial viability of the business



**Figure 57 Importance of game-fishing clientele to business throughout the year**



### Importance of game fishing to the wider community

Business and community respondents were asked how much game-fishing tournaments contribute to the vitality of their local community. Community vitality is the capacity to live, grow or develop to support a vibrant community and includes activities that make the community a better place to live. This description was provided to respondents if they asked or were not sure what community vitality meant.

Most respondents (69 per cent) thought that game-fishing tournaments were important to their community's social vitality. About 30 per cent thought that tournaments were only slightly important or were not important (Figure 58).

Some respondents believed game fishing not only provides a social outlet for the game fisher but also for their families. Similarly, game fishing was considered as an opportunity to bring the town together and give the community an opportunity to showcase the region:

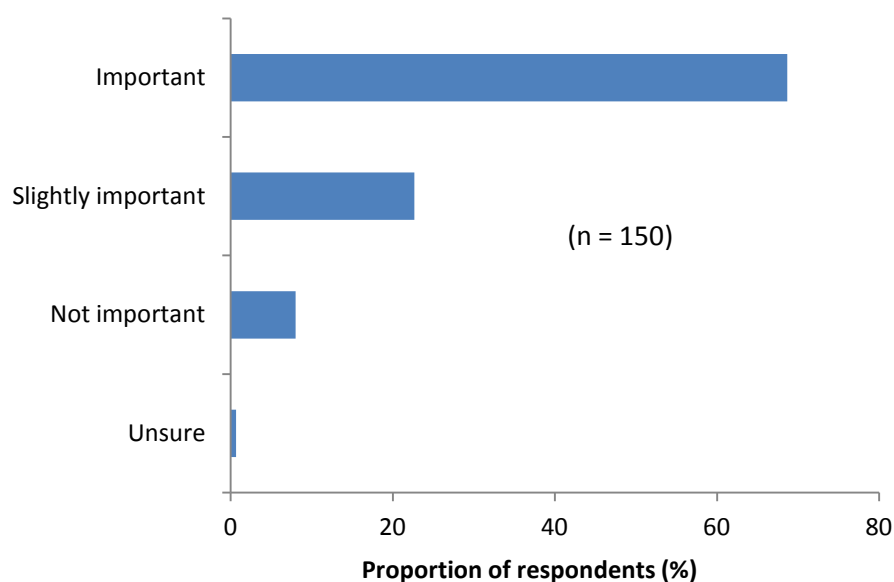
*... it keeps the small businesses operating and brings local community members together as they watch the catches come in and meet up with each other.*

Many respondents believed the income generated from game-fishing tournaments is important in providing assistance to community groups through mechanisms such as sponsorship. For example, respondents stated that donations from businesses to community groups would not be possible without the income generated from game-fishing tournaments:

*... we contribute \$30 000 each year to the Bermagui community through donations and sponsorship. Without the income from game fishing this wouldn't be possible.*

Rates of volunteering can also be a potential indication of the levels of social capital—the social bonding and ties that hold communities together. All respondents (business as well as community) were asked if they had volunteered in the past for their community. Around 70 per cent of respondents had volunteered in Mooloolaba and Bermagui, while about 35 per cent volunteered in Port Stephens (discussed further in 'Volunteering activities').

**Figure 58 Importance of game-fishing tournaments for the social vitality of the community**



Trailer boats queuing at a Bermagui boat ramp at dawn (Ward, ABARES)

## Characteristics of businesses and community members

Over 20 per cent of respondents engaged additional staff during game-fishing tournaments and over half of the respondents had family members helping with the business (Figure 59 to Figure 66). About 30 per cent of respondents paid family members for their help (Figure 63). The majority of respondents had owned or managed the business for 4–10 years. One-quarter of respondents had owned or managed the business for more than 10 years (Figure 64).

Figure 59 Number of full-time employees

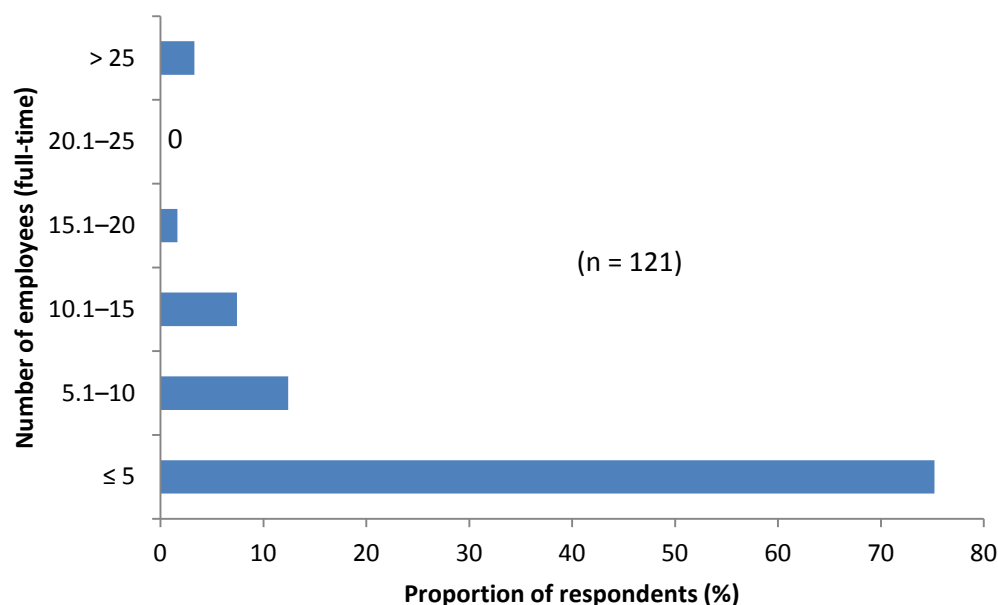
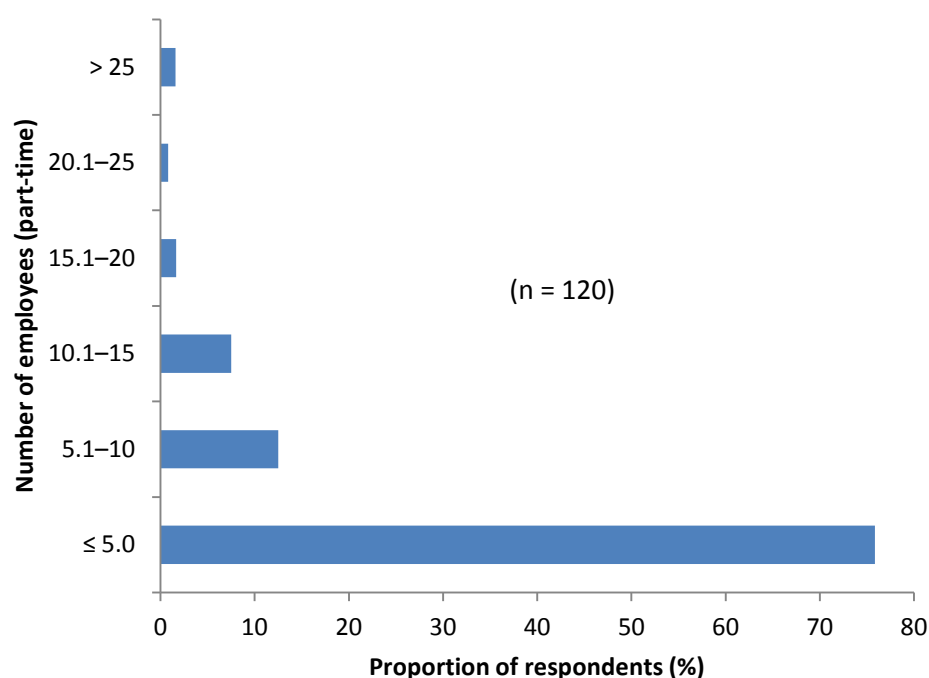
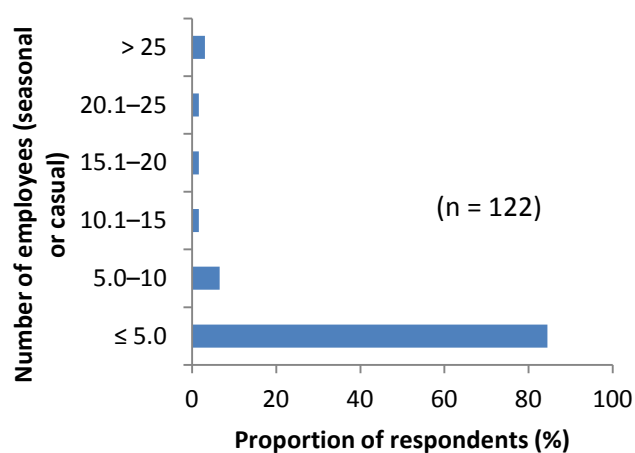
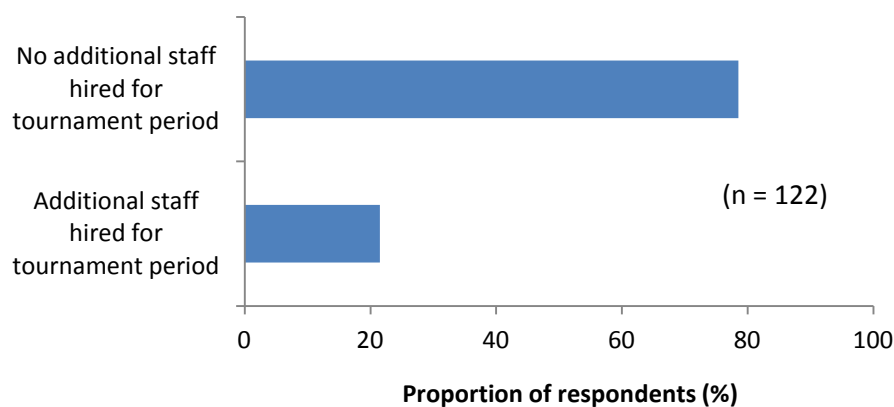
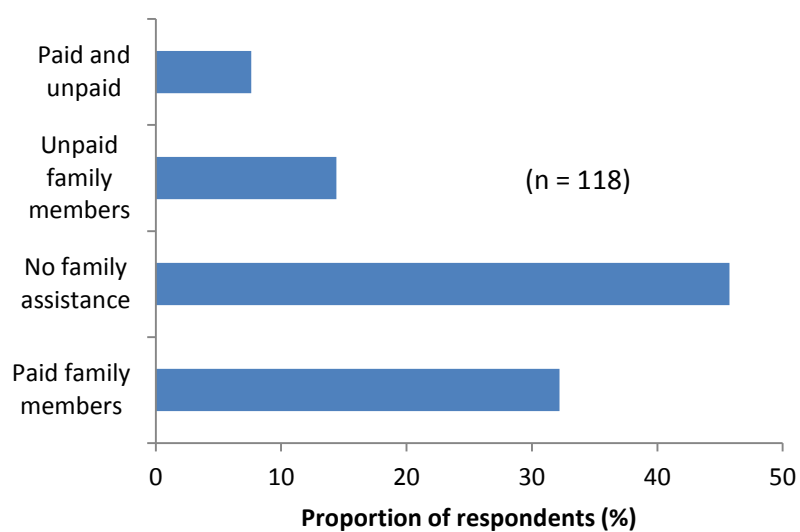
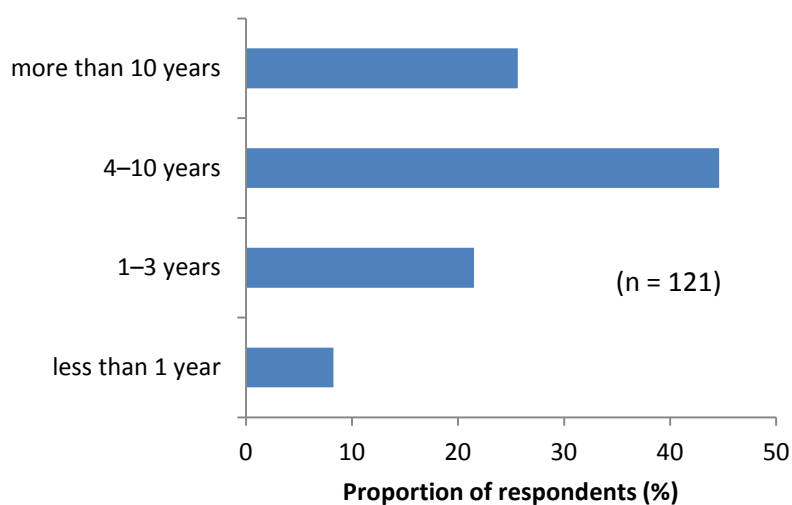
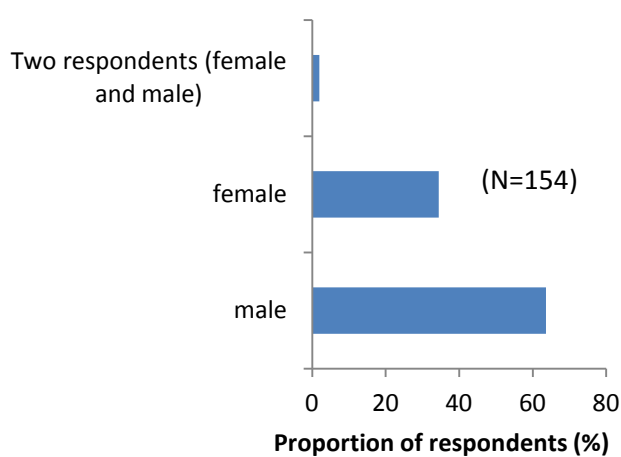
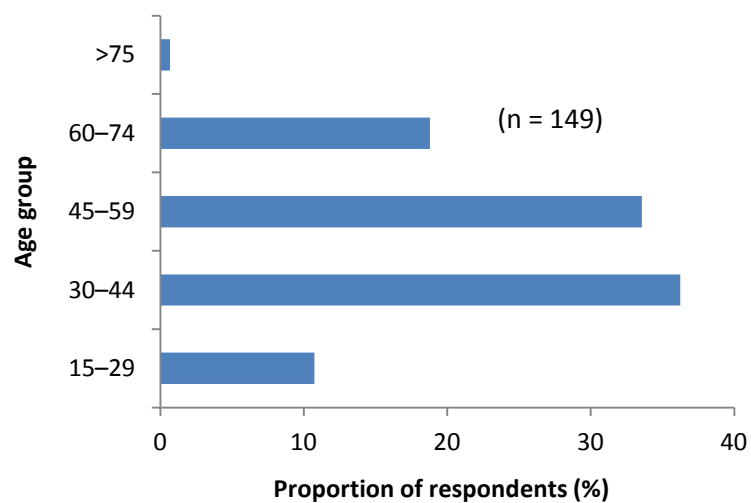


Figure 60 Number of part-time employees



**Figure 61 Number of seasonal or casual employees****Figure 62 Engaged additional staff during game-fishing tournaments****Figure 63 Family members helping with the business**

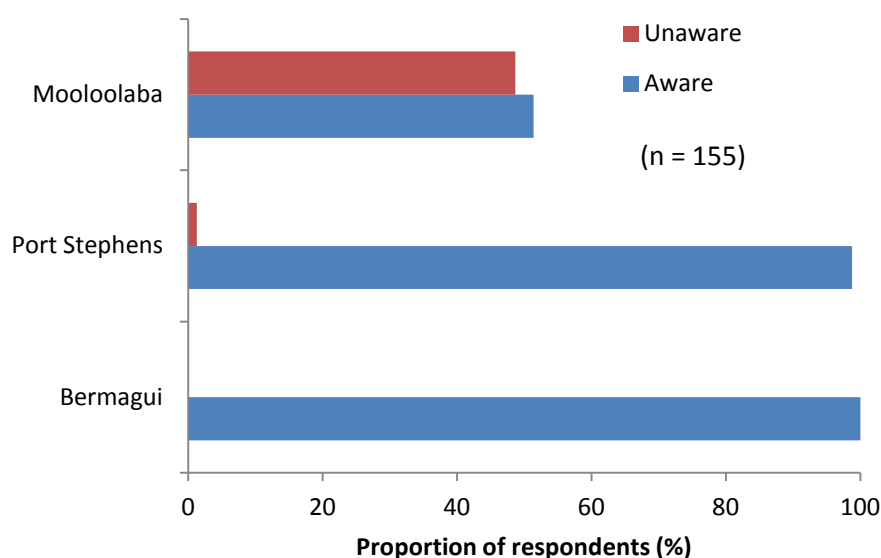


**Figure 64 Duration of ownership or managing the business****Figure 65 Gender of respondents (businesses and community members combined)****Figure 66 Age group (businesses and community members combined)**

## Comparison of values among sites

Almost all business and community survey respondents in Port Stephens and Bermagui were aware that there was a game-fishing tournament in the previous week or weeks. However, there was much less awareness in Mooloolaba, where only about half the respondents knew of the game-fishing tournament (Figure 67). There was widespread awareness of the Bluewater Classic game-fishing tournament in Bermagui because of media reports and also because people saw an increased number of cars and trailers parked on the headland where the tournament is held.

Figure 67 Awareness of game-fishing tournament—regional comparison



## Dependence of businesses on game fishing

Businesses in Bermagui reported more reliance on game-fishing customers than in the other regions (Figure 68 to Figure 71). Business and community representatives in Bermagui consider game fishing as crucial to maintaining and enhancing commercial activities within the region. Many respondents indicated that, without game fishing, business would suffer. Some respondents stated that many businesses would have to close down or cut back on staff if game fishing ceased.

In contrast to Bermagui, businesses in Port Stephens were generally less dependent on game fishing for their financial viability. Many of the businesses had a diversified customer base, with a considerable dependence on general tourism (Figure 69 and Figure 70). Game fishing was seen to extend the tourist season or provide a helpful 'extra boost' for many businesses.

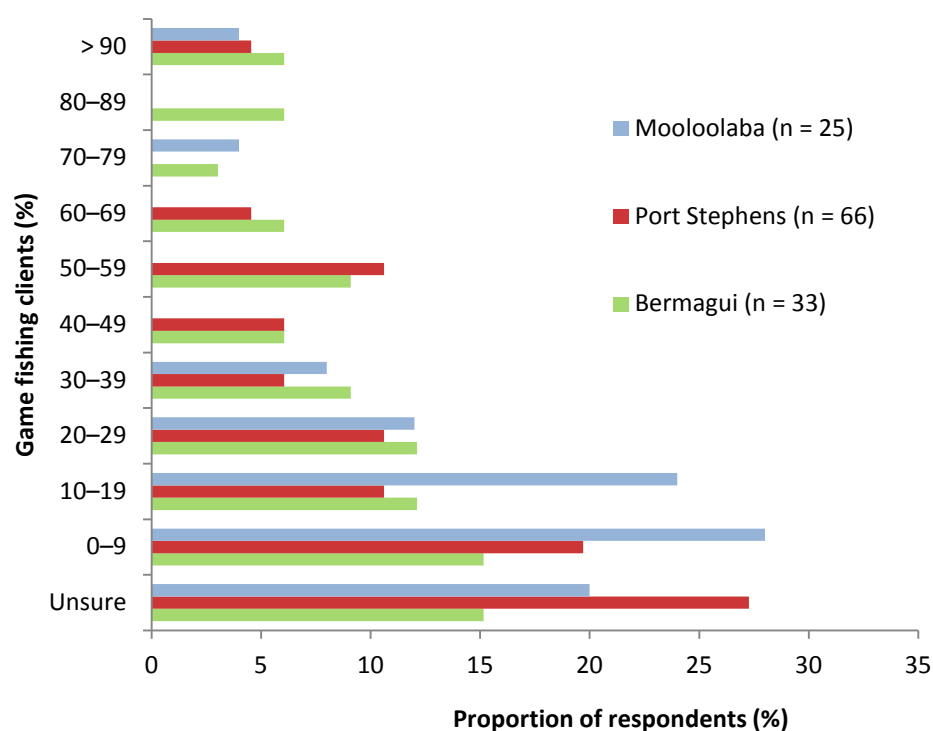
In their written comments, respondents from Port Stephens indicated that they were aware of the contribution that game fishers bring to the economy when they visit. Many were of the opinion that profits might decline if game-fishing tournaments were to cease; but it would not result in businesses closing because the tourism industry in the area was quite strong.

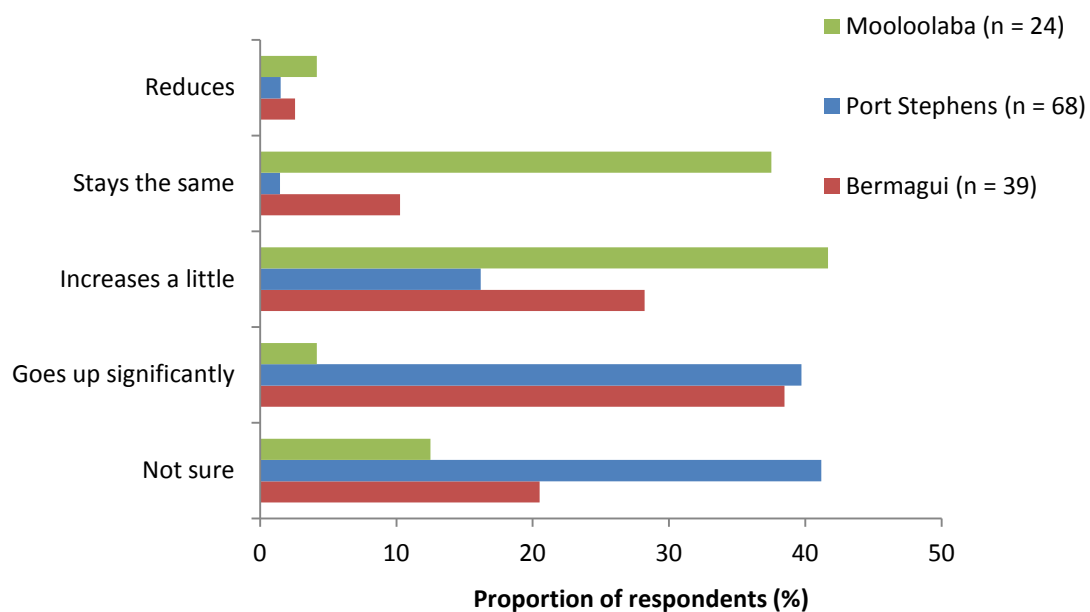
Only one respondent from each case study location indicated that game-fishing tournaments reduced their business sales and income (Figure 69). Two of these were cooked food outlets who indicated their income and sales were reduced during game-fishing tournaments because they either had customer access problems due to a busy car park during the event or had extra competition from mobile food sellers at the wharf. The third was a charter business operator whose income was reduced because the business was expected to take the event sponsors out on the water for free.

Mooloolaba respondents were less dependent on game-fishing activities and tournaments for financial viability than respondents in Bermagui and Port Stephens. Many of the businesses we spoke to depended on the main tourism season for customers and income, rather than game fishing-related activities. Many businesses were not sure if they depended on game fishing because it was too difficult to tell which customers were game fishers. This may be due to game-fishing activities in Mooloolaba being relatively small compared to other activities such as recreational fishing. There was also an indication that the tourism industry in general dominated the Mooloolaba area.

Financial viability was defined as being able to generate sufficient income to meet operating payments, debt commitments and, where applicable, to allow growth while maintaining service levels. The survey results show that in Bermagui, nearly 60 per cent of respondents saw game-fishing tournaments as important for the financial viability of their business. A smaller proportion in Port Stephens (just under 50 per cent) said game-fishing tournaments were important for their business viability. Most respondents in Mooloolaba felt that game-fishing tournaments did not affect their business financial viability (Figure 71).

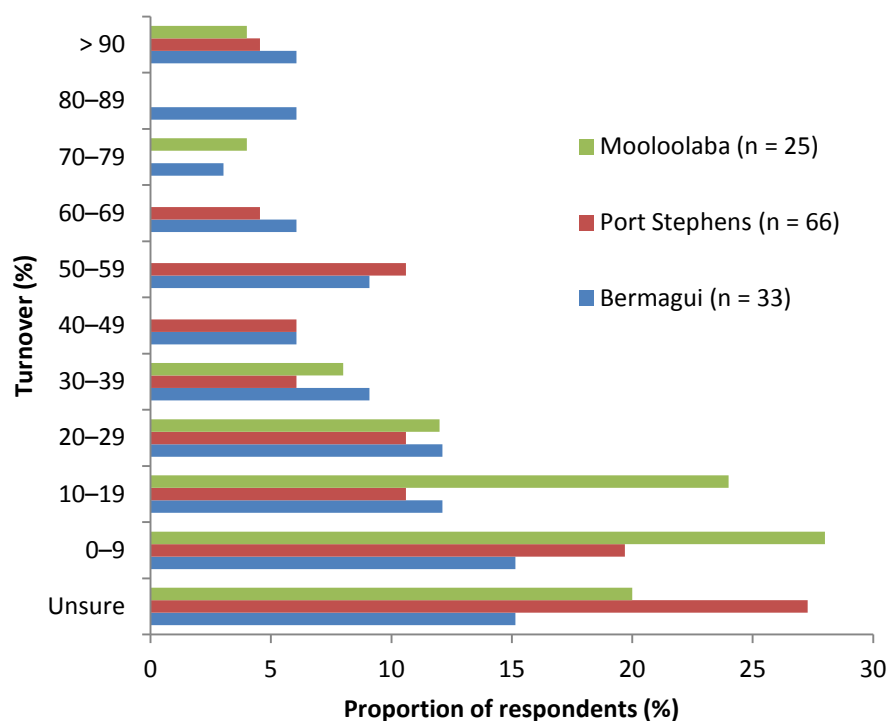
**Figure 68 Proportion of clientele who are game fishers—regional comparison**



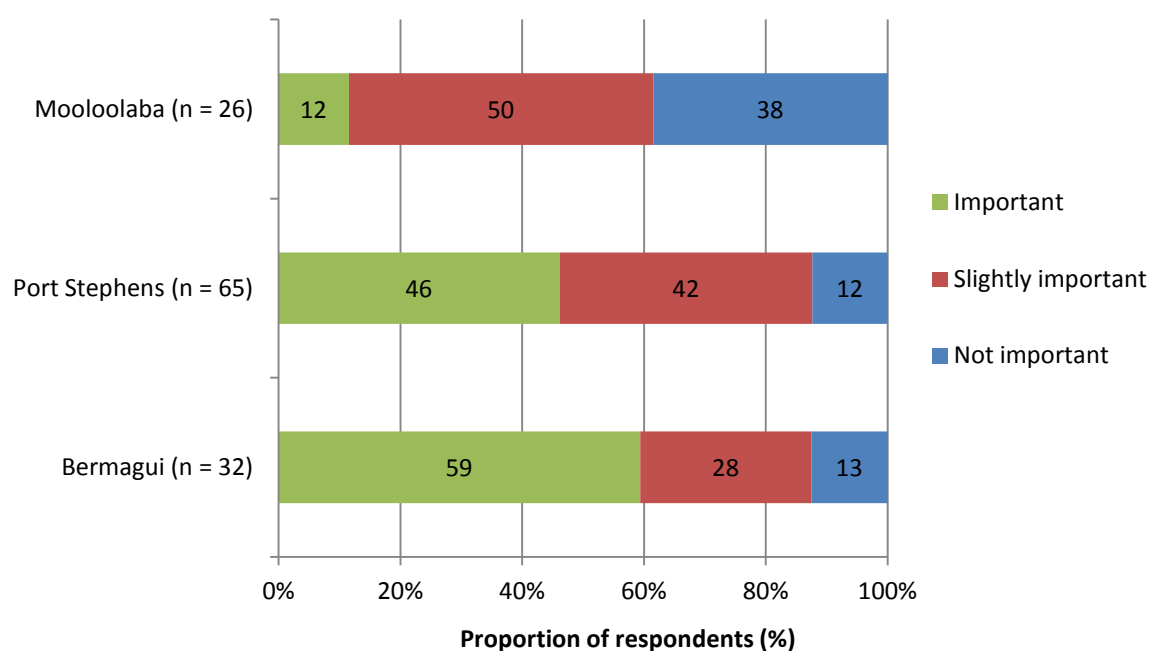
**Figure 69 Sales and income affected by game-fishing tournaments—regional comparison**

Cruiser competing in a game-fishing tournament (Leatherbarrow, ABARES)

**Figure 70 Proportion of turnover received from game-fishing customers—regional comparison**



**Figure 71 Importance of game-fishing tournaments for business financial viability—regional comparison**



### **Importance of game fishing to the wider community**

Seventy-five per cent or more of respondents in Bermagui and Port Stephens thought that game-fishing tournaments were important to the community's social vitality (Figure 72). However, most Mooloolaba respondents felt that tournaments were not important or were only slightly important for the social vitality of their community.

From speaking to the respondents, there seemed to be two main groups: those who were interested or involved with game fishing through their business or social life; and those who were not connected with game fishing and had little interaction with game fishers (e.g. retirees, tourists, some local business managers and owners). People described game fishers as a 'sub-culture' who kept to themselves. However, many who were not involved still acknowledged that game fishing was an important activity historically and that it continued to be beneficial to the town, particularly as a drawcard for tourists. This view was particularly strong in Bermagui.

Written comments from respondents in Bermagui indicated that they regarded game fishing as extremely important to maintaining and increasing the community's social vitality. Most who commented believed that game fishers are important for stimulating the economy, which in turn supports businesses and their ability to fund local events. Several respondents also indicated the influence that game fishing had on prioritising upgrades of local facilities. Not only does the income generated allow businesses to support the community, but government funding has also become available as a result of the popularity of game fishing in the region.

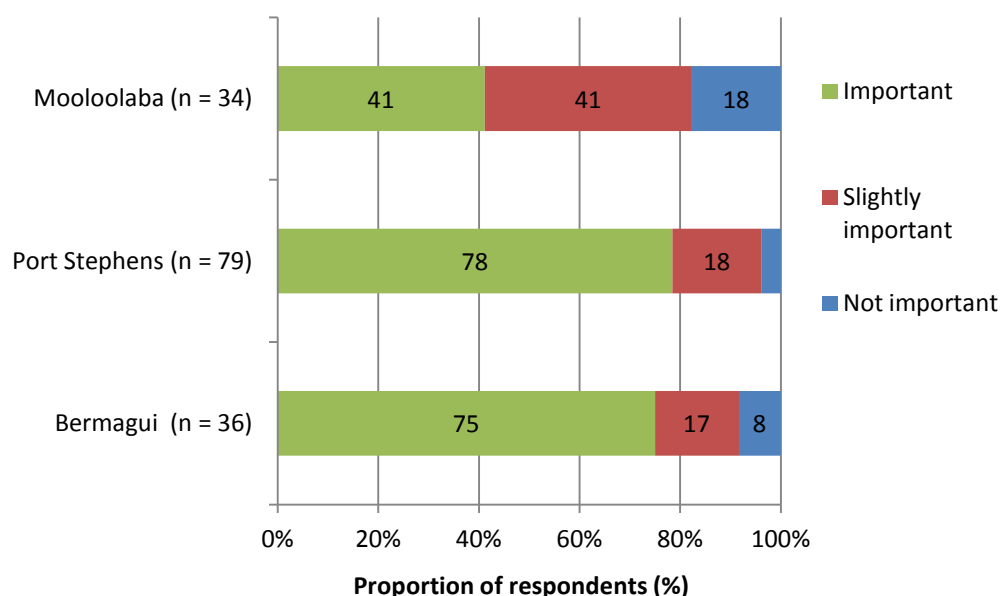
Similar to opinion in Bermagui, written responses from Port Stephens emphasised the important economic contribution that game fishers made to the area. By contrast, a number of respondents were in two minds as to the importance of game fishers to the region's social vitality. On one hand, they were happy with the money the sport injects into the community. However, some respondents were also of the opinion that game fishing is a sport associated with heavy drinking and behavioural problems.

Written comments by respondents from Mooloolaba suggested that, although game-fishing tournaments are only one of many events that contribute to the social vitality of Mooloolaba, these events are important for some businesses:

*... it keeps the small businesses operating and brings local community members together as they watch the catches come in and meet up with each other.*

### **Volunteering activities and game fishing—regional comparison**

The proportion of Mooloolaba and Bermagui respondents who had volunteered in the past was almost double that of Port Stephens. Seventy per cent of respondents in Mooloolaba and Bermagui had volunteered in their community, compared with 35 per cent of respondents in Port Stephens (Figure 73).

**Figure 72 Importance of game-fishing tournaments for community social vitality—regional comparison**

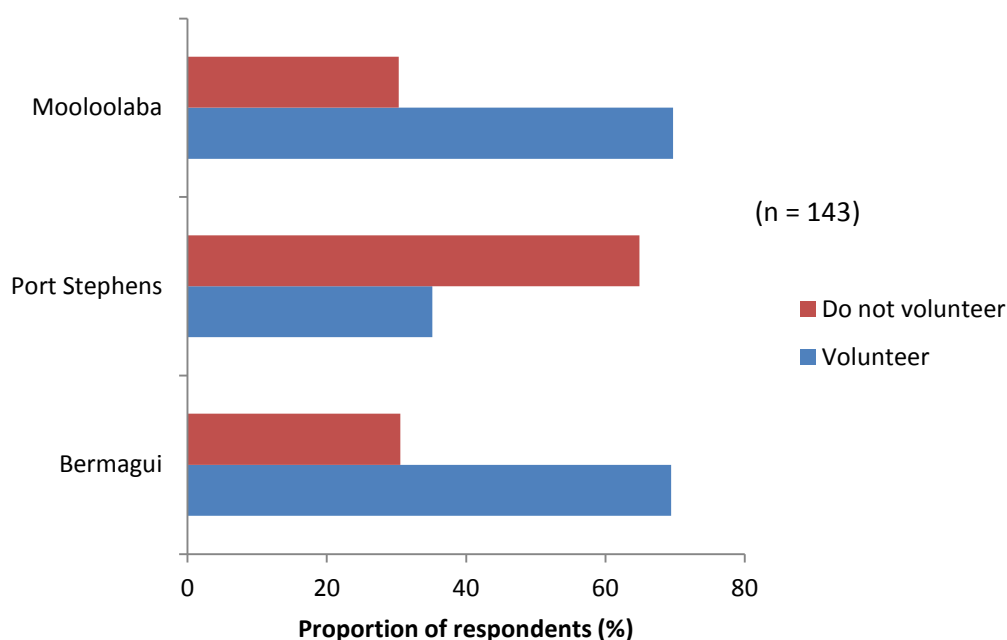
Business and community respondents across the survey sites were asked to provide information on their contribution to social capital through local voluntary activities. For those who indicated 'yes' they had volunteered<sup>1</sup>, there was a follow up question (open-ended) asking in which type of volunteering activities they participated, in order to identify if there was any relationship to game fishing-related activities. The significance of this linkage between volunteering levels and game fishing would need further investigation as these survey sample sizes were quite small.

Overall, 47 per cent of respondents indicated that they participated in voluntary work within the community while 44 per cent indicated they were not involved in any sort of voluntary activity.

Across the three survey sites, 17 per cent of respondents who volunteered indicated that they were involved in the organisation, administration or management of game-fishing clubs and activities. Of the 25 Bermagui respondents who volunteered, 16 per cent indicated that they had volunteered during a game-fishing tournament or club event. In Port Stephens, this proportion was slightly higher, with 19 per cent of the 26 volunteer respondents indicating that they had been involved in a game-fishing tournament or club event. In Mooloolaba, 17 per cent of 23 volunteers indicated that they had been involved in a game-fishing tournament or club event. It is interesting to note that Bermagui had a slightly lower proportion of respondents who volunteered in game fishing-related activities. This is unexpected, as this site is thought to have an economy that may rely on game-fishing activities (more so than in the other two survey sites). This may simply reflect the size of the game fishing events in each location and the requirement for volunteering to assist with activities and events. Also it may also reflect who was surveyed rather than any difference in volunteering levels in game fishing-related activities.

<sup>1</sup> As noted in the section on 'Importance of game fishing to the wider community', the proportion of respondents who volunteered at each site varied, with around 70 per cent of respondents volunteering in Mooloolaba and Bermagui, while only about 35 per cent volunteering in Port Stephens (Figure 73).

**Figure 73 Proportion of respondents who volunteer in each community—regional comparison**



## Benefits and drawbacks of game-fishing tournaments

Respondents were asked how much they agreed or disagreed with various benefits and drawbacks that occurred in their community as a result of game-fishing tournaments (Figure 74).

Most business and community respondents (>60 per cent) thought that game-fishing tournaments:

- were good for business
- helped generate employment
- improved the town profile
- encouraged visitors
- improved the social life of the community.

Respondents agreed on average, but less strongly, that game-fishing tournaments bring the town's people together. Some respondents expressed a view that this was because tournament participants formed a somewhat separate social group and, therefore, limited social interaction occurred between locals and visiting game fishers.

When asked about other drawbacks and benefits of tournaments in their community, business and community respondents at all three sites agreed on average that game-fishing tournaments are unlikely to impact on fish stocks. Comments made during face-to-face discussions suggested that this view was often based on the 'catch and release' that was strongly promoted at tournaments.



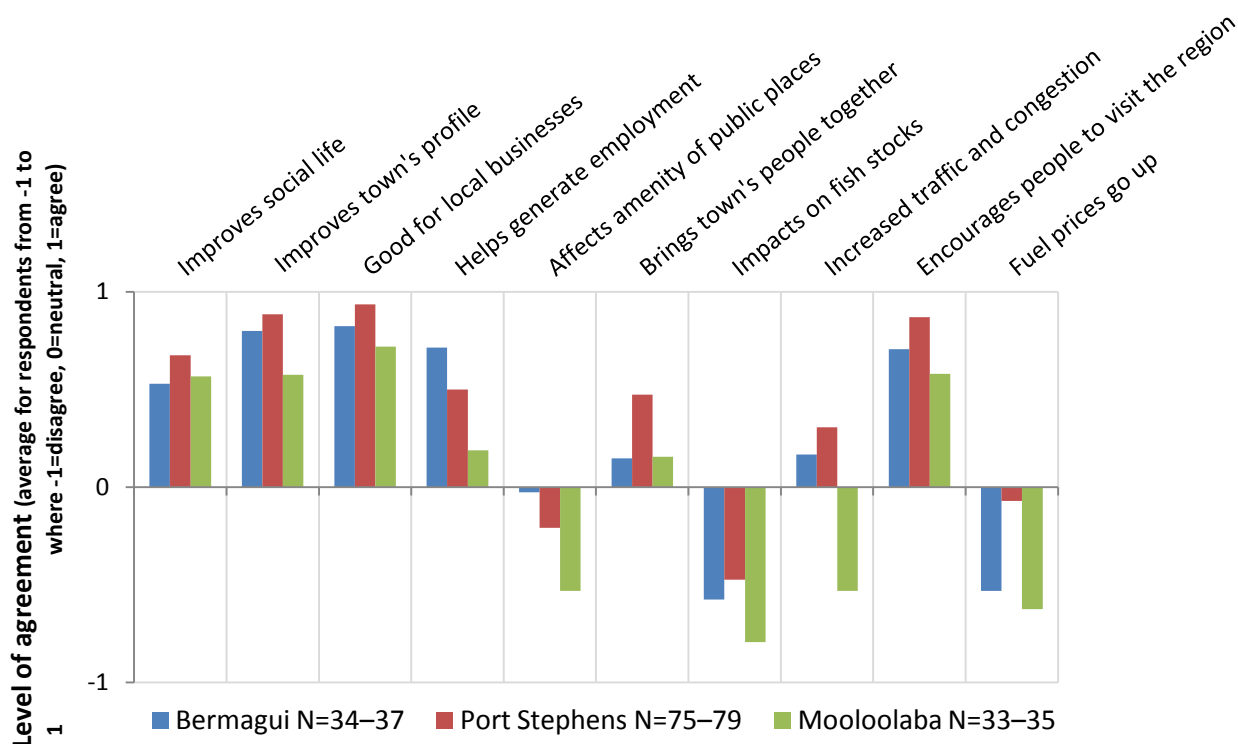
In Mooloolaba, more respondents also disagreed that game-fishing tournaments affected the amenity of public places (e.g. fuel spilling, boat washing, fish offal) compared with respondents in Bermagui and Port Stephens.

Responses about whether game-fishing tournaments were associated with traffic congestion were less consistent. On average, more respondents in Bermagui and Port Stephens thought traffic congestion was associated with tournaments than in Mooloolaba, where the tournament involved less than 40 boats.

A question about game-fishing tournaments and fuel price increases was included in the questionnaire, based on discussions with advisory committee members who were interested in whether the large number of cars and boats at the events might increase demand for fuel and thereby affect prices. Business and community respondents at all three sites thought that tournaments were not associated with an increase in fuel prices, and this was reflected in comments made to the survey team that other (e.g. global) factors influence fuel prices. It should be noted that business and community respondents were in some cases likely to be referring to fuel prices in the town, rather than at specialised marine fuel outlets.

Given that half of Mooloolaba respondents did not know of the recent game-fishing tournament, their responses about the benefits and drawbacks might have been based on previous game fishing events in the region. They had the option to answer 'unsure', but few respondents chose this option.

**Figure 74 Benefits and drawbacks of game-fishing tournaments—regional comparison**



## 5 Discussion

### Social and economic evaluation of game fishing

#### Sector characteristics

Game fishers are a dedicated minority of enthusiasts within the recreational fishing community, devoting considerable time and spending large amounts on the sport. The game-fisher survey, for example, indicated that average expenditure ranged from \$2014 to \$8429 per trip over the three survey sites. Many of the drivers for game fishing differ to those of other resource users. Survey respondents were motivated by the challenge of encountering large fish, relaxing with friends and other game fishers, and viewing marine wildlife. In contrast, recreational anglers in the Great Barrier Reef Marine Park, for instance, are motivated by catching fish for the table, relaxation and experiencing the outdoors (Sutton 2006). Many respondents believe that the sport is central to their lives and that it contributes to their personal health and wellbeing. These insights into the values and motivations for game fishing will be important considerations in the development and implementation of any future management plans and resource access arrangements.

#### Box 2 Limitations and caveats

ABARES surveyed 3 sites out of 16 eastern Australian sites where annual GFAA game-fishing tournaments are held. There are many more sites where, and times when, club members and non-organised game fishers are active. Within the three survey sites, the business survey targeted businesses that were likely to depend on game fishing or were in the vicinity of game-fishing activities. The economic value of game fishing and actual expenditure were quite different among regional centres, and are likely to be site specific. Estimates of the social and economic value of game fishing are indicative of each site during survey periods, but they cannot be transferred to other regional centres or over a full year or used to extrapolate to national assessments.

Respondents to the game-fisher survey were predominantly males, aged in their mid-40s, with relatively high incomes. Boat owners and tournament participants were disproportionately represented in the survey. Tournament participants completed 361 questionnaires compared to 62 completed by game fishers who were not currently participating in a game-fishing tournament. Local residents provided most of those 'non-tournament' responses and many were from Bermagui. Therefore, care is needed in transferring estimates for tournament game fishers to non-tournament game fishers.

Furthermore, the distinction between 'tournament' and 'non-tournament' game fishers is blurred. Some of the non-tournament game fishers were members of game-fishing clubs and participated in other tournaments during the year; also, many 'tournament game fishers' fished outside of tournaments. Annual expenditure may have been overestimated because we assumed that expenditure on non-tournament trips is the same as that on tournament trips.

Expenditure estimates were adjusted for a bias towards boat owners in the survey. However, an 'avidity bias' might remain because enthusiastic game fishers are expected to be more likely to complete the questionnaire. The level of such bias—if it occurred—is unknown.

Survey results indicate that the game-fisher population is diverse. Respondents included anglers who occasionally target game fish as part of other fishing activities through to those who go game fishing many times each year, local residents and those that travel hundreds or thousands of kilometres to go game fishing. The sector also involves shore-based game fishing, bluewater spearfishing and commercial charter boats. Charter boat clients include domestic and international tourists, tournament game fishers and recreational anglers. Our surveys did not include game fishers who were currently involved in shore-based game fishing, and only one completed survey was obtained from a game fisher who was spearfishing.

The quality of equipment and skill levels required for game fishing are much higher than those required for most other forms of recreational fishing, such as those targeting smaller species like bream and whiting. The survey showed that game-fishing boats range from small trailer boats to substantial cruisers worth millions of dollars. Boat equipment and fishing gear dominated expenditure on the sport. Local businesses and communities need to be aware that game fishers tend to spend more on equipment and gear than on other items, such as food and accommodation.

As a proportion of population size, game-fishing club membership rates are low in metropolitan areas compared to rural areas (GFAA 2011). Analyses of tag-release data indicated that the distribution of game-fishing activity is not solely determined by population density—it is strongly influenced by the distribution and abundance of target species. Many respondents travelled considerable distances to areas where game fish are abundant. Survey respondents, for example, travelled an average of 464 km (one-way) for their game-fishing trip to Bermagui. Our analyses of charter boat and tag-release data also show considerable variation in the location and intensity of game-fishing activities. Game fishing increases economic activity in coastal communities, but activity levels fluctuate considerably during the fishing season and between years.

