

Survey of Recreational Fishing in New South Wales

INTRODUCTION.....	3
METHODS	4
RESULTS.....	4
a) Number of Recreational Fishers	4
b) Recreational Fishing Effort.....	5
c) Recreational Fish Catch	6
d) Expenditure by Recreational Fishers	7
CONCLUSIONS.....	8
BIBLIOGRAPHY.....	8

INTRODUCTION

A twelve month survey of recreational fishing in New South Wales was conducted in 2000-01. The survey was part of a broader national initiative to obtain fisheries statistics on non-commercial components of Australian fisheries. The survey obtained estimates of the level of participation, fishing effort and catch by recreational fishers. The survey also sought information on the economic activity associated with fishing and the attitude of recreational fishers to prominent fisheries issues. These data were required at a national, state and regional level by Australian fishery agencies. The broader national project was planned, developed and supported by Commonwealth and State governments, peak commercial and recreational fishing groups, indigenous and environmental associations. The project was funded by grants from the Fisheries Research and Development Corporation (FRDC), Natural Heritage Trust (NHT), and by State fisheries agencies. A team of scientists from the State fisheries agencies and several external consultants implemented the project as a series of independent State wide surveys under national coordination and management. The national project is currently being finalised and a report will be available early in 2003.

Recreational fishing surveys have been conducted in New South Wales since the late 1950's. Approximately 30 recreational fishing surveys have now been conducted in NSW and they encompass the range of biological, economic and social issues. Reviews of the Australian angling survey literature can be found in McGlennon (1995), West (1998) and McIlgorm and Pepperell (1999). Unfortunately, most surveys are limited in their temporal (once-off) or spatial (single lake or estuary) scale which has reduced their value in resource assessment, resource allocation and management disputes on a State wide basis. Short term surveys have resolved short term management issues, but there is a growing desire to incorporate large-scale, longer term, monitoring programs, such as those in place for commercial fisheries, into the management of recreational fisheries. In recent years, **NSW DPI** has placed increased emphasis on ensuring that fishing activities are environmentally sustainable. This requires the development of fishery management strategies for significant commercial and recreational fisheries. It also requires an assessment of the environmental impacts of those fisheries.

Clearly, **NSW DPI** needs an information base to support the management of commercial and recreational fishing, the protection of aquatic resources and the implementation of its legislation. This is available for the commercial sector where mandatory reporting programs have been in place for decades. However, NSW also has a significant recreational sector where arrangements to collect fishery statistics are not standard practice. The significant number of people involved in recreational fishing has the potential to impact fishery resources. The quantification of the commercial and recreational harvest by species and region is fundamental to the determination of appropriate fishing regulations, sustainable harvesting and good management. Recreational fishing surveys of sound design and implementation are necessary to obtain this information for the recreational sector (Pollock et al, 1994).

METHODS

The survey used remote (telephone and diary) survey methods as the primary source of information from recreational fishers. A clustered stratified random sample of household telephone numbers was drawn from electronic white page directories. Researchers rang each household and conducted an interview with respondents to obtain information on their fishing and boating activities and demographic profile. Each respondent who indicated that a member of the household was likely to go fishing in the coming 12 months was invited to participate in a diary survey. Fishing households were issued with survey kits containing a diary or memory jogger, fish identification booklet and a letter of confirmation from the relevant fishery management agency. Fishing households were contacted each month (whether fishing was anticipated or not) to obtain the details of their fishing activity and expenditure on fishing related items. A number of calibration/ validation (refusals, non-contact, intending non-fisher, on-site creel) surveys were conducted at the end of the diary survey to correct for non-response and other sources of bias. The survey methodology has been described by West (1998), SDWG (2000) and Lyle et al (2002) and a detailed account of the survey methodology will be available in the final national report.

The survey was undertaken at a national level and a project team was established in each Australian State and Territory to implement the survey. In New South Wales, the project team consisted of three NSW DPI staff and 22 telephone interviewers who were sub-contracted for the term of the project. An additional 10 field staff were sub-contracted by NSW DPI to conduct interviews at beaches, boat ramps and other locations frequented by recreational fishers. The comparison of information obtained by the two groups (telephone and face-to-face) was an important component of the validation process. The project was developed over a number of years and included several developmental and testing phases. A feasibility survey was conducted in 1998 to select the most appropriate survey method. A pilot survey was conducted in 1999 to test the method. Staff training for the project began in January 2000, data collection occurred from mid-2000 to the end of 2001. Data entry analysis and reporting occurred in 2002. The project has involved State and Commonwealth fisheries agencies, peak recreational and commercial advisory groups and other interested parties. The total budget for the NSW component of the national survey was approximately \$680,000 which was provided by the funding agencies mentioned above and NSW DPI.