Survey respondents indicated that the challenge of encountering game fish is more important than catching large numbers of fish. Most respondents, especially those involved in tournaments, aspire to catching (i.e. retaining or tagging) marlin. However, survey respondents averaged only two or three game fish caught per trip (mostly tuna). Many felt that they have a low impact on pelagic fish resources. They support conservation and are keen to learn about the marine environment. Respondents felt that they contribute to conservation and marine research through tag-and-release and biological research programs. It is noteworthy that a review of community involvement in the collection of data on recreational fisheries highlighted the need to ensure the quality and credibility of data through long-term funding and programs to recruit, train and maintain volunteers (Stenekes & Sahlqvist 2011). There may be potential for government agencies to further involve game fishers in marine conservation, research and monitoring, but care must be taken in matching volunteer capacity and skills with suitable program activities.

### **How big is the game-fishing sector?**

It is not presently possible to accurately estimate the size of the game fishing population in eastern Australia, their total catch levels or level of fishing activity. About 7000 individuals are members of game-fishing clubs and thousands of people participate in game-fishing tournaments each year in eastern Australia. However, game fishers who participate in tournaments comprise a small proportion of the total population of recreational anglers in eastern Australia. Results of the 2000 National Recreational Fishing Survey (Henry & Lyle 2003), suggest that game-fishing club members comprise a small proportion (<0.5 per cent) of the

recreational fishing population. This poses problems for obtaining representative samples of the game-fisher population and surveying game-fishing activities.

There is also a significant—though unknown—number of game fishers who are not members of game-fishing clubs and do not participate in organised events (Pepperell & Henry 1997). The average number of non-tournament game fishing days for respondents to the game-fisher survey ranged from 6 (Bermagui non-tournament survey) to 48 days (Port Stephens Interclub Tournament; Table 16). If the level of activity seen during the Port Stephens Interclub Tournament was repeated throughout the fishing season, the overall level of non-tournament activity would greatly exceed the tournament level. But such an extrapolation might be quite misleading, because of variations in activity levels between holiday periods and weekdays, and with the abundance and availability of target species as the fishing season progresses. Like overall activity levels, the relative importance of organised and non-organised activities is likely to vary geographically, temporally and historically.

## Expenditure

Individual expenditure on tournament trips was highest in Port Stephens (an average of \$4625 per trip to Port Stephens) compared to Bermagui (\$2698) and Mooloolaba (\$2370). This can be explained by the higher investment made in the sport by Port Stephens respondents (e.g. larger boats, more fishing equipment) compared with those in Bermagui. Annual individual expenditure was estimated by multiplying the expenditure reported by respondents for their current trip by the number of game-fishing trips they reported to that site per year. Mooloolaba respondents had the highest estimated expenditure (\$31 626 on average per year), followed by Port Stephens (\$26 895) and Bermagui (\$11 509). The high annual expenditure for Mooloolaba respondents is due to their high number of game-fishing trips per year, which is likely to be related to the high proportion of respondents who were local residents (60 per cent) in the Mooloolaba survey.

Multiplying annual individual expenditure by the total number of participants registered in each tournament provides an estimate of expenditure of all tournament participants at each site. The estimated expenditure was highest for Port Stephens (\$20.0 million per year), followed by Bermagui (\$7.1 million) and Mooloolaba (\$1.5 million). This is because the number of tournament participants and individual expenditure was high in Port Stephens.

Tournament respondents spent more per trip than non-tournament game fishers. In Bermagui, for example, tournament boat owners spent \$4218 per trip compared to \$2356 by non-tournament boat owners. On the other hand, non-tournament respondents reported more game-fishing trips and more days of game fishing. In Bermagui, non-tournament game fishers averaged 8 trips per year for a total of 15 days compared to 4 trips totalling 11 days for tournament game fishers. Although these are large differences, it is unclear whether they are significant because of the relatively small sample size (e.g. 35 non-tournament game fishers returned surveys in Bermagui).

Most of the estimates of expenditure in the present study are comparable when adjusted for inflation and the number of adults in the vehicle to those of past studies of game fishing at Bermagui (Pepperell 1992) and Port Stephens (Pepperell 2002). However, the current study shows greater expenditure on boat and fishing equipment. Note that not all of this expenditure occurred in the survey sites; a large proportion of expenditure on fishing gear and boating equipment, for example, is likely to occur in the respondent's home town or through internet sales.

Given the size of these regional economies, expenditure was highest in Bermagui. Small regional centres like Bermagui, which have low economic diversity, are likely to be more dependent on large events like game-fishing tournaments, which attract large numbers of participants, their friends and families.

### **Net economic value**

The net economic value is the amount, in addition to actual expenditure, that individuals would pay to experience game fishing. The net economic value and actual expenditure are added together to estimate the total economic value of a game-fishing trip. Also termed the 'willingness to pay', the total economic value is the maximum amount that a game fisher would be prepared to pay on average for a game-fishing trip.

Respondents reported more frequent trips and travelled greater distances to experience game fishing in Bermagui than for the other sites. Bermagui is 800 km by road from Melbourne, 250 km from Canberra and 400 km from Sydney. By contrast, Port Stephens is less than 200 km from the major population centres of Sydney and Newcastle. It is feasible for residents of Sydney and Newcastle to undertake daytrips to Port Stephens for game fishing. Similarly, residents of Brisbane and Queensland's Sunshine Coast can take daytrips to Mooloolaba.

The net economic value of a game-fishing trip to Bermagui was substantially higher than that of Port Stephens. Respondents valued a game-fishing trip to Bermagui at \$334 per group (\$124 per adult) compared to \$168 per group (\$67 per adult) for Port Stephens. The higher net economic value of trips to Bermagui might be due to Bermagui's history and reputation for game fishing, the short distance to game-fishing grounds and accommodation and port facilities. The narrow continental shelf off Bermagui and other southern New South Wales ports also helps relatively small trailer boats (<6 m in length) to access game-fishing grounds.

The estimates of net economic value from this study are similar to those of studies of other recreational activities. For example, Prayaga et al. (2010) estimated the net economic value of recreational fishing trips to the Great Barrier Reef Marine Park at \$385 per group (\$167 per angler). Rolfe and Prayaga (2006) estimated the value per recreational fishing trip at \$60–998 per person for three Queensland dams. Rolfe and Dyack (2011) estimated the value for trips to the Coorong at \$714 per group. Of particular relevance is the study by Ezzy and Scarborough (2011), which estimated the value of non-tournament game-fishing trips to Portland for southern bluefin tuna at \$132 per group (\$33 per person). This net economic value is substantially lower than that estimated in this study. The differences may be due to our estimates being based on tournament respondents and due to site-specific differences, such as Bermagui's reputation and other attractions that are listed above.

### **Business and community views**

The business and community survey verified that local residents recognise many of the benefits of game fishing identified by the game-fisher survey. Some specialised businesses rely on game-fishing clientele (e.g. fishing tackle, boat maintenance and certain accommodation facilities and food outlets). Specialised businesses, especially those in small regional centres, reported that their financial viability depended on game fishing.

Businesses in large regional centres, like Port Stephens, tended to be less dependent on game fishing because of their diverse customer base. Nevertheless, many reported that game fishing was important in extending or adding to their 'high season' for general tourism.

Negative attitudes towards game fishing were rare in the business and community survey; several respondents indicated that game-fishing tournaments increased traffic congestion, affected the amenity of public places (e.g. fish offal at boat ramps) or attracted anti-social behaviour, but these respondents were not representative of the average view. The prevailing opinion was that game fishing, especially tournaments, contributes to social vitality by bringing people together for special events, enhancing community identity and through direct sponsorship of community activities. The benefits of game fishing to local communities go beyond the generation of income and employment.

## Benefits and adoption

This study identified the social values and quantified the economic value of game fishing at three sites. Local businesses and community members verified the social and economic importance of game fishing, especially for small regional centres that have a limited number of alternative industries. Information on game fishing and sportfishing club membership and the annual number and size of tournaments provide an indication of the magnitude of organised game-fishing activities off eastern Australia. This, combined with our estimates of total economic value, provides an indication of the value of the organised component of the eastern Australia game-fishing sector. However, extrapolations of this data to other regions or to Australia's game-fishing sector overall are not recommended because of the substantial differences in the economic value of game fishing among sites and the lack of time series data. Furthermore, extrapolations would ignore the sector's non-organised component, which includes the game-fishing activities of club members and charter boats outside tournaments and, importantly, the activities of game fishers who are not charter boat clients and who do not participate in organised events. The size of the non-organised component is unquantified, but likely to be substantial.

The net economic value of an activity provides important information for decisions on how many resources to allocate to research, monitoring and management. The information compiled by this study is considerably more comprehensive than what was previously available. The study results are relevant to managing resource access, which has been highlighted by game fishing and commercial fishing interests in Australia. Estimates of the value of game fishing at specific sites can inform management discussions and approaches, but a valuation methodology needs to be developed to compare the economic value and other benefits of game fishing and commercial fishing.

## Further development

This study highlighted the diverse nature of the game-fishing sector and the complexities involved in sampling and valuing game-fishing activities. It would be beneficial for the study to be repeated every few years, with surveys of the same sites at the same time of year. This should involve further development of the survey methodology to improve the representativeness of the sample and to increase response rates. Repeating the study at the same sites would allow variations in attitudes, the value of game fishing and characteristics of the game-fisher population to be tracked over time.

Expansion of the study to other sites, which involve different types of game-fishing activities, might provide estimates of the total value of the game-fishing sector and characterise the diversity of game-fishing activities. Other important sites include Cairns (Queensland), northern New South Wales (e.g. Coffs Harbour) and Tasmania. Surveys should also be extended to cover



game-fishing activities for southern bluefin tuna. However, the purpose of estimating the total value of the game-fishing sector or tracking its value requires careful consideration. Knowledge of fishing activities, catches and the value of fishing is fundamental to policy development and fishery management. Beyond those general requirements, expansion of work on game fishing should be in response to a clearly articulated management or policy need.

The delivery method for the game-fisher survey was satisfactory, although improvements could be made to the on-site checking of answers, obtaining contact details to allow follow-up with all game fishers and increasing the interception of, and response rates for, non-tournament game fishers. Increased interception of non-tournament game fishers could be achieved by monitoring current game-fishing activity through local contacts and having survey teams available to visit active sites at short notice. There might be opportunities to liaise with charter boat operators to efficiently collect information from their clients.

We did not attempt to estimate the total value of the eastern Australian game-fishing sector from the three study sites because the level and characteristics of game-fishing activities are likely to vary among sites, over fishing seasons and among years. This variability applies to charter boat, tournament and non-tournament activities. Important factors influencing activity levels are likely to include the abundance (or availability) of target species, distance and access to fishing grounds, recent reports of catches, tournament dates, holidays (e.g. weekends and public holidays), the time of year and environmental conditions (e.g. sea surface temperature) in relation to past catches, local weather conditions and predictions.

To estimate the total value of the game-fishing sector, the surveys would need to cover a representative number of sites and periods. This might involve desk-top analyses and pilot surveys to determine how many other game-fishing sites in eastern Australia would need to be surveyed to obtain an estimate of total value with acceptable levels of precision. Similarly, the frequency of sampling at each site to provide robust estimates over fishing seasons would need to be determined. Another option would be to obtain the non-market value of game fishing through benefit transfer analyses. Benefit transfer adapts non-market estimates from different studies and applies them to a similar study. It can significantly reduce the costs of obtaining non-market values for similar studies, but close similarities between studies are necessary. Regardless, the clear articulation of management and policy information requirements and expected outcomes is a prerequisite before any attempts are made to place a value on the entire game-fishing sector.

The approach described above would also need to be compared with the cost-effectiveness of off-site surveys. For off-site surveys, game fishing and sportfishing member databases would be an effective method of sampling the organised component of the game-fishing sector. Maintaining the support and cooperation of game fishing and sportfishing associations is essential to using those structures and databases. A larger study might also ask charter boat operators to provide contact details of clients for a survey.

Attributes of the non-organised component of the game-fishing sector are more difficult to sample than the organised component. We concluded that non-organised game-fishing activities are a significant component of the sector. However, the magnitude of those activities remains a major uncertainty for valuing the game-fishing sector.

It is likely that the level of non-tournament activity is unique to each site and is highly variable within fishing seasons and over time. Our surveys suggested that non-tournament game fishers were less active during large tournaments, when compared to small tournaments. Non-tournament days accounted for 4 per cent of game fishing days during the Port Stephens Interclub Tournament and 6 per cent of total game fishing days during the Bermagui Yellowfin Tournament (Table 16). By contrast, non-tournament game fishing days accounted for 13 per cent during the Blue Water Classic and 14 per cent of total game fishing days during the Billfish Bonanza.

Cost-effective methods for estimating the level of non-tournament game-fishing activity need to be investigated. Potential methods include the use of local residents to regularly count the different sizes of boat trailers parked at boat ramps, traffic-counters that record the number and size of trailers, remote cameras that continuously monitor access points and obtaining information on fishing activities from marina managers or sea rescue. All of these suggested methods have issues in sampling bias, logistics and cost.

Ad hoc estimates of the magnitude of non-tournament activity relative to tournament activity might be obtained through telephone surveys of tackle shop staff (e.g. West 1990) or broader surveys collecting information on club membership and tournament participation rates. The NSW DPI Gamefish Tournament Monitoring Program provides useful, long term statistics on catch and fishing effort for specific game-fishing tournaments in New South Wales. However, it does not collect data on non-GFAA tournaments or non-organised game-fishing activities. Nevertheless, it might be possible to link tournament monitoring estimates of catch and effort with the estimates of expenditure and net economic benefit estimated in the present study.

Other, off-site methods include respondent-driven sampling, time–location sampling (Griffiths et al. 2010a, 2010b), sub-sampling state boat-licensing databases or combinations of these methods. A well-resourced, time–location sampling method would be required to obtain a statistically representative sample of non-tournament game fishers active at each site. Such an approach would need to address non-response bias, which is likely to be significant for non-tournament game fishers. Other potential biases include the frequency of visits to the tackle store, number of tackle stores in the angler's regular shopping area and online shoppers who may rarely visit a store.

Several jurisdictions have supported broad surveys of recreational fishing activities. Game fishing comprises a small proportion of total recreational fishing effort in terms of boat numbers and participation levels (although its unit value will be disproportionately high because of the larger outlays required for game fishing gear and large boats). The 2000–01 phone-based screening survey undertaken as part of the National Recreational and Indigenous Fishing Survey (Henry & Lyle 2003) estimated 3.36 million recreational anglers Australia-wide, including 0.4 per cent who were game-fishing club members. The small proportion that game fishing represents of total recreational activities and the high variability in game-fishing activities suggest that off-site surveys will not be cost-effective for assessing the value of the entire game-fishing sector unless a complete sampling frame is developed.



## Planned outcomes

The study was designed to inform management and policy decisions affecting game fishers in eastern Australia. DAFF Fisheries Branch, NSW DPI and GFAA were all involved throughout the study. Through reports, summary reports and presentations, study results are being disseminated to these and other stakeholders, including game fishing associations, clubs, charter boat operators, individual game fishers, community members and local businesses, and state fishery management and policy agencies. Findings are relevant to future resource-sharing discussions in the Eastern Tuna and Billfish Fishery and Western Tuna and Billfish Fishery, although there is currently no commitment from the Australian Government to recommence resource-sharing negotiations for those fisheries. The project's summary report will be considered by Australian Fisheries Management Authority's Tropical Tuna Resource Assessment Group. Findings will be available for the case study on southern bluefin tuna resource-sharing that is currently being progressed by the Australian Fishery Management Forum (AFMF). Specifically, this study shows that game fishing contributes to the viability of certain small businesses, especially those in regional centres that do not have a broad economic base. Game fishing also adds to the social fabric and identity of small regional centres like Bermagui.



Spectators watch the sail-past as part of the Port Stephens Interclub Tournament, Nelson Bay (Leatherbarrow, ABARES)

## 6 Conclusions

Many of the drivers for game fishing differ to those of other marine resource users, such as commercial fishers and other recreational anglers. Game fishers are motivated by the challenge of targeting large fish, relaxing with friends and other game fishers, and viewing marine wildlife. Given these interests and values, there may be further potential for involvement of game fishers in marine conservation, research and monitoring programs.

Reported catch rates are low on average and many game fishers believe that they have a low impact on the game fish they harvest.

The distribution of game-fishing activity is strongly influenced by the abundance of the target species (billfish or tuna). Game fishing increases economic activity in coastal communities, but there are considerable geographical, seasonal and annual variations in activity levels.

Game fishers tend to spend more on their sport (e.g. boat equipment and fishing gear) than on other items, such as food and accommodation. Most of the expenditure on fishing gear and boats is likely to occur outside of the coastal communities where they travel to.

Individual expenditure on tournament trips was highest in Port Stephens. This is because the Port Stephens tournament involves larger boats and more fishing equipment. Estimated total expenditure was highest for Port Stephens because of the large number of tournament participants and high individual expenditure. However, respondents reported longer trips to Bermagui and, because it is a long way from major population centres, they travelled larger distances to experience game fishing there.

The dependence of businesses on large events like game-fishing tournaments is likely to be greatest in small regional centres that have low economic diversity. However, we did not compile information to allow the importance of game fishing to be compared with that of other recreational activities, commercial fishing or other industries.

The benefits of game fishing to local communities go beyond the generation of income and employment. Game fishing, especially tournaments, contributes to social vitality by bringing people together for special events, enhancing community identity and through direct sponsorship of community activities.

## Appendix A: Intellectual Property

The information compiled by the study was published, widely disseminated and promoted. There is no need to protect intellectual property beyond the Australian Government's standard copyright that applies to the study's reports and other outputs.



Trailer boat returning from game fishing, Bermagui, January 2011 (Ward, ABARES)

# Appendix B: Staff

**Table B1 ABARES staff members who were directly involved in the study.**

<b>Surname</b>	<b>First name</b>	<b>Position</b>	<b>Responsibilities</b>
Begg	Gavin	General Manager	Project oversighting
Biggs	Bill	Research Scientist	Community and business surveys
Curtotti	Robert	Senior Economist	Economic analyses, survey design
Err	Dawn	DAFF Graduate Development Program	Community and business surveys, data management
George	Daniel	ABARES Graduate Development Program	Game-fisher surveys, data management
Gibbs	Cheryl	Scientist	Analyses for social and demographic profiles
Hobsbawn	Patty	Fisheries Scientist	Data management
Hormis	Mary	ABARES Graduate Development Program	Game fisher, community and business surveys, data management
Kancans	Robert	Research Scientist	Survey design, social science analyses, social and demographic profiles
Keightley	Ryan	DAFF Graduate Development Program	Game-fisher surveys, data management
Marton	Nicholas	Fisheries Scientist	Descriptions of the game-fishing sector
Mazur	Kasia	Fisheries Economist	Survey design, economic analyses,
Mills	Kelly	UVEP Student	Game-fisher surveys, data management
Morris	Kathleen	DAFF Graduate Development Program	Community and business surveys, data management
Roach	Justin	DAFF Graduate Development Program	Analysis of targeting and catch data from game-fisher survey; analysis of comments in survey forms
Sahlqvist	Phil	Fisheries Scientist	Survey design, game-fisher surveys, information on related studies
Skirtun	Maggie	ABARES Graduate Development Program	Community and business surveys, data management
Stenekes	Nyree	Research Scientist	Survey design, social science analyses, social and demographic profiles
Stobutzki	Ilona	Assistant Secretary	Project oversighting, report clearance
Summerson	Rupert	Fisheries Scientist	Data analyses and mapping
Vieira	Simon	Fisheries Economist	Economic analyses
Ward	Peter	Senior Scientist	Principal investigator, project management, survey design, game-fisher surveys, reporting

# Appendix C: Social and economic profiles of key game fishing areas in eastern Australia

## Introduction

This appendix summarises demographic and economic characteristics of 16 regional centres along the eastern Australian seaboard. The centres were those where annual GFAA-affiliated game-fishing tournaments are held. They include Mooloolaba, Port Stephens and Bermagui where the project conducted social and economic surveys of game fishers, businesses and community members. The Australian Bureau of Statistics (ABS 2006a, 2006b) was the source of demographic and economic information.



A game fishing cruiser returning to the Bermagui marina (Ward, ABARES)



## Individual regional centres

### Cairns

The local government area of Cairns is located on the far north coast of Queensland (Figure C1).

#### Population

In 2006 there were 127 434 people usually residing in the local government area of Cairns (ABS 2006a, 2006b). Of these, 13 per cent are 60 years old or over, 58 per cent are between 20 and 60 years old and 29 per cent were 19 years old or younger (Figure C2). Fifty per cent of residents were female. The median age of people in Cairns was 35, which is lower than the median age of 37 years for people in Australia (ABS 2006a, 2006b).

#### Indigenous

Of the total population in Cairns local government area, 7.8 per cent of people are Indigenous compared with a much lower average of 2.3 per cent across Australia (ABS 2006a, 2006b).

#### Education

Of people aged 15 years and over in Cairns, 42 per cent had completed Year 12 or equivalent compared with 42.2 per cent for the total Australian population (ABS 2006a, 2006b).

#### Workforce and industry

During the week before the 2006 Census, 65 523 people aged 15 years and over who were usual residents in Cairns were in the labour force. Of these, 64 per cent were employed full-time and 26 per cent were employed part-time. The unemployment rate in Cairns in 2006 was 4.3 per cent, which was lower than the national average of 5.2 per cent (ABS 2006a, 2006b).

Retail trade was the largest employment sector with 8093 people employed, followed by accommodation and food services (6585 people), construction (6349 people), and health care and social assistance (6106 people) (ABS 2006a, 2006b).

#### Income

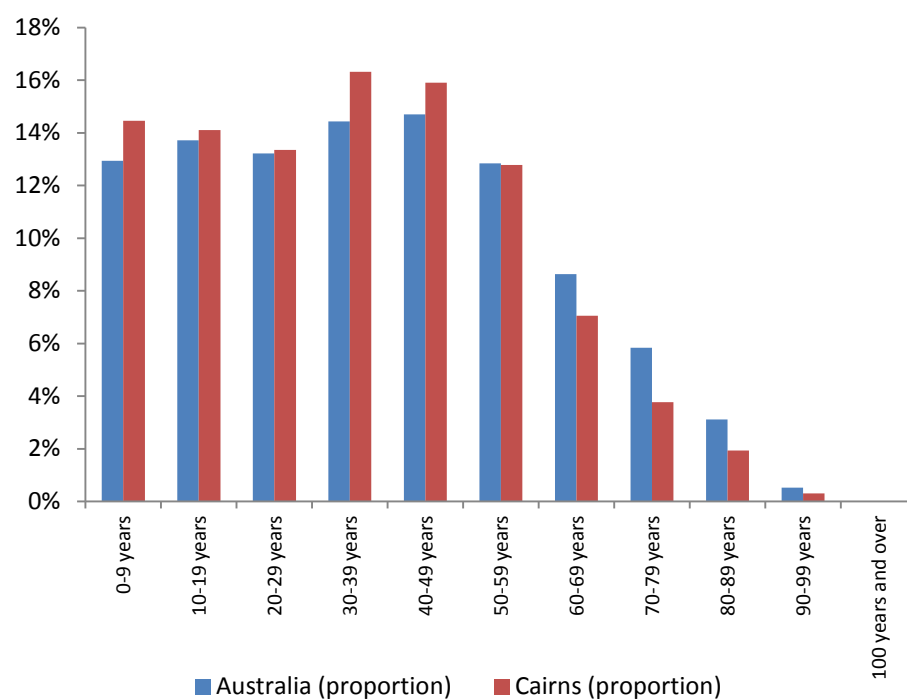
In the Cairns local government area, the median weekly individual income for people aged 15 years and over who were usual residents was \$530 compared with \$466 in Australia (ABS 2006a, 2006b).

#### Country of birth

Twenty-eight per cent of residents in Cairns local government area were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Cairns born outside of Australia, 5909 residents were born in the United Kingdom and 4136 were born in New Zealand.

**Figure C1 Map of Cairns local government area**

Data source: ABS (2006a, 2006b)

**Figure C2 Age profile of Cairns local government area compared with national age profile**

Data source: ABS (2006a, 2006b)

## Innisfail

The urban centre/locality of Innisfail is located on the Far North Coast of Queensland (Figure C3).

### Population

In 2006 there were 8261 people usually residing in the locality of Innisfail (ABS 2006a, 2006b). Of these, 22 per cent are 60 years old or over, 49 per cent are between 20 and 60 years old and 29 per cent were 19 years old or younger (Figure C4). Fifty per cent of residents were female. The median age of people in Innisfail was 39, which is higher than the median age of 37 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in Innisfail (urban centre/locality), 13 per cent of people are Indigenous compared with a much lower average of 2.3 per cent across Australia (ABS 2006a, 2006b).

### Education

Of persons aged 15 years and over in Innisfail, 26 per cent had completed Year 12 or equivalent. This is considerably lower than 42 per cent average for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 3359 people aged 15 years and over who were usual residents in Innisfail were in the labour force. Of these, 61 per cent were employed full-time and 26 per cent were employed part-time. The unemployment rate in Innisfail in 2006 was 6.2 per cent, which was higher than the national average of 5.2 per cent (ABS 2006a, 2006b).

Retail trade was the largest employment sector with 415 people employed, followed by health care and social assistance (330 people), manufacturing (322 people) and construction (288 people) (ABS 2006a, 2006b).

### Income

In the locality of Innisfail, the median weekly individual income for persons aged 15 years and over who were usual residents was \$394, compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

Twenty-three per cent of residents in Innisfail urban centre/locality were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Innisfail born outside of Australia, 224 residents were born in Southern Europe and 171 were born in Mainland South-East Asia.

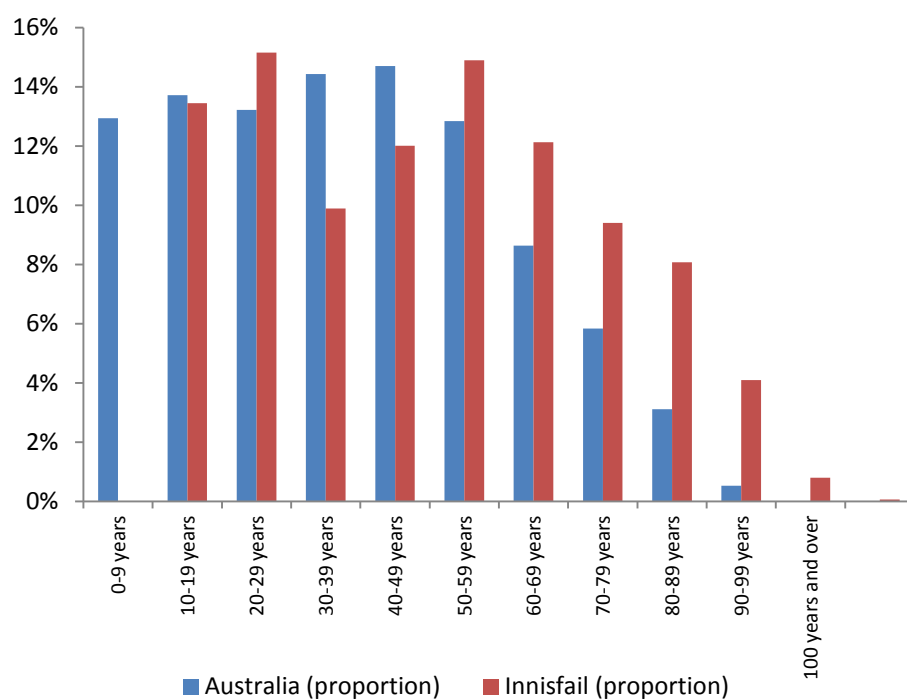


Figure C3 Map of Innisfail urban centre/locality



Data source: ABS (2006a, 2006b)

Figure C4 Age profile of Innisfail urban centre/locality compared with national age profile



Data source: ABS (2006a, 2006b)

## Hervey Bay

The urban centre/locality of Hervey Bay is located on the south-east coast of Queensland (Figure C5).

### Population

In 2006 there were 41 225 people usually residing in the locality of Hervey Bay (ABS 2006a, 2006b). Of these, 29 per cent are 60 years old or over, 46 per cent are between 20 and 60 years old and 25 per cent were 19 years old or younger (Figure C6). Fifty-two per cent of residents were female. The median age of people in Hervey Bay was 44, which is higher than the median age of 37 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in Hervey Bay (urban centre/locality), 2.6 per cent of people are Indigenous compared with 2.3 per cent in Australia (ABS 2006a, 2006b).

### Education

Of persons aged 15 years and over in Hervey Bay, 30 per cent had completed Year 12 or equivalent compared with 42 per cent for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 15 446 people aged 15 years and over who were usual residents in Hervey Bay were in the labour force. Of these, 54 per cent were employed full-time and 31 per cent were employed part-time. The unemployment rate in Hervey Bay in 2006 was 8.6 per cent, which was higher than the national average of 5.2 per cent (ABS 2006a, 2006b).

Retail trade was the largest employment sector with 1987 persons employed, followed by health care and social assistance (1844 people), construction (1810 people), and accommodation and food services (1557 people) (ABS 2006a, 2006b).

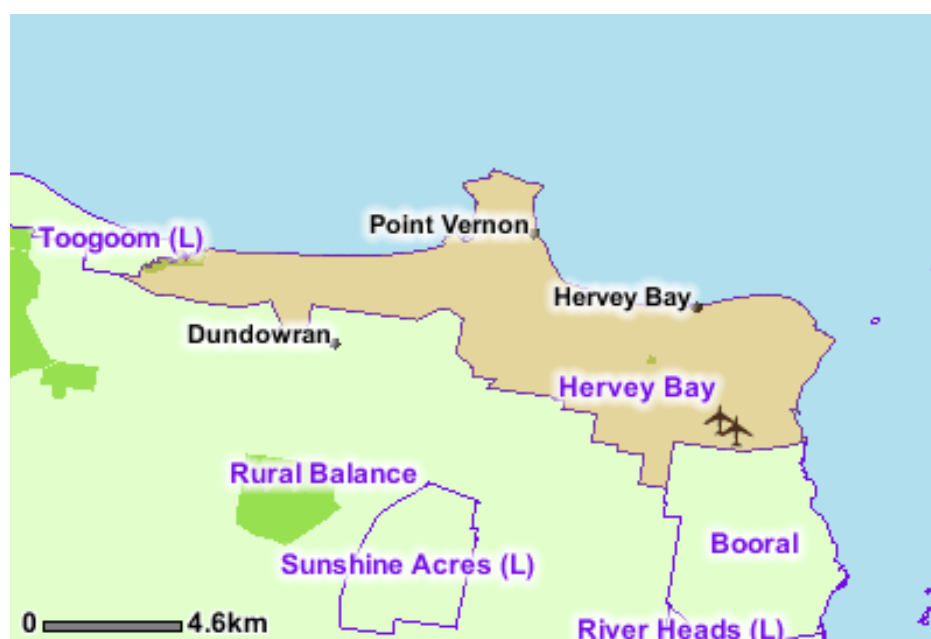
### Income

In the locality of Hervey Bay, the median weekly individual income for people aged 15 years and over who were usual residents was \$348, compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

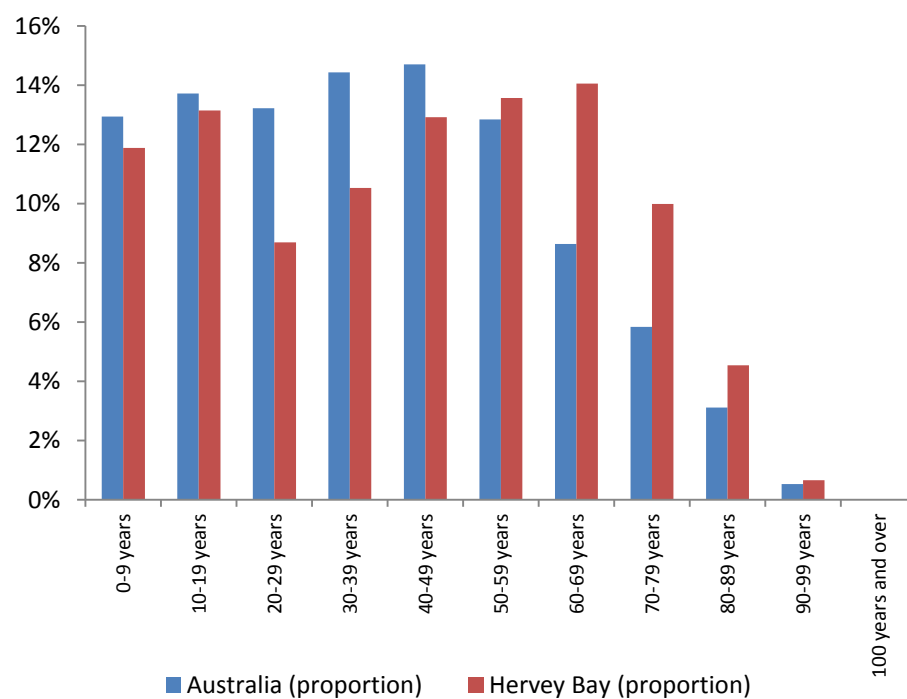
Twenty-two per cent of residents in Hervey Bay urban centre/locality were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Hervey Bay born outside of Australia, 2960 residents were born in the United Kingdom and 1282 were born in New Zealand.

Figure C5 Map of Hervey Bay urban centre/locality



Data source: ABS (2006a, 2006b)

Figure C6 Age profile of Hervey Bay urban centre/locality compared with national age profile



Data source: ABS (2006a, 2006b)

## Mooloolaba

Mooloolaba is located on the coast of Queensland, within the Sunshine Coast statistical region (Figure C7).

### Population

In 2006, there were 276 267 people usually residing in the Sunshine Coast statistical region (ABS 2006a, 2006b). Of these, 23 per cent are 60 years old or over, 51 per cent are between 20 and 60 years old and 26 per cent were 19 years old or younger (Figure C8). Fifty-one per cent of residents were female. The median age of people in the Sunshine Coast was 41, which is lower than the median age of 44 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in the Sunshine Coast statistical region, 1.2 per cent of people are Indigenous compared with 2.3 per cent across Australia (ABS 2006a, 2006b).

### Education

Of persons aged 15 years and over in the Sunshine Coast, 40 per cent had completed Year 12 or equivalent compared with 42 per cent for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 126 929 people aged 15 years and over who were usual residents in the Sunshine Coast were in the labour force. Of these, 55 per cent were employed full-time and 34 per cent were employed part-time. The unemployment rate in the Sunshine Coast in 2006 was 5.8 per cent, which was higher than the national average of 5.2 per cent (ABS 2006a, 2006b).

Retail trade was the largest employment sector with 16 715 people employed, followed by construction (15 280 people), health care and social assistance (13 118 people), and accommodation and food services (11 129 people) (ABS 2006a, 2006b).

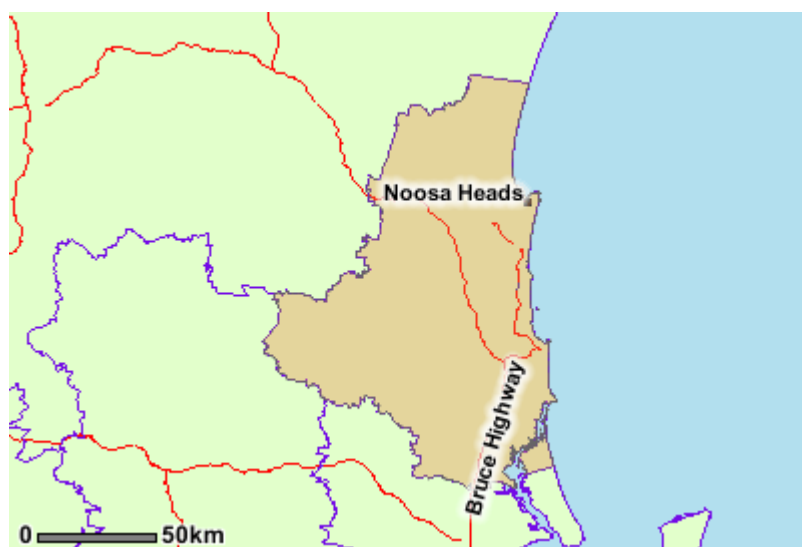
### Income

In the Sunshine Coast statistical region, the median weekly individual income for people aged 15 years and over who were usual residents was \$428 compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

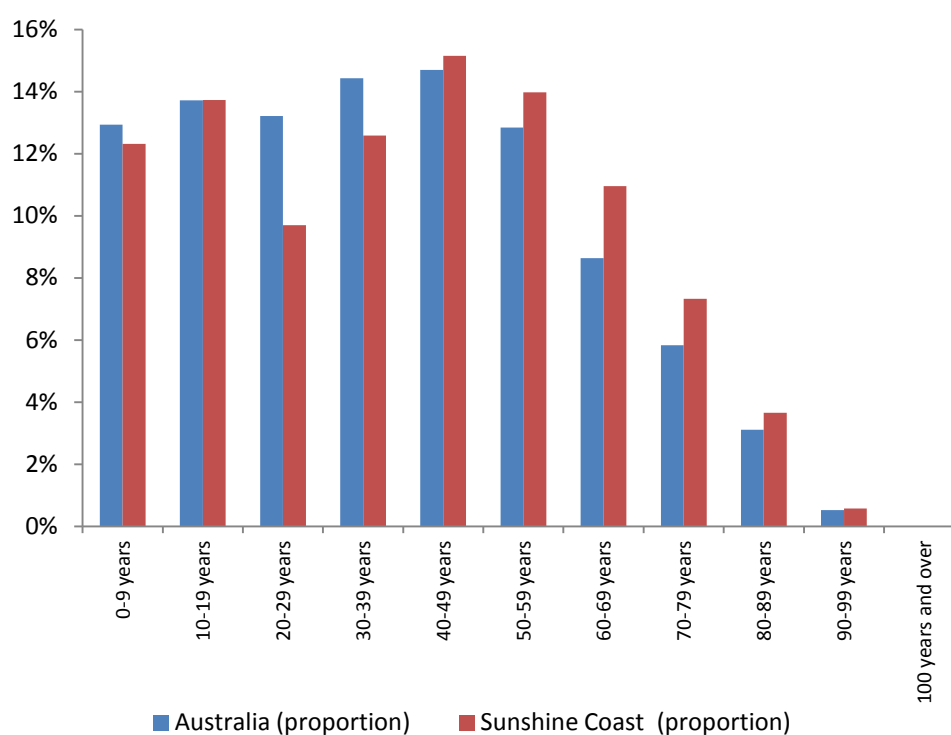
Twenty-four per cent of residents in the Sunshine Coast statistical region were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of the Sunshine Coast born outside of Australia, 19 782 residents were born in the United Kingdom and 12 271 were born in New Zealand.

Figure C7 Map of the Sunshine Coast statistical region



Data source: ABS (2006a, 2006b)

Figure C8 age profile of Sunshine Coast statistical region compared with national age profile



Data source: ABS (2006a, 2006b)

## Southport

The statistical local area of Southport is located on the Queensland coast, within the Gold Coast City local government area (Figure C9).

### Population

In 2006 there were 24 098 people usually residing in the statistical local area of Southport (ABS 2006a, 2006b). Of these, 23 per cent are 60 years old or over, 57 per cent are between 20 and 60 years old and 20 per cent were 19 years old or younger (Figure C10). Fifty-one per cent of residents were female. The median age of people in Southport was 38, which is lower than the median age of 44 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in Southport statistical local area, 1.3 per cent of people are Indigenous compared with 2.3 per cent Indigenous persons in Australia (ABS 2006a, 2006b).

### Education

Of persons aged 15 years and over in Southport, 44 per cent had completed Year 12 or equivalent compared with 42 per cent for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 11 220 people aged 15 years and over who were usual residents in Southport were in the labour force. Of these, 56 per cent were employed full-time and 31 per cent were employed part-time. The unemployment rate in Southport in 2006 was 6.9 per cent, which was higher than the national average of 5.2 per cent (ABS 2006a, 2006b).

Accommodation and food services was the largest employment sector with 1360 people employed, followed by retail trade (1292 people), health care and social assistance (1292 people) and construction (957 people) (ABS 2006a, 2006b).

### Income

In the statistical local area of Southport, the median weekly individual income for people aged 15 years and over who were usual residents was \$410 compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

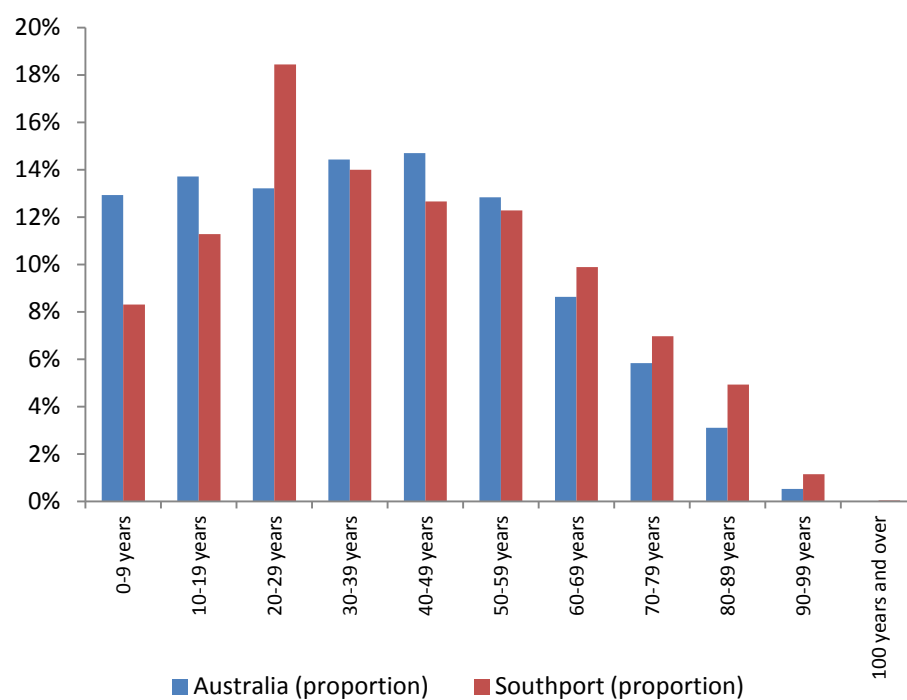
Forty-two per cent of residents in Southport statistical local area were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Southport born outside of Australia, 1758 residents were born in New Zealand and 1358 were born in the United Kingdom.

Figure C9 Map of Southport statistical local area



Data source: ABS (2006a, 2006b)

Figure C10 Age profile of Southport statistical local area compared with national age profile



Data source: ABS (2006a, 2006b)

## Lord Howe Island

The urban centre/locality of Lord Howe Island is situated in the Tasman Sea, approximately 600 kilometres off the coast of New South Wales (Figure C11).

### Population

In 2006 there were 349 people usually residing in the locality of Lord Howe Island (ABS 2006a, 2006b). Of these, 23 per cent are 60 years old or over, 59 per cent are between 20 and 60 years old and 18 per cent were 19 years old or younger (Figure C12). Fifty per cent of residents were female. The median age of people in Lord Howe Island was 44, which is higher than the median age of 37 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Although 2.3 per cent of Australians are Indigenous, there were no Indigenous persons residing in Lord Howe Island at the time of the 2006 census (ABS 2006a, 2006b).

### Education

Of people aged 15 years and over in Lord Howe Island, 44 per cent had completed Year 12 or equivalent compared with 42 per cent for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 219 people aged 15 years and over who were usual residents in Lord Howe Island were in the labour force. Of these, 55 per cent were employed full-time and 32 per cent were employed part-time. The unemployment rate in Lord Howe Island in 2006 was 1.4 per cent, which was lower than the national average of 5.2 per cent (ABS 2006a, 2006b).

Accommodation and food services were the largest employment sector with 84 people employed, followed by public administration and safety (43 people) and transport, postal and warehousing (13 people) (ABS 2006a, 2006b).

### Income

In the locality of Lord Howe Island, the median weekly individual income for people aged 15 years and over who were usual residents was \$549, compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

Nineteen per cent of residents in Lord Howe Island urban centre/locality were born outside of Australia, compared with 29.1 per cent born in Australia. Of those residents of Lord Howe Island born outside of Australia, 18 residents were born in New Zealand and 18 were born in the United Kingdom.

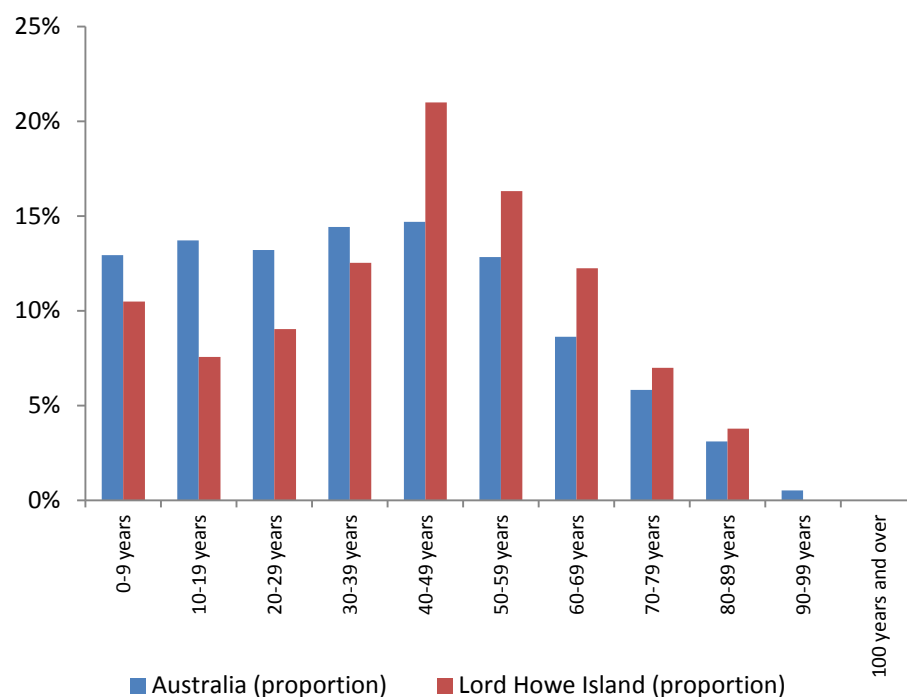


Figure C11 Map of Lord Howe Island urban centre/locality



Data source: ABS (2006a, 2006b)

Figure C12 Age profile of Lord Howe Island urban centre/locality compared with national age profile



Data source: ABS (2006a, 2006b)

## Port Macquarie

The urban centre/locality of Port Macquarie is located on the Mid-North coast of New South Wales (Figure C13).

### Population

In 2006 there were 39 218 people usually residing in the locality of Port Macquarie (ABS 2006a, 2006b). Of these, 30 per cent are 60 years old or over, 46 per cent are between 20 and 60 years old and 24 per cent were 19 years old or younger (Figure C14). Fifty-three per cent of residents were female. The median age of people in Port Macquarie was 45, which is higher than the median age of 37 years for persons in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in Port Macquarie (urban centre/locality), 2.6 per cent of persons are Indigenous persons compared with 2.3 per cent Indigenous persons in Australia (ABS 2006a, 2006b).

### Education

Of people aged 15 years and over in Port Macquarie, 31 per cent had completed Year 12 or equivalent compared with 42 per cent for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 15 990 people aged 15 years and over who were usual residents in Port Macquarie were in the labour force. Of these, 52 per cent were employed full-time and 34 per cent were employed part-time. The unemployment rate in Port Macquarie in 2006 was 8.4 per cent, which was higher than the national average of 5.2 per cent (ABS 2006a, 2006b).

Retail trade was the largest employment sector with 2388 people employed, followed by health care and social assistance (2033 people), accommodation and food services (1489 people) and construction (1283 people) (ABS 2006a, 2006b).

### Income

In the locality of Port Macquarie, the median weekly individual income for people aged 15 years and over who were usual residents was \$377, compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

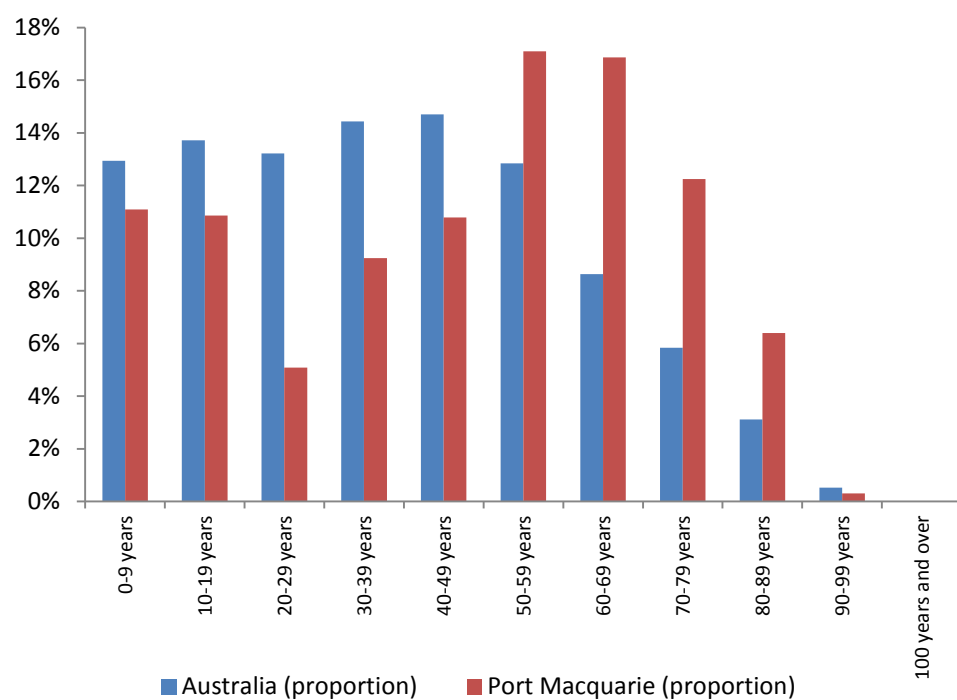
Eighteen per cent of residents in Port Macquarie urban centre/locality were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Port Macquarie born outside of Australia, 2367 residents were born in the United Kingdom and 565 were born in New Zealand.

Figure C13 Map of Port Macquarie urban centre/locality



Data source: ABS (2006a, 2006b)

Figure C14 Age profile of Port Macquarie urban centre/locality compared with national age profile



Data source: ABS (2006a, 2006b)

## Port Stephens

The local government area of Port Stephens is located on the northern coast of New South Wales (Figure C15).

### Population

In 2006 there were 60 485 people usually residing in the local government area of Port Stephens (ABS 2006a, 2006b). Of these, 23 per cent are 60 years old or over, 49 per cent are between 20 and 60 years old and 28 per cent were 19 years old or younger (Figure C16). Fifty-one per cent of residents were female. The median age of people in Port Stephens was 40, which is higher than the median age of 37 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in Port Stephens local government area, 2.9 per cent of people are Indigenous compared with 2.3 per cent in Australia (ABS 2006a, 2006b).

### Education

Of people aged 15 years and over in Port Stephens, 28 per cent had completed Year 12 or equivalent. This is lower than the 42 per cent of the total Australian population that had completed Year 12 or equivalent (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 25 712 people aged 15 years and over who were usual residents in Port Stephens were in the labour force. Of these, 55 per cent were employed full-time and 32 per cent were employed part-time. The unemployment rate in Port Stephens in 2006 was 7.1 per cent, which was higher than the national average of 5.2 per cent (Australian ABS 2006a, 2006b).

Retail trade was the largest employment sector with 3041 people employed, followed by manufacturing (2540 people), public administration and safety (2516 people) and health care and social assistance (2443 people) (ABS 2006a, 2006b).

### Income

In the local government area of Port Stephens, the median weekly individual income for people aged 15 years and over who were usual residents was \$388 compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

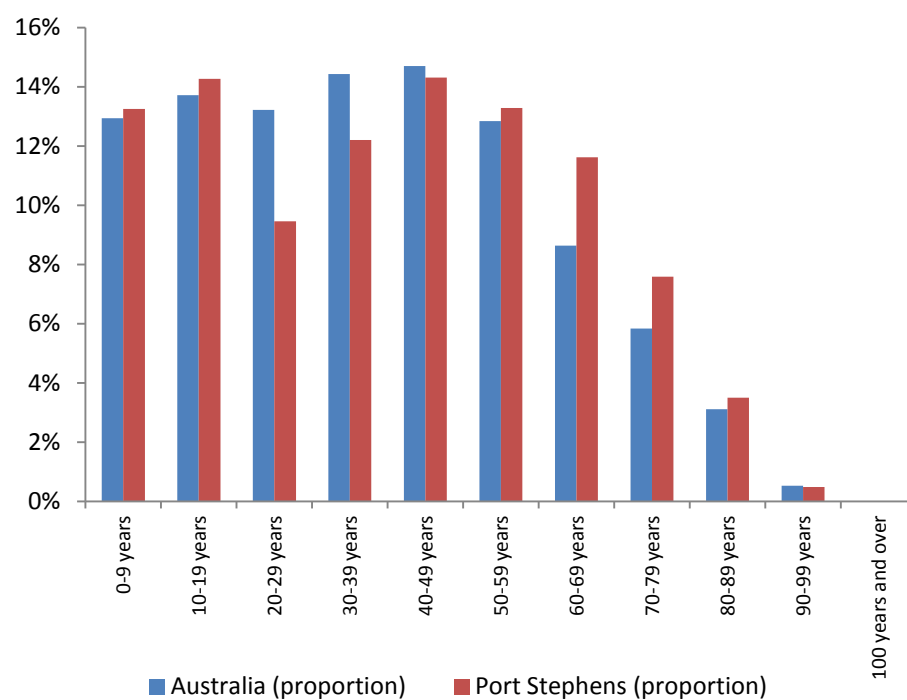
Seventeen per cent of residents in Port Stephens local government area were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Port Stephens born outside of Australia, 2858 residents were born in the United Kingdom and 740 were born in New Zealand.

Figure C15 Map of Port Stephens local government area



Data source: ABS (2006a, 2006b)

Figure C16 Age profile of Port Stephens local government area compared with national age profile



Data source: ABS (2006a, 2006b)

## Broken Bay

Broken Bay is located in the local government area of Pittwater, to the north of Sydney on the New South Wales coast (Figure C17).

### Population

In 2006 there were 54 158 people usually residing in the local government area of Pittwater (ABS 2006a, 2006b). Of these, 21 per cent are 60 years old or over, 53 per cent are between 20 and 60 years old and 26 per cent were 19 years old or younger (Figure C18). Fifty-one per cent of residents were female. The median age of people in Pittwater was 41, which is higher than the median age of 37 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in Pittwater (local government area), 0.3 per cent of people are Indigenous compared with the much higher national average of 2.3 per cent (ABS 2006a, 2006b).

### Education

Of people aged 15 years and over in Pittwater, 54 per cent had completed Year 12 or equivalent compared with 42 per cent for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 28 021 people aged 15 years and over who were usual residents in Pittwater were in the labour force. Of these, 59 per cent were employed full-time and 33 per cent were employed part-time. The unemployment rate in Pittwater in 2006 was 2.7 per cent, which was much lower than the national average of 5.2 per cent (ABS 2006a, 2006b).

Professional, scientific and technical services was the largest employment sector with 3051 people employed, followed by retail trade (2957 people), construction (2766 people) and health care and social assistance (2626 people)] (ABS 2006a, 2006b).

### Income

In the local government area of Pittwater, the median weekly individual income for people aged 15 years and over who were usual residents was \$653, compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

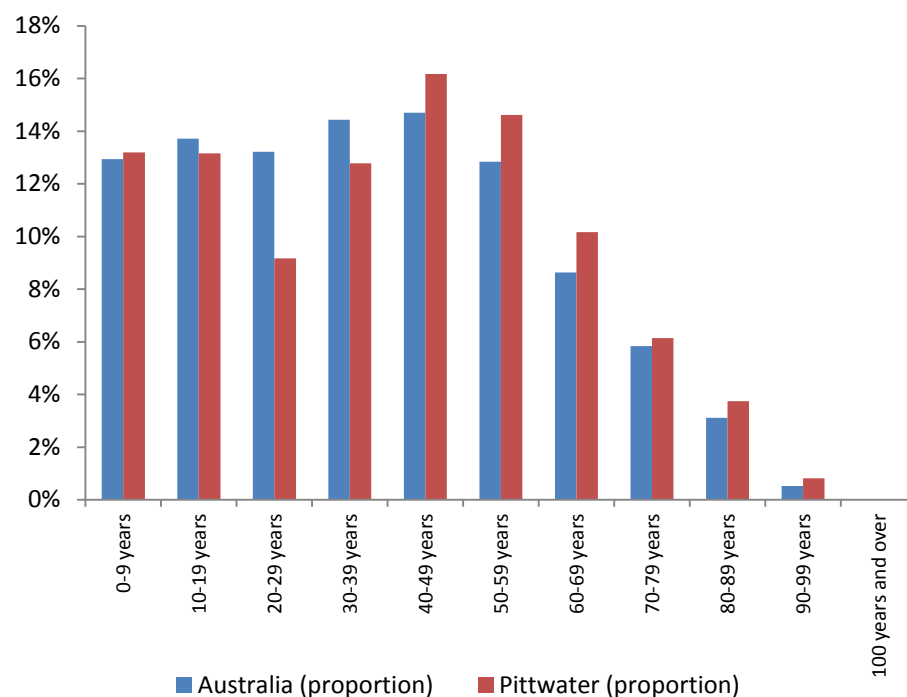
Twenty-eight per cent of residents in Pittwater local government area were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Pittwater born outside of Australia, 4803 residents were born in the United Kingdom and 1110 were born in New Zealand.

Figure C17 Map of Pittwater local government area



Data source: ABS (2006a, 2006b)

Figure C18 age profile of Pittwater local government area compared with national age profile



Data source: ABS (2006a, 2006b)

## Wollongong

The local government area of Wollongong is located in the Illawarra region on the coast of New South Wales (Figure C19).

### Population

In 2006 there were 184 213 people usually residing in the local government area of Wollongong (ABS 2006a, 2006b). Of these, 20 per cent are 60 years old or over, 54 per cent are between 20 and 60 years old and 26 per cent were 19 years old or younger (Figure C20). Fifty-one per cent of residents were female. The median age of people in Wollongong was 37, which is lower than the median age of 44 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in Wollongong local government area, 1.7 per cent of people are Indigenous compared with 2.3 per cent in Australia (ABS 2006a, 2006b).

### Education

Of people aged 15 years and over in Wollongong, 37 per cent had completed Year 12 or equivalent compared with 42 per cent for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 83 548 people aged 15 years and over who were usual residents in Wollongong were in the labour force. Of these, 57 per cent were employed full-time and 17 per cent were employed part-time. The unemployment rate in Wollongong in 2006 was 7.5 per cent, which was higher than the national average of 5.2 per cent (ABS 2006a, 2006b).

Manufacturing was the largest employment sector with 9266 persons employed, followed by health care and social assistance (9019 people), retail trade (8349 people) and education and training (8072 people) (ABS 2006a, 2006b).

### Income

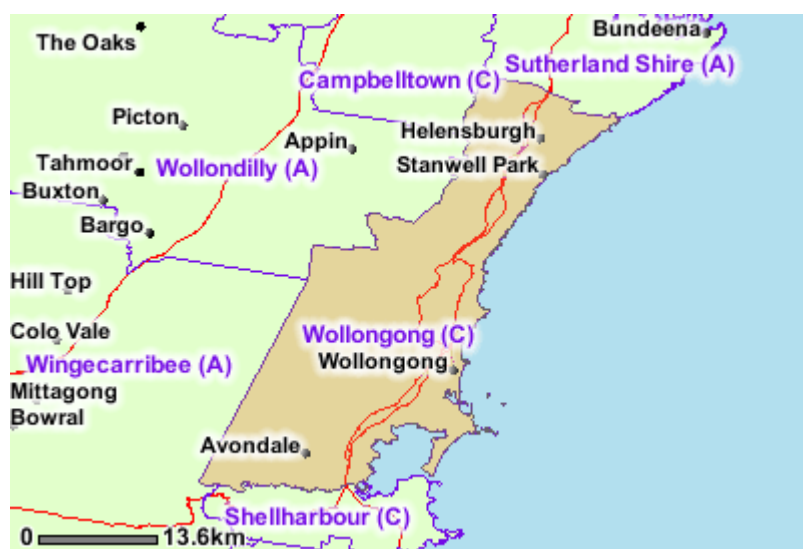
In the local government area of Wollongong, the median weekly individual income for people aged 15 years and over who were usual residents was \$391 compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

Twenty-eight per cent of residents in Wollongong local government area were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Wollongong born outside of Australia, 11 041 residents were born in the United Kingdom and 7047 were born in South Eastern Europe.

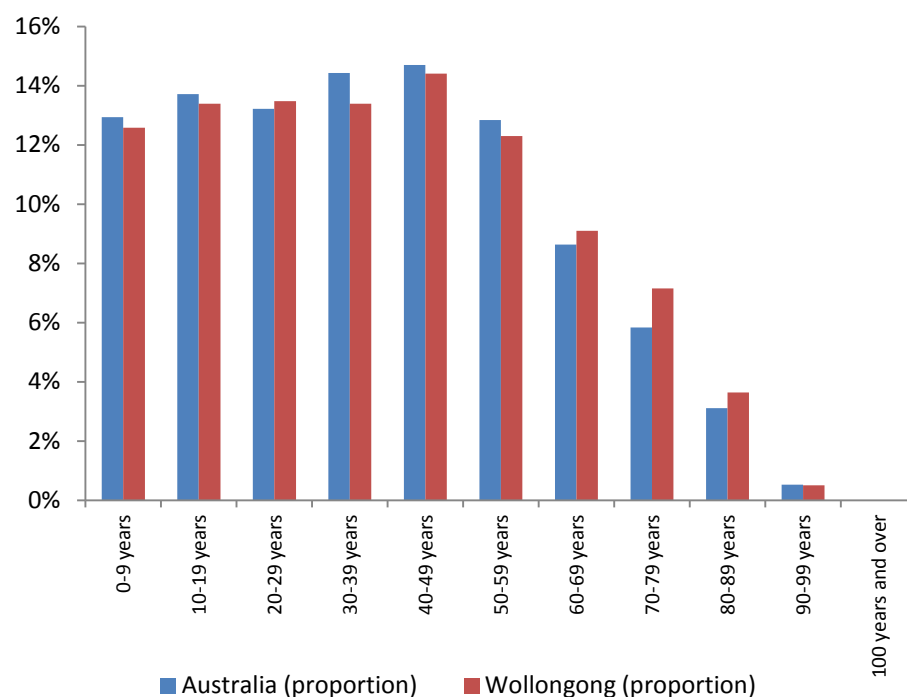


Figure C19 Map of Wollongong local government area



Data source: ABS (2006a, 2006b)

Figure C20 Age profile of Wollongong local government area compared with national age profile



Data source: ABS (2006a, 2006b)

## Shoalhaven

The local government area of Shoalhaven is located on the south coast of New South Wales (Figure C21).

### Population

In 2006 there were 88 405 people usually residing in the local government area of Shoalhaven (ABS 2006a, 2006b). Of these, 28 per cent are 60 years old or over, 46 per cent are between 20 and 60 years old and 26 per cent were 19 years old or younger (Figure C22). Fifty-one per cent of residents were female. The median age of people in Shoalhaven was 44, which is equal to the median age of people in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in Shoalhaven local government area, 3.7 per cent of people are Indigenous compared with 2.3 per cent in Australia (ABS 2006a, 2006b).

### Education

Of people aged 15 years and over in Shoalhaven, 27 per cent had completed Year 12 or equivalent compared with 42 per cent for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 34 479 people aged 15 years and over who were usual residents in Shoalhaven were in the labour force. Of these, 51 per cent were employed full-time and 34 per cent were employed part-time. The unemployment rate in Shoalhaven in 2006 was 9.2 per cent, which was higher than the national average of 5.2 per cent (ABS 2006a, 2006b).

Retail trade was the largest employment sector with 4459 people employed, followed by health care and social assistance (3678 people), construction (3116 people) and public administration and safety (2959 people) (ABS 2006a, 2006b).

### Income

In the local government area of Shoalhaven, the median weekly individual income for people aged 15 years and over who were usual residents was \$349 compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

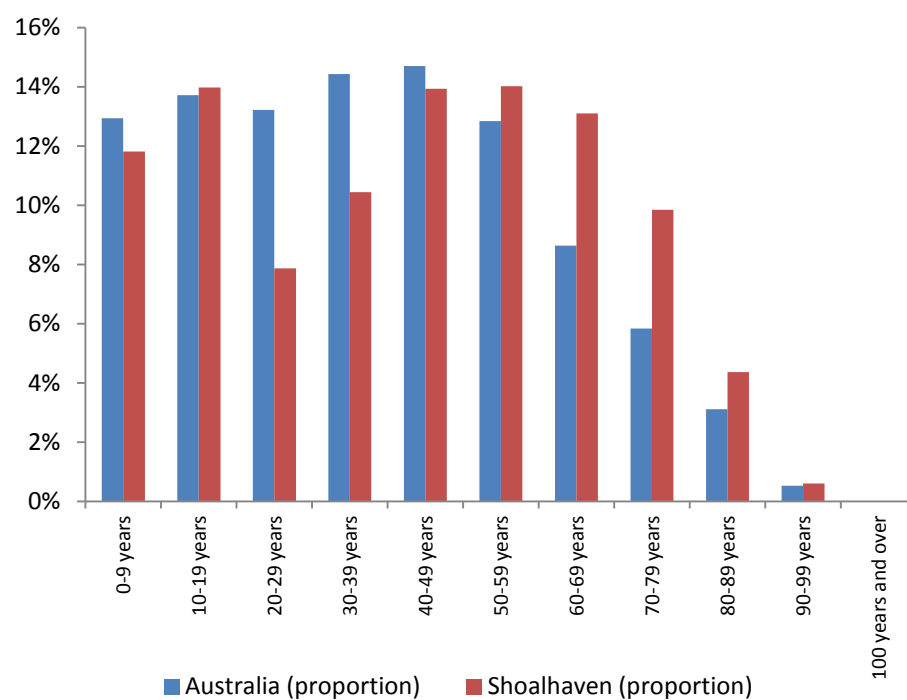
Nineteen per cent of residents in Shoalhaven local government area were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Shoalhaven born outside of Australia, 5474 residents were born in the United Kingdom and 1202 were born in Western Europe.

Figure C21 Map of Shoalhaven local government area



Data source: ABS (2006a, 2006b)

Figure C22 age profile of Shoalhaven local government area compared with national age profile



Data source: ABS (2006a, 2006b)

## Bermagui

The urban centre/locality of Bermagui is located on the south coast of New South Wales within the local government area of Bega Valley (Figure C23).

### Population

In 2006 there were 1298 people usually residing in the locality of Bermagui (ABS 2006a, 2006b). Of these, 36 per cent are 60 years old or over, 42 per cent are between 20 and 60 years old, and 22 per cent were 19 years old or younger (Figure C24). Fifty-one per cent of residents were female. The median age of people in Bermagui was 51, which is much higher than the median age of 37 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in Bermagui (urban centre/locality), 4.5 per cent of people are Indigenous compared with 2.3 per cent in Australia (ABS 2006a, 2006b).

### Education

Of people aged 15 years and over in Bermagui, 28 per cent had completed Year 12 or equivalent compared with 42 per cent for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 399 people aged 15 years and over who were usual residents in Bermagui were in the labour force. Of these, 43 per cent were employed full-time and 39 per cent were employed part-time. The unemployment rate in Bermagui in 2006 was 10 per cent which was higher than the national average of 5.2 per cent (ABS 2006a, 2006b).

Accommodation and food services were the largest employment sector with 78 people employed, followed by retail trade (56 people), construction (39 people), health care and social assistance (30 people) and agriculture, forestry and fishing (27 people) (ABS 2006a, 2006b).

### Income

In the locality of Bermagui, the median weekly individual income for people aged 15 years and over who were usual residents was \$304, compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

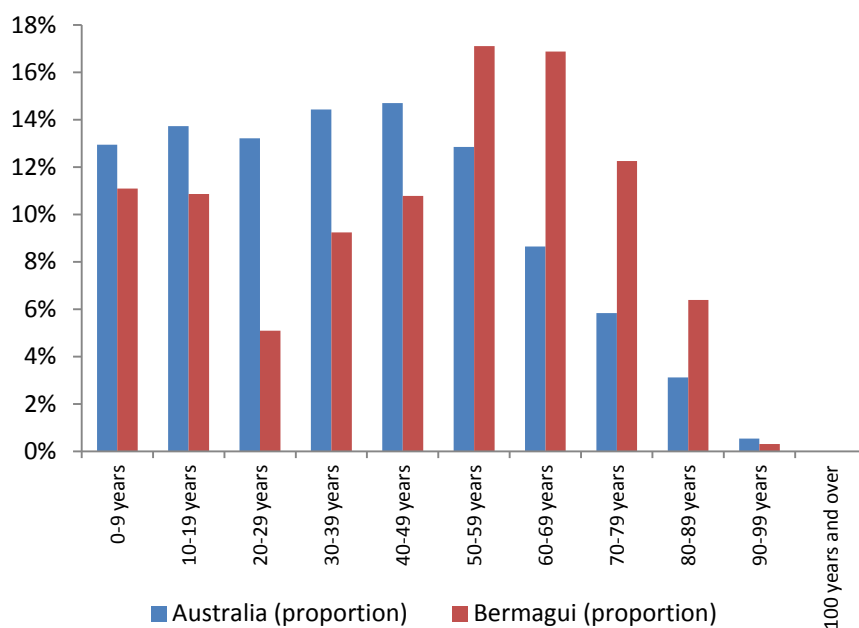
Nineteen per cent of residents in Bermagui urban centre/locality were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Bermagui born outside of Australia, 68 residents were born in England and 16 were born in New Zealand.

Figure C23 Map of Bermagui urban centre/locality



Data source: ABS (2006a, 2006b)

Figure C24 Age profile of Bermagui urban centre/locality compared with national age profile



Data source: ABS (2006a, 2006b)

## Merimbula

The state suburb of Merimbula is located on the Far South Coast of New South Wales, within the Bega Valley Shire local government area (Figure C25).

### Population

In 2006 there were 3207 people usually residing in the state suburb of Merimbula (ABS 2006a, 2006b). Of these, 33 per cent are 60 years old or over, 46 per cent are between 20 and 60 years old and 21 per cent were 19 years old or younger (Figure C26). Fifty-one per cent of residents were female. The median age of people in Merimbula was 49, which is higher than the median age of 44 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in Merimbula (state suburb), 0.9 per cent of people are Indigenous compared with 2.3 per cent in Australia (ABS 2006a, 2006b).

### Education

Of people aged 15 years and over in Merimbula, 32 per cent of those had completed Year 12 or equivalent compared with 42 per cent for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 1430 people aged 15 years and over who were usual residents in Merimbula were in the labour force. Of these, 50.6 per cent were employed full-time and 37 per cent were employed part-time. The unemployment rate in Merimbula in 2006 was 7.5 per cent, which was higher than the national average of 5.2 per cent (ABS 2006a, 2006b).

Accommodation and food services was the largest employment sector with 305 people employed, followed by retail trade (192 people), construction (153 people) and health care and social assistance (107 people) (ABS 2006a, 2006b).

### Income

In the state suburb of Merimbula, the median weekly individual income for persons aged 15 years and over who were usual residents was \$392 compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

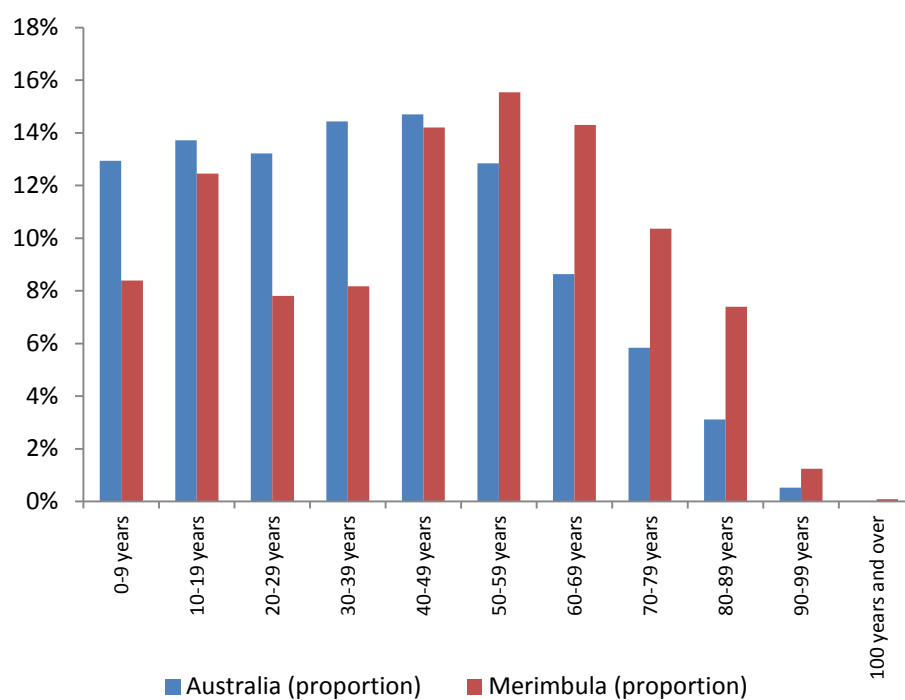
Twenty per cent of residents in the state suburb of Merimbula were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Merimbula born outside of Australia, 226 residents were born in the United Kingdom and 70 were born in Western Europe.

Figure C25 Map of Merimbula state suburb



Data source: ABS (2006a, 2006b)

Figure C26 Age profile of Merimbula state suburb compared with national age profile



Data source: ABS (2006a, 2006b)

## Port Welshpool

The state suburb of Port Welshpool located on the southern coast of Victoria within the South Gippsland Shire local government area (Figure C27).

### Population

In 2006 there were 198 people usually residing in the state suburb of Port Welshpool (ABS 2006a, 2006b). Of these, 39 per cent are 60 years old or over, 39 per cent are between 20 and 60 years old and 22 per cent were 19 years old or younger (Figure C28). Forty-four per cent of residents were female. The median age of people in Port Welshpool was 49, which is higher than the median age of 44 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Although 2.3 per cent of people across Australia are Indigenous, there were no Indigenous people living in the state suburb of Port Welshpool at the time of the census in 2006 (ABS 2006a, 2006b).

### Education

Of people aged 15 years and over in Port Welshpool, 17 per cent had completed Year 12 or equivalent. This is much lower than the 42 per cent of the total Australian population that had completed Year 12 or equivalent (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 60 people aged 15 years and over who were usual residents in Port Welshpool were in the labour force. Of these, 50 per cent were employed full-time and 43 per cent were employed part-time. The unemployment rate in Port Welshpool in 2006 was 6.7 per cent, which was higher than the national average of 5.2 per cent (ABS 2006a, 2006b).

Retail trade was the largest employment sector with 11 people employed, followed by construction (10 people), transport, postal and warehousing (7 people) and agriculture, forestry and fishing (6 people) (ABS 2006a, 2006b).

### Income

In the state suburb of Port Welshpool, the median weekly individual income for people aged 15 years and over who were usual residents was \$328 compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

Eighteen per cent of residents in Port Welshpool state suburb were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Port Welshpool born outside of Australia, 14 residents were born in the United Kingdom.

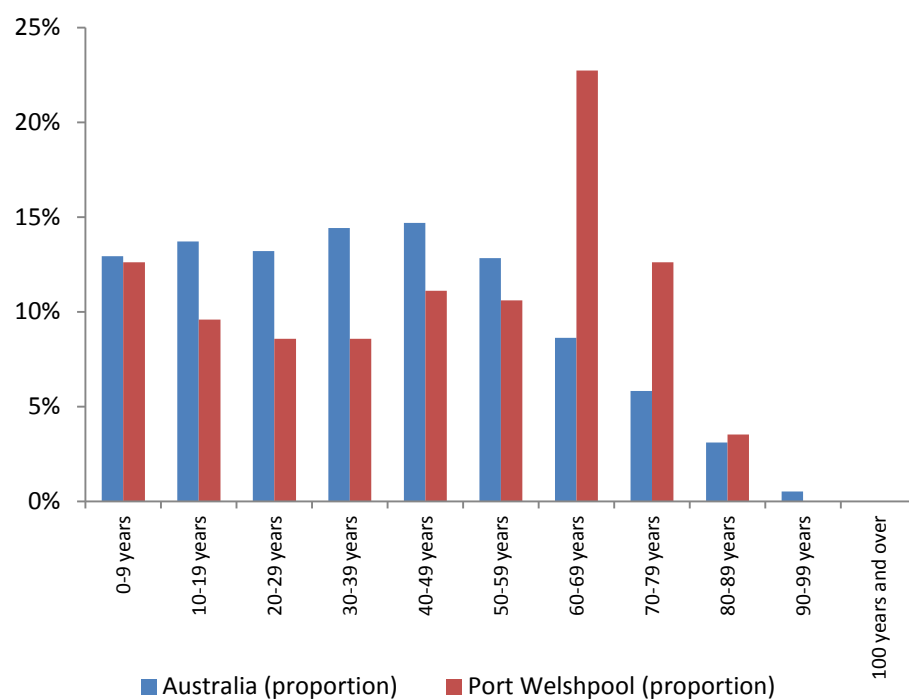


Figure C27 Map of Port Welshpool state suburb



Data source: ABS (2006a, 2006b)

Figure C28 Age profile of Port Welshpool state suburb compared with national age profile



Data source: ABS (2006a, 2006b)

## St Helens-Stieglitz

The urban centre/locality of St Helens-Stieglitz is located on the north-east coast of Tasmania (Figure C29).

### Population

In 2006 there were 20 549 persons usually residing in the locality of St Helens-Stieglitz (ABS 2006a, 2006b). Of these, 34 per cent are 60 years old or over, 44 per cent are between 20 and 60 years old and 22 per cent were 19 years old or younger (Figure C30). Fifty-three per cent of residents were female. The median age of people in St Helens-Stieglitz was 49, which is higher than the median age of 37 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in St Helens-Stieglitz (urban centre/locality), 3.6 per cent of people are Indigenous compared with 2.3 per cent in Australia (ABS 2006a, 2006b).

### Education

Of people aged 15 years and over in St Helens-Stieglitz, 21 per cent had completed Year 12 or equivalent compared with 42 per cent for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 667 people aged 15 years and over who were usual residents in St Helens-Stieglitz were in the labour force. Of these, 45 per cent were employed full-time and 38 per cent were employed part-time. The unemployment rate in St Helens-Stieglitz in 2006 was 9.1 per cent, which was higher than the national average of 5.2 per cent (ABS 2006a, 2006b).

Retail trade was the largest employment sector with 93 people employed, followed by accommodation and food services (89 people), agriculture, forestry and fishing (61 people) and health care and social assistance (60 people) (ABS 2006a, 2006b).

### Income

In the locality of St Helens-Stieglitz, the median weekly individual income for people aged 15 years and over who were usual residents was \$296, compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

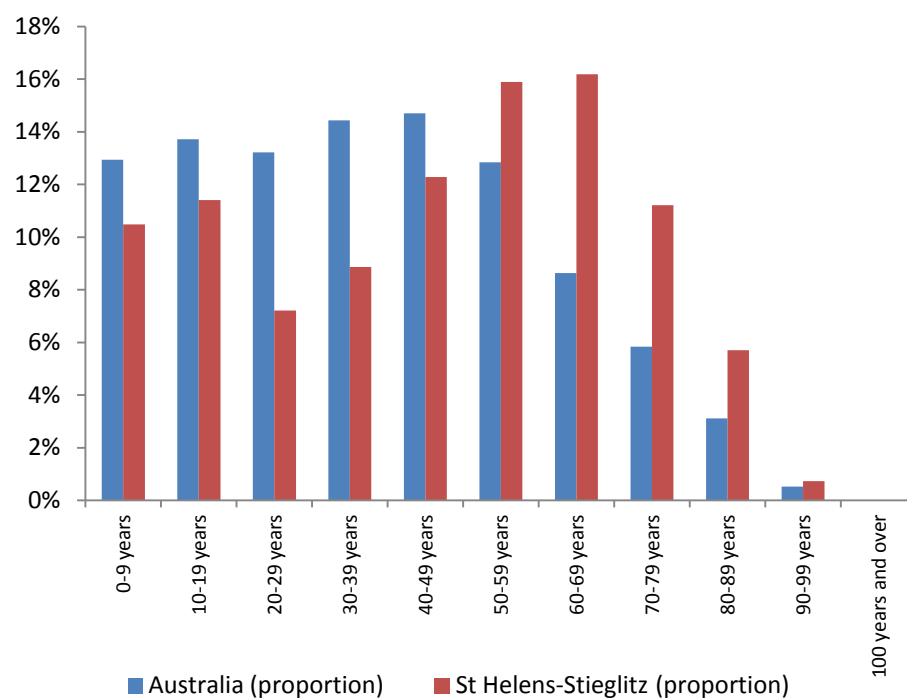
Nineteen per cent of residents in St Helens-Stieglitz urban centre/locality were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of St Helens-Stieglitz born outside of Australia, 155 residents were born in the United Kingdom and 29 were born in New Zealand.

Figure C29 Map of St Helens-Stieglitz urban centre/locality



Data source: ABS (2006a, 2006b)

Figure C30 age profile of St Helens-Stieglitz urban centre/locality compared with national age profile



Data source: ABS (2006a, 2006b)

## Eaglehawk Neck

The urban centre/locality of Eaglehawk Neck is located on the south-east coast of Tasmania (Figure C31).

### Population

In 2006 there were 269 persons usually residing in the locality of Eaglehawk Neck (ABS 2006a, 2006b). Of these, 23 per cent are 60 years old or over, 61 per cent are between 20 and 60 years old and 16 per cent were 19 years old or younger (Figure C32). Forty-eight per cent of residents were female. The median age of people in Eaglehawk Neck was 50, which is higher than the median age of 37 years for people in Australia (ABS 2006a, 2006b).

### Indigenous

Of the total population in Eaglehawk Neck (urban centre/locality), 3.3 per cent of people are Indigenous compared with 2.3 per cent in Australia (ABS 2006a, 2006b).

### Education

Of people aged 15 years and over in Eaglehawk Neck, 30 per cent had completed Year 12 or equivalent compared with 42 per cent for the total Australian population (ABS 2006a, 2006b).

### Workforce and industry

During the week before the 2006 Census, 123 people aged 15 years and over who were usual residents in Eaglehawk Neck were in the labour force. Of these, 55 per cent were employed full-time and 32 per cent were employed part-time. There was 2.4 per cent unemployment in Eaglehawk Neck residents at the time of the census in 2006. The national unemployment rate was 5.2 per cent (ABS 2006a, 2006b).

Accommodation and food services were the largest employment sector with 24 people employed, followed by agriculture, forestry and fishing (20 people), construction (12 people) and transport, postal and warehousing (12 people) (ABS 2006a, 2006b).

### Income

In the locality of Eaglehawk Neck, the median weekly individual income for people aged 15 years and over who were usual residents was \$373, compared with \$466 in Australia (ABS 2006a, 2006b).

### Country of birth

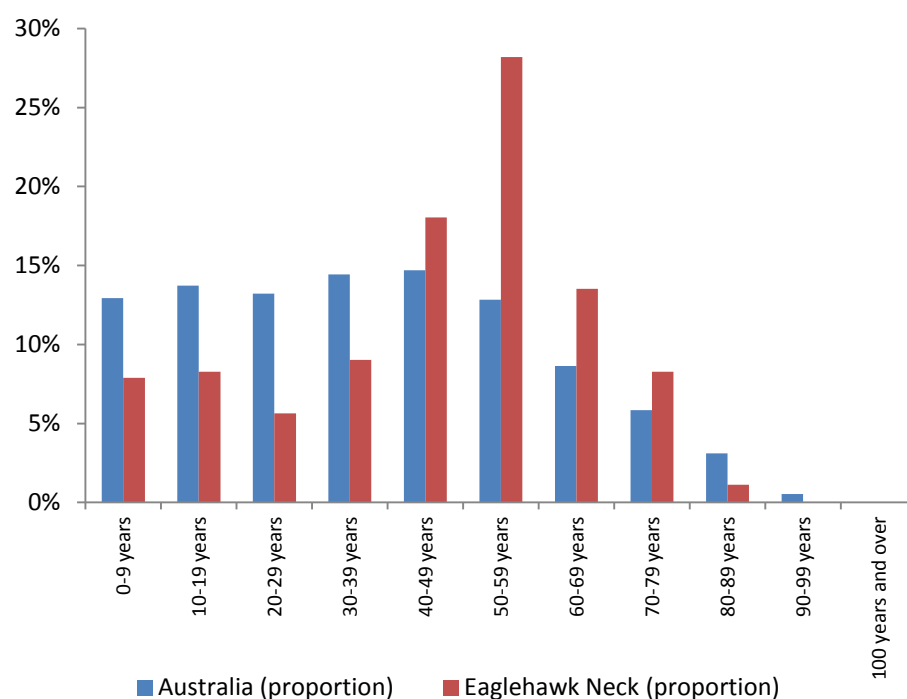
Twenty per cent of residents in Eaglehawk Neck urban centre/locality were born outside of Australia, compared with 29 per cent born in Australia. Of those residents of Eaglehawk Neck born outside of Australia, 28 residents were born in the United Kingdom and 4 were born in New Zealand.

Figure C31 Map of Eaglehawk Neck urban centre/locality



Data source: ABS (2006a, 2006b)

Figure C32 age profile of Eaglehawk Neck urban centre/locality compared with national age profile



Data source: ABS (2006a, 2006b)

# Appendix D: The travel-cost method

## Non-market valuation of recreational activities

The value associated with using fisheries resources represents the utility, or economic satisfaction, derived through actual use of fisheries resources for commercial, recreational or aesthetic purposes (Tietenberg 2010). The value of fisheries is either market or non-market in nature.

There is also an economic 'non-use' value associated with using fisheries resources. This value reflects the value that individuals derive satisfaction from knowing the resources are maintained (Perman et al. 1999). These values are more difficult to measure quantitatively than use values. They are always non market in nature. Non-use values are described in environmental economics literature and embodied in the concept of total economic value which includes both use and non-use values (Perman et al. 2003, OECD 1995).

While the benefits and costs of using fishery resources for commercial fishing are market values and can be readily quantified in monetary terms, the predominantly non-market use value of recreational game-fishing activities is more difficult to quantify, owing to the lack of clear market signals associated with the activity. The benefits and costs of game fishing are not readily expressed in dollar terms.

Various methods can be used to estimate non-market use and non-use values, broadly classified as either 'revealed preference' or 'stated preference' methods.

Frequently used revealed preference techniques include the hedonic pricing method and the travel-cost method. These methods provide a way to calculate the non-market use value associated with using a resource. Both methods value non-market benefits and costs by observing consumer behaviour in markets for related goods and services.

Stated preference methods are able to estimate both the use and non-use values associated with use or existence of a resource. Popular techniques that apply this framework include choice modelling and contingent valuation. These methods rely on asking people to state their preference for non-market impacts using hypothetical examples.

An advantage of stated preference methods over revealed preference methods is that the former can measure an individual's willingness to pay—not only for use but also for non-use values. Stated preference methods can measure changes in consumer utility, or in satisfaction associated with using a resource, arising from changes in resource allocation. Despite this advantage, revealed preference methods remain a popular choice with analysts because they are relatively inexpensive, straightforward, easy to analyse and are based on actual market behaviour.

We used the revealed preference travel-cost method to estimate the non-market recreational use values of game fishing in eastern Australia. The values estimated in this study can be used in further cost-benefit analyses of different resource access scenarios between game fishers and commercial fishers or as an input to other studies focused on estimating the total economic value of game fishing in south eastern Australia. The travel-cost method approach and how it applies to valuing game-fishing activity was discussed in Chapter 2 of this report and more technical details are presented below.

## The travel-cost method

In this study travel costs are defined as the cost game fishers incurred to participate in game fishing at the two study sites. In this study respondents were asked about their travel time to the site, on-site time and fishing time and whether they incurred any income losses due to participation in the game-fishing trip. In case of partial income loss, a percentage of the respondent's estimated wage rate was used to estimate the opportunity cost of time as suggested by Coupal et al. (2001), Fix and Loomis (1997) and Layman et al. (1996). A percentage of the respondent's observed wage rate could not be estimated because of data reliability problems and ambiguity in understanding the opportunity cost of the time question. It was therefore assumed that if visitors travel during their holiday or weekends there is no opportunity cost of time (Ward & Beal 2000).

The treatment of the opportunity cost of time is debated in the literature. For example, some authors argue that the time spent on travel could also be an enjoyable experience for participants; and most recreational trips are during holiday or non-work time when no income is lost (Ward & Beal 2000).