RESULTS

a) Number of Recreational Fishers

NSW had an estimated $998,501 \pm 33,686$ recreational fishers (Figure 1). The proportion of the NSW population that participated in recreational fishing was 17.1%. (Figure 2). Almost 24% of the NSW male population went fishing while about 10% of females fished. The participation rate in NSW country regions was twice as high as the rate observed in the main metropolitan area. The

NSW south coast recorded the highest fishing participation rate (30.1%) while Sydney recorded the lowest (13.1%). However, Sydney had the largest number of recreational fishers (482,739 fishers) by virtue of its population size. Almost half the State's recreational fishers lived in Sydney. The Hunter (131,348 fishers), **Mid-North Coast** (74,441 fishers) and Illawarra (73,686 fishers) followed in importance as recreational fishing communities.

b) Recreational Fishing Effort

Estimates of fishing effort are used to describe the pressure being applied to a resource by fishers and to derive (with catch data) an index of relative abundance of fish. The response of a fishery to variations in fishing effort is the basis of stock assessment and population modeling. Recreational fishing effort may be described in terms of the number of fishers participating in the fishery, the number of fishing events (or trips) undertaken by these fishers and the time (days or hours) spent fishing.

More than 7.7 million recreational fishing events were undertaken in NSW during the survey period. These fishing events were conducted on 6 million days. The estimated time spent recreational fishing in NSW was 30.4 million hours. Interstate patterns in fishing effort indicated that about 1.5 million fishing events were undertaken in NSW by fishers from other states. On-the-other-hand, NSW fishers conducted about 500,000 fishing events in states other than NSW. These data indicate that NSW was a net importer of recreational fishing effort. NSW mainly imported fishing effort from Victoria (about 750,000 events), but exported fishing effort to Queensland (about 400,000 events).

NSW waters were classified into five categories of water body type to describe the distribution of fishing effort. These categories were offshore waters (>5km from the coast), coastal waters (shoreline to 5km), estuarine, freshwater rivers and freshwater lakes/ dams. Offshore waters also coincided with waters managed by the Commonwealth Government for some fisheries. Recreational fishing activity was greatest in estuarine waters (47% of total events). Fishing in coastal waters (28% of events), freshwater rivers (15% of events) and lakes and dams (10% of events) followed in importance. Recreational fishing in offshore waters (1% of events) was a relatively minor recreational activity in NSW. Recreational fishing in saltwater (offshore, coastal and estuarine waters) accounted for 76% of the NSW recreational fishing effort while freshwater fishing (freshwater rivers, lakes and dams) accounted for 24% of the effort.

The survey recorded recreational effort from eighteen different fishing methods. These were further grouped into five main categories for reporting purposes. The grouped categories were line fishing methods, fishing with pots or traps, fishing with nets, diving methods and other hand collecting methods. Line fishing methods (lines, lures, jigs, fly, and setlines) accounted for 90% of the recreational activity in NSW. Bait gathering with pumps, rakes, spades and hand collecting accounted for 4% of the fishing effort. Fishing with pots and traps also accounted for 4% of the fishing effort. Recreational diving with

spears or for hand collecting (1%) accounted for the smallest level of fishing effort in NSW.

NSW recreational fishers used a range of fishing platforms including boats (private, hire and charter), shore (ocean beach and rocks, man-made structures) during the survey year. Fishing from the shore attracted a greater level of activity (59% of events) than fishing from boats (41% of events). Of the boat-based fishing effort, more than 92% of fishing events were conducted from private fishing boats as opposed to 4% from charter vessels and 4% from hire boats.

A common feature of recreational fisheries is the apparent skewed distribution of fishing effort and catch between fishers. At one end of the catch and effort scale, large numbers of fishers do relatively little fishing and catch few fish. At the other end a high proportion of the fishing effort and catch is attributed to relatively few fishers. In NSW, the range of fishing activity varied from 1 day fishing per person per year to 169 days fishing per person per year. The NSW average was 6.9 days fishing per person per year. At the lower end of the effort scale, i.e. fishers who fished for 1-5 days per year, a large number of fishers (50% of fishers) were responsible for a relatively small amount of the fishing effort (less than 20% of the total effort). While at the top of the fishing activity scale, 10% of fishers were responsible for nearly 30% of the fishing effort.

c) Recreational Fish Catch

Recreational fishers in NSW harvested approximately 13 million finfish (e.g. bream, whiting, flathead), 1.3 million baitfish (e.g. pilchards, yellowtail), 500,000 crabs and lobsters, 16 million prawns and yabbies, 1.2 million shellfish (e.g. abalone, pipi, oysters), 160,000 squid and cuttlefish and 300,000 miscellaneous species. About 200 species were reported in recreational catches from NSW. However, it was likely that many of the more obscure species were not correctly identified. The harvest of the key recreational species were reported with some confidence. Flathead (*Platycephalidae*), bream (*Sparidae*), whiting (*Sillaginidae*), European carp (*Cyprinus carpio*), tailor (*Pomatomus saltatrix*) and luderick (*Girella tricuspidata*) were the most prominent species in the NSW recreational catch. Generally, these species were relatively abundant and broadly distributed, particularly in coastal and estuarine waters adjacent to large urban populations.