The travel-cost method is based on expenditure associated with visiting a site. The models tend to underestimate the net economic value of the recreational good because the travel-cost method concentrates on the expenditure required to participate in a recreational activity, rather than on all non-market benefits including non-use values (Randall 1994). Other common constraints with applying the travel-cost method include: the choice of dependant variable, multi-purpose trips<sup>2</sup>, calculation of travel costs, visitors versus residents and the availability of substitute sites that may affect values and time and sampling biases (Kjaer 2005).

Multi-purpose trips were not a serious problem in this study, however, because the primary reason identified for a game fisher visiting a site was to participate in game fishing (over 95 per cent). Multi-destination trips were identified through questions about the number of different sites that respondents visited on the trip. However, respondents often did not answer this question. With the main purpose of the trip usually to participate in a game-fishing tournament it can be assumed that most respondents did not visit other sites. This assumption may not be valid when respondents were travelling for non-tournament game-fishing trips.

## Technical framework

The demand function for the 'average' game fishing visitor to the site is estimated using regression analysis that takes into account the relationship between the price of travel and time cost and the game fisher's characteristics.

Several forms are available to estimate the trip function (e.g. linear, quadratic, semi-log and double log forms). Count data models are commonly used to calculate net economic value using the Poisson or negative binominal regression distributions (Ward & Loomis 1986). The Poisson and negative binominal distributions are described below:

---

<sup>2</sup> Multi-purpose trips occur when respondents travel to the site for more than one purpose, e.g. visiting family and friends, swimming or boating.

Let  $\mu$  be the rate of expected number of game-fishing trips in a given period of time, and  $y$  be the rate of occurrence of game-fishing trips in a given period of time. The relationship between the expected count ( $\mu$ ) and the probability of observing any observed count ( $y$ ) is specified by the Poisson distribution:

$$\Pr(y|\mu) = \frac{e^{-\mu} \mu^y}{y!} \quad \text{for } y=0,1,2,\dots$$

where  $\mu > 0$  is the sole parameter defining the distribution (Long & Freese 2006).

If visitors who differ in their rates of visits are combined, the univariate distribution of visits will be over-dispersed (i.e. the variance is greater than the mean; Long & Freese 2006). Differences in rates of visits can be due to other factors such as gender, income or other socio-demographic characteristics. To account for such differences they need to be specified as independent variables.

Often the Poisson model does not fit due to over-dispersion. To address the issue of over-dispersion the negative binomial model is applied. The negative binomial model adds a parameter,  $\alpha$ , that reflects unobserved heterogeneity among observations. Starting from the Poisson model:

$$\mu_i = \exp(\beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3})$$

The negative binomial regression model adds an error,  $\varepsilon$ , that is assumed to be uncorrelated with the  $X$ s,

$$\begin{aligned} \mu_i &= \exp(\beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3}) \\ &= \exp(\beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3}) \exp(\varepsilon_i) \\ &= \exp(\beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3}) \delta_i \end{aligned}$$

The Poisson model and the negative binomial regression model have the same mean structure.

The test for over-dispersion was conducted. The hypothesis tested was:  $H_0: \alpha = 0$ . Because  $\alpha > 0$  there is significant evidence of over dispersion (Long & Freese 2006).

Because of the zero truncated nature of the game-fishing trip data, the zero truncated Poisson and zero truncated negative binomial regression models were the most appropriate to use (Cameron & Trivedi 1986, Cameron & Trivedi 1998, Creel & Loomis 1990, Grogger & Carson 1991, Hellerstein 1991, Hellerstein & Mendelsohn 1993, Winkelmann 2000).

The mean individual net economic value per visit representing angler is calculated as:

$$-1/\beta$$

Where  $\beta$  is the coefficient on travel cost

The average net economic value is multiplied by the total relevant population in order to estimate the total net economic value for the site (Creel & Loomis 1990).



# Appendix E: The distribution of game fishing off eastern Australia as indicated by tagging data

## Summary

Eastern Australia tag-release data from the voluntary NSW DPI Game Fish Tagging Program was analysed to gain insights into the temporal, seasonal and geographical distribution of game-fishing activities. The data provide a guide to the distribution and intensity of game-fishing activities overlaid on the distribution, abundance and availability of game-fish species. Important considerations in interpreting these data include variations in retention practices, reporting, species identification, the timing and location of tournaments, catchability of individual species the experience levels, and techniques used by different game fishers.

The 0.25 million tag-releases of key game-fish species reported since the mid- 1970s in the exclusive economic zone (EEZ) off eastern Australia were broadly distributed from Cape York to southern Tasmania. Most tag-releases (72%) were from coastal waters. The distribution of game-fishing activity is not solely determined by population density; it is strongly influenced by the distribution and abundance of target species. Tag-releases were concentrated off New South Wales ports (Port Stephens – Eden and Coffs Harbour – Port Macquarie) and Queensland's Sunshine Coast (Mooloolaba). Game fishers reported moderate numbers of releases from North Queensland (Lizard Island – Cairns and Townsville). They reported fewer releases from Bass Strait and Tasmania.

Game fishers target a variety of tropical and temperate species off eastern Australia. Temperate species, such as southern bluefin tuna, are limited to cooler waters, including the southern states, and south-eastern New South Wales over the winter. The distribution of tropical species, such as marlins and yellowfin tuna, extends throughout eastern Australian waters to eastern Tasmania, expanding and contracting with seasonal variations in water temperature and the strength of the Eastern Australian Current. Game-fishing activities for southern bluefin tuna often overlap activities for tropical species off south-eastern New South Wales during winter.

Tag-releases of key game-fish species peaked at over 10 000 per year in the mid- 1990s and then fluctuated between about 4000 and 9000 releases per year. Black marlin has been the most frequently tagged game-fish species since at least the mid- 1970s. By contrast, tag-releases of striped marlin were rare before the 1990s and then increased rapidly to peak in 2000. This increase is attributed to the development of techniques for targeting this species and variations in striped marlin abundance or availability off eastern Australia. Other frequently tagged game-fish species include yellowfin tuna, dolphinfish, albacore, sailfish and pelagic sharks. Although they are highly prized by game fishers, there were fewer reports of blue marlin and southern bluefin tuna tag-releases. Releases of southern bluefin tuna have been highly variable from year to year, but they have increased significantly off south-eastern Australia in recent years.

## Introduction

This Appendix uses an extensive set of game fish tagging data to provide insights into the historical, seasonal and geographical distribution of game-fishing activity off eastern Australia. Maps of tag–releases of selected game-fish species reflect the distribution, abundance or availability of those species and also the types of game-fishing activity. The areas fished and techniques used to catch black marlin, for example, are quite different to those used to catch southern bluefin tuna. We selected game-fish species that are found in eastern Australian waters and are the responsibility of the Australian Government (Table E1). These ‘key game-fish species’ include billfish (e.g. black marlin, blue marlin, striped marlin and Pacific), tuna (e.g. yellowfin tuna and southern bluefin tuna) and sharks (e.g. mako sharks).

## Tagging programs

Game fish tagging programs operate throughout the world. They may be used to obtain information on the distribution, movement, growth and exploitation of a wide range of fish species. Partnerships with angling communities have proven to be a cost-effective method of collecting data because anglers are able to tag more fish over a larger geographic area than individual research projects could. Furthermore, the opportunity for recreational anglers and commercial fishers to participate in research projects often engenders a sense of ownership of the resource and may improve their linkages with fishery managers and scientists.

Tagging programs are coordinated by government agencies, universities, game fishing organisations or independent research bodies who provide anglers with tags to attach to captured fish prior to release. Each tag is uniquely coded and has an associated card that should be returned to program organisers. Anglers record information on the release card, such as the date and location of capture, skipper and angler details, fish species, estimated size and its condition. Anglers who recapture tagged fish are asked to report the tag’s unique identifier along with information on the date and location of capture, angler’s name, species and estimated size. Tagged fish that are recaptured are often re-released, sometimes with a replacement tag or an additional tag.

Some tagging programs offer rewards or incentives to anglers for recaptures of tagged fish. NSW DPI provides a recapture certificate to both the angler who originally released the fish and the angler who later recaptured it. The certificate provides details on the fish's growth and displacement since release.

The following description of the temporal, seasonal and geographical distribution of game-fishing activities is based on tag–release data for eastern Australia from the NSW DPI Game Fish Tagging Program. Over 361 000 fish have been successfully tagged by over 18 000 anglers since this voluntary program commenced in 1973 (NSW DPI 2005, NSW DPI 2009). The program recommends a list of 36 species for tagging, including billfish, tuna, sharks, kingfish and mackerel. The types of tags include stainless-steel tags (recommended for sharks), double-barbed nylon tags (recommended for billfish) and single-barb nylon tags (general use). While the tagging program is run by NSW DPI, game fishers use those tags throughout Australia (and the wider region). The Game Fishing Association of Australia approves the use of Game Fish Tagging Program tags in affiliated tournaments. The intention is to use the tag–release data to describe the nature and extent of game-fishing activities; we do not present information on the recaptures of tagged fish.

## Data and processing

We present 1976–2010 tag–release data for key game fishing species (Table E1) provided by NSW DPI on 4 April 2011. This is not an exhaustive dataset of all species tagged and released under the Game Fish Tagging Program. For example, tuna is probably the most frequently encountered species by game fishers. However skipjack are often released, but they are rarely tagged.

**Table E1 List of key game-fish species and species groups which are the responsibility of the Australian Government and are analysed in this appendix**

Common name	Scientific name	Total no. tagged	Individual species maps
Black marlin	<i>Makaira indica</i>	50 883	✓
Yellowfin tuna	<i>Thunnus albacares</i>	33 373	✓
Dolphinfish	<i>Coryphaena hippurus</i>	21 077	×
Striped marlin	<i>Kajikia audax</i>	19 293	✓
Albacore	<i>Thunnus alalunga</i>	18 818	×
Pacific sailfish	<i>Istiophorus platypterus</i>	11 132	✓
Mako sharks	<i>Isurus</i> spp.	6 463	✓
Whaler sharks	<i>Carcharhinus</i> spp.	6 366	×
Blue marlin	<i>Makaira nigricans</i>	3 762	✓
Blue shark	<i>Prionace glauca</i>	3 749	×
Southern bluefin tuna	<i>Thunnus maccoyii</i>	2 105	✓
Tiger shark	<i>Galeocerdo cuvier</i>	786	×
Shortbill spearfish	<i>Tetrapturus angustirostris</i>	334	×
Bigeye tuna	<i>Thunnus obesus</i>	108	×
Bigeye thresher shark	<i>Alopias superciliosus</i>	92	×
Broadbill swordfish	<i>Xiphias gladius</i>	85	×
<b>Total</b>		178 426	

Data source: NSW DPI Game Fish Tagging Program

To respect the confidentiality of game fishers' sites, each tag–release was plotted as a 50 km circle. Circles that overlapped contributed to the density of shaded areas. The area is shaded a deeper colour when it exceeds a threshold for the density category of the map series (Figures E10–E40). This form of presentation may underplay the density of releases near the coastline because land often overlays the density distributions.

Each species map (Figures E10–E40) includes a boundary labelled 'Footprint—all species' that shows the distribution of all releases combined in that same period. The footprint on the striped marlin map for April–June, for example, is the boundary of the distribution of releases of all game-fish species combined for April–June. This comparison of each species distribution with the footprint highlights areas where game fishers were known to be active, but may not have encountered or targeted the species that is the subject of that map.

## Data issues and caveats

The Game Fish Tagging data are likely to include mistakes in species identification because fish are usually tagged while they are in the water alongside the boat and because the game-fisher population is made up of participants who have a wide range of expertise and experience in species identification (Table E2). Misidentification is more likely for small fish; for example, juvenile bigeye tuna are very difficult to distinguish from juvenile yellowfin tuna, whereas adults

are more distinct. Misidentification can sometimes be corrected when the fish is recaptured and reliably identified.

**Table E2 List of key game-fish species and species with which they are commonly confused**

Common name	Common misidentification	Notes
<b>Billfish</b>		
Broadbill	–	Also known as swordfish or broadbill swordfish.
Black marlin	blue marlin	–
Blue marlin	black marlin	–
Striped marlin	–	Sometimes confused with juvenile blue marlin, black marlin or sailfish.
Sailfish	–	Sometimes confused with juvenile striped marlin, shortbill spearfish, blue marlin or black marlin.
Shortbill spearfish	–	Sometimes confused with sailfish or juvenile striped marlin, blue marlin or black marlin.
<b>Tuna</b>		
Southern bluefin tuna	–	May be confused with Pacific bluefin tuna and juvenile yellowfin tuna, bigeye tuna or longtail tuna.
Yellowfin tuna	bigeye tuna	May also be confused with juvenile southern bluefin tuna.
Albacore tuna	–	–
<b>Sharks</b>		
Mako sharks	–	Includes shortfin mako and the rarer longfin mako shark.
Thresher sharks	–	Includes common thresher shark, bigeye thresher and rarer pelagic thresher shark.
Tiger shark	–	–
Whaler sharks	–	Various species, predominantly silky, dusky, bronze whaler and common blacktip sharks.
<b>Other</b>		
Dolphinfish	–	Also known as mahi mahi.

NSW DPI has processes to correct inconsistencies in the species name of releases and recaptures. Out of 6300 recaptures, for example, game fishers reported a different species name for the release and recapture of 52 fish (<1 per cent of the total) following the application of those procedures (Adam Welfare, pers. comm., 11 May 2011). In addition to incorrect species identification, many of these discrepancies may be attributed to tagging cards being mixed up when there are multiple releases from the same boat and to incorrect recording of the tag number of recaptured fish (where the tag is not recovered).

In addition to the problems of species identification described above, there are several important limitations with using tag-release data as a guide to the distribution of game-fishing activities and species:

- Game fishers could be active in particular locations or times, but they might not catch fish. Low or elevated catches might be due to variations in the game fisher's skills or the local abundance of fish or their availability (the fish might have been present but 'were not biting').
- Game fishers might choose to retain catches. Generally, retention rates have declined over time with the increasing promotion and popularity of releasing fish (and tagging them; Pepperell 1990). Retention rates vary among species; large species like sharks and blue marlin are rarely kept for the table, whereas species like dolphinfish are popular eating fish. Tournament rules, conservation measures and state-enforced bag limits also influence decisions on whether to release or retain fish.

- Game fishers might choose to release catches but not tag them. In recent years in the Cairns black marlin fishery, for example, a large proportion of charter boat operators have tended not to tag black marlin that they release (Julian Pepperell, pers. comm., 10 November 2011).
- Support for the Game Fish Tagging Program has varied among game fishers over time and by locality. Tournament organisers, game fishing associations and media have promoted the NSW DPI Program in recent years. New South Wales residents might be more supportive of this New South Wales Government program than game fishers from other states. In the early years, game fishers sometimes used tags from other programs (e.g. the International Game Fish Association). Some billfish are also tagged with Billfish Foundation tags. The International Game Fish Association and Billfish Foundation tag-releases are not included in the maps presented here.
- Game fishers may sometimes neglect to obtain tags before a fishing trip or they might run out of tags during a trip.
- Game fishers might not return tagging cards for fish that they have released.
- Release details (e.g. location) might be incorrectly reported, illegible or they might be mistyped in the database.
- Targeting, changes in fishing practices and fishing gear will result in variations in the species composition of catches and catch levels. For example, the increased use of live and dead baits resulted in the expansion of striped marlin catches so that this species is now the prime target of many game-fishing activities off south-eastern Australia.
- Access to fishing and weather information, affluence, population growth, transport infrastructure, leisure time, availability of boats at attractive prices, the development of port facilities and the availability of safe harbours will influence activity levels and the location and timing of game-fishing activities.
- The timing and location of major tournaments (e.g. Port Stephens Interclub Tournament) pre-determine the location and timing of many game-fishing activities, regardless of the local abundance of target species.

Most of these factors will result in the underestimation of the level and extent of game-fishing activities. Several factors, such as species identification and transcription errors, will introduce uncertainty to the analyses, but not a systematic bias. Other factors may introduce bias. For example, the general decline in retaining fish may mean that the tag-release data underestimate game fishing catches and activity levels in the early years.

The maps and graphs presented in this section highlight broad patterns and trends in tag-releases. Note, however, that this level of detail will often gloss over important characteristics of the sector. For example, the apparent reduction in releases of black marlin off Cairns might be due to low numbers of small male black marlin whereas the availability or abundance of large female black marlin remained static.

Figure E1 shows localities and ports mentioned in this Appendix. Tag-releases with positions that coincided with land were not included in our analyses. They amounted to 24 035 tags (about 10 per cent of the total releases). Tag-releases with positions on land had the following characteristics:

- Records that are inland, but very close to the coast are probably navigation errors. An analysis of the numbers of errors per decade showed relatively high error rates in the years before global positioning systems (GPS) were widely available.
- A number of land releases were clustered at the same locality. Perhaps the location of the angler's club had been entered in the database instead of the release position.
- The extreme inland records are probably transcription errors, i.e. errors that occurred when transcribing hand-written records into a database. Some are identifiable as errors in latitude and some are likely to be errors in longitude, which can be deduced from the name of the club.

### Proportion of game fish tagged

Estimates of the total catch of game fish—the total number retained and released—are not available for eastern Australia. The New South Wales Gamefish Tournament Monitoring Program (Park 2007) has provided annual estimates of the total catch in game-fishing tournaments since 1993. The Program is limited to game-fishing tournaments in New South Wales and does not cover other fishing tournaments or game-fishing activities outside of tournaments.

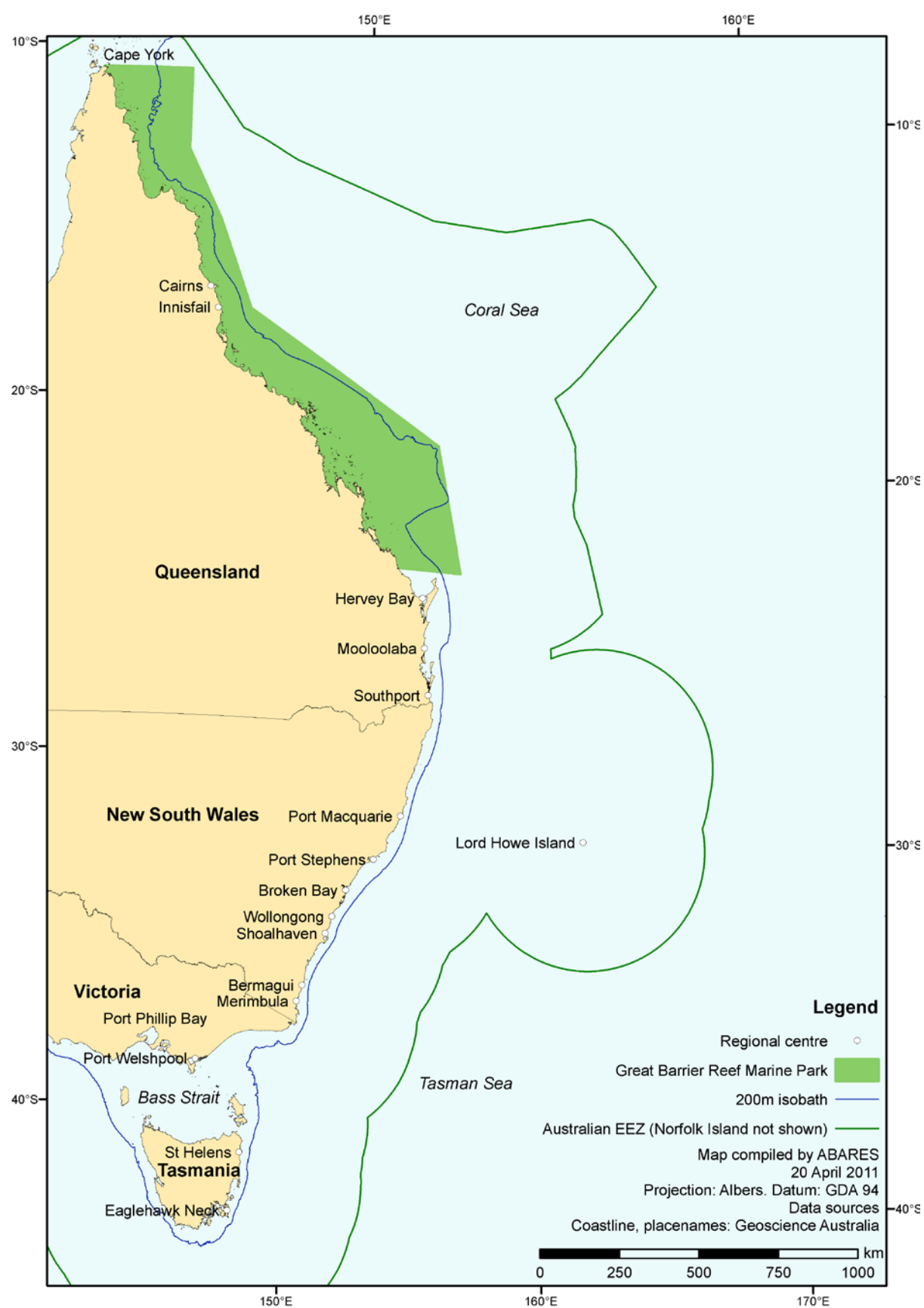
Catch estimates derived from the New South Wales Gamefish Tournament Monitoring Program (1993–94 to 2004–05) provide insights into the proportion of game fish that are tagged and released:

The catch-data set incorporates the results of the tournaments as well as fish reported captured in [radio] scheds. Of the 21,987 fish with a reported fate at monitored tournaments, 84.8 per cent of fish were tagged and released. There was a trend through the monitoring period of an increasing proportion of fish tagged and released compared to those retained and weighed. The proportion tagged increased from 75.7 per cent in 1993/94 to 88.6 per cent in 2004/05. There was also a small proportion of landed fish that were reported but scored no points ('not weighed'). The average of not-weighed fish over the period from tournament results was 2 per cent though this had declined from 9 per cent in 1993/94 to 0.7 per cent in 2004/05 (Park 2007).

Park (2007) reported that 26 per cent of blue marlin caught at New South Wales game-fishing tournaments were tagged and released, although this proportion ranged between 62 per cent and 86 per cent during 1993–94 to 2004–05. The proportion of striped marlin tagged and released (90 per cent) and black marlin (94 per cent) was higher than that of blue marlin. The proportion of black marlin tagged varied seasonally with fluctuations in the availability of small male black marlin and large female black marlin. The proportion of striped marlin tagged increased from 81 per cent (1993–94) to 95 per cent (2004–05). The proportion of yellowfin tuna tagged and released at game-fishing tournaments averaged 85 per cent, ranging between 69 per cent and 93 per cent between 1993–94 and 2004–05. The proportion of sharks that are tagged and released is generally lower, partly due to high points awarded for large sharks that are weighed and partly due to fishing methods. Among the sharks, there was a high proportion of mako sharks tagged (72 per cent; Park 2007).



Figure E1 Map showing localities and game fishing ports referred to in Appendix E



## Distribution of tag-releases

### All Releases Combined

The number of releases of key game-fish species peaked at over 10 000 in the mid- 1990s. The 222 011 tag-releases during 1976–2010 were broadly distributed from Horne Island off the tip of Cape York to south of Tasmania (Figure E1). Releases were concentrated in coastal waters between Port Stephens and Eden, Coffs Harbour – Port Macquarie and the Sunshine Coast. Game fishers reported moderate numbers of releases from Lizard Island – Cairns and Townsville. Lower levels extended into oceanic waters of the Australian fishing zone (AFZ), especially around reefs, seamounts and islands, including Lord Howe Island. Game fishers reported fewer releases from Bass Strait and inside the Great Barrier Reef Marine Park. Eighty-five per cent of tag-releases were from coastal waters (<200 m; Table E3).

**Table E3 The number of each game-fish species tagged and released off eastern Australia, including numbers released inside the 200 m isobath, 1976–2010**

Species	Total	Inside 200 m	
	(no.)	(no.)	(%)
Black marlin	46 800	43 877	94
Yellowfin tuna	28 990	19 581	68
Mahi mahi	19 790	17 970	91
Striped marlin	18 438	13 940	76
Mackerel tuna	13 982	13 797	99
Albacore tuna	13 921	8 832	63
Striped tuna	13 307	12 371	93
Sailfish	10 745	10 584	99
Bonito	9 875	9 761	99
Mako sharks	5 695	4 245	75
Whaler sharks	5 230	4 449	85
Blue marlin	3 589	2 192	61
Blue shark	3 160	2 329	74
Longtail tuna	2 961	2 940	99
Southern bluefin tuna	1 236	1 043	84
Tiger shark	739	589	80
Shortbill spearfish	313	178	57
Bigeye tuna	105	66	63
Thresher sharks	65	60	92
Broadbill	59	41	69
<b>Total</b>	<b>199 000</b>	<b>168 845</b>	<b>85</b>

Data source: NSW DPI Game Fish Tagging Program

Game fishers reported high levels of tag-releases from January–March (89,247 releases) each year and much lower levels in July–September (25 399 releases). During July–September, releases were concentrated off Townsville and around other major population centres, including Cairns, Mooloolaba, Coffs Harbour and Sydney. There were also releases of temperate species, such as southern bluefin tuna, off Tasmania in July–September. The black marlin season in

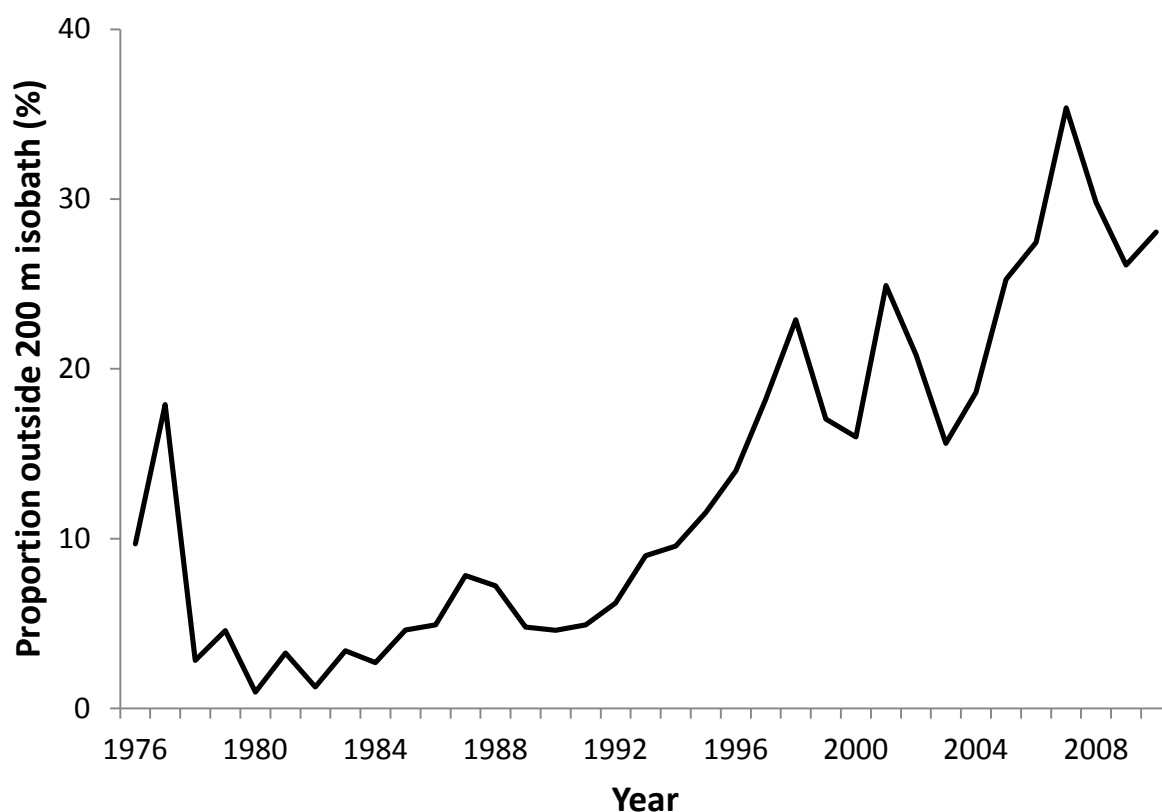


Cairns is evident in October–December, as are increased reports of tags off south-eastern Queensland, Coffs Harbour and Port Stephens – Bermagui. Releases increase and extend southwards to Bass Strait and Tasmania as the East Australian Current gathers strength during January–June. Game fishers reported low levels of releases off North Queensland during this period.

The five-year series shows the steady geographical expansion of tag-releases during 1976–90, then stabilising over the following 20 years (Figure E12). Initially, during 1976–80, releases were limited to the New South Wales coast, Lord Howe Island and sections of Queensland. Game fishers reported many releases from the Lizard Island – Cairns and Port Stephens – Sydney areas. No releases were reported from Victoria or Tasmania during 1976–80. Releases increased off Mooloolaba and Coffs Harbour – Port Macquarie from 1981–85, and low levels extended into the Tasman Sea. Townsville and Lord Howe Island emerged as tagging hotspots from 1986–90. The location of hotspots and the broad distribution of releases were stable over the subsequent two decades. Game fishers reported low levels of releases from the Lizard Island – Cairns area during 2006–10.

The proportion of releases from inside the 200 m isobath (Figure E2) declined from around 95 per cent in the early 1980s to around 70 per cent in recent years. Among other factors, this reflects the increasing range of vessels venturing into offshore waters.

**Figure E2 Annual trend in the percentage of game fish tag-releases reported from outside the 200 m isobath**



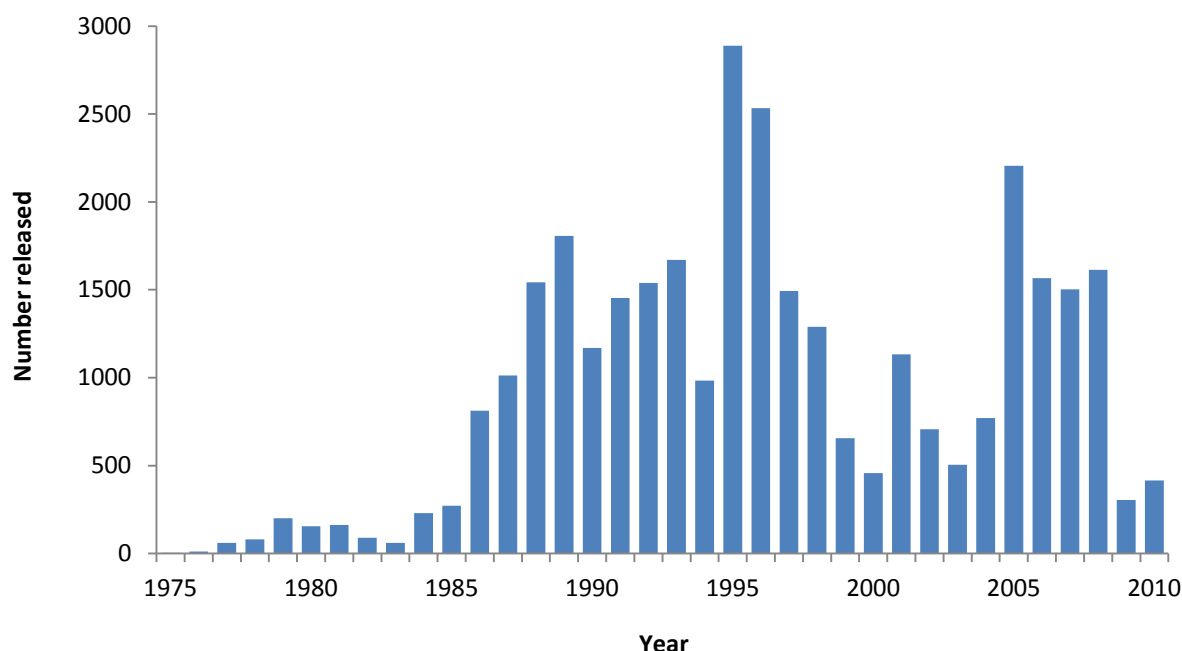
Data source: NSW DPI Game Fish Tagging Program

Large numbers of releases reported from south-eastern Queensland, Port Stephens, Sydney, Jervis Bay and Bermagui contributed to the single year of highest tag-releases in 2005 (9097; Figure E10). Low levels of releases are noticeable from the Lizard Island – Cairns area in all years after 2005, potentially reflecting poor black marlin seasons. It is unclear, however, whether this is due to variations in the size of black marlin encountered, or charter boat operators preferring not to tag marlin that they released. Townsville featured in only three years in that decade (2005, 2006 and 2008). By contrast, other key game fishing centres, such as Mooloolaba, Port Stephens, Sydney, Jervis Bay and Bermagui were more consistent with game fishers there reporting high numbers of releases from those sites in most years.

## Yellowfin tuna

Releases of tagged yellowfin tuna increased in the late 1980s, peaking at almost 3000 in 1995 (Figure E3). Yellowfin tuna releases then fluctuated widely, ranging from 300 (2009) to over 2250 (2005).

**Figure E3 Annual number of yellowfin tuna reported tagged and released off eastern Australia**



Data source: NSW DPI Game Fish Tagging Program

The 33 371 releases of tagged yellowfin tuna were broadly distributed from Cooktown to Hobart (Figure E13). Compared to most other game-fish species, fewer releases of yellowfin tuna (68 per cent) were reported from inside the 200 m isobath. Releases of yellowfin tuna were concentrated off Sydney and along the New South Wales south coast. Game fishers also reported moderate numbers from Moreton Island, Coffs Harbour, Port Macquarie and Port Stephens.

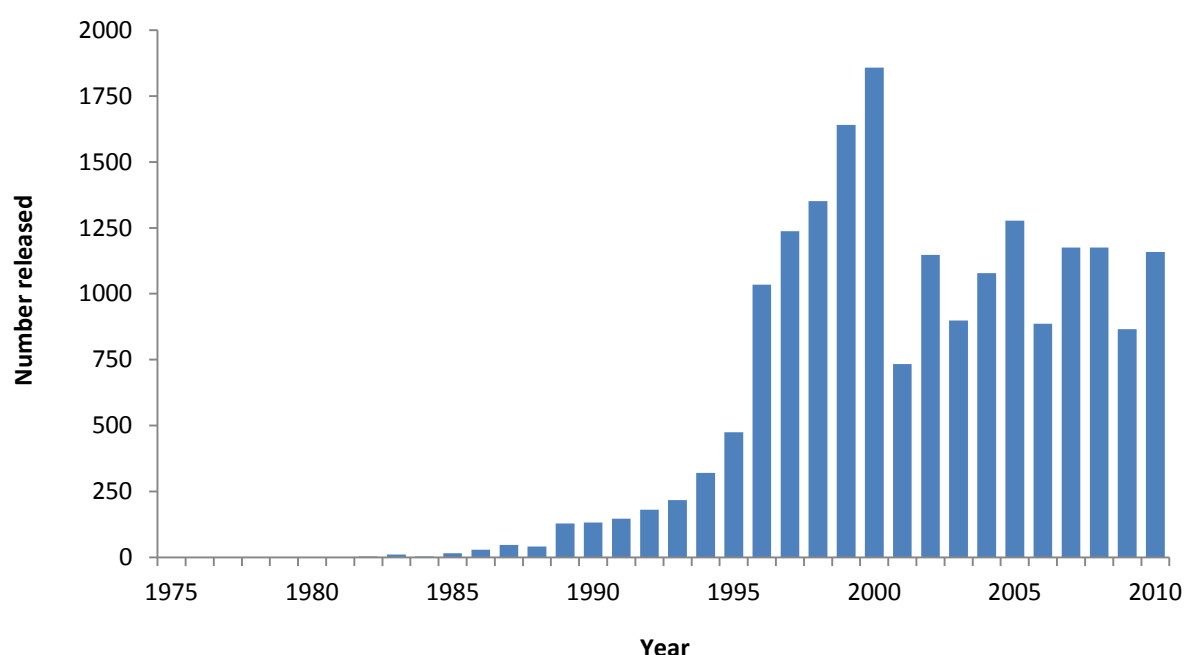
Game fishers reported low levels of tag-releases from July–September (3097 releases), compared to consistently high releases over the other three quarters (Figure E14). Those three quarters show the effects of the East Australian Current extending the southern distribution of yellowfin tuna releases to Bermagui and south-eastern Tasmania in January–March, then contracting to the New South Wales south coast in later months.

Yellowfin tuna releases were reported over a broad geographical throughout the five-year series (Figure E15). They extended to Tasmania after 1985. There were large annual variations in the number of yellowfin tuna releases, ranging from 304 (2009) to 2206 (2005; Figure E16). No releases were reported from Tasmania and Bass Strait after 2007.

## Striped marlin

Releases of tagged striped marlin were rare before the 1990s (Figure E4). The number of striped marlin releases increased rapidly in the late 1990s, peaking at almost 2000 releases in 2000. This increase is partly attributed to the development and adoption of techniques for targeting striped marlin and, probably, increased abundance or availability off eastern Australia (Knight et al. 2006). During the 2000s, the number of releases varied between 750 and 1250 per year.

**Figure E4 Annual number of striped marlin reported tagged and released off eastern Australia**



Data source: NSW DPI Game Fish Tagging Program

The 19 236 releases of tagged striped marlin were broadly distributed from Cooktown to Hobart (Figure E4). Seventy-six per cent of the releases were reported from inside the 200 m isobath (Table E3). Releases of striped marlin were concentrated off Port Stephens – Sydney and along the New South Wales south coast, especially Bermagui. They were rare in Bass Strait and oceanic waters of the AFZ, including Lord Howe Island.

Game fishers reported low levels of striped marlin releases during July–September (420 releases; Figure E18). The highest releases (14 637) were in January–March when the East Australian Current extended the southern distribution of striped marlin releases to south-eastern Tasmania. In other months, the southerly distribution was limited to the New South Wales far south coast.

Striped marlin releases were rare before the mid- 1990s as the species were an incidental catch of game-fishing activities targeting black marlin and blue marlin (Figure E19). With the

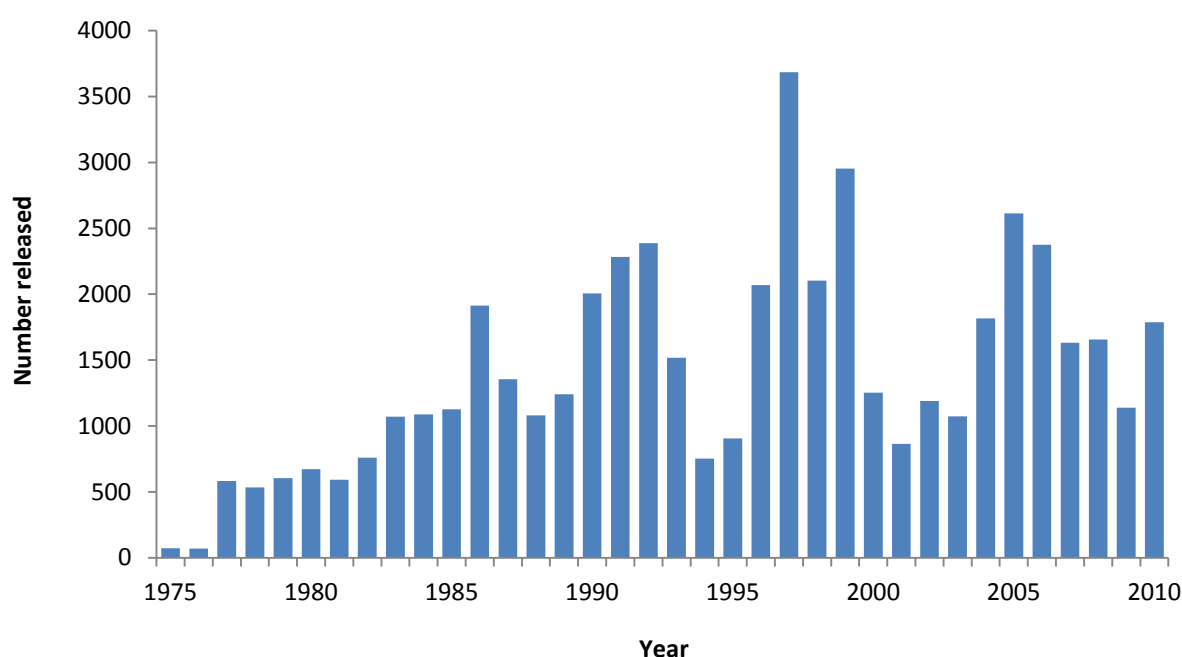
development of targeting techniques in the 1990s, striped marlin releases then quickly expanded to the entire New South Wales coast and south-eastern Queensland.

Over the past decade, game fishers off Port Stephens and Jervis Bay – Bermagui reported consistently high levels of striped marlin releases (Figure E20). The biggest year was 2008, when game fishers reported the release of 1176 striped marlin.

## Black marlin

Releases of tagged black marlin ranged up to 1000 per year in the late 1970s (Figure E5), reflecting the long history of game fishers targeting this species. The number of black marlin released each year then varied widely, from 700 (1994) to over 3500 in 1997.

**Figure E5 Annual number of black marlin reported tagged and released off eastern Australia**



Data source: NSW DPI Game Fish Tagging Program

The 48 091 releases of tagged black marlin were distributed from the tip of Cape York to Eden (Figure E5). Compared to most other game-fish species, more releases of black marlin (94 per cent) were reported from inside the 200 m isobath. Releases of black marlin were concentrated in the Lizard Island – Cairns area, Townsville, the Sunshine Coast and Port Stephens, with moderate levels reported from Innisfail, the Gold Coast and Port Macquarie. Game fishers reported low levels of black marlin releases from oceanic waters and they were not reported south of New South Wales apart from several from Port Phillip Bay.

Game fishers reported very low levels of black marlin releases in April–June (1685 releases; Figure E22). The highest releases were in October–December (18 690), especially from the Lizard Island – Cairns area, and in January– March (14 637), especially from the Sunshine Coast and Port Stephens. The seasonal fishery for small black marlin south-east of Townsville is evident in July–September.

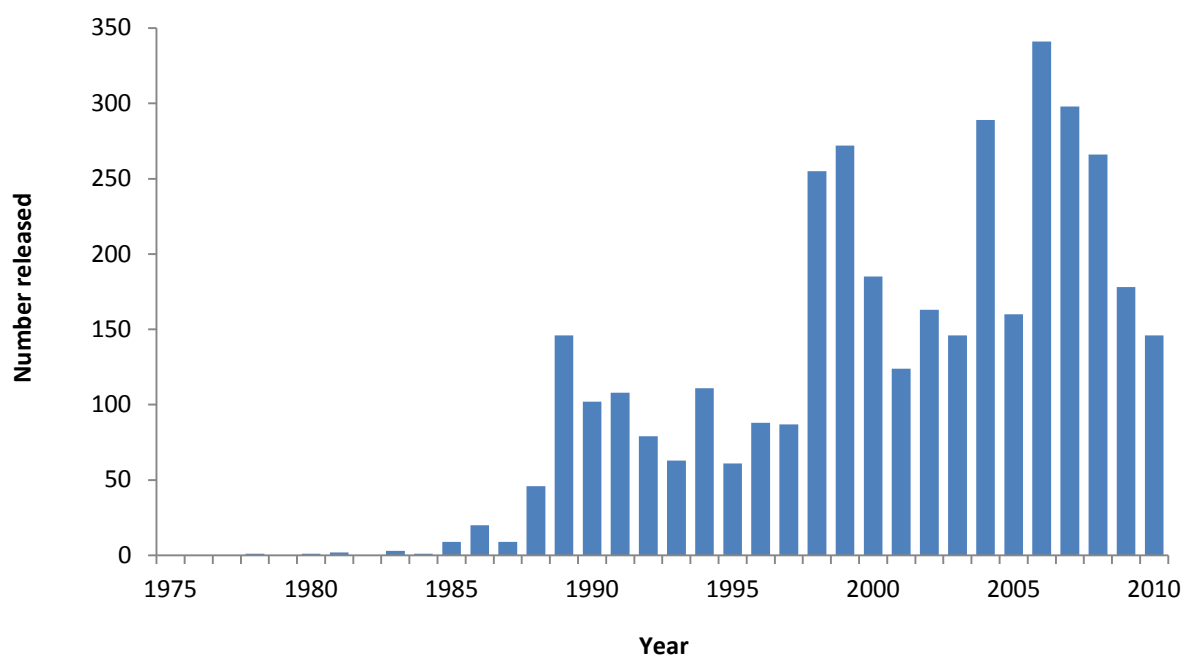
At the beginning of the time-series black marlin releases were high in the Lizard Island – Cairns area (Figure E23). The distribution of releases rapidly expanded southwards to Bermagui and offshore, with Mooloolaba rising to moderate levels after 1981, Townsville after 1986 and Port Stephens after 1991.

The biggest year was 2005 when game fishers reported the release of 2614 black marlin. Over the past decade, game fishers off Mooloolaba have reported consistently high levels of black marlin releases. Releases were relatively rare off Port Stephens in 2002, 2003 and 2009. From 2008 to 2010 the traditional Lizard Island – Cairns fishery for ‘giant black marlin’ reported low numbers of releases. As noted above, this probably involved reasonable numbers of large female black marlin, but few catches of small male black marlin, which make up three-quarters of the catch.

## Blue marlin

The level of tag-releases of tagged blue marlin was an order of magnitude lower than that of black marlin. Blue marlin releases varied from year-to-year, but generally increased after 1987, reaching over 340 in 2006 (Figure E6). The number of blue marlin then declined steadily, with about 150 reported in 2010.

**Figure E6 Annual number of blue marlin reported tagged and released off eastern Australia**



Data source: NSW DPI Game Fish Tagging Program

The 3726 releases of tagged blue marlin were distributed from Cooktown to Eden (Figure E25). The distribution of releases tended to be more oceanic than those of other marlins, with only 61 per cent reported from inside the 200 m isobath. Releases of blue marlin were concentrated off south-eastern Queensland and Port Stephens – Sydney. Game fishers reported moderate levels of releases off Coffs Harbour, Port Macquarie and Bermagui. Like black marlin, blue marlin releases were not reported south of New South Wales. In contrast to black marlin, they were rare in the Lizard Island – Cairns area.

Blue marlin releases were rare in July–September (100 releases) and game fishers rarely reported tagging blue marlin in October–December (402 releases; Figure E26). The highest releases were in January–March (2255 releases), with south-eastern Queensland and Port Stephens prominent. Game fishers continued to report high numbers of releases off South-eastern Queensland, especially Mooloolaba, in April–June.

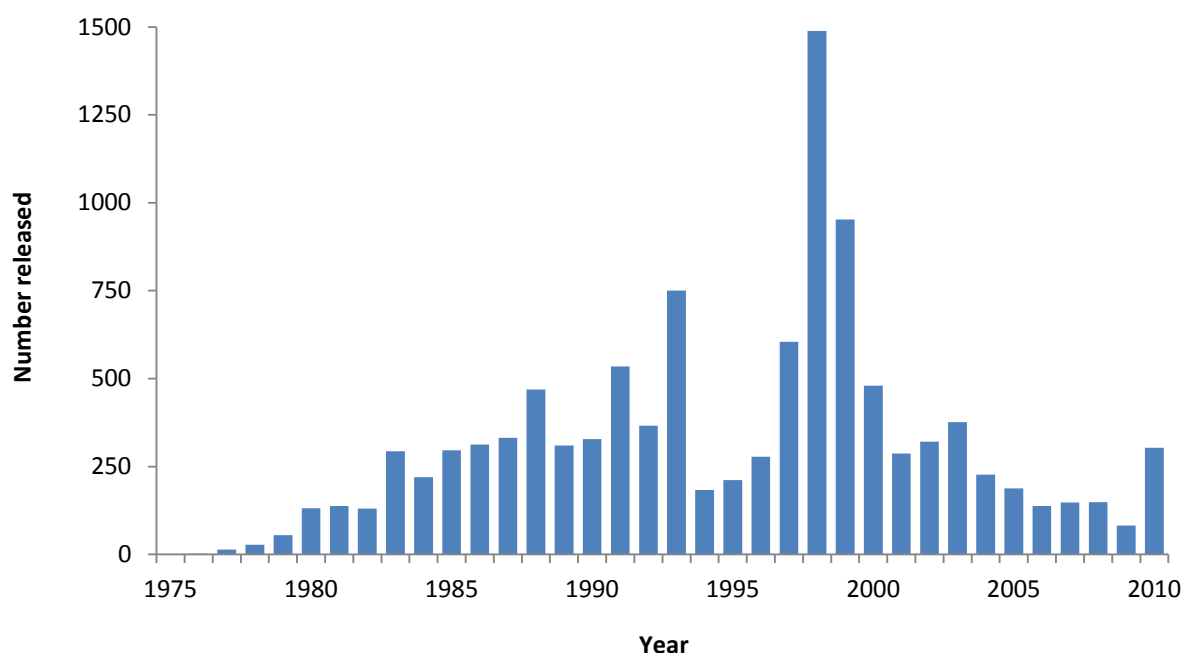
Game fishers rarely reported blue marlin before 1986 (Figure E27). The five-year time series shows the development of game-fishing grounds for blue marlin in the late 1980s. The distribution of releases then expanded southwards to Port Stephens (1991–95), and, later, Sydney, Bermagui and Coffs Harbour.

The biggest year on record was 2006, when game fishers released 341 blue marlin (Figure E28). Over the past decade, game fishers off south-eastern Queensland have reported consistently high levels of blue marlin releases. Releases were rare off southern New South Wales after 2008.

## Sailfish

Game fishers have reported sailfish since the beginning of the tagging program. The number of releases of tagged sailfish generally increased to a peak of 1500 in 1998 then declined to fewer than 400 releases per year (Figure E7). The general increasing trend in releases in earlier years did show a short-term decline in the mid- 1990s.

**Figure E7 Annual number of sailfish reported tagged and released off eastern Australia**



Data source: NSW DPI Game Fish Tagging Program

The 11 123 releases of tagged sailfish were distributed from Cape York to Jarvis Bay (Figure E29). The southern limit of their distribution was further north than other tropical billfish, such as blue marlin and blue marlin. The distribution of releases was heavily concentrated in coastal waters, with 99 per cent of releases reported from waters shallower than 200 m. Releases of sailfish were concentrated off south-eastern Mooloolaba. Game fishers reported moderate levels of releases off Innisfail, Townsville and Mackay.

The number of sailfish releases did not show a strong seasonal pattern, although their distribution does show seasonal expansion and contraction (Figure E30). Sailfish releases were limited to Queensland in July–September and game fishers reported few releases off the New South Wales coast from April–June. The distribution of sailfish releases expanded southwards over the summer. Game fishers reported high numbers of sailfish releases off Mooloolaba year-round.

The five-year time series shows the expansion of sailfish releases southwards and offshore, with the geographical distribution and releases peaking in the late 1990s (Figure E31). Mooloolaba has remained a major hotspot for sailfish releases throughout the time-series.

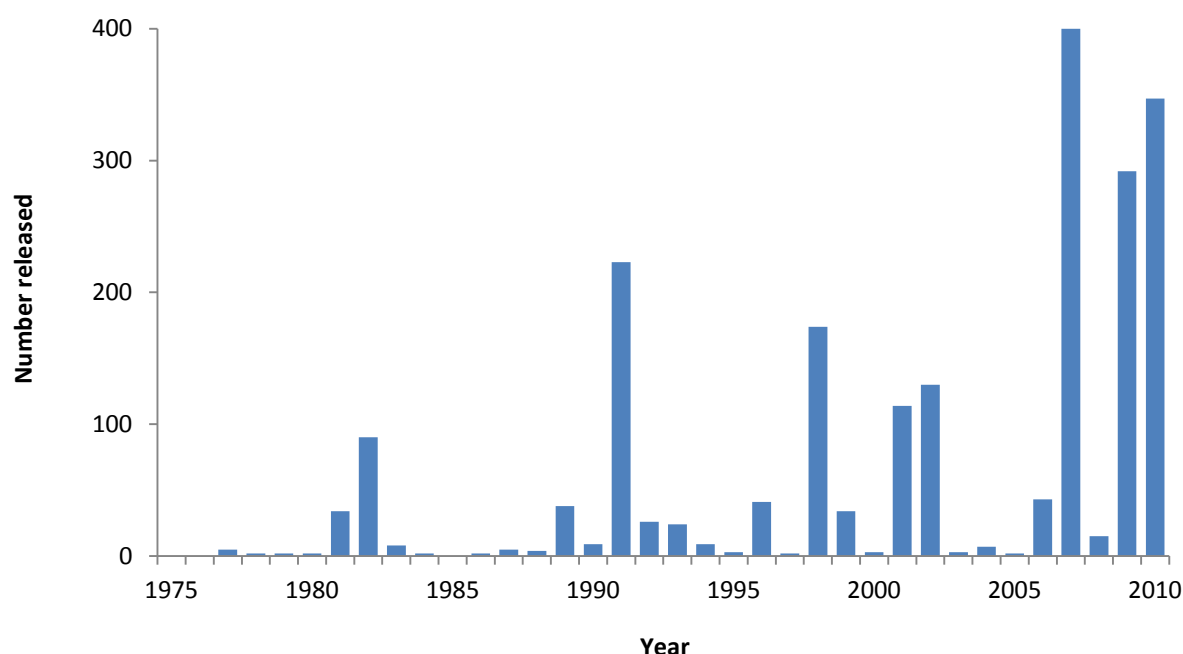
The biggest years were 2002 (321 sailfish releases) and 2003 (376 releases; Figure E32). Over the past decade, sailfish releases have become more prominent off north Queensland.

### Southern bluefin tuna

In considering southern bluefin tuna tag-releases it is important to note that the main centres of game-fishing activity for this species (e.g. Portland and Port MacDonnell) are outside the study area; and they are not included in the maps and graphs presented in this Appendix.

Releases of tagged southern bluefin tuna showed the greatest inter-annual variability of the key game-fish species considered in this report. In several years, reported releases were orders of magnitude higher than those of preceding and subsequent years (Figure E8). The number of releases has increased in recent years, although the number reported in 2008 was noticeably low.

**Figure E8 Annual number of southern bluefin tuna reported tagged and released off eastern Australia**



Data source: NSW DPI Game Fish Tagging Program

The 1388 releases of tagged southern bluefin tuna were concentrated off southern and eastern Tasmania, particularly Hobart and Southport (Figure E33). Eighty-four per cent of southern bluefin tuna releases were reported from inside the 200 m isobath. There were no releases north of Port Macquarie. There were few oceanic releases, which contrasts with historical catches by commercial longliners in the eastern AFZ as far north as the New South Wales – Queensland border.

The geographical distribution of southern bluefin tuna releases shows strong seasonality (Figure E34). In the first half of the year they are concentrated in southern waters off Tasmania (January–June). Releases are then concentrated off the New South Wales South Coast, from Bermagui to Sydney. They are rare or absent from eastern Tasmania and Victoria during this quarter (July–December). During October–December, southern bluefin tuna releases extend to Port Stephens with concentrations off Wollongong and Bermagui.

Game fishers reported fewer than 11 releases of tagged southern bluefin in the study area before 1986 (Figure E35). The Tasmania fishery developed in the late 1980s, followed by increased releases off Victoria and the New South Wales South Coast. The Bermagui fishery was quite patchy, with many releases reported in the early 1990s and late 2000s, but few reported in the late 1990s and early 2000s.

The biggest years were 2007 and 2009 when releases amounted to several hundred southern bluefin tuna per year (Figure E36). There was considerable annual variability with game fishers reporting fewer than 11 releases in several years (2003–05, 2008).

## **Mako sharks**

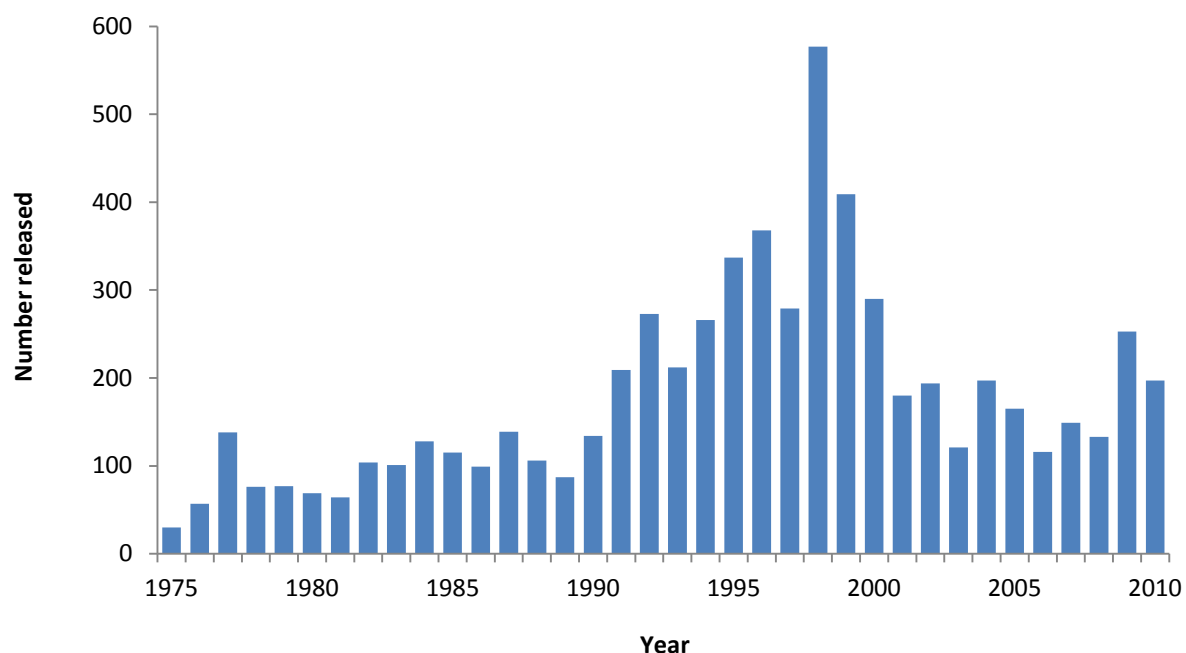
Releases of tagged mako sharks highlight the long history of game fishers targeting these species. Mako shark releases generally increased to a peak (almost 600 releases) then fell to several hundred releases per year (Figure E9).

The 6457 releases of tagged mako sharks were distributed from Townsville to Hobart, including Bass Strait (Figure E37). Seventy-five per cent of the releases were reported from inside the 200 m isobath. This contrasts with frequent catches by commercial longliners throughout the eastern AFZ. Mako shark tag-releases were patchy north of Sydney and rare off Queensland; their distribution tended to be in colder waters, south of Port Stephens with concentrations off Sydney and Bermagui.

Mako shark releases do not show strong seasonality (Figure E38), perhaps because this species maintains an elevated body temperature (Lowe & Goldman 2001). During July–September, mako shark releases were concentrated off Sydney–Wollongong, extending to Port Stephens in October–December. Areas of high releases are then evident southwards in January–March off Bermagui and Port Phillip Bay, before contracting to Bermagui in April–June.



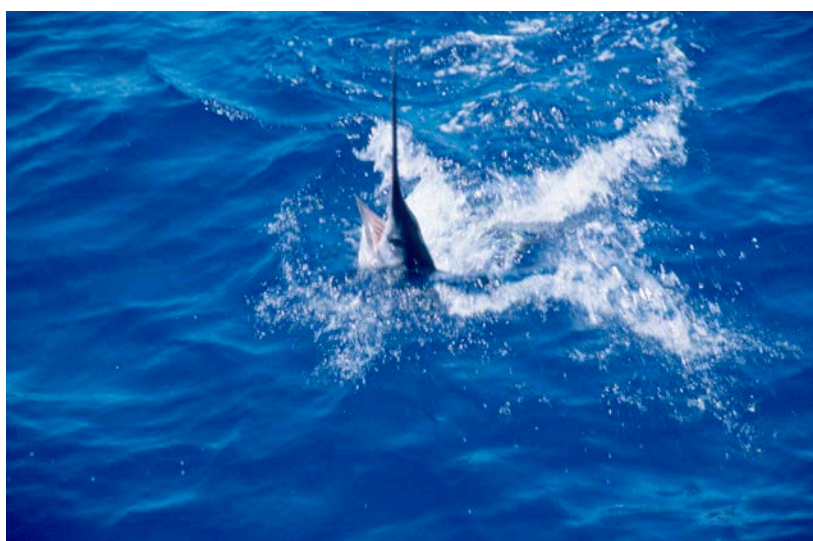
**Figure E9 Annual number of mako sharks reported tagged and released off eastern Australia**



Data source: NSW DPI Game Fish Tagging Program

Game fishers have consistently reported releases of mako sharks since 1976 (Figure E39). In the early years, releases were concentrated around Port Stephens and Sydney. In the late 1980s they expanded to Victoria, with high numbers reported from Victoria in the last five years.

The biggest year was 2009 when game fishers released 253 mako sharks (Figure E40). Releases were rarer in 2003 and 2006. A Tasmanian fishery commenced in 2003. Over the past decade, game fishers off Victoria have reported consistent levels of mako sharks releases. Releases were rare off southern New South Wales after 2008.



Striped marlin are taken by commercial longliners and are also highly prized by game fishers (Ward, ABARES).

Figure E10 Annual distribution of tag-releases for all species combined, 2001–10

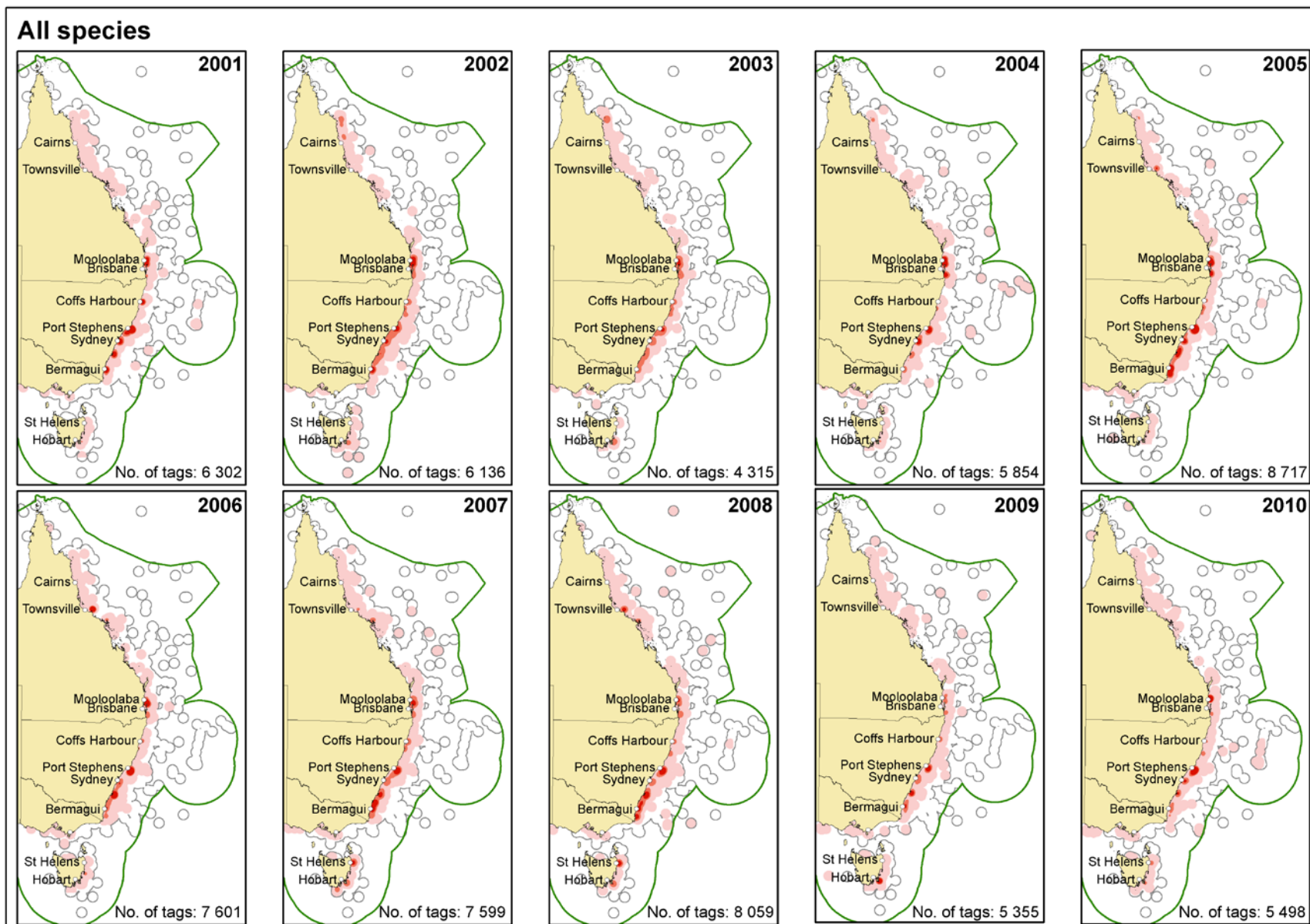


Figure E11 Distribution of tag-releases for all species combined, three-month quarter, 1976–2010

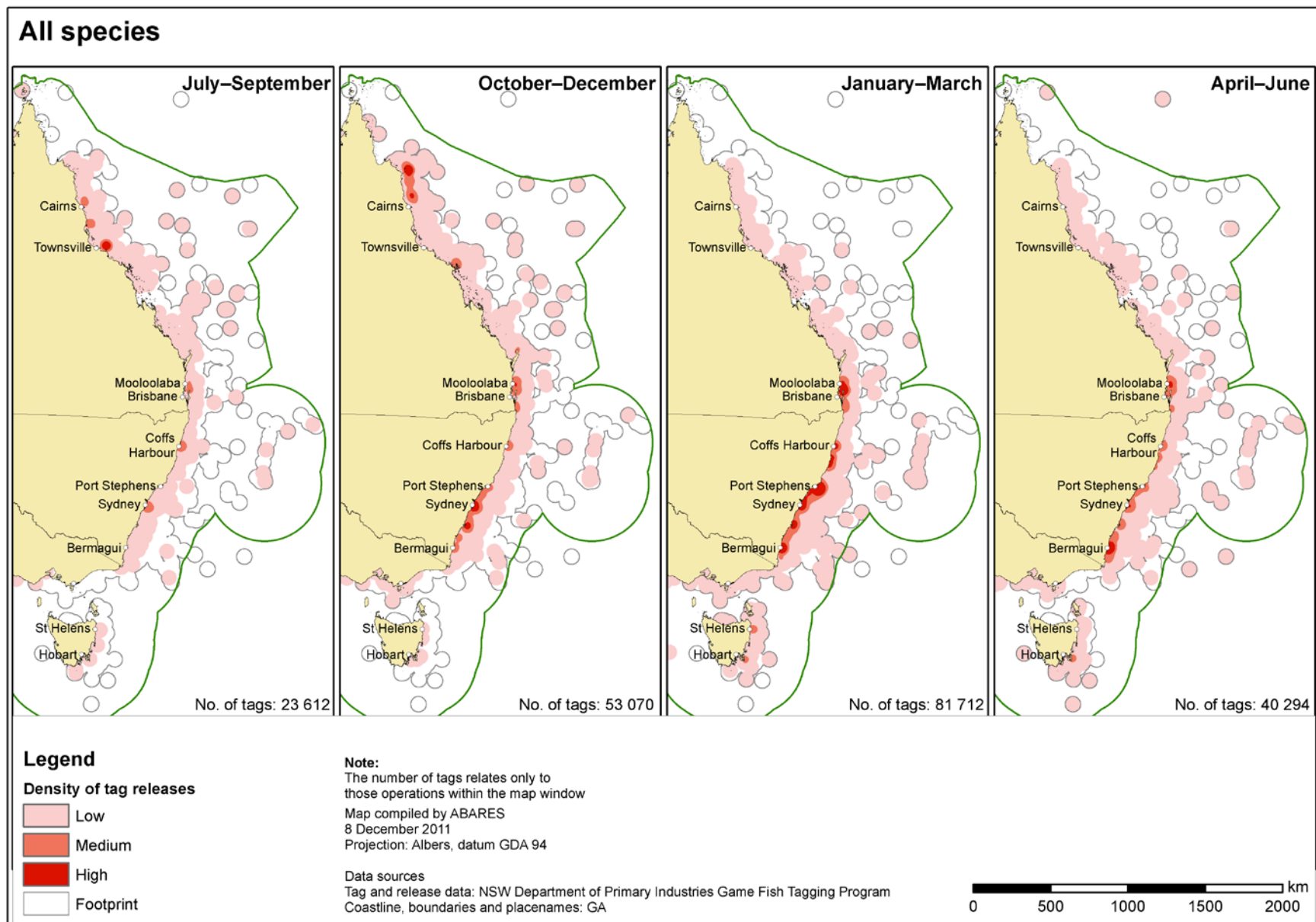


Figure E12 Distribution of tag-releases for all species combined, five-year period, 1976–2010

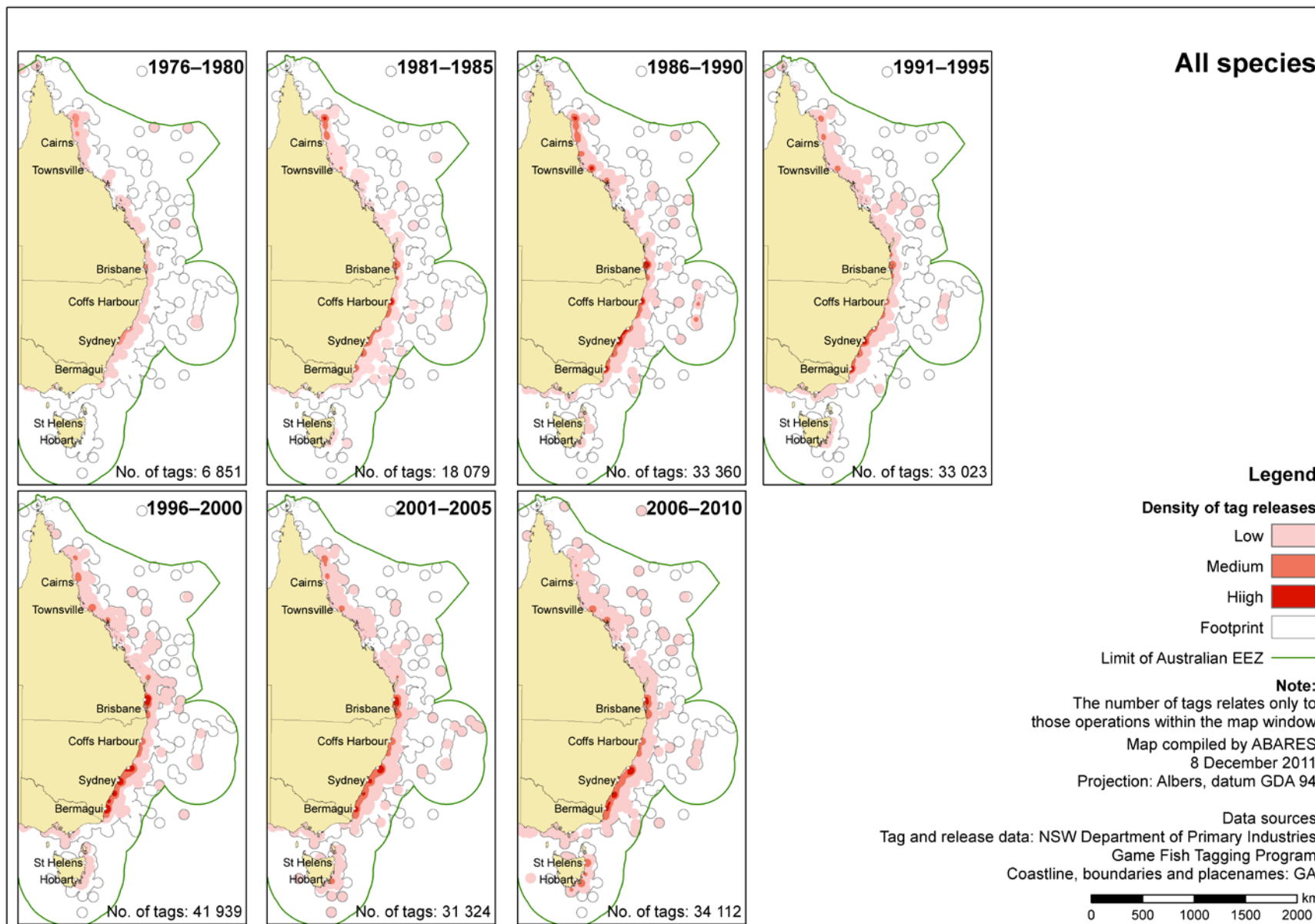




Figure E13 Distribution of tag releases of yellowfin tuna, 1976–2010

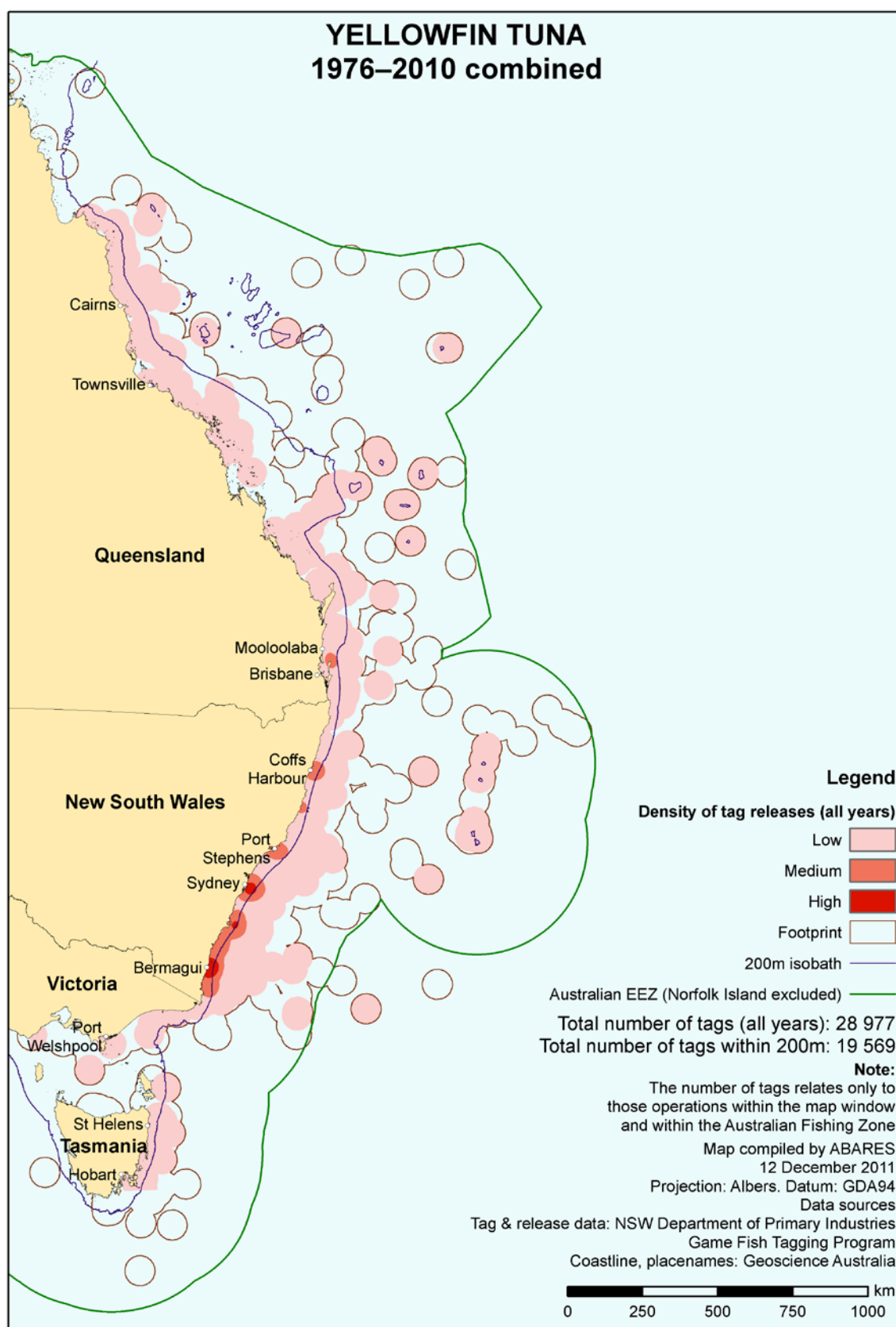


Figure E14 Distribution of tag releases of yellowfin tuna, three-month quarter, 1976–2010

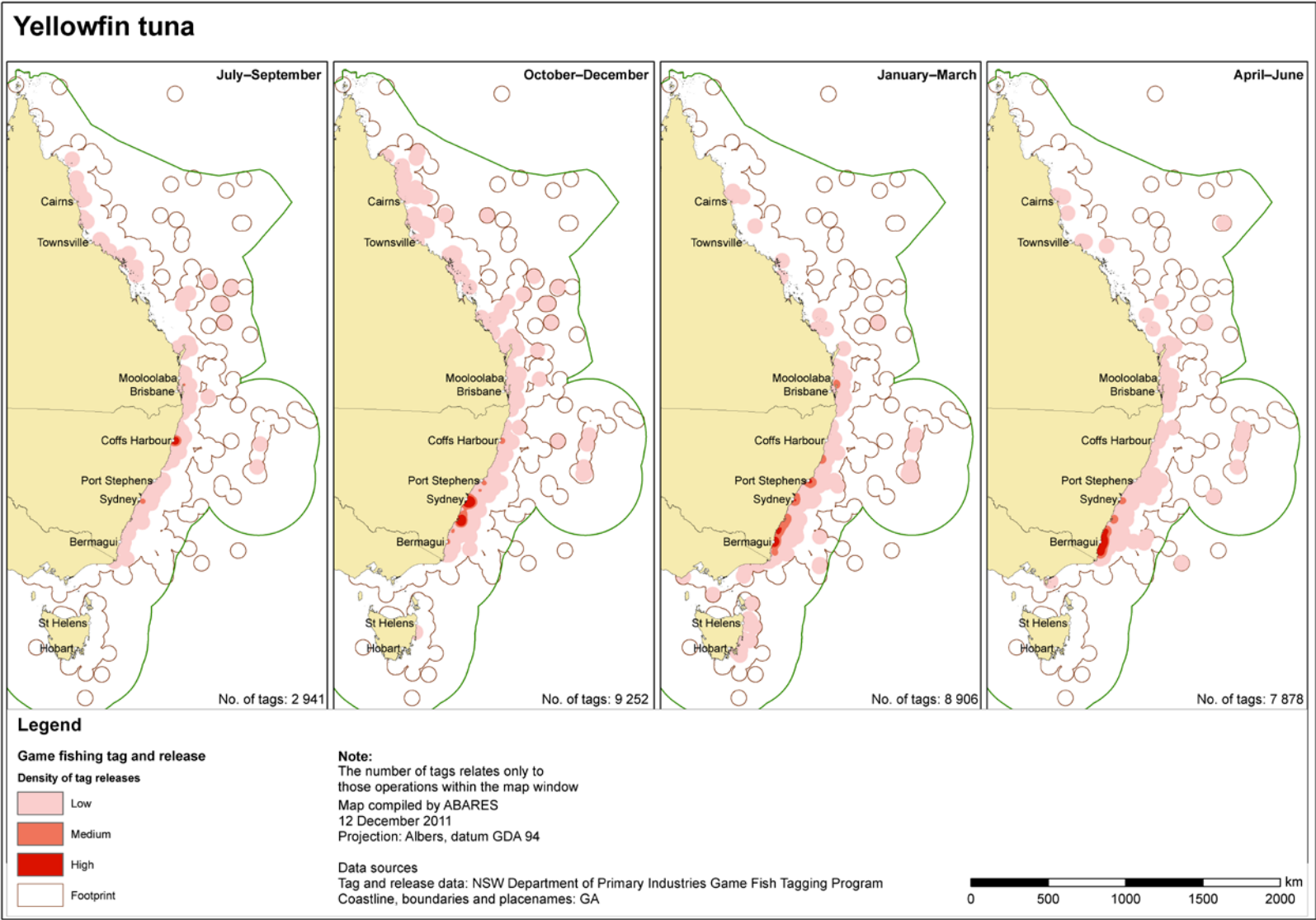


Figure E15 Distribution of tag releases of yellowfin tuna, five-year period, 1976–2010

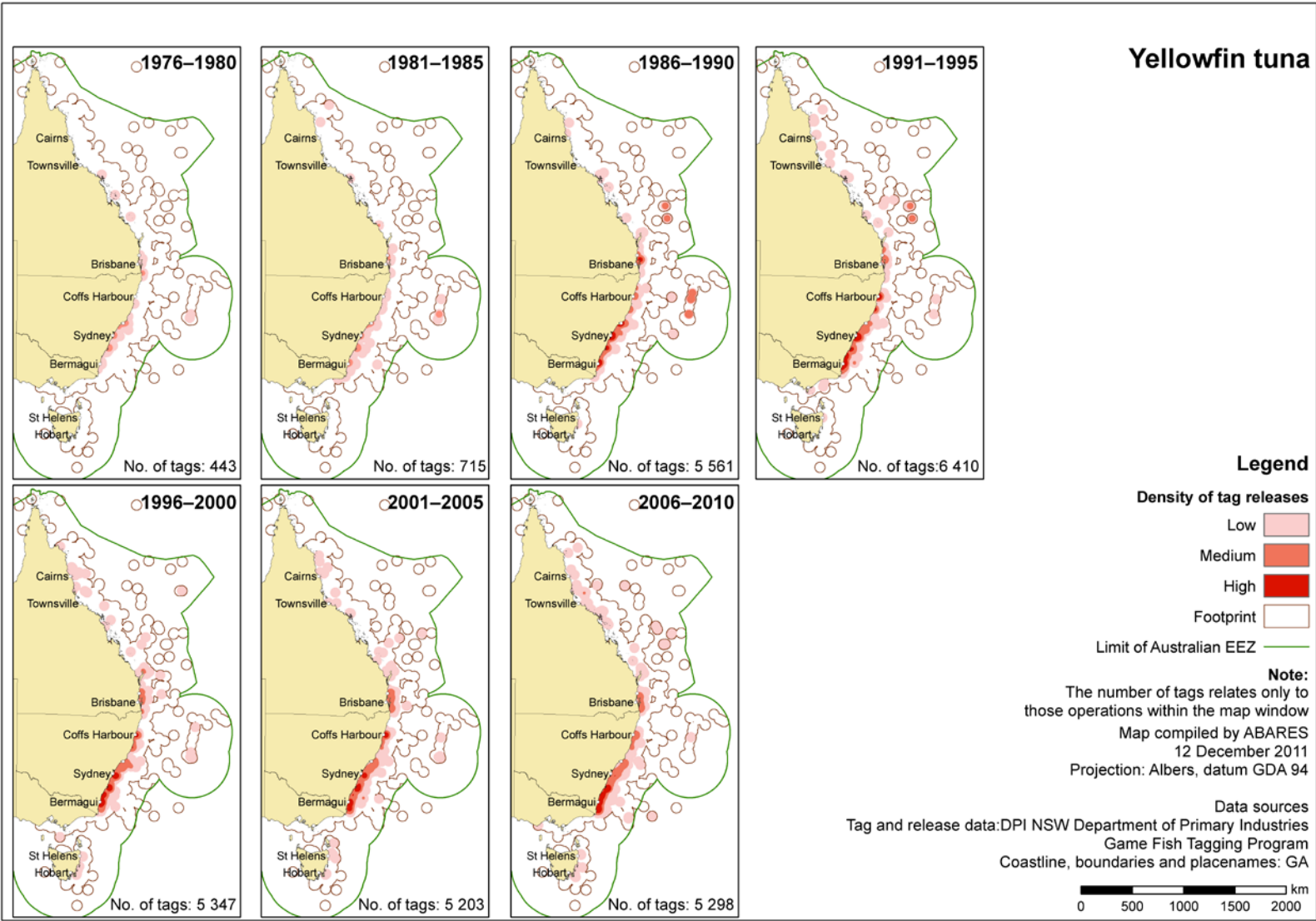


Figure E16 Annual distribution of tag releases of yellowfin tuna, 2001–10

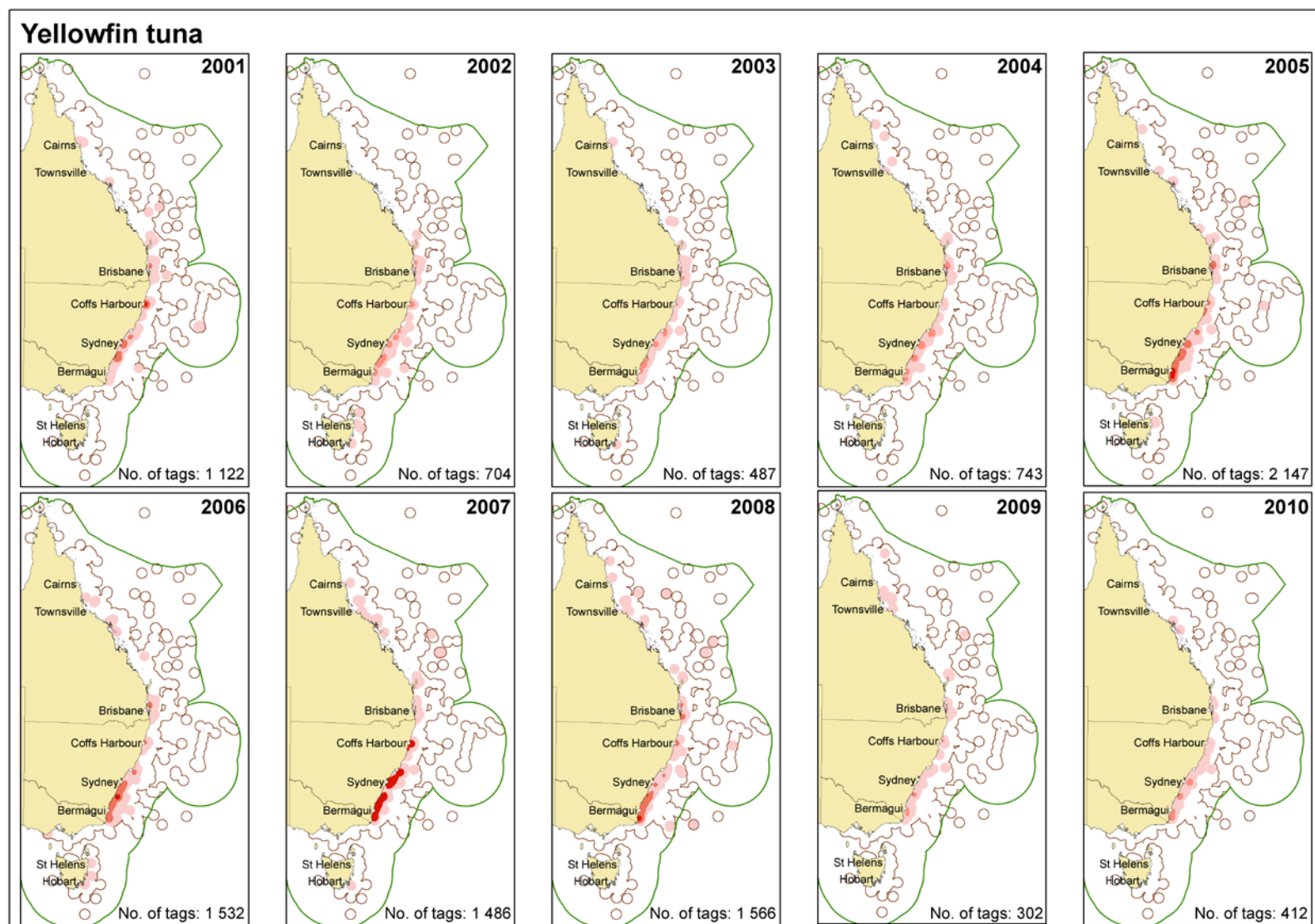




Figure E17 Distribution of tag releases of striped marlin, 1976–2010

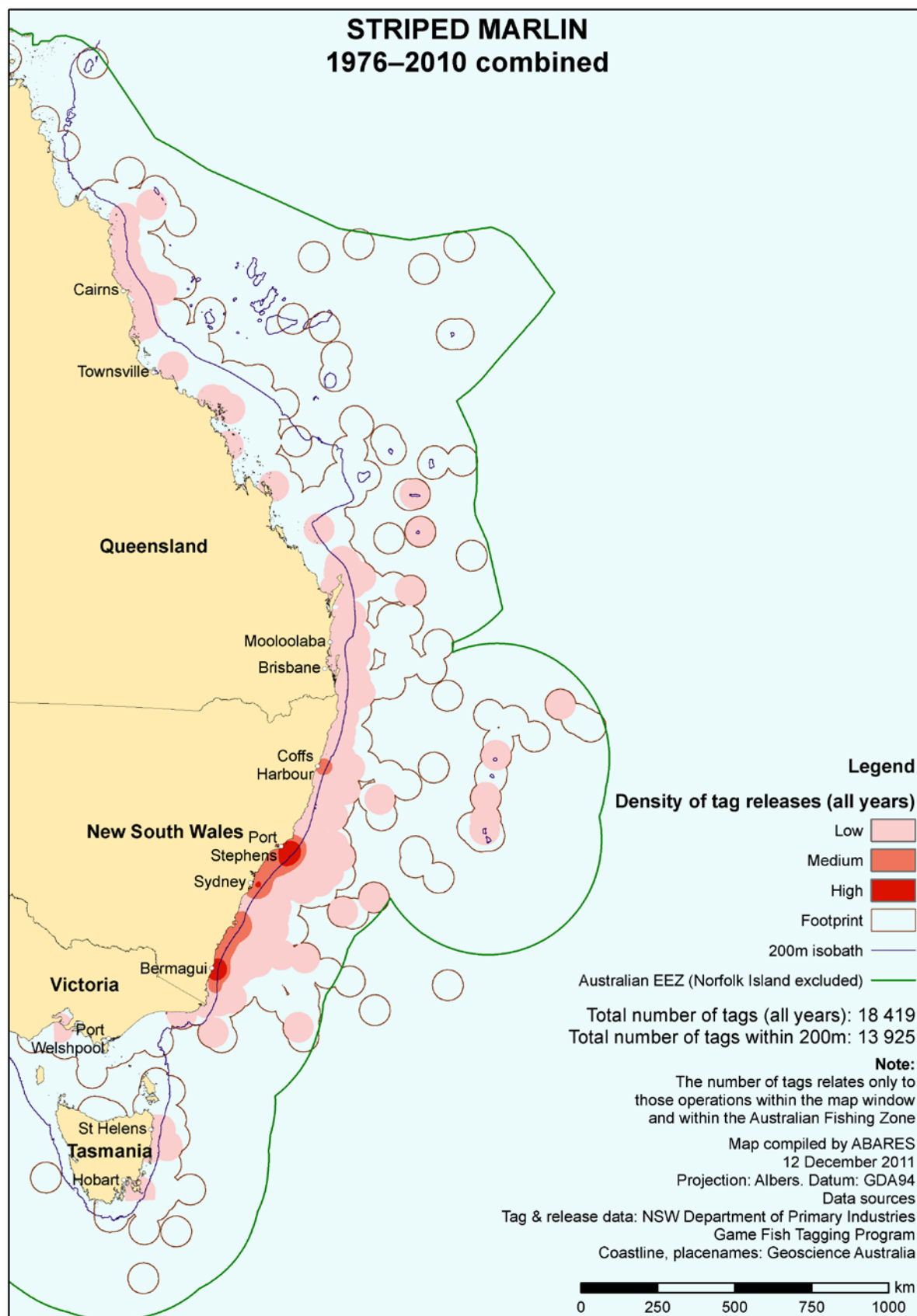


Figure E18 Distribution of tag releases of striped marlin, three-month quarter, 1976–2010

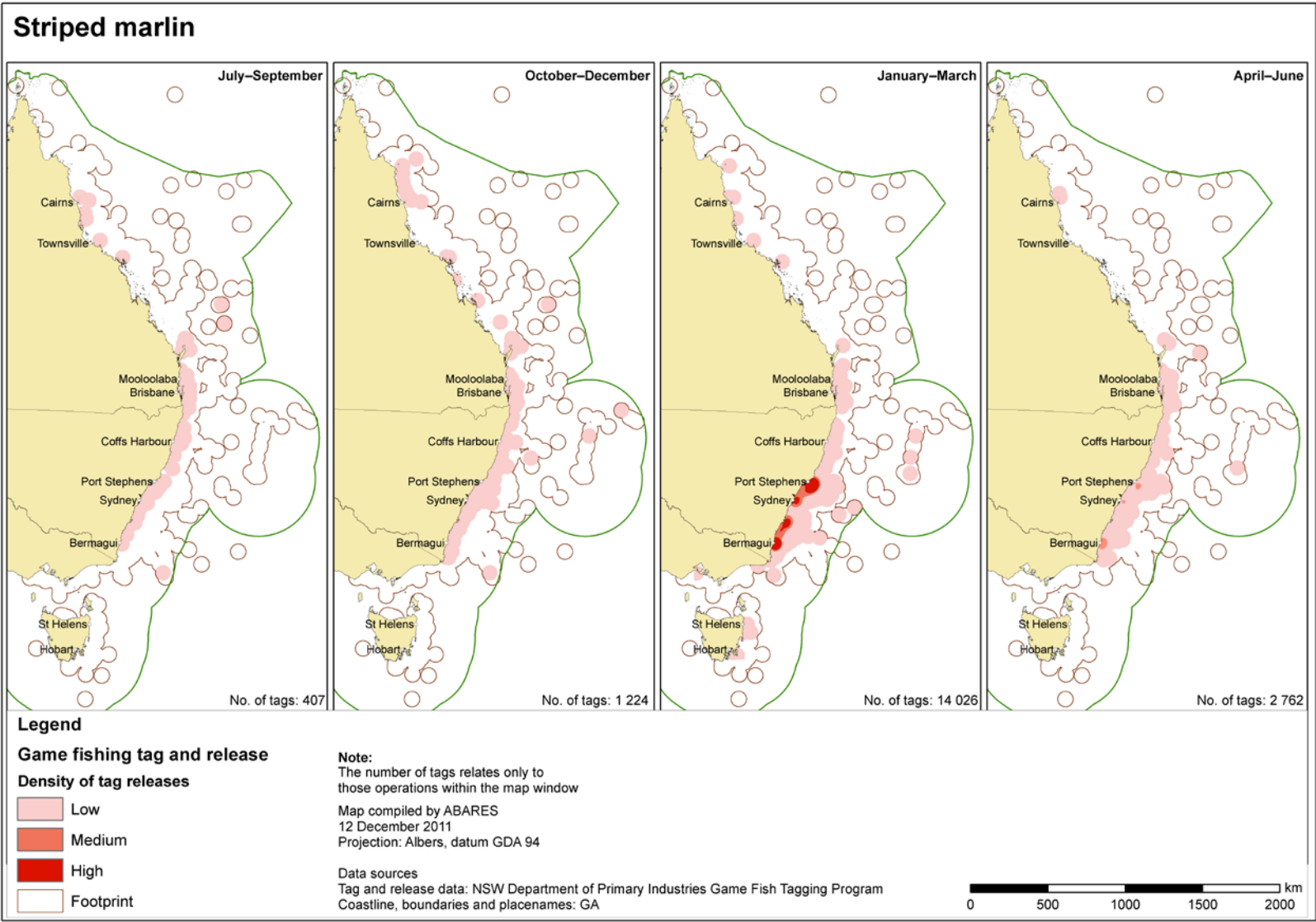


Figure E19 Distribution of tag releases of striped marlin, five-year period, 1976–2010

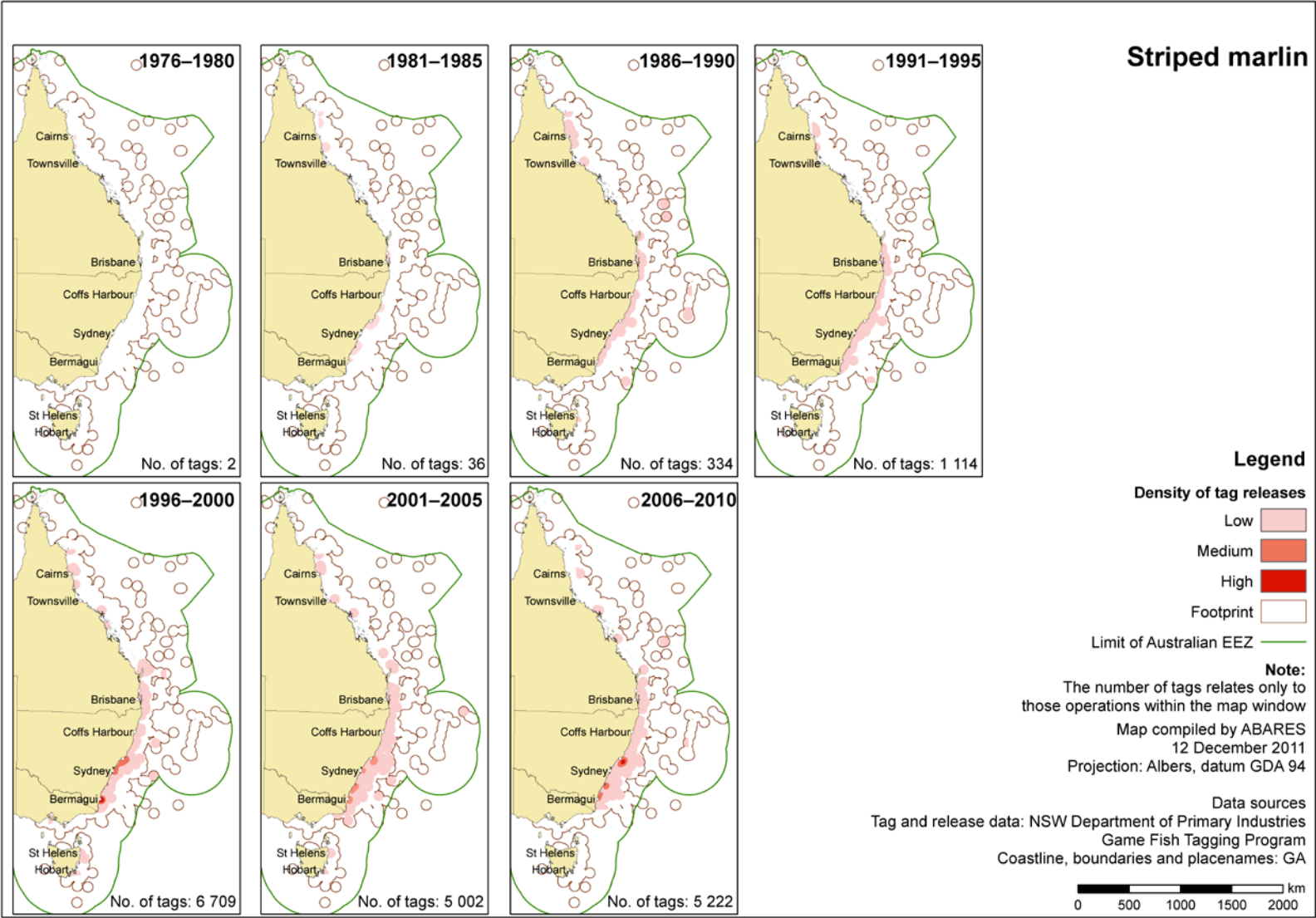


Figure E20 Annual distribution of tag releases of striped marlin, 2001–10

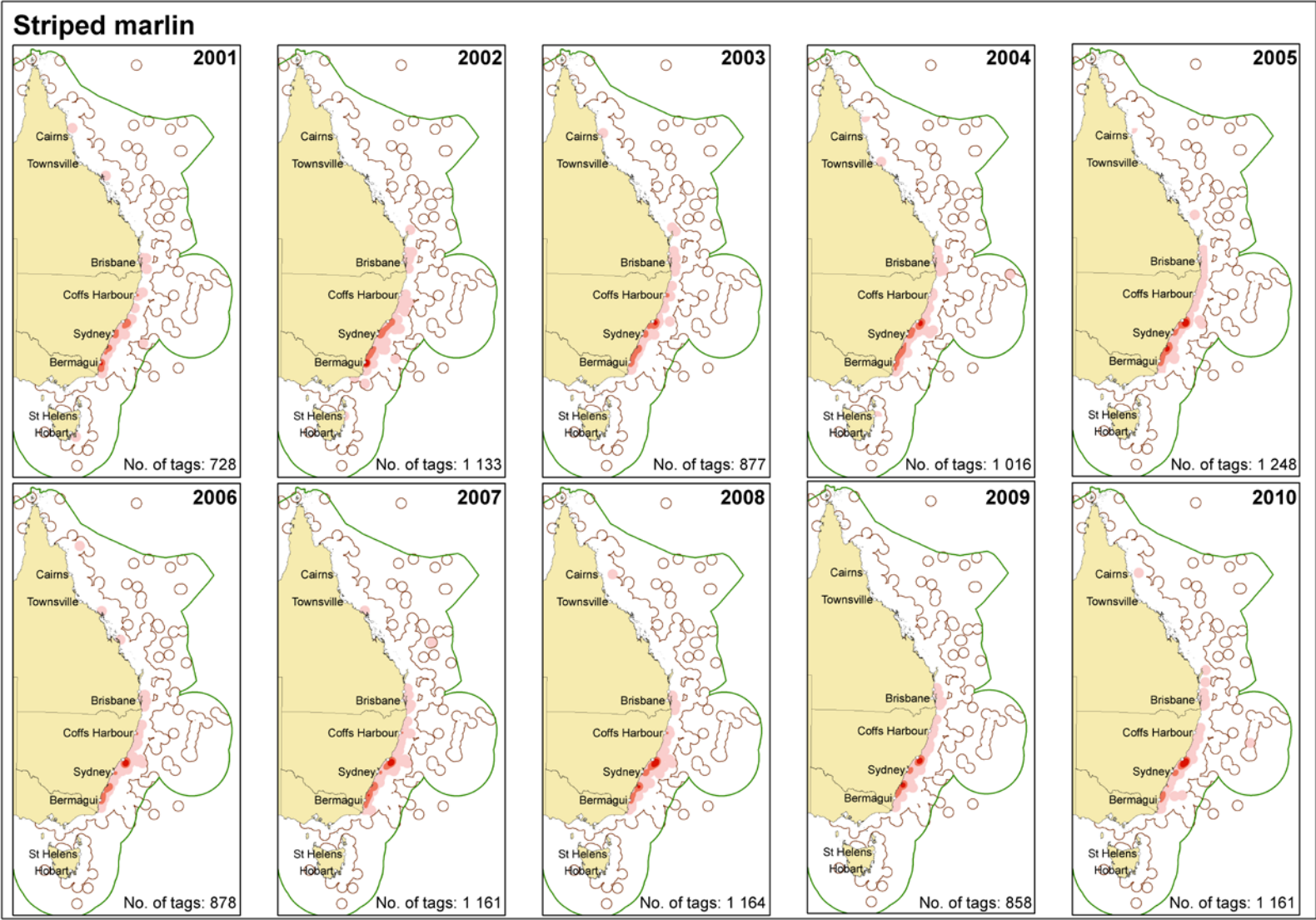


Figure E21 Distribution of tag releases of black marlin, 1976–2010

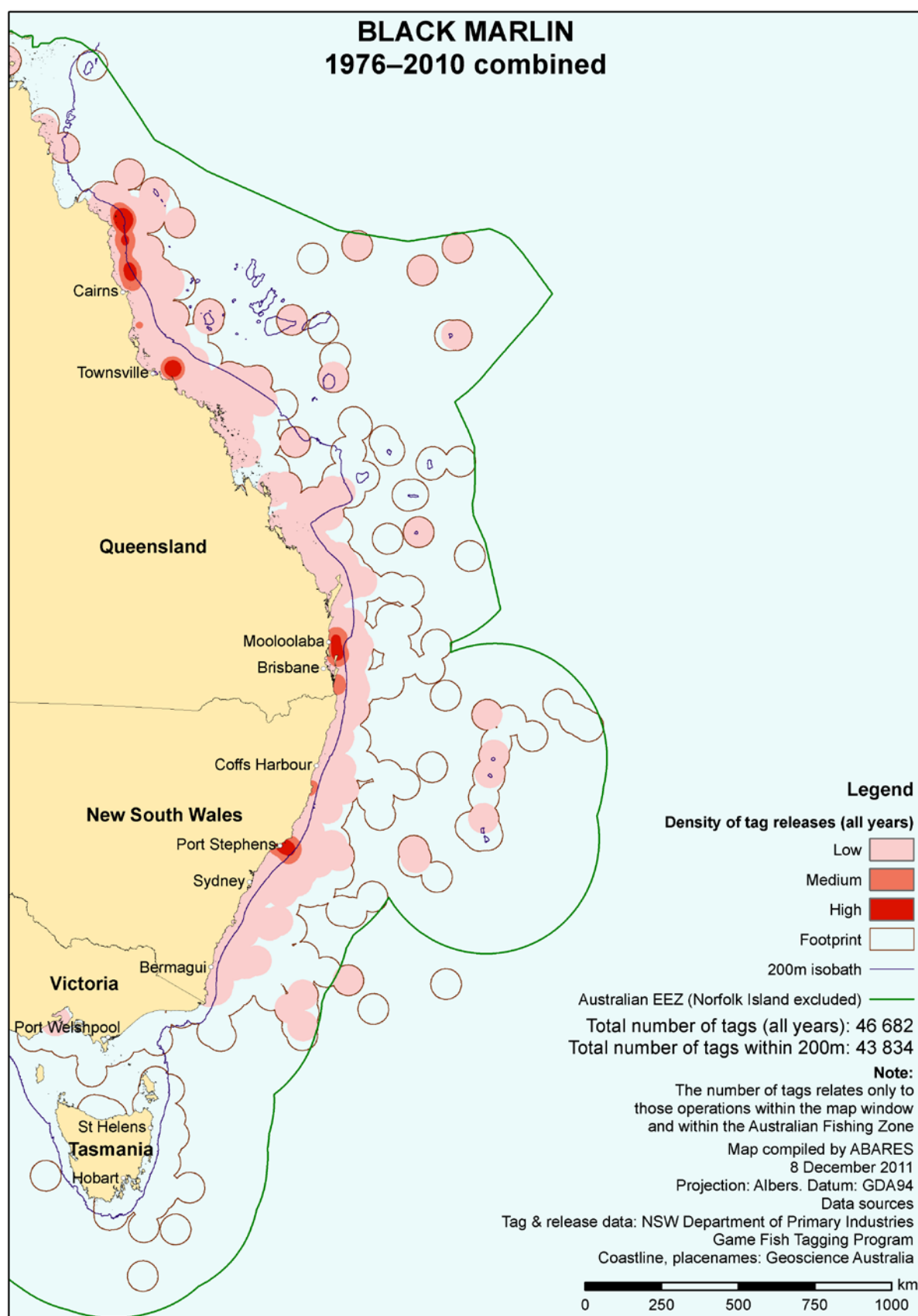




Figure E22 Distribution of tag releases of black marlin, three-month quarter, 1976–2010

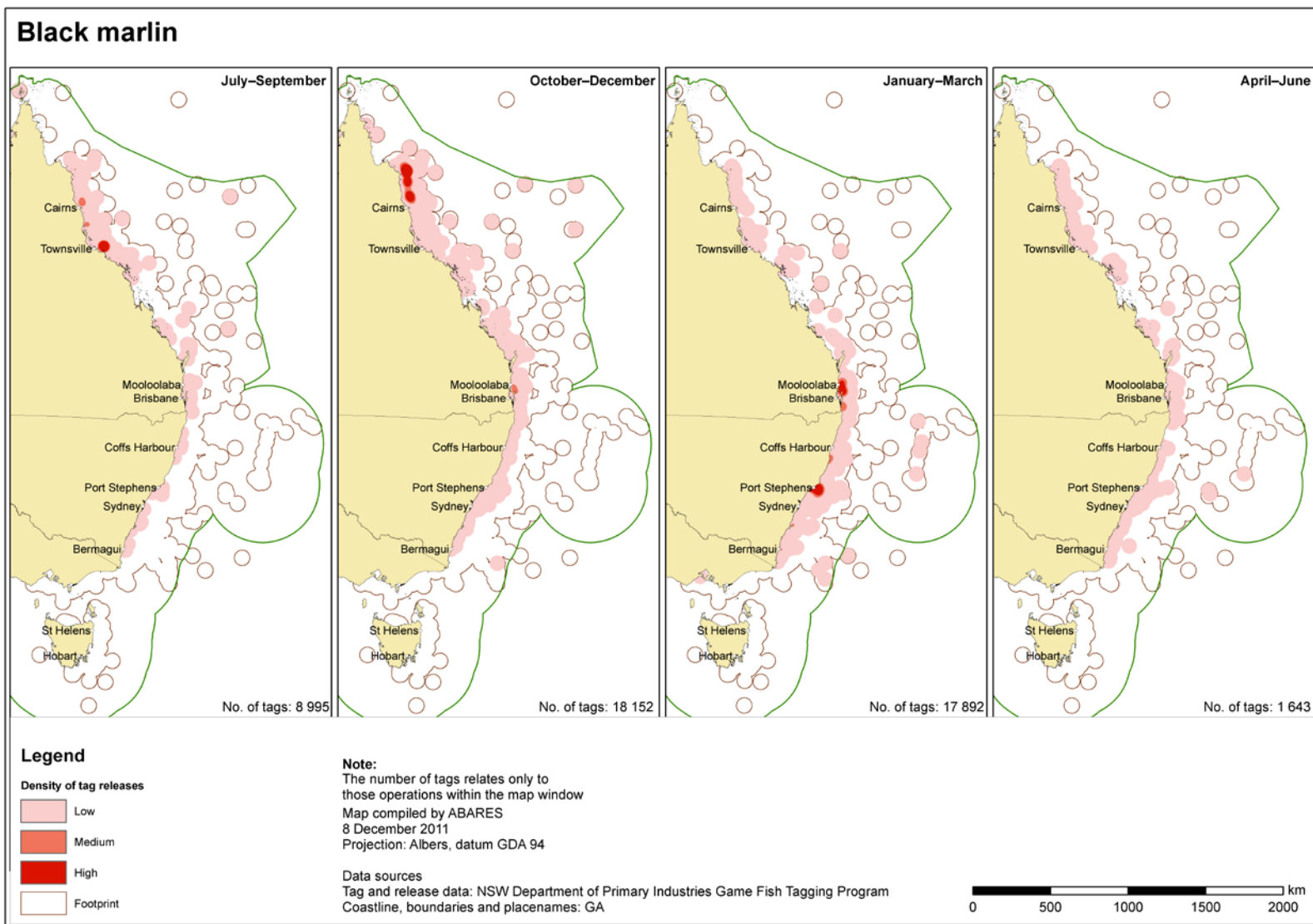


Figure E23 Distribution of tag releases of black marlin, five-year period, 1976–2010

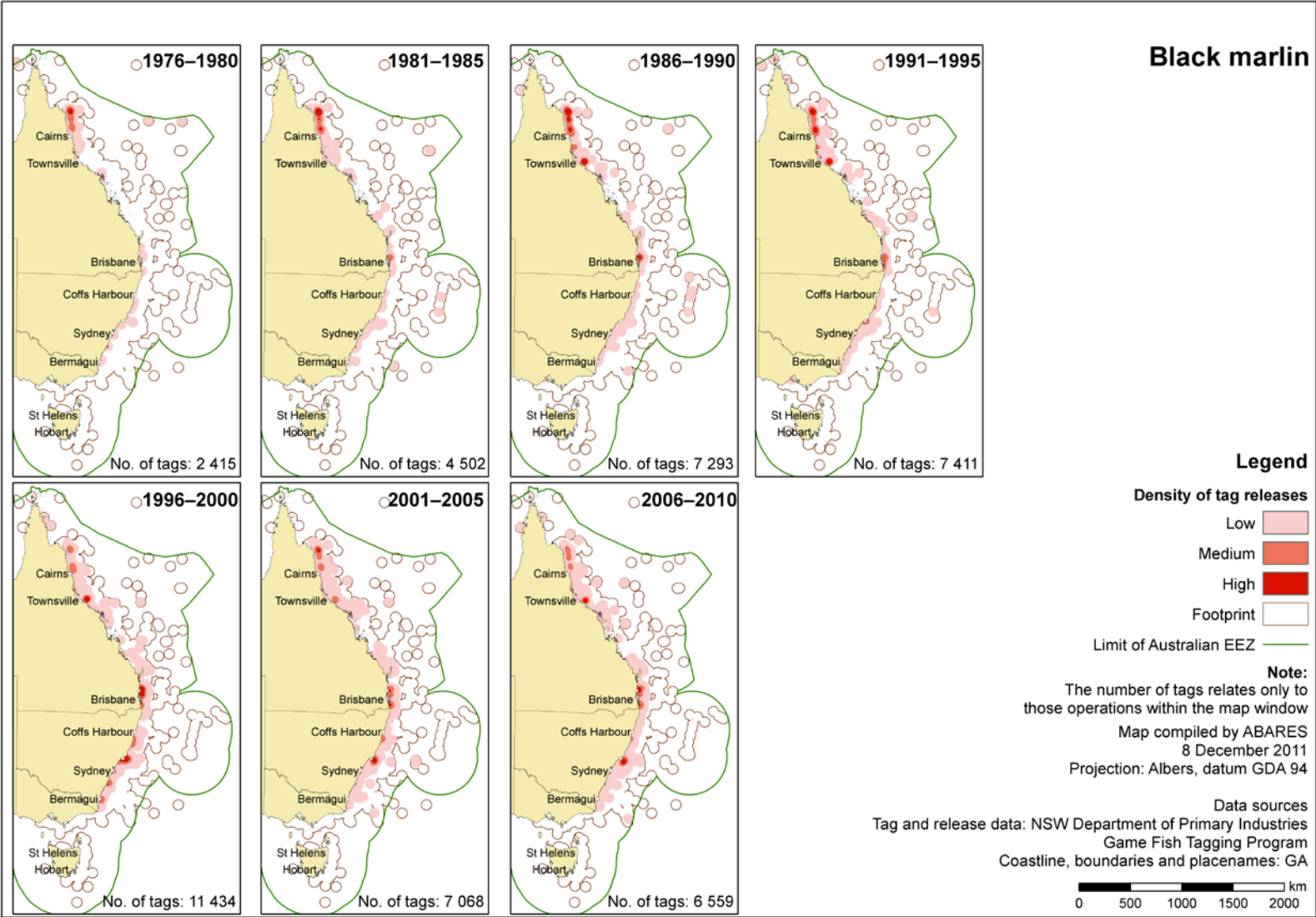


Figure E24 Annual distribution of tag releases of black marlin, 2001–10

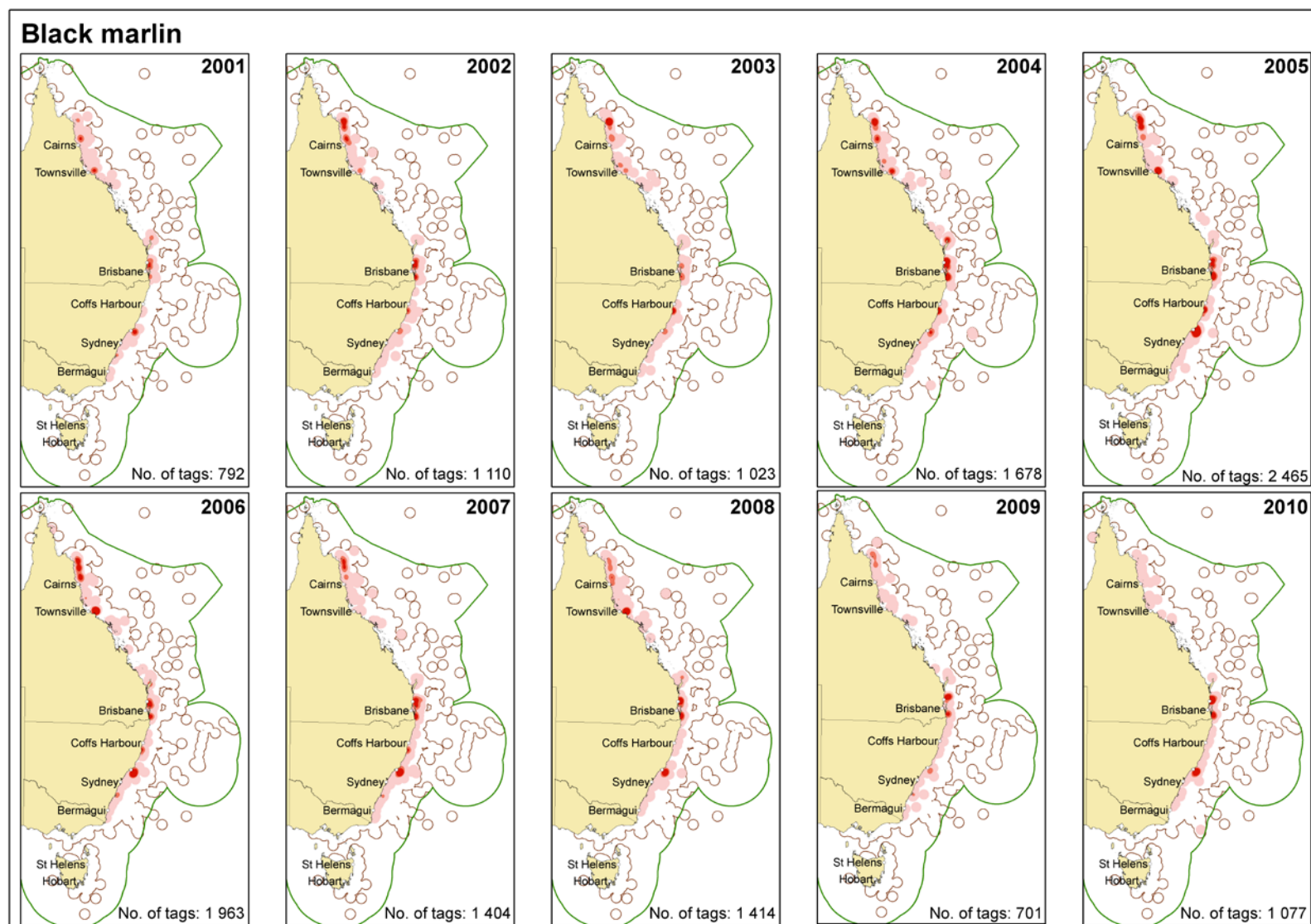




Figure E25 Distribution of tag releases of blue marlin, 1976–2010

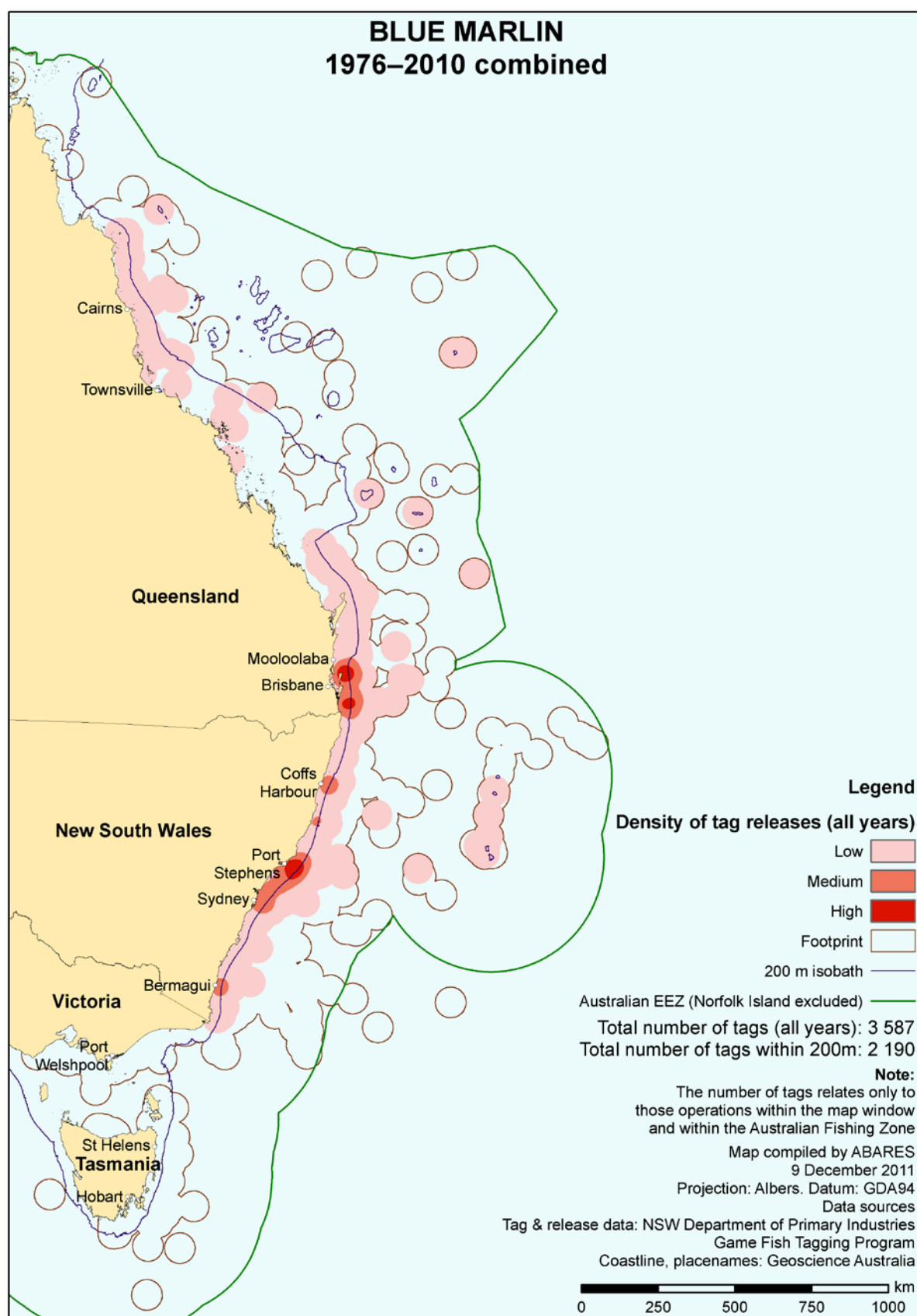


Figure E26 Distribution of tag releases of blue marlin, three-month quarter, 1976–2010

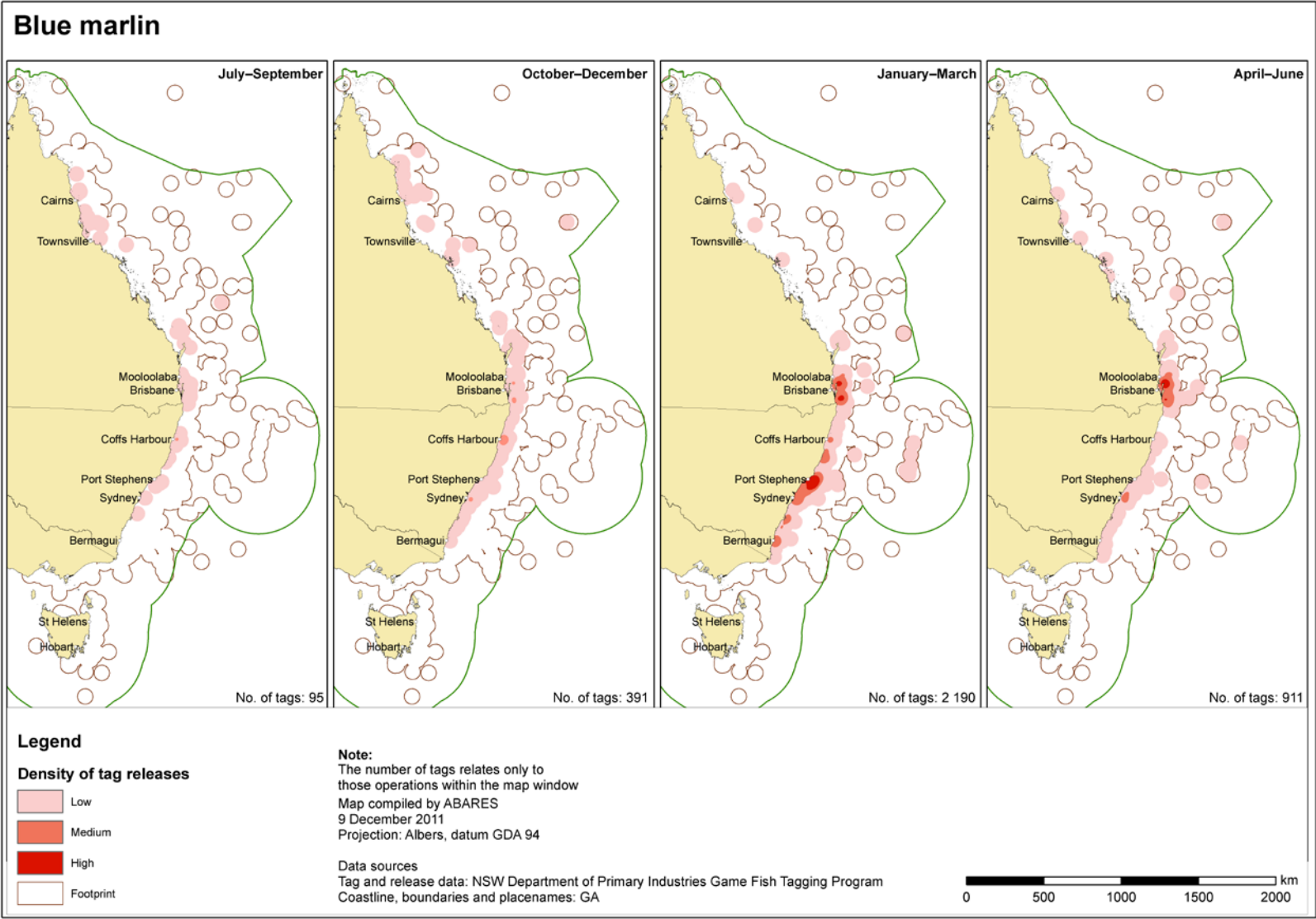


Figure E27 Distribution of tag releases of blue marlin, five-year period, 1976–2010

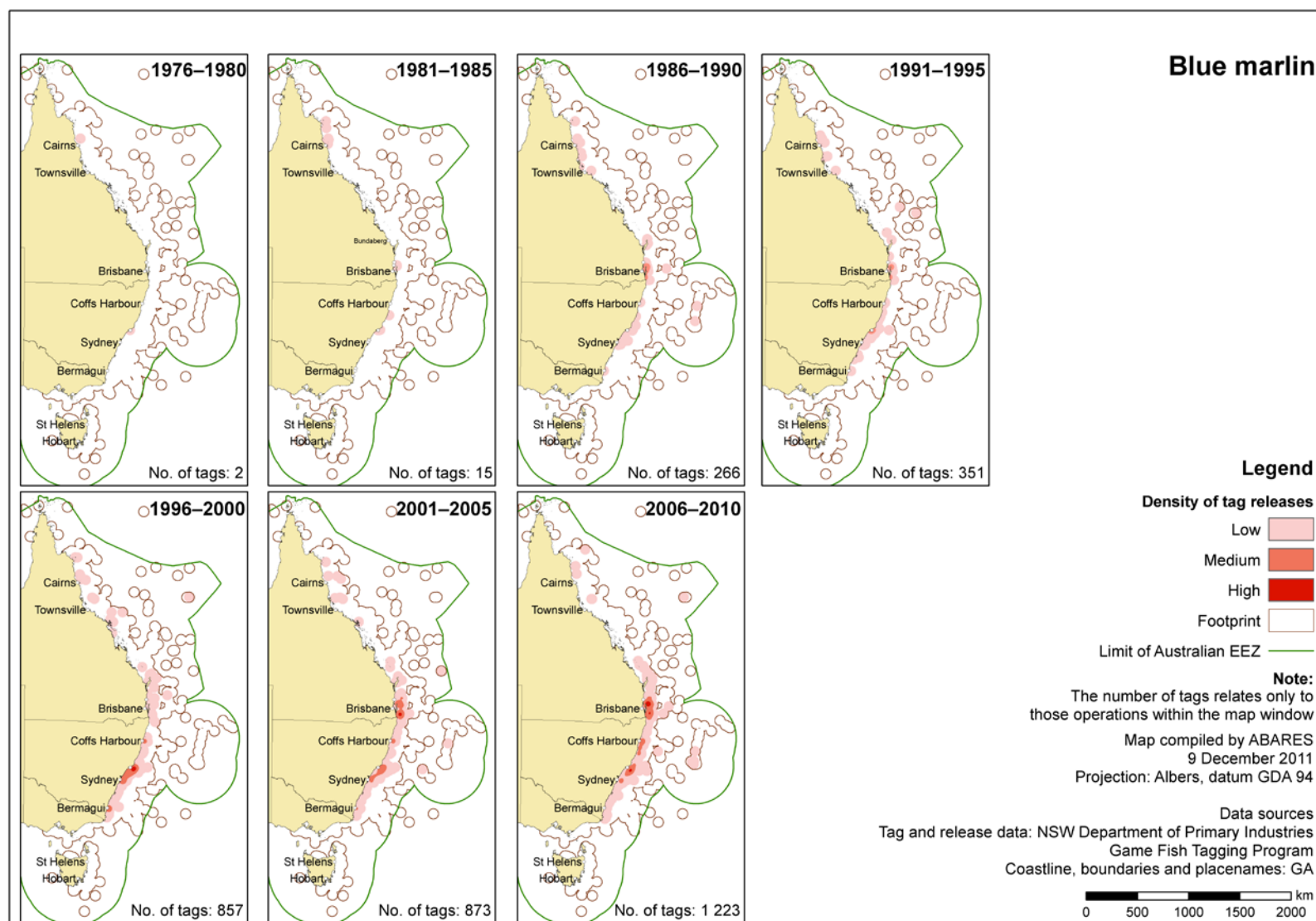


Figure E28 Annual distribution of tag releases of blue marlin, 2001–10

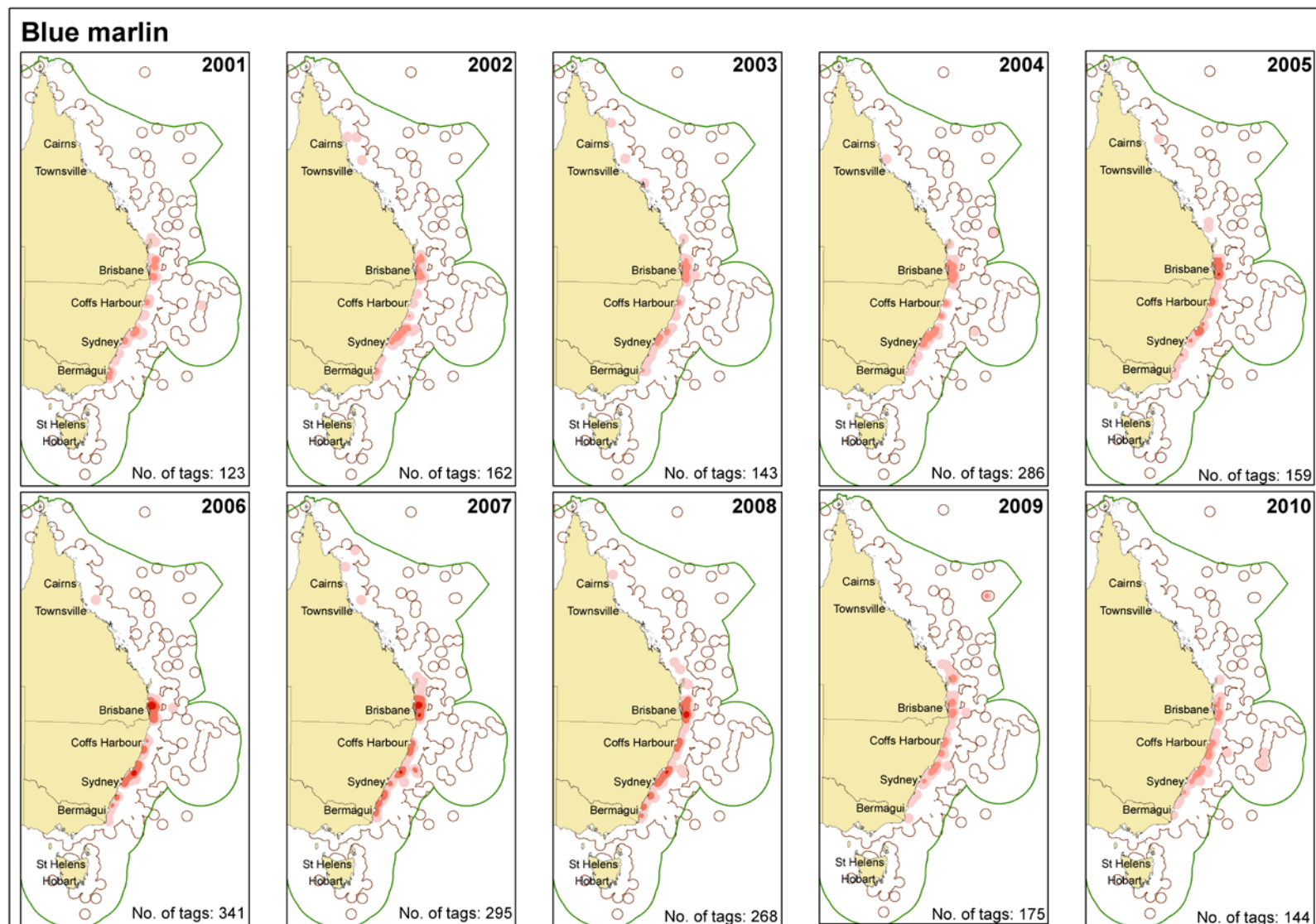


Figure E29 Distribution of tag releases of sailfish, 1976–2010

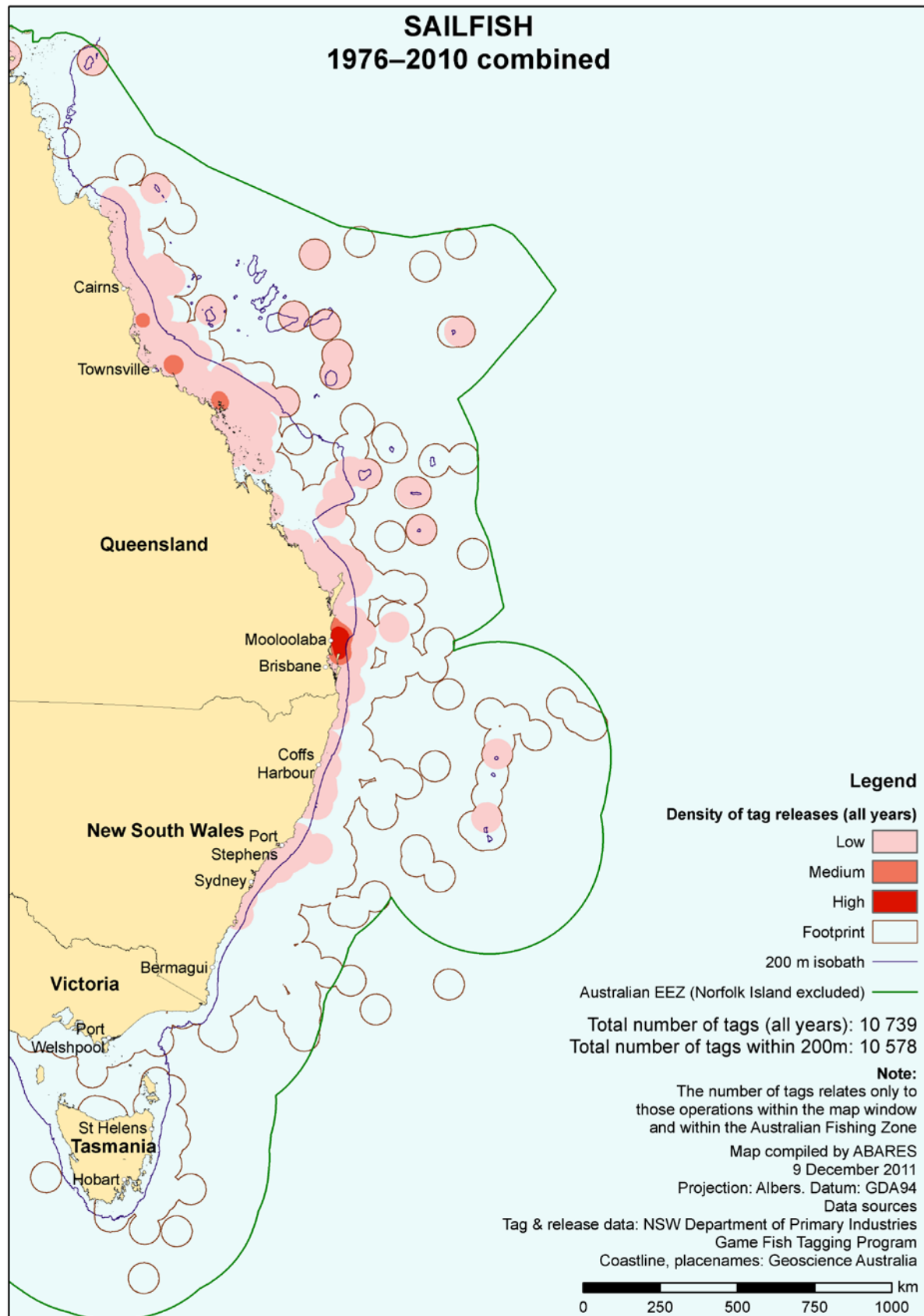




Figure E30 Distribution of tag releases of sailfish, three-month quarter, 1976–2010

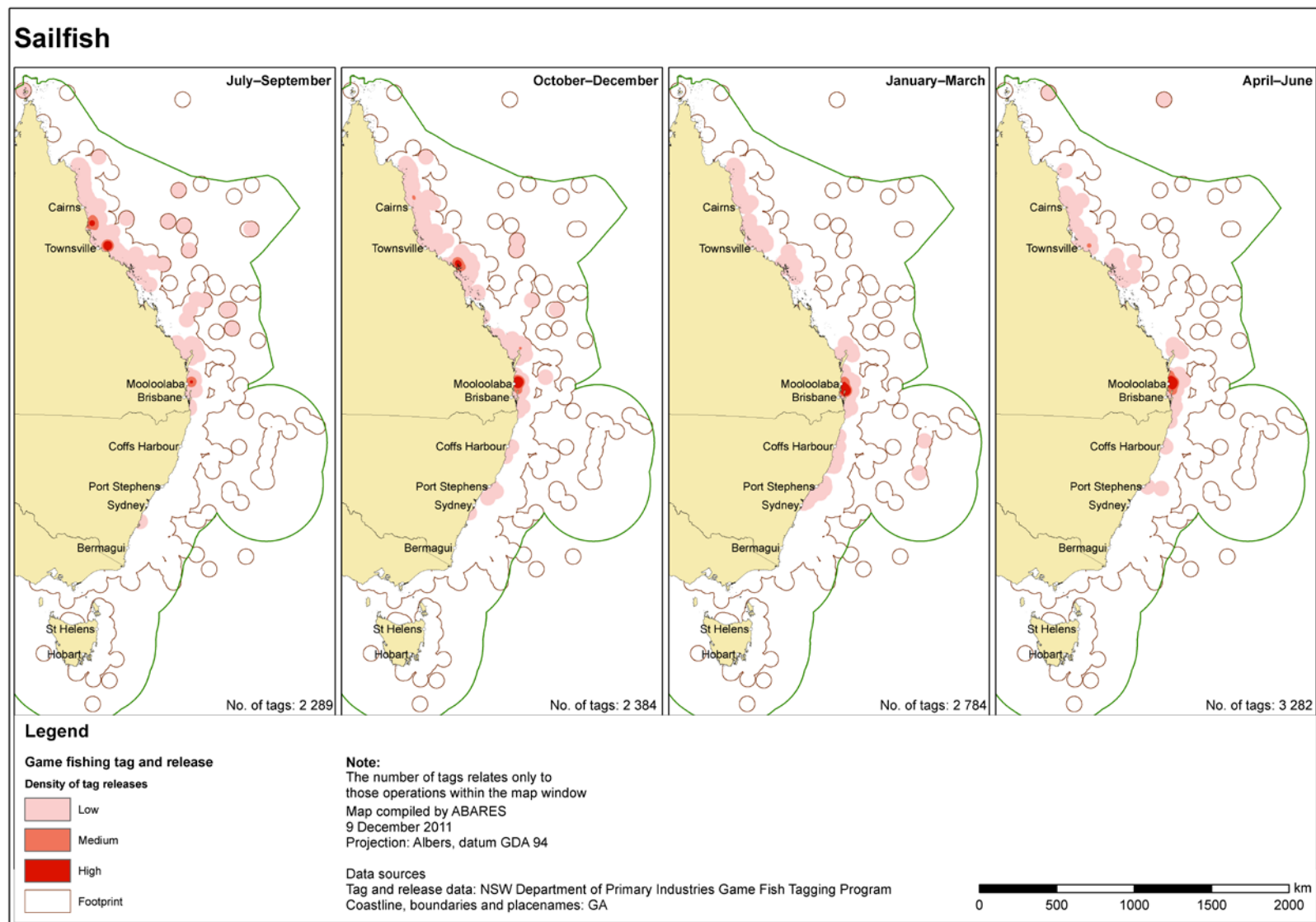


Figure E31 Distribution of tag releases of sailfish, five-year period, 1976–2010

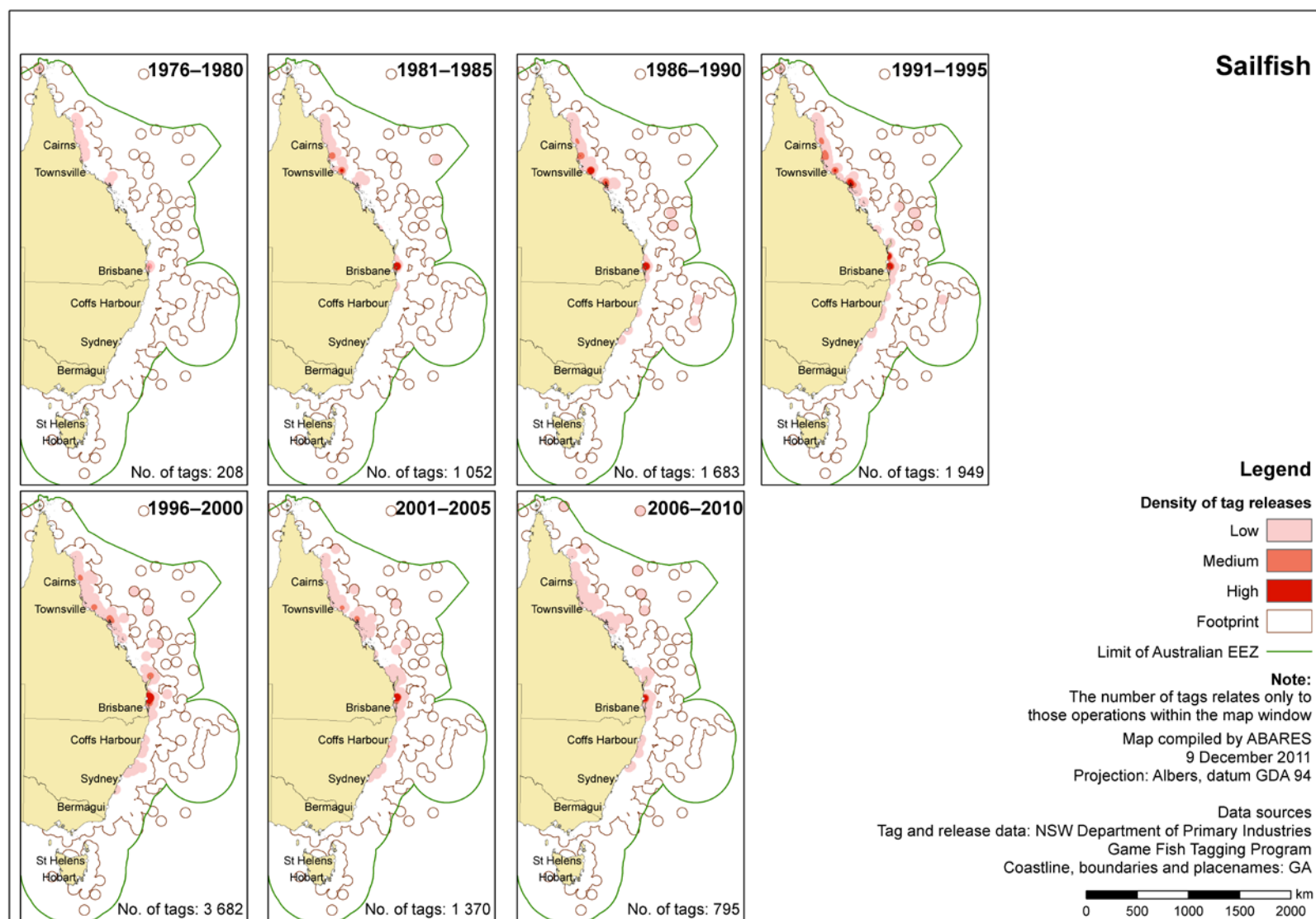


Figure E32 Annual distribution of tag-releases of sailfish, 2001–10

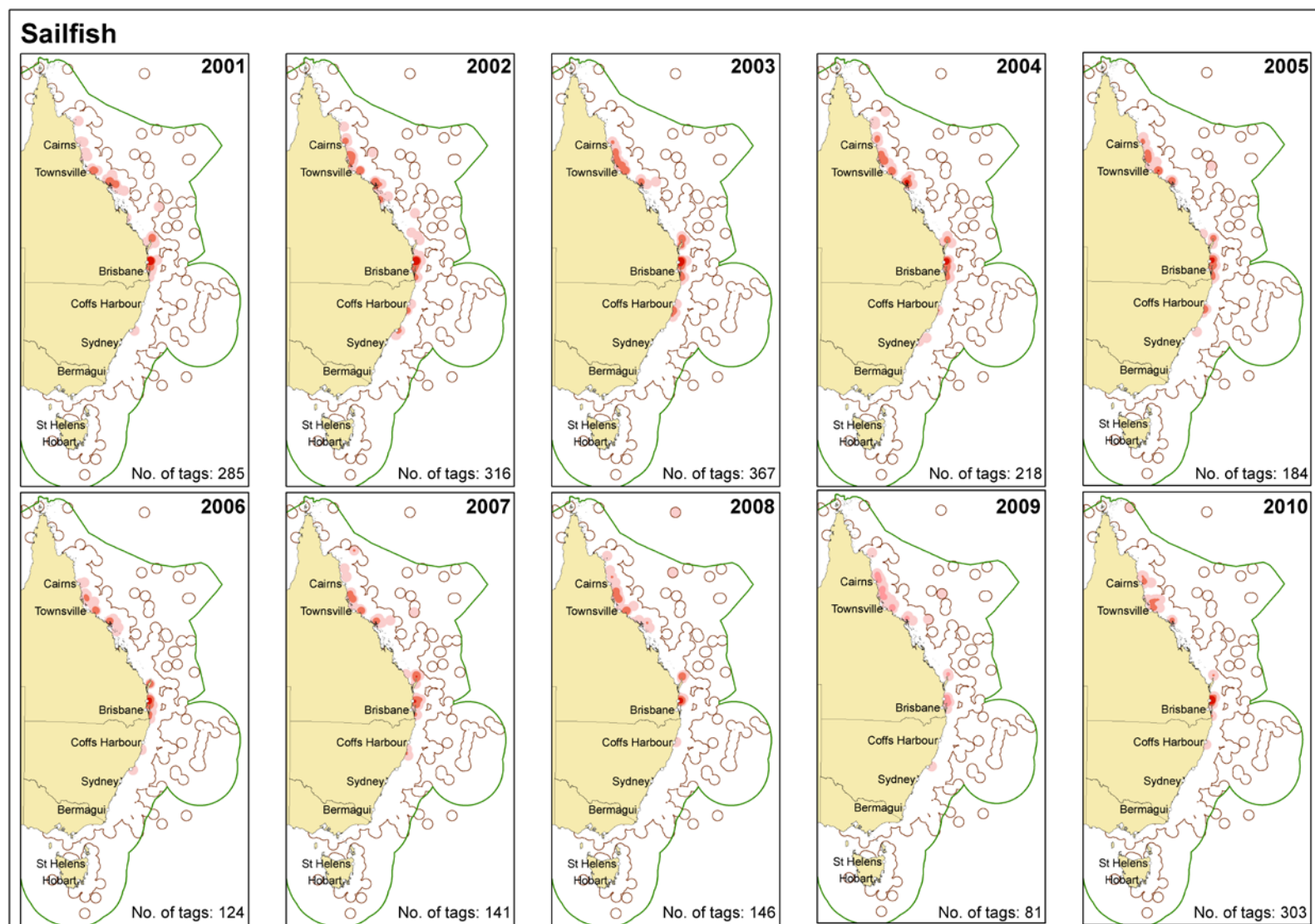




Figure E33 Distribution of tag releases of southern bluefin tuna, 1976–2010

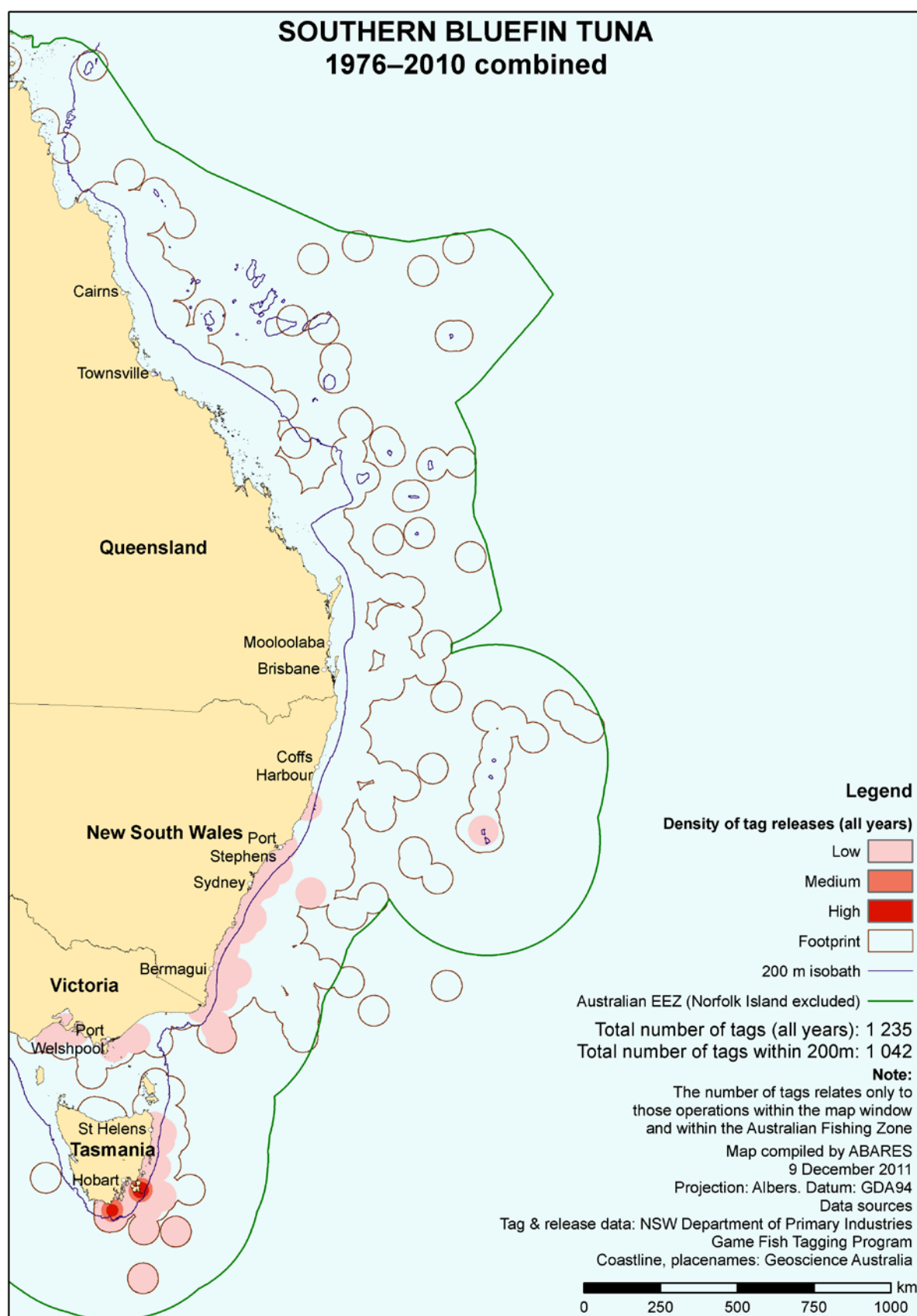


Figure E34 Distribution of tag releases of southern bluefin tuna, three-month quarter, 1976–2010

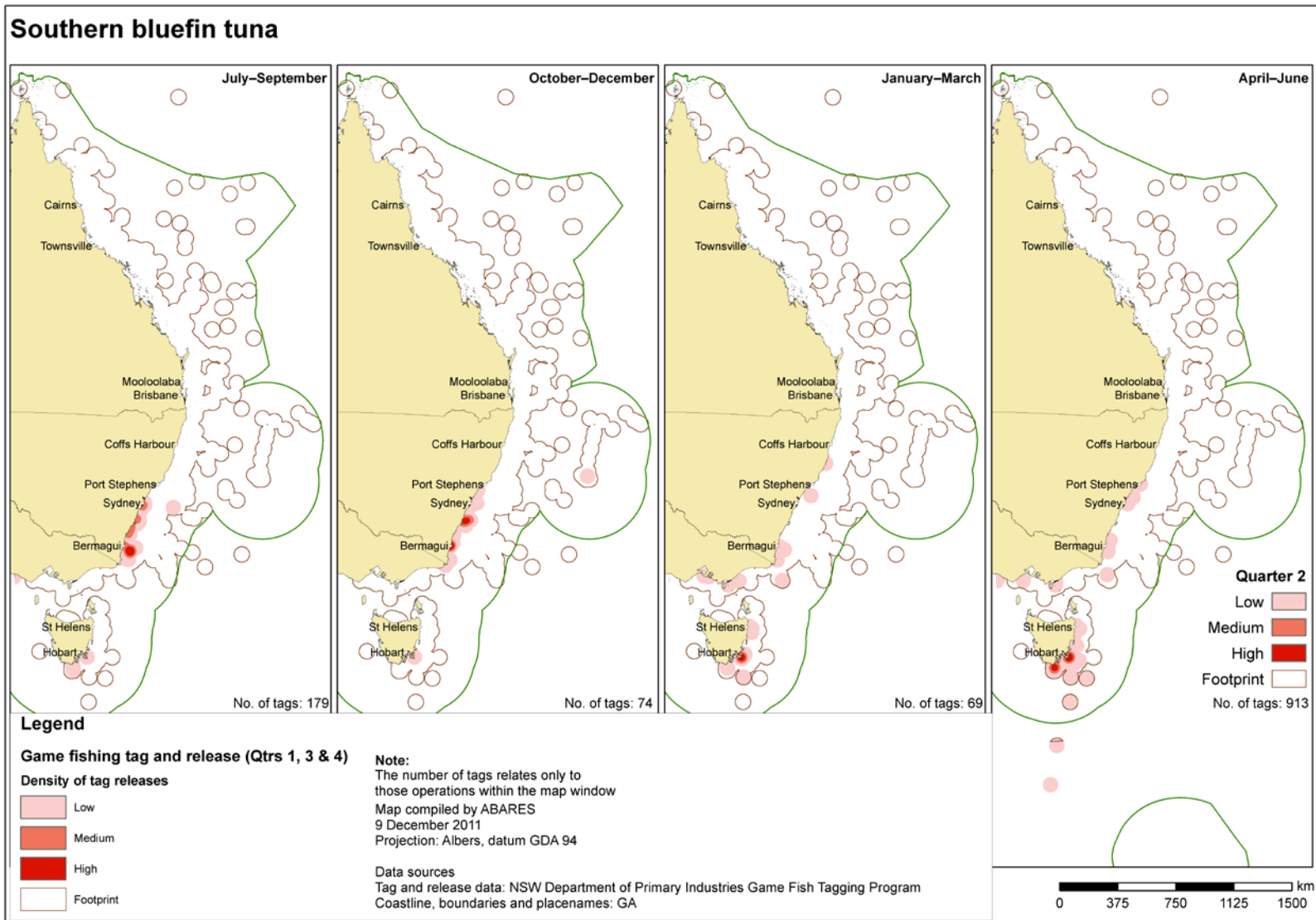


Figure E35 Distribution of tag releases of southern bluefin tuna, five-year period, 1976–2010

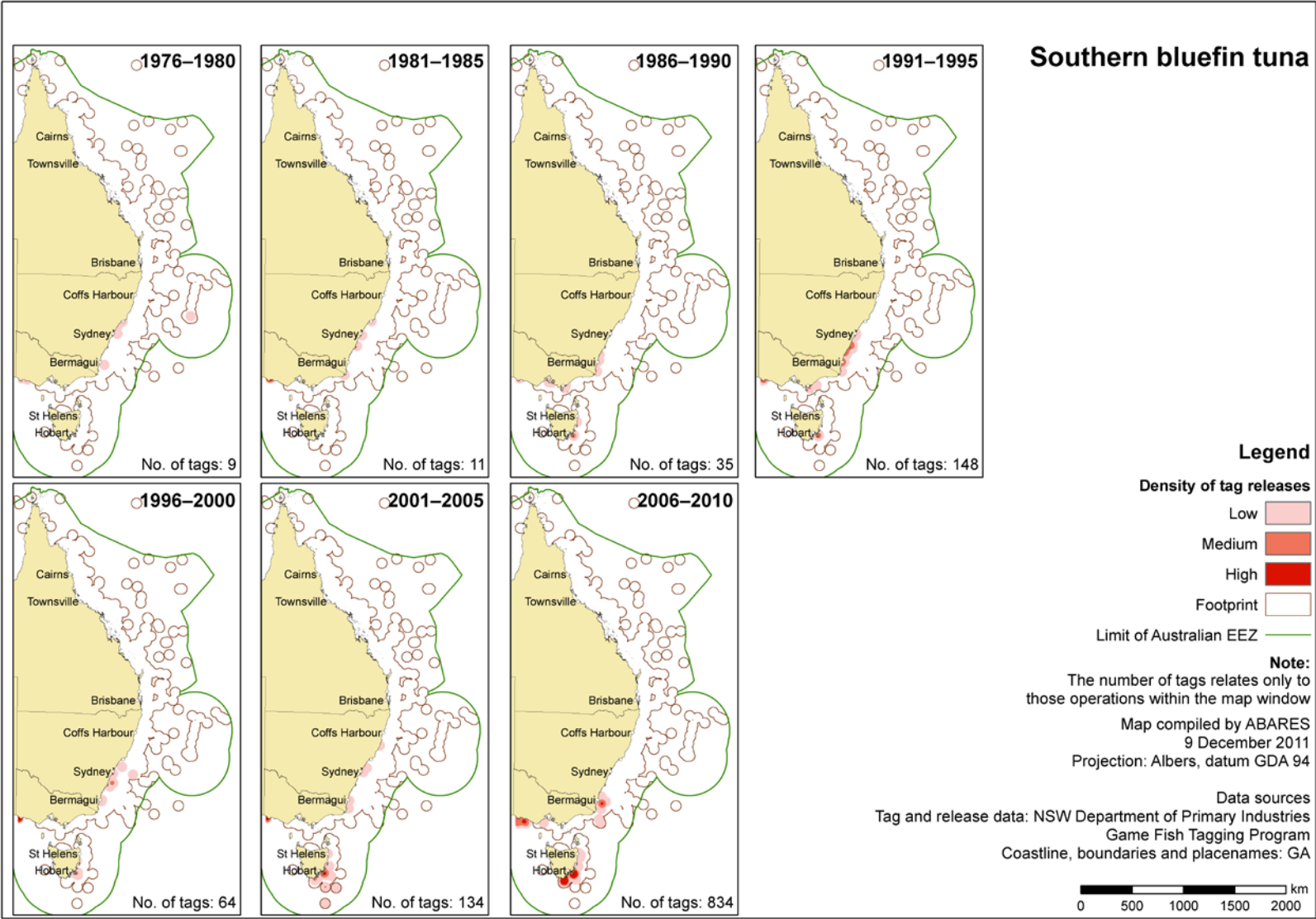


Figure E36 Annual distribution of tag releases of southern bluefin tuna, 2001–10

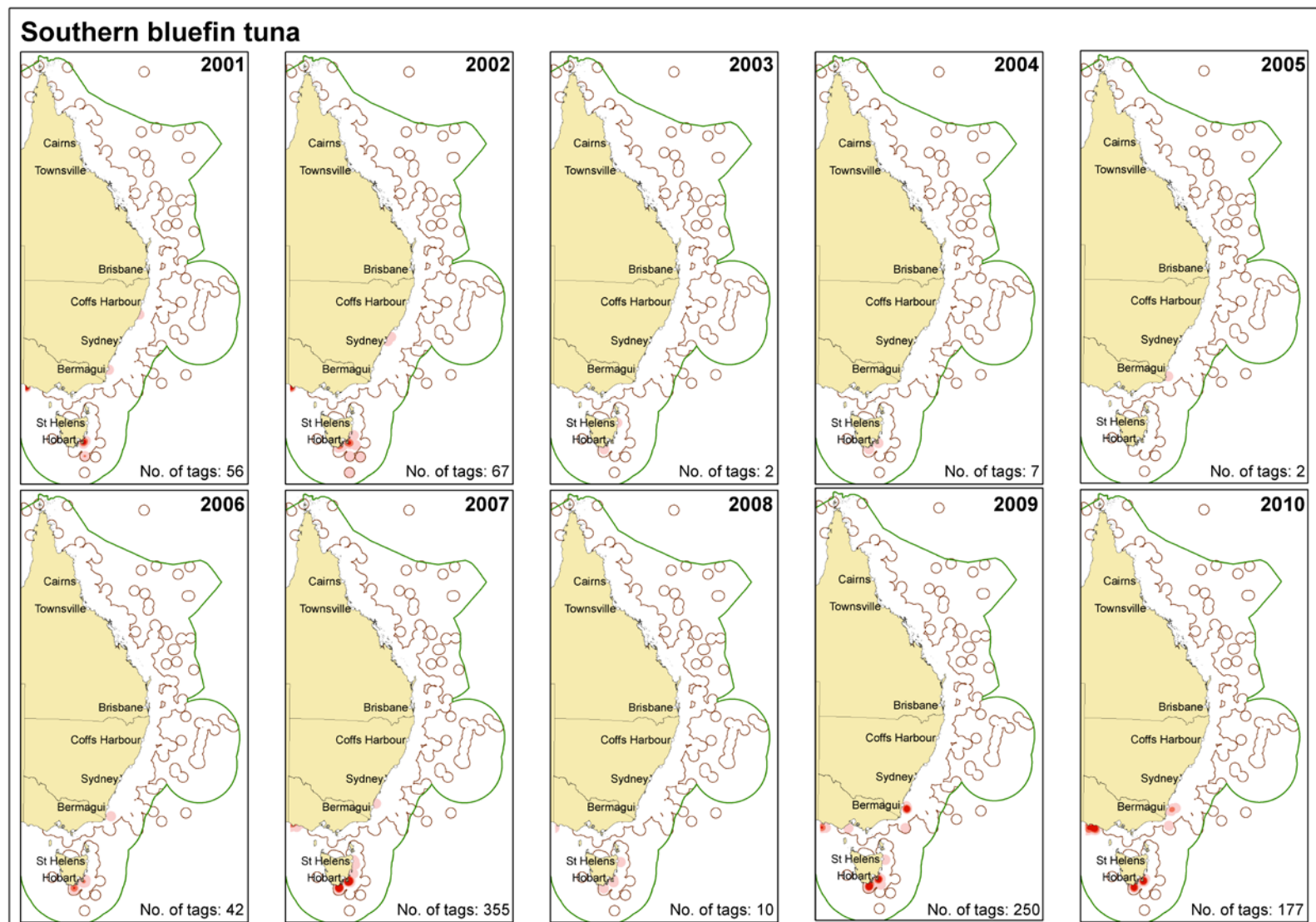


Figure E37 Distribution of tag releases of mako sharks, 1976–2010

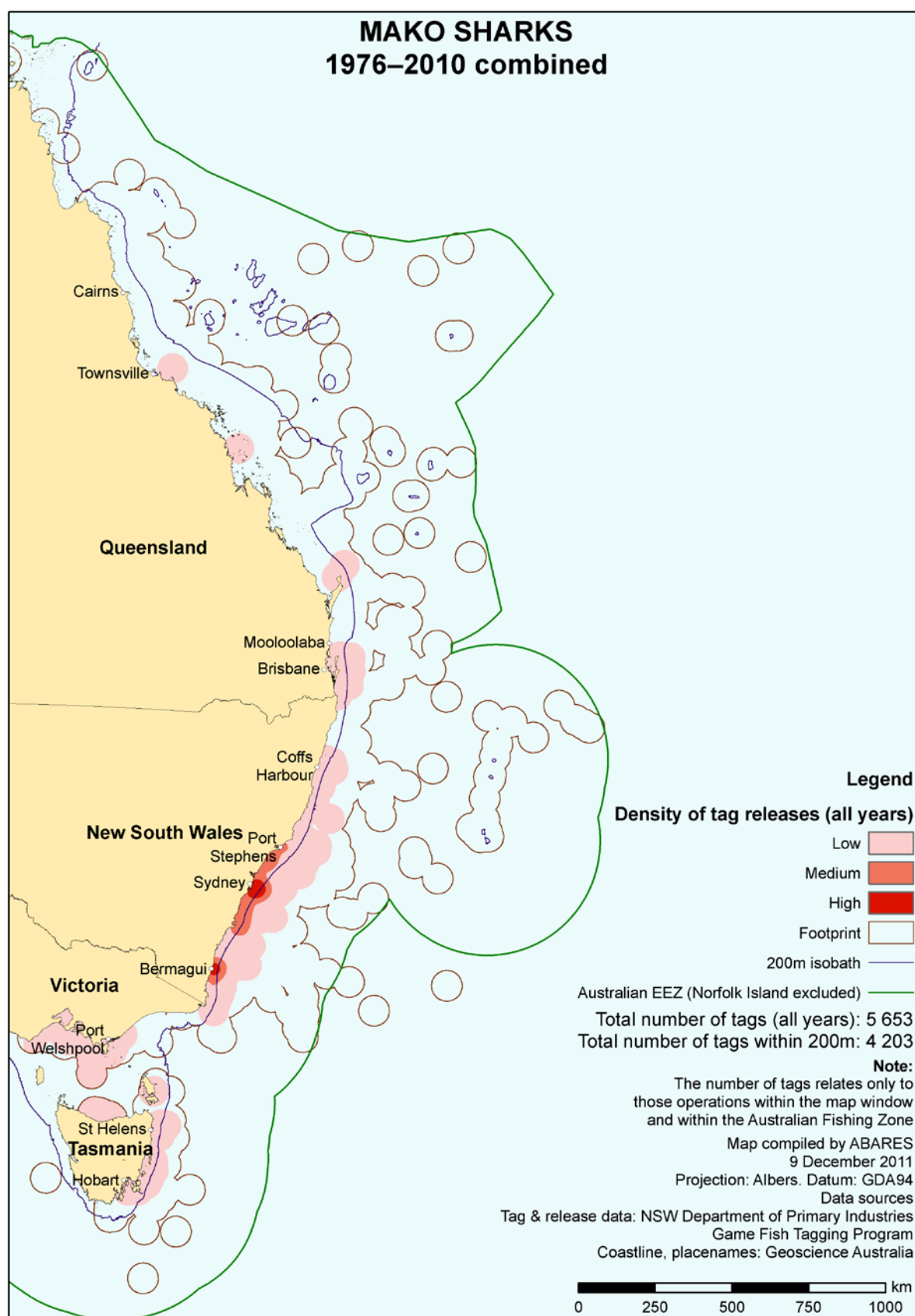




Figure E38 Distribution of tag releases of mako sharks, three-month quarter, 1976–2010

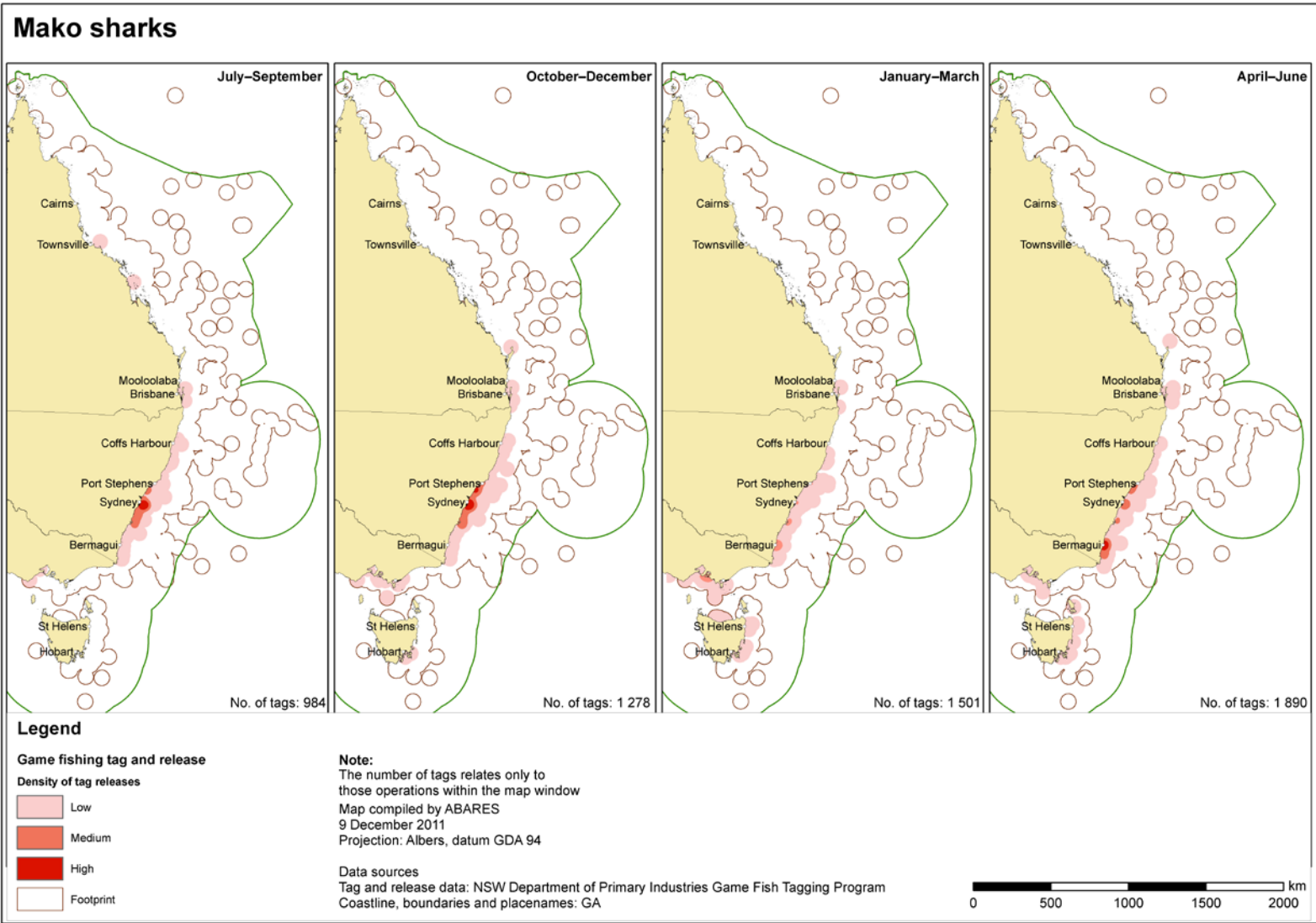


Figure E39 Distribution of tag releases of mako sharks, five-year period, 1976–2010

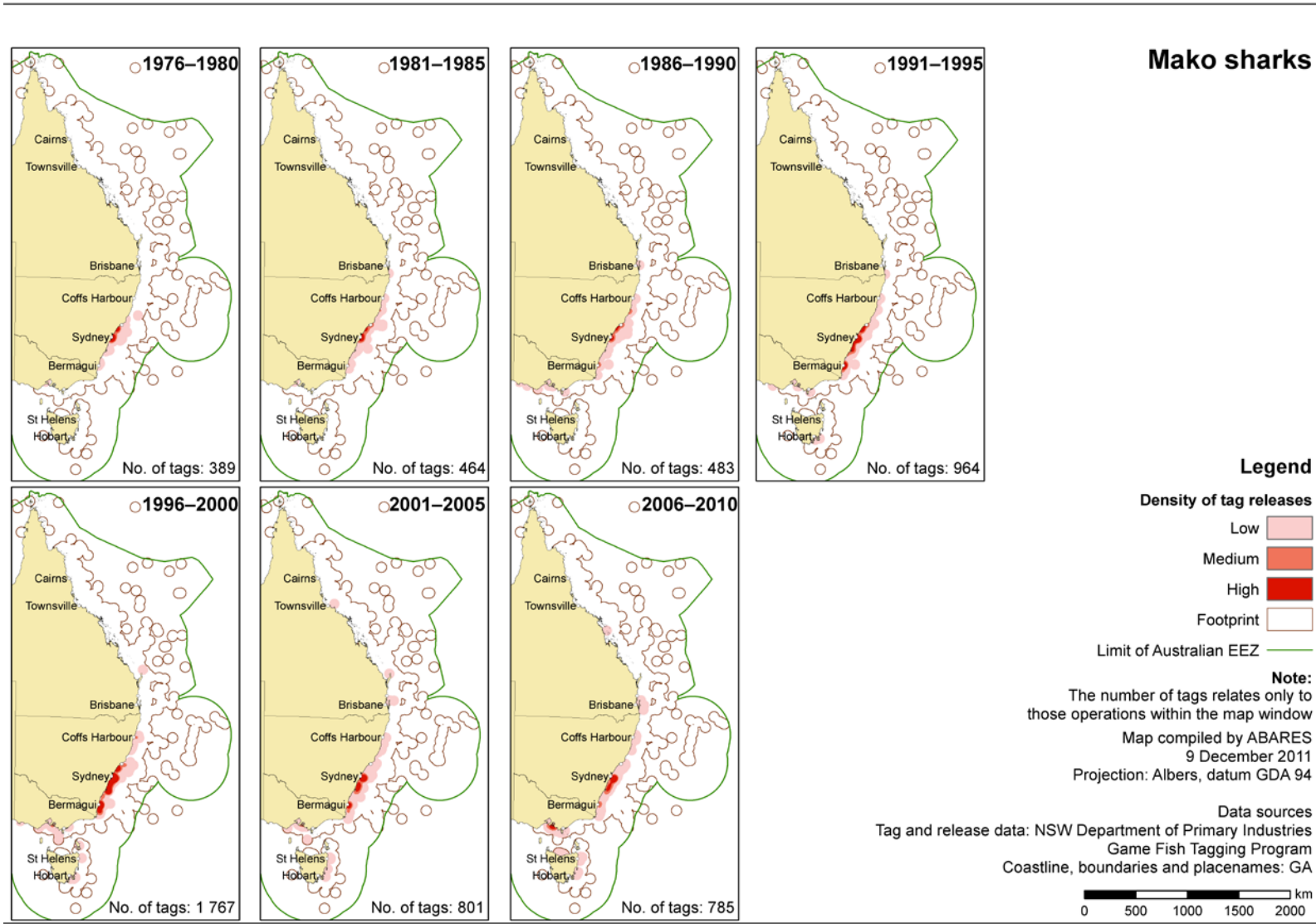
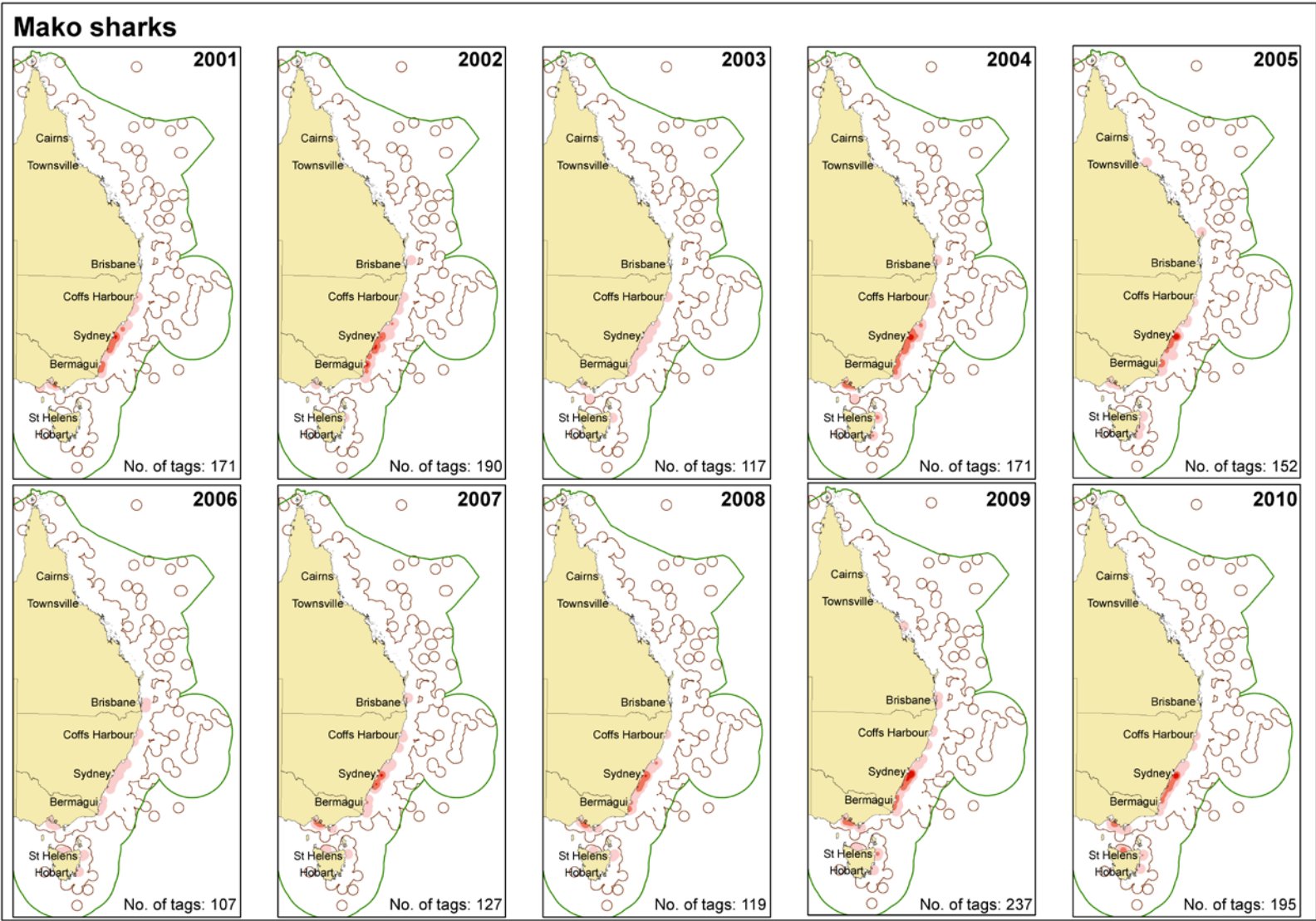




Figure E40 Annual distribution of tag releases of mako sharks, 2001–10



## Appendix F: Survey forms and supporting information

Game-fisher surveys used four, colour-coded versions of the game fisher questionnaire, depending on whether the game fisher was registered in a current game-fishing tournament and whether they were a visitor to the area. This Appendix includes an example of the information sheet that was distributed with questionnaires and a game fisher questionnaire for tournament-visitors to Bermagui. Copies of other versions of the questionnaire are available on request from ABARES.

Game-fisher surveys also involved a tally sheet where staff recorded details of all recreational boats encountered at access points, contact details of game-fishing boats that received questionnaires and a record of numbers of questionnaires distributed and returned.

Business and community surveys were conducted as face-to-face interviews, telephone interviews or, occasionally, completed by respondents and collected in person by ABARES staff. ABARES social scientists developed separate business survey forms and community survey forms. Many questions on the community survey form were the same as the business version of the survey to facilitate comparisons of responses between businesses and community members. An information sheet, which was similar to that used in the game-fisher survey, was distributed to business managers, owners and community members.



**Australian Government**  
**Australian Bureau of Agricultural and  
Resource Economics and Sciences**

## Gamefisher survey information sheet

### Social and Economic Evaluation of Gamefishing in Eastern Australia

#### What does it involve?

The Australian Government has initiated a social and economic study of gamefishing off eastern Australia. The project will compile a description of the nature and extent of gamefishing activities off eastern Australia. It will also involve surveys of gamefishers to gather data on expenditure and other benefits generated by gamefishing activities. The surveys are being conducted in the first half of 2011.

#### Why is it being done?

Information on catches and the value of fishing are routinely collected for commercial fisheries. However, there is little information on the value of gamefishing and its importance to local communities. Better information will result in better management decisions.



#### Who is doing the study?

The study is being undertaken by economists and social scientists from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES). The study is funded by the Australian Government and administered by the Fisheries Research and Development Corporation (FRDC). It is guided by an advisory committee consisting of experts from CSIRO, the Game Fishing Association of Australia (GFAA), New South Wales Department of Industry and Investment, Dr Julian Pepperell and the Australian Government. GFAA and the NSW Game Fishing Association have indicated their strong support for the study.

#### How can gamefishing associations and clubs help?

The surveys are being conducted during several gamefishing tournaments and outside tournaments in 2011. We are working closely with tournament organisers and club officials to provide gamefishers with background information about the study and to circulate questionnaires.

#### Who to contact for further information

Dr Peter Ward  
Senior Scientist  
Fisheries and Risk Analysis  
ABARES  
Ph + 61 2 6272 4163      Email [peter.ward@abares.gov.au](mailto:peter.ward@abares.gov.au)

GPO Box 1563  
Canberra ACT 2601



## Gamefisher Survey (Bermagui)

Surveying gamefishers at tournaments in Bermagui is a key part of the Australian Government's social and economic study of gamefishing. The gamefisher survey is similar to several economic surveys of gamefishing tournaments undertaken by Dr Julian Pepperell in the early 1990s.

### What does the questionnaire involve?

The questionnaire shouldn't take any more than 10-minutes to complete. It collects information on expenditure by gamefishers and values that can't be estimated in dollars and cents ('non-market values').

Part A (Economic Assessment) of the questionnaire gathers information on the costs of your travel to this tournament (transport, accommodation, fishing gear, etc). It also collects the same information on other gamefishing trips that you may have made to Bermagui over the past 12-months.

Part B (Social Assessment) collects information about the attitudes of gamefishers and their values.

### How is it being distributed?

Several project staff will be in Bermagui in mid- May. Staff will distribute questionnaires to skippers at the pre-tournament briefing. Skippers will be provided with copies of the questionnaire for themselves and for each gamefisher on their boat. We'll also record names and contact details so that they can be checked off as questionnaires are returned. After the tournament, this information may be used to contact any gamefishers who were unable to complete their questionnaire to see if they'd like to complete it through a phone interview. Personal contact information is confidential and survey results will be presented as aggregated data only.



We are doing similar surveys of non-tournament gamefishers at Bermagui. Earlier this year we surveyed gamefishers at the Blue Water Classic and in local businesses and community members to assess the importance of gamefishing to regional communities.

### Feedback

It's important to the success of the study and to gamefishing in Australia that we obtain accurate information on the importance of gamefishing to regional centres like Bermagui. Bermagui is the fourth tournament to be surveyed by the study, and we'd welcome your feedback on the survey and the questions asked.

### For further information please contact

Dr Peter Ward

Senior Scientist

Fisheries and Risk Analysis

ABARES

Ph + 61 2 6272 4163

Email [peter.ward@abares.gov.au](mailto:peter.ward@abares.gov.au)

GPO Box 1563  
Canberra ACT 2601





Australian Government  
Australian Bureau of Agricultural and  
Resource Economics and Sciences

CONFIDENTIAL

Tournament-Visitor

OFFICIAL USE

## GAMEFISHER SURVEY 2011

### INSTRUCTIONS

- Please complete this questionnaire if you are participating in a gamefishing tournament or are skippering a gamefishing boat.
- Each gamefisher should complete only one questionnaire per tournament.
- Please return the completed questionnaire to project staff (phone 0419 722 111 or toll free on 1800 026 120 if you're unable to hand the questionnaire to staff).
- Please check with staff if you have problems with any questions.

You are assured of complete confidentiality. Your name will not be used in any reports. No group outside the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) will have access to your questionnaire.

Tick

If you have previously completed an ABARES Gamefisher Survey please tick this box ☐

AND write the name of the place where you completed that Survey and the boat you were on:

PLACE

BOAT NAME

### Part A. Economic assessment of gamefishing

1 Your postcode OR suburb, town and state if you can't recall your post code


2 a) In total, how many gamefishing trips did you make to Bermagui in the past 12-months? (including this trip)

Number of trips

Days of gamefishing

Total days in Bermagui

b) How many of those trips were for gamefishing tournaments? (including this trip)

Number of tournament trips

c) What percentage of your gamefishing trips to Bermagui usually occur between January and June?

Percentage of trips

    %

3 Please indicate the distance and time travelled from your home to Bermagui for this current gamefishing trip (one-way)

Kilometres

AND

Days and hours



ABARES Gamefisher Survey 2011		CONFIDENTIAL		
<p>If you undertook a gamefishing trip to Bermagui in the past 12-months <u>outside of a tournament</u> please complete <b>both column A and B</b> of this table. Otherwise please complete <b>only column A</b>.</p>				
<p><b>4</b> From the following list, please <u>rank</u> in order of importance (from 1 to 5) your reason(s) for visiting Bermagui.</p> <p>Please number up to 5 boxes.</p>	<p><b>Column A</b></p> <p>Your current tournament trip to Bermagui</p> <p>Rank</p> <p>1 (most important)</p> <p>5 (least important)</p>	<p><b>Column B</b></p> <p>Your last NON-tournament trip to Bermagui</p> <p>Rank</p> <p>1 (most important)</p> <p>5 (least important)</p>		
	Gamefishing	<input type="checkbox"/>	<input type="checkbox"/>	
	Other recreational fishing	<input type="checkbox"/>	<input type="checkbox"/>	
	Boating	<input type="checkbox"/>	<input type="checkbox"/>	
	Business	<input type="checkbox"/>	<input type="checkbox"/>	
	Camping	<input type="checkbox"/>	<input type="checkbox"/>	
	Bushwalking	<input type="checkbox"/>	<input type="checkbox"/>	
	Sightseeing	<input type="checkbox"/>	<input type="checkbox"/>	
	Visiting friends or family	<input type="checkbox"/>	<input type="checkbox"/>	
	Other (please describe) <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p><b>5</b> Please estimate the amount that <b>YOU</b> paid for your gamefishing trip to Bermagui:</p>	<p>Amount YOU paid for your current tournament gamefishing trip to Bermagui</p>	<p>Amount YOU paid for your last NON-tournament gamefishing trip to Bermagui</p>		
	a) Cost of <u>travel</u> from home to Bermagui (fuel, fares, etc; both ways – <u>return trip</u> )	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
	b) Cost of <u>boat fuel</u> used in gamefishing	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
	c) Boat equipment (for this trip)	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
	d) Fishing equipment (for this trip)	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
	e) Bait	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
	f) Accommodation	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
	g) Food, refreshments and liquor	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
	h) Charter boat or hire boat	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
	i) Tournament fees	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
	j) Mooring fees and other marine costs	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
	k) Other please specify: <input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	

ABARES Gamefisher Survey 2011		CONFIDENTIAL	
<p>If you undertook a gamefishing trip to Bermagui in the past 12-months <u>outside of a tournament</u> please complete <b>both column A and B</b> of this table. Otherwise please complete <b>only column A</b>.</p>			
	<b>Column A</b> Your current tournament trip to Bermagui	<b>Column B</b> Your last NON-tournament trip to Bermagui	
<b>6</b> How did you get from home to Bermagui? a) Small car (<2 litre) b) Large car (>2 litre) c) 4WD d) Light truck e) Other: <input type="text"/> please describe: <input type="text"/>	Y/N <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Y/N <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
<b>7</b> Who travelled in the vehicle with you to Bermagui? a) Friend(s) b) Family c) No one	Y/N <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Y/N <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
<b>8</b> How many people travelled in the vehicle with you to Bermagui? a) Under 18 years of age b) 18 years or older	Number of people <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Number of people <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
<b>9</b> How many income-earning days did you give up for this trip? (do not include paid holidays)	Number of days <input type="text"/> <input type="text"/>	Number of days <input type="text"/> <input type="text"/>	
<b>10</b> How many days did you stay in Bermagui?	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	
<b>11</b> For how long did you go gamefishing on this trip?	Days and Hours <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Days and Hours <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
<b>12</b> Did you visit any other place(s) <u>on the way to Bermagui</u> ? If yes, please indicate the place(s) that you visited and the time spent there:	Y/N <input type="checkbox"/> <div>PLACE#1 VISITED</div> <div>DAYS HOURS</div> <div>PLACE#2 VISITED</div> <div>DAYS HOURS</div>	Y/N <input type="checkbox"/> <div>PLACE#1 VISITED</div> <div>DAYS HOURS</div> <div>PLACE#2 VISITED</div> <div>DAYS HOURS</div>	



ABARES Gamefisher Survey 2011										CONFIDENTIAL	
<b>About you</b>											
13 Your gender (please tick one box)						14 Your age group (please tick one box)					
M		F				<15		15-29		30-44	
<input type="checkbox"/>		<input type="checkbox"/>				<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
						45-59		60-74		>74 years	
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
15 Your highest educational qualification (please tick one box)											
Primary school		Year 10		Year 12		Diploma or certificate		Tertiary degree		Postgraduate degree	
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
16 Your employment (please tick at least one box)											
Employed		Self-employed		Student		Retired		Unemployed		Other	
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
										please describe:	
										<input type="text" value="EMPLOYMENT"/>	
↓		↓									
What type of work do you do?				<input type="text" value="TYPE OF WORK"/>							
17 Please indicate your total household income (before tax) in 2009/10 (please tick one box)											
				<\$20k		\$20k - \$40k		\$40k - \$60k		\$60k - \$80k	
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
				\$80k - \$100k		\$100k - \$120k		\$120k - \$140k		\$140k - \$160k	
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
				\$160k - \$180k		>\$180k		<input type="checkbox"/>		<input type="checkbox"/>	
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
18 Do you speak a language other than English at home? (Y/N)											
<input type="checkbox"/>										NAME OF LANGUAGE	
19 Are you a member of a gamefishing club? (Y/N)											
<input type="checkbox"/>										NAME OF CLUB	
<b>Part B. Social assessment of gamefishing</b>											
20 Who do you usually go gamefishing with? (please tick at least one box)											
Alone		Friends		Family		Club members		Other		please describe:	
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="text" value=""/>	
21 What is the name the boat that is being used for this gamefishing trip?											
<input type="text" value="BOAT NAME"/>											
Do you own or part-own the boat that is being used for this gamefishing trip? (Y/N)											
<input type="checkbox"/>											
If YES, please estimate the boat's current market value (incl. motor) and the percentage that you actually own:						Boat's value:			Your share:		
\$						,			%		
<input type="text" value=""/>						<input type="text" value=""/>			<input type="text" value=""/>		
22 Do you own or part-own real estate property in Bermagui? (Y/N)											
<input type="checkbox"/>											
If YES, please estimate the property's current market value and the percentage that you actually own:						Property's value:			Your share:		
\$						,			%		
<input type="text" value=""/>						<input type="text" value=""/>			<input type="text" value=""/>		
23 Is this the first time you've been gamefishing? (Y/N)											
<input type="checkbox"/>										Year:	
If NO, in which year did you first go gamefishing?										<input type="text" value=""/>	

## ABARES Gamefisher Survey 2011

CONFIDENTIAL

24 In the past 12-months, what 3 locations did you most frequently go to gamefish? (please indicate the nearest town, landmark or port)

LOCATION #1

LOCATION #2

LOCATION #3

25 Listed below are statements about what makes a successful gamefishing trip. Please indicate the extent that you agree or disagree with each of the statements:

Tick the most appropriate box for each statement

Strongly disagree Disagree Neutral Agree Strongly agree

- |   |                          |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a) The more fish I catch, the happier I am                              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b) A gamefishing trip can be successful even if no fish are caught      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c) The bigger the fish I catch, the better the gamefishing trip         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d) I'm just as happy if I don't keep the fish I catch                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e) I'm happiest with the fishing trip if I catch a challenging gamefish | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

26 We'd also like to know the reasons why you go gamefishing. Please indicate the importance of the following reasons you gamefish:

Tick the most appropriate box for each statement

Not at all important Slightly important Moderately important Important Very important

- |   |                          |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a) To be outdoors                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b) To be close to nature                            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c) To catch fish for eating                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d) For relaxation                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e) To get away from the regular routine             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f) To catch a 'record' or 'trophy' fish             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g) For the challenge or sport of fishing            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| h) To be with friends                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| i) To bring my family closer together               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| j) To be with others who enjoy the same things I do | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

ABARES Gamefisher Survey 2011		CONFIDENTIAL																																																												
<p>27 Are there any other recreational activities that would provide you with the same level of satisfaction and enjoyment that you receive from gamefishing? (Y/N) <input type="checkbox"/></p> <p style="text-align: center;">↓</p> <p>If YES, please indicate the activities that would substitute for gamefishing:</p> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 30%;"></div> <div style="width: 65%; border: 1px solid black; padding: 2px;">NAME OF SUBSTITUTE ACTIVITY #1</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 30%;"></div> <div style="width: 65%; border: 1px solid black; padding: 2px;">NAME OF SUBSTITUTE ACTIVITY #2</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 30%;"></div> <div style="width: 65%; border: 1px solid black; padding: 2px;">NAME OF SUBSTITUTE ACTIVITY #3</div> </div>																																																														
<p>28 This question will help us to understand what sorts of personal benefits gamefishing provides. Please indicate the extent that you agree or disagree with each of the following statements:</p>	<p style="text-align: center;">Tick the most appropriate box for each statement</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 15%; text-align: center;">Strongly disagree</th> <th style="width: 15%; text-align: center;">Disagree</th> <th style="width: 15%; text-align: center;">Neutral</th> <th style="width: 15%; text-align: center;">Agree</th> <th style="width: 15%; text-align: center;">Strongly agree</th> </tr> </thead> <tbody> <tr><td>a) Most of my friends are in some way connected with gamefishing</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>b) I have developed good friends through gamefishing</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>c) I really enjoy spending time with other gamefishers</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>d) If I ceased gamefishing, I might lose touch with a lot of my friends</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>e) I get physical benefits from gamefishing (e.g. fitness or strength)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>f) I get a sense of fulfilment from gamefishing</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>g) I feel more positive about my life when I gamefish</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>h) Gamefishing is a great reliever of stress for me</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>i) My family relationships improve because I have gamefishing as an outlet</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </tbody> </table>			Strongly disagree	Disagree	Neutral	Agree	Strongly agree	a) Most of my friends are in some way connected with gamefishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	b) I have developed good friends through gamefishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	c) I really enjoy spending time with other gamefishers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	d) If I ceased gamefishing, I might lose touch with a lot of my friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	e) I get physical benefits from gamefishing (e.g. fitness or strength)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	f) I get a sense of fulfilment from gamefishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	g) I feel more positive about my life when I gamefish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	h) Gamefishing is a great reliever of stress for me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	i) My family relationships improve because I have gamefishing as an outlet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree																																																									
a) Most of my friends are in some way connected with gamefishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
b) I have developed good friends through gamefishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
c) I really enjoy spending time with other gamefishers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
d) If I ceased gamefishing, I might lose touch with a lot of my friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
e) I get physical benefits from gamefishing (e.g. fitness or strength)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
f) I get a sense of fulfilment from gamefishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
g) I feel more positive about my life when I gamefish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
h) Gamefishing is a great reliever of stress for me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
i) My family relationships improve because I have gamefishing as an outlet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
<p>29 Listed below are statements about gamefishing and the environment. Please indicate to what extent you agree or disagree with each of the statements.</p>	<p style="text-align: center;">Tick the most appropriate box for each statement</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 15%; text-align: center;">Strongly disagree</th> <th style="width: 15%; text-align: center;">Disagree</th> <th style="width: 15%; text-align: center;">Neutral</th> <th style="width: 15%; text-align: center;">Agree</th> <th style="width: 15%; text-align: center;">Strongly agree</th> </tr> </thead> <tbody> <tr><td>a) I want my kids to be able to enjoy gamefishing like I have enjoyed it</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>b) I make an effort to learn as much as I can about the marine environment</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>c) Gamefishers don't take enough fish to impact fish stocks</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>d) Viewing marine wildlife (such as seabirds and dolphins) adds to my enjoyment of gamefishing</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>e) Gamefishers play a surveillance role in the marine environment</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>f) Gamefishers contribute to marine science</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </tbody> </table>			Strongly disagree	Disagree	Neutral	Agree	Strongly agree	a) I want my kids to be able to enjoy gamefishing like I have enjoyed it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	b) I make an effort to learn as much as I can about the marine environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	c) Gamefishers don't take enough fish to impact fish stocks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	d) Viewing marine wildlife (such as seabirds and dolphins) adds to my enjoyment of gamefishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	e) Gamefishers play a surveillance role in the marine environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	f) Gamefishers contribute to marine science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																		
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree																																																									
a) I want my kids to be able to enjoy gamefishing like I have enjoyed it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
b) I make an effort to learn as much as I can about the marine environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
c) Gamefishers don't take enough fish to impact fish stocks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
d) Viewing marine wildlife (such as seabirds and dolphins) adds to my enjoyment of gamefishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
e) Gamefishers play a surveillance role in the marine environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									
f) Gamefishers contribute to marine science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																									



ABARES Gamefisher Survey 2011		CONFIDENTIAL			
30 Please indicate which gamefish you fished for ('targeted') and how many you caught on this trip and in the previous 12-months ('caught' includes gamefish tagged, released, kept, landed or weighed):					
		Your current tournament trip to Bermagui		Previous 12-months	
		Tick if targeted	Number caught	Tick if targeted	Number caught
Tuna	albacore	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	skipjack ('stripies')	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	southern bluefin	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	yellowfin	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Billfish	black marlin	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	blue marlin	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	striped marlin	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	sailfish	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	spearfish	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	broadbill swordfish	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Sharks	blue shark	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	hammerhead	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	mako	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	tiger	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	whalers	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Other	dolphinfish	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	kingfish	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
	wahoo	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Other (please name)					
<input type="text"/>		<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
<input type="text"/>		<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
<input type="text"/>		<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>

ABARES Gamefisher Survey 2011

CONFIDENTIAL

**OTHER COMMENTS**

Are there any other issues or gamefishing activities that you would like to tell us about? Please use this space to provide other comments about gamefishing and to suggest ways that the questionnaire might be improved.

**THANK YOU FOR YOUR TIME**

We appreciate the time you have spent answering the questionnaire. A summary of survey findings will be available in December 2011 on [www.abares.gov.au](http://www.abares.gov.au).

If you need assistance with the questionnaire or wish to make specific comments about it, please contact a member of the research team or use the toll free number 1800 026 120 to contact ABARES.

© Commonwealth of Australia 2011

[illegible]

205

## Community and business survey information sheet



Australian Government

Australian Bureau of Agricultural and  
Resource Economics and Sciences



### Social and Economic Evaluation of Gamefishing in Eastern Australia

#### What does it involve?

The Australian Government has initiated a social and economic study of gamefishing off eastern Australia. The project is compiling a description of the nature and extent of gamefishing activities off eastern Australia. It also involves a survey of gamefishers to gather data on expenditure and other benefits generated by gamefishing, and a survey of local businesses and community members to assess the importance of gamefishing to regional communities. The surveys will be conducted in the first half of 2011.

#### Why is it being done?

Information on catches and the value of fishing are routinely collected for commercial fisheries. However, there is little information on the value of gamefishing and its importance to local communities. Better information will result in better management decisions.

#### Who is doing the study?

The study is being undertaken by researchers from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES). The study is funded by the Australian Government and administered by the Fisheries Research and Development Corporation (FRDC). It is guided by an advisory committee consisting of experts from CSIRO, the Game Fishing Association of Australia (GFAA), NSW Department of Industry and Investment and the Australian Government. GFAA and the NSW Game Fishing Association have indicated their support for the study.



#### Feedback

It's important to the success of the study and to gamefishing in Australia that we obtain accurate information on the importance of gamefishing to regional centres like Port Stephens. We welcome your feedback on the survey and the questions asked.

#### Who to contact for further information:

Business and community survey:

Nyree Stenekes — Social Scientist  
Productivity, water and social sciences  
ABARES

Ph 02 6272 3253 / 0430 191394  
nyree.stenekes@abares.gov.au

Robert Kancans — Social Scientist  
Productivity, water and social sciences  
ABARES

Ph 02 6272 4052  
robert.kancans@abares.gov.au



## BUSINESS SURVEY 2011: importance of gamefishing

- This survey is part of a social and economic study of gamefishing in eastern Australia by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES).
- More information is required about the importance of gamefishing activities to the social and economic viability of regional communities and businesses. (Gamefishing is an offshore recreational fishing activity in which people fish for large tuna, marlin, sailfish or sharks.)
- The survey will take about 10 minutes to fill in. It is a confidential survey and your name will not be disclosed or used in any reports. The information you provide will be used for the purposes of research and the results of the survey will only be made available in aggregated form.
- Information gathered by this study will lead to better decisions on recreational fishing data collection, research, consultation and management.

Please contact researchers **Nyree Stenekes** (02 6272 3253 [nyree.stenekes@abares.gov.au](mailto:nyree.stenekes@abares.gov.au)) or **Robert Kancans** (02 6272 4052 [robert.kancans@abares.gov.au](mailto:robert.kancans@abares.gov.au)) if you have any queries.

### IMPORTANCE OF GAMEFISHING TOURNAMENTS TO YOUR BUSINESS

- Are you aware that there was a gamefishing tournament in Port Stephens 2 weeks ago [25th Feb. to 6th March] ☐Yes ☐No
- a) What proportion of your clientele are gamefishers? \_\_\_\_\_% ☐Not sure  
[Throughout the gamefishing season Nov. to June]
  - b) Of these, what proportion are local? \_\_\_\_\_% ☐ Not sure
- Which of the following statements would best describe the way that your sales or income is affected prior to or during gamefishing tournaments? [Please tick only one box.]
 

goes up significantly	<input type="checkbox"/>
increases a little	<input type="checkbox"/>
stays the same	<input type="checkbox"/>
reduces	<input type="checkbox"/>
not sure	<input type="checkbox"/>
- What proportion of your turnover is received from your gamefishing customers? \_\_\_\_\_% ☐ Not sure
- How important are gamefishing tournaments for your business' financial viability?  
  
Financial viability is about being able to generate sufficient income to meet operating payments, debt commitments and, where applicable, to allow growth while maintaining service levels.

*[Please tick the box that corresponds to your response.]*

Not important at all ☐ Slightly important ☐ Moderately important ☐ Important ☐ Very important ☐

Comments? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- 6 To what extent are gamefishing clientele important to your business at the following times of the year:

*[Please tick the box that corresponds to your response, where 1 means gamefishing clientele are not important at all and 5 means gamefishing clientele are very important to your business.]*

	Not important at all 1	2	Neutral 3	4	Very important 5
Prior to or during a gamefishing tournament?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Throughout the gamefishing season (Nov. to June)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outside of the fishing season?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**IMPORTANCE OF GAMEFISHING TOURNAMENTS TO YOUR COMMUNITY****7 How important are gamefishing tournaments for your community's social vitality?**

Social vitality is the capacity to live, grow or develop to support a vibrant community and includes activities that make the community a better place to live.

*[Please tick the box that corresponds to your response.]*

Not important at all ☐ Slightly important ☐ Moderately important ☐ Important ☐ Very important ☐

Comments? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**8 To what extent do you agree or disagree that the following benefits and drawbacks of gamefishing tournaments occur in your community?**

*[Please tick the box for each item that corresponds to your response where 1 means strongly disagree that these occur in your community due to gamefishing tournaments and 5 means strongly agree that these occur in your community due to gamefishing tournaments.]*

	Unsure	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
Improves the social life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improves the town's profile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Good for local businesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Helps generate employment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Affects the amenity of public places, e.g. fuel spilling, boat washing, fish offal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brings towns' people together	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Impacts on fish stocks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increased traffic and congestion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Encourages people to visit the region	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fuel prices go up	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other? <i>[Please state.]</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____						

- 9 Have you ever been a volunteer in your community before? ☐Yes ☐No

If so, what for?

---



---



---

### ABOUT YOU AND YOUR BUSINESS

- 10 How many employees do you have in your business?  full-time  
 part-time  
 seasonal
- 11 Do you engage additional staff during a gamefishing tournament? ☐Yes ☐No
- 12 Do you have any family members helping out with the business? Yes → ☐Paid ☐Unpaid  
☐ Both paid & unpaid  
 No ☐
- 13 How long have you owned or managed the business?
- |                    |                          |
|--------------------|--------------------------|
| Less than 1 year   | <input type="checkbox"/> |
| 1-3 years          | <input type="checkbox"/> |
| 4-10 years         | <input type="checkbox"/> |
| more than 10 years | <input type="checkbox"/> |
- 14 What is your gender? ☐ male ☐ female
- 15 What is your age group?
- |           |                          |
|-----------|--------------------------|
| <15 years | <input type="checkbox"/> |
| 15-29     | <input type="checkbox"/> |
| 30-44     | <input type="checkbox"/> |
| 45-59     | <input type="checkbox"/> |
| 60-74     | <input type="checkbox"/> |
| >75       | <input type="checkbox"/> |

**Thank you for participating in this study.**

If you would like a summary of the results of the study, please provide your email address or fax number: \_\_\_\_\_

## COMMUNITY SURVEY 2011: importance of gamefishing

- This survey is part of a social and economic study of gamefishing in eastern Australia by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES).
- More information is required about the importance of gamefishing activities to the social and economic viability of regional communities and businesses. (Gamefishing is an offshore recreational fishing activity in which people fish for large tuna, marlin, sailfish or sharks.)
- The survey will take about 10 minutes to fill in. It is a confidential survey and your name will not be disclosed or used in any reports. The information you provide will be used for the purposes of research and the results of the survey will only be made available in aggregated form.
- Information gathered by this study will lead to better decisions on recreational fishing data collection, research, consultation and management.

Please contact researchers **Nyree Stenekes** (02 6272 3253 [nyree.stenekes@abares.gov.au](mailto:nyree.stenekes@abares.gov.au)) or **Robert Kancans** (02 6272 4052 [robert.kancans@abares.gov.au](mailto:robert.kancans@abares.gov.au)) if you have any queries.

### IMPORTANCE OF GAMEFISHING TO YOUR COMMUNITY

- 1 Are you aware that there was a gamefishing tournament in Port Stephens 2 weeks ago [25th Feb. to 6th March]? ☐ Yes ☐ No

- 2 How important are gamefishing tournaments for your community's social vitality?

Social vitality is the capacity to live, grow or develop to support a vibrant community and includes activities that make the community a better place to live.

[Please tick the box that corresponds to your response.]

Not important at all ☐ Slightly important ☐ Moderately important ☐ Important ☐ Very important ☐

Why or why not? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- 3 To what extent do you agree or disagree that the following benefits and drawbacks of gamefishing tournaments occur in your community?

*[Please tick the box for each item that corresponds to your response where 1 means strongly disagree that these occur in your community due to gamefishing tournaments and 5 means strongly agree that these occur in your community due to gamefishing tournaments.]*

	Unsure	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
Improves the social life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improves the town's profile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Good for local businesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Helps generate employment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Affects the amenity of public places, e.g. fuel spilling, boat washing, fish offal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brings towns' people together	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Impacts on fish stocks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increased traffic and congestion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Encourages people to visit the region	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fuel prices go up	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other? [Please state.]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 4 Have you ever been a volunteer in your community? ☐Yes ☐No

If so, what for?

---



---



---

- 5 What other festivals, events or activities have you or your local community organised to coincide with gamefishing tournaments? *[Please list.]*

---



---



---

- 6 Please feel free to provide any further thoughts or comments on the importance of gamefishing activities and events to your community.

---



---



---



---



---



---



---

### ABOUT YOU

- 7 a) Are you a local resident of Port Stephens? ☐ Yes ☐ No

b) If so, how long have you lived in this region? \_\_\_\_\_ years

- 8 Have you done any gamefishing yourself? ☐ Yes ☐ No

- 9 ☐ male ☐ female  
What is your gender?

- 10 What is your age group?

<15 years	<input type="checkbox"/>	15-29	<input type="checkbox"/>	30-44	<input type="checkbox"/>
45-59	<input type="checkbox"/>	60-74	<input type="checkbox"/>	>75	<input type="checkbox"/>

**Thank you for participating in this study.**

If you would like a summary of the results of the study, please provide your email address or fax number: \_\_\_\_\_



# References

ABS (Australian Bureau of Statistics) 2006a, Census of Population and Housing, tables generated using ABS TableBuilder based on place of usual residence, viewed 2011, <<https://www.censusdata.abs.gov.au/webapi/jsf/login.xhtml>>.

ABS (Australian Bureau of Statistics) 2006b, Basic Community Profile Series for selected geographies based on place of usual residence, Catalogue No. 2001.0, viewed 2011, <<http://www.abs.gov.au/websitedbs/censushome.nsf/home/map>>.

ANSA (Australian National Sportfishing Association) 2011. *Australian National Sportfishing Association*, viewed 18 February 2011, <[www.ansa.com.au](http://www.ansa.com.au)>.

Bateman, J 1993. Valuation of the environment, methods and techniques: revealed preference methods in R Turner (ed.), *Sustainable environmental economics and management—principles and practice*, Belhaven, London.

Bishop, T 2011, *Cubing or chunking for increased snapper catches*, Bish & Fish in New Zealand, online blog, viewed 18 February 2011, <[www.bishfish.co.nz/articles/salt/snapcube.htm](http://www.bishfish.co.nz/articles/salt/snapcube.htm)>.

Cameron, CA & Trivedi, PK 1986, 'Econometric models based on count data. Comparisons and applications of some estimators and tests', *Journal of applied econometrics*, Vol. 1, no. 1, pp. 29–53.

Cameron, CA & Trivedi, PK 1998, *Regression analysis and count data*, Cambridge University Press, United Kingdom.

Coupal, RH, Bastian, C, May, J & Taylor, DT 2001, The economic benefits of snowmobiling to Wyoming residents: a travel cost approach with market segmentation. *Journal of Leisure Research*, vol. 33, pp. 492–510.

Creel, M & Loomis, J 1990, 'Theoretical and Empirical advantages of truncated count data estimators for analysis of deer hunting in California', *American Journal of Agricultural Economics*, vol. 72, pp. 434–441

DAFF (Department of Agriculture, Fisheries and Forestry) 2000, *Assessment of black marlin and blue marlin in the Australian Fishing Zone*, report of the Black and Blue Marlin Working Group, DAFF, Canberra.

Ernst & Young 2006. *Economic impact of recreational fishing in Port Stephens and Narooma/Bermagui*, Ernst & Young, Sydney.

Ezzy, E & Scarborough, H 2011. 'Estimation of the recreational use value gained from recreational fishing of southern bluefin tuna at Portland, Australia', *AARES 2011: Australian Agricultural & Resource Economics Society 55th Annual Conference Handbook*, Deakin University 8–11 February 2011, AARES, Melbourne.

Fishing World 2008. *Practical boating: using outriggers*, Fishing World, June 2008, viewed 27 May 2011, <[www.fishingworld.com.au/news/practical-boating-using-outriggers](http://www.fishingworld.com.au/news/practical-boating-using-outriggers)>.

Fishing World 2010. *Spread 'em*, Fishing World, December 2010. viewed 27 May 2011, <[www.fishingworld.com.au/news/spread-em](http://www.fishingworld.com.au/news/spread-em)>.

- Fix, P & Loomis, J 1997, 'The economic benefits of mountain biking at one of its meccas: an application of the travel cost method to mountain biking in Moab, Utah', *Journal of Leisure Research*, vol. 29, p. 342.
- Garrod, G & Willis, KG 1999. *Economic Valuation of the Environment*, Edward Elgar Publishing Ltd, Cheltenham, UK.
- GFAA (Game Fishing Association Australia) 2011. *The official GFAA gamefishing 2011 journal*, Bluewater Publishing, St Leonards, Sydney.
- Ghosn, D 2012, 'The highs of tournament gamefishing in NSW', *The official GFAA gamefishing 2012 journal*, BlueWater Publishing, pp. 34–36.
- Griffiths, S, Pepperell, J, Tonks, M, Sawynok, W, Olyott, L, Tickell, S, Zischke, M, Lynne, J, Burgess, J, Jones, E, Joyner, D, Makepeace, C & Moyle, K 2010a, *Biology, fisheries and status of longtail tuna (Thunnus tonggol), with special reference to recreational fisheries in Australian waters*, Fisheries Research and Development Corporation, Final Report 2008/058, FRDC, Canberra.
- Griffiths, SP, Pollock, KH, Lyle, JM, Pepperell, JG, Tonks, ML & Sawynok, W 2010b, 'Following the chain to elusive anglers', *Fish and Fisheries*, vol. 11, pp. 220–228.
- Griffiths, S, Pepperell, J, Tonks, M, Fay, G, Venables, W, Lyle, J, Olyott, L, Sawynok, W & Edgar, S 2010c, *Developing innovative and cost-effective tools for monitoring recreational fishing in Commonwealth fisheries*, Fisheries Research and Development Corporation & Commonwealth Scientific and Industrial Research Organisation Marine and Atmospheric Research, Canberra.
- Grogger, JT & Carson, RT 1991, 'Models for truncated counts', *Journal of applied econometrics*, vol. 6, no. 3, pp. 225–238.
- Haab, TC & McConnell, KE 2002, *Valuing environmental and natural resources, the econometrics of non-market valuation*, Edward Elgar Publishing Ltd Cheltenham, UK.
- Hailu, A, Gao, L, Durkin, J & Burton, M 2011. *Ningaloo Collaboration Cluster: estimation and integration of socioeconomic values of human use of Ningaloo*, University of Western Australia, Perth.
- Hellerstein, DM 1991, 'Using count data models in travel cost analysis with aggregate data', *American Journal of Agricultural Economics*, vol. 73, no. 3, pp. 860–866.
- Hellerstein, DM & Mendelsohn, R 1993, 'A theoretical foundation for count data models', *American Journal of Agricultural Economics*, vol. 75, no. 3, pp. 604–611.
- Henry, GW & Lyle, JM (eds) 2003. *The national recreational and indigenous fishing survey*, final report to the Fisheries Research and Development Corporation, project 99/158, NSW Fisheries Final Report Series No. 40, Australian Government Department of Agriculture, Fisheries and Forestry, Sydney.
- Kjaer, T 2005, *A review of the discrete choice experiment—with emphasis on its application in health care*, Health Economics Papers, University of Southern Denmark, Odense.
- Knight, E, Park, T, Bromhead, D, Ward, P, Barry, S & Summerson, R 2006, *Analyses of interactions between longline and recreational gamefish fisheries taking or tagging striped marlin off New South Wales*, Bureau of Rural Sciences, Canberra.

Layman, CR, Boyce, JR & Keith, CR 1996, 'Economic valuation of the Chinook Salmon Sport Fishery of the Gulkana River, Alaska, under current and alternate management plans'. *Land Economics*, vol. 72, pp. 113–128.

Long, SJ, & Freese, J 2006, *Regression models for categorical dependent variable using STATA* (second edition), College Station, STATA press 2006.

Lowe, CG & Goldman, KJ 2001, 'Thermal and bioenergetics of elasmobranchs: bridging the gap', *Environmental Fish Biology*, vol. 60, pp. 251–266.

Moore, E 2001, *Measuring economic diversification*, Oregon Labor Market Information System, Oregon Employment Department USA.

NSW DPI 2005, *NSW DPI Game fishing tagging program: program summary and report to July 2005*, NSW Department of Primary Industries, available at <[http://www.dpi.nsw.gov.au/\\_data/assets/pdf\\_file/0004/207652/GFT-Report-04-05.pdf](http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/207652/GFT-Report-04-05.pdf)>.

NSW DPI 2009, *NSW DPI Game fishing tournament monitoring program (GTMP) in operation since 1994*, NSW Department of Primary Industries, available at <<http://www.shellharbourgamefishing.com.au/Tournaments/Tournament%202009%20Images/DPI%20Survey.pdf>>.

OECD (Organisation for Economic Co-operation and Development) 1995, *The economic appraisal of environmental projects and policies*, OECD Publishing, Paris.

Park, T 2007, *NSW Gamefish Tournament Monitoring—Angling Research Tournament Monitoring Program*, viewed 21 July 2011, <[www.dpi.nsw.gov.au/\\_data/assets/pdf\\_file/0017/212372/Game fish-Monitoring-Final-Report---Fisheries-Final-Report-Series-No.94.pdf](http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0017/212372/Game%20fish-Monitoring-Final-Report---Fisheries-Final-Report-Series-No.94.pdf)>.

Pepperell, JG 1990, Movements and variations in early year-class strength of black marlin (*Makaira indica*) off eastern Australia, in Stroud RH (ed.), *Second International Billfish Symposium: Planning the Future of Billfishes, Research and Management in the 90s and Beyond*, Kailua-Kona, Hawaii, 1–5 August 1988, National Coalition for Marine Conservation, Inc., Kailua-Kona, Hawaii.

Pepperell, JG 1991, *The economic value of the Golden Lure Tournament to the Port Macquarie District*, report to the Port Macquarie Game Fishing Club, Pepperell Research & Consulting Pty Ltd, Caringbah, New South Wales.

Pepperell, JG 1992, *The economic value of the Bermagui Blue Water Classic Game Fishing Tournament to the Bermagui District*, report to the Bermagui Big Game Anglers Club, Pepperell Research & Consulting Pty Ltd, Noosaville, Queensland.

Pepperell, JG 2002, *Regional economic impact of the Toyota Sportivo 40th New South Wales Interclub Game Fishing Tournament, Port Stephens 2002*, report to the New South Wales Game Fishing Association, Pepperell Research & Consulting Pty Ltd, Noosaville, Queensland.

Pepperell, JG 2010, *Fishes of the Open Ocean*, University of New South Wales Press, Sydney.

Pepperell, JG & Henry, G 1997, *Development and implementation of a catch/effort monitoring system for the organized gamefish fishery off eastern Australia*, Report to the Australian Fisheries Management Authority, Pepperell Research & Consulting Pty Ltd, Noosaville, Queensland.

Perman, P, Ma, Y, McGilvray, J & Common, M 1999, *Natural resource and environmental economics*, Prentice Hall, London.

Perman, R, Ma, Y, McGilvray, J & Common, M 2003 *Natural resources and environmental economics*, Pearson Education Ltd, Essex.

Polson Enterprises 2010, *Boating statistics*, Polson Enterprises Research Services, viewed 19 September 2008, <[www.rbbs.com.au/desks/mkt/stats/stats.htm](http://www.rbbs.com.au/desks/mkt/stats/stats.htm)>.

Prayaga, P, Rolfe, JC & Stoekl, N 2010, 'The value of recreational fishing in the Great Barrier Reef, Australia: a pooled revealed preference and contingent behaviour model', *Marine Policy*, vol. 34, pp. 244–251.

Randall, A 1994, 'A difficulty with the travel cost method', *Land Economics*, vol. 70, pp. 88–89.

Recfish Australia 2011, Recfish Research Business Plan 2011/12, Fisheries Research and Development Corporation, Canberra, available at <<http://www.recfishingresearch.org/wp-content/uploads/2011/08/IF-BP-2011-PP.pdf>>.

Rolfe, J & Dyack, B 2011, 'Valuing recreation in the Coorong, Australia, with travel cost and contingent behaviour model', *Economic Record*, vol. 87, pp. 282–293.

Rolfe, J & Prayaga, P 2006, 'Estimating values for recreational fishing at freshwater dams in Queensland', *Australian Journal of Agricultural and Resource Economics*, vol. 51, pp. 157–174.

Schirmer, J & Pickworth, J 2005, *Social impacts of the South Australia Marine Scalefish Fishery: report of a case study conducted as part of the 'Social Assessment Handbook for the Australian Fishing sector' project*, e-Publication, Bureau of Rural Sciences—Social Sciences Program, Canberra.

Shrestha, RK, Seidl, AF & Moraes, AS 2002, 'Value of recreational fishing in the Brazilian Pantanal: a travel cost analysis using count data models', *Ecological Economics*, vol. 42, pp. 289–299.

Siderelis, C 2001, 'Incidental trips and aquarium benefits', *Leisure Sciences*, vol. 23, pp. 193–199.

Steneke, N & Sahlqvist, P 2011, *Community involvement in recreational fisheries data collection: Opportunities and challenges*, Australian Bureau of Agricultural and Resource Economics and Sciences Technical report No. 11.5, ABARES, Canberra.

Strang, J 2011, *Gamefishing—game chairs*, Hook, Line & Sinkers, New Zealand Fishing News, viewed 18 February 2011, <[www.fishing.net.nz/index.cfm/pageid/56/view/yes/editorialID/1041](http://www.fishing.net.nz/index.cfm/pageid/56/view/yes/editorialID/1041)>.

Sutton, SG 2006, *An assessment of the social characteristics of Queensland's recreational fishers*, Cooperative Research Centre Reef Research Centre Technical Report No. 65, CRC Reef Research Centre, School of Tropical Environment Studies and Geography, James Cook University, Townsville.

Tietenberg, T 2010, *Environmental economics & policy*, Addison–Wesley, Boston, Massachusetts.

Trailerboat Fisherman 2010, 'On your game', *Trailerboat Fisherman*, viewed 24 March 2011, <[www.marine.com.au/boating/boating-articles/on-your-game/605/](http://www.marine.com.au/boating/boating-articles/on-your-game/605/)>.

Turner, K, Pearce, D, & Bateman, I 1994, *Environmental economics: an elementary introduction*, Harvester Wheatsheaf, Hemel Hempstead, UK.

Ward, FA & Beal, D 2000, *Valuing nature with travel cost models: a manual*, Edward Elgar Publishing Inc, Northampton, Massachusetts.

Ward, FA & Loomis, JB 1986, 'The travel cost demand model as an environmental policy assessment tool: A review of literature', *Western Journal of Agricultural Economics*, vol. 11, pp. 164–178.

Ward, PJ 1996, *Japanese longlining in eastern Australian waters 1962–1990*, Bureau of Resource Sciences, Canberra.

West, L 1990, *A review of existing and potential data systems for recreational fishing for tuna and billfishes—east coast of Australia*, Kewagama Research, Tewantin, Queensland.

Winkelmann, R 2000, 'Seemingly unrelated negative binomial regression', *Oxford Bulletin of Economics and Statistics*, vol. 62, no. 4, pp. 553–560.