Most of the key recreational species were harvested from estuarine or coastal waters, however, the current survey provided the first like-for-like comparison of saltwater and freshwater recreational harvests. A number of freshwater species including European carp, redfin, golden perch and trout were prominent in the NSW harvest despite past assumptions regarding the overall prominence of saltwater species in state recreational fisheries. Two species (European carp and redfin) that were harvested in substantial numbers by recreational fishers are considered by **NSW DPI** and many fishers to be pest species.

While the key recreational species tended to be popular fish that were targeted for their edible or sporting qualities, other groups of aquatic animals were also harvested in substantial numbers by recreational fishers. Abalone, squid, prawns, lobsters and crabs were obviously important to recreational fishers considering the number of fishers who nominated these species as their principal target and the size of the harvest. Prawns were harvested in greater numbers than any other recreational species while yabbies and blue swimmer crabs were harvested in larger numbers than most fish species.

Comparisons between the recreational and commercial catches in NSW (table 1) indicated that the fisheries were geographically distinct. Species forming the bulk of the commercial catch were generally taken from coastal or offshore waters, while the major portion of the recreational catch was taken from estuarine waters. Both groups of fishers harvested about 200 species of fish, but the total recreational catch was about 30% of the total commercial catch. About 6 of the prominent species harvested by both fishing groups were taken in greater numbers by recreational fishers. These species were generally common estuarine species taken in metropolitan waters where the number of recreational fishers and their fishing effort was greatest. These results were anticipated and were consistent with the information provided by earlier small-scale studies.

d) Expenditure by Recreational Fishers

The study sought information on the economic activity associated with recreational fishing, i.e. the expenditure of fishers during the course of the fishing. This is not an estimate of the "value" of recreational fishing to the community - that needs to be explored by different techniques. However, economic activity, in this case direct expenditure, is useful information to help understand the importance of fishing to regional economies.

Recreational fishers in NSW spent more than \$550 million on fishing related items during the survey year. NSW recreational fishers reported in excess of 50 different expenditure items related to their fishing activity. These items ranged from the obvious (fishing gear) to the more obtuse (camping gear). In every case, anglers were asked to nominate the proportion (%) of the expense that should be attributed to fishing. The attribution varied from 100% in the case of fishing gear to 1-2% in the case of some obtuse items. However, the correct attribution is an essential step for an accurate estimate of economic activity. Without this step estimates of recreational fishing expenditure will be grossly overstated.

Boat and trailer (\$276 million) was the largest individual expense for NSW anglers. These items accounted for approximately 50% of the expenditure of NSW fishers. Vehicle and other travel costs related to fishing (\$118 million), accommodation on fishing related trips (\$54 million) and fishing gear (\$46 million) followed in importance. More than \$26 million was spent on the charter/ hire of boats and \$12 million on bait/ burley/ ice. This expenditure pattern may reflect the fishing opportunities and characteristics of NSW recreational fisheries. Anglers in NSW are willing to travel to fish and use

boats. The estimated expenditure by NSW recreational fishers equates to an average expenditure of about \$550 per angler per year.

CONCLUSIONS

A significant proportion of the NSW population was polled and a large number of recreational fishers identified. A high proportion of these fishers accepted a diary and participated in the survey for its duration. The Australian Bureau of Statistics confirmed the representative nature of the initial screening and the subsequent diary sample. Recreational fishing catch data were expanded to State estimates of participation and harvest and corrected for potential biases. The resultant recreational fishing database is one of the most comprehensive body of statistics to be collected on the NSW recreational fishing sector. These data will be used to support the management of recreational fishing in NSW.

In line with expectations, the NSW recreational fishery involved a substantial number of people (1 million fishers), using a diverse range of fishing methods to harvest finfish, crustaceans and molluscs from all of the State's regional areas and water body types. More than 200 species of fish were taken, but the top 30 species constituted the bulk of the catch. Recreational fishers harvested a substantial number of fish (approximately 13 million).

While the catch of individual fishers was not large (about 2 fish per event), the recreational sector as a whole has the potential to impact aquatic resources. The recreational catch of several common estuarine species is larger than the commercial catch. However, for most species, the commercial catch is substantially greater than the recreational catch. Recreational fishers spend substantial sums of money in pursuit of their sport and this expenditure is likely to be important to regional economies.

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Table 1. Harvest of NSW recreational fishing catches compared with an estimate of NSW commercial fishery landings (grouped species).

Harvest of key species by fishing sector	Recreational (kg)	Commercial (kg)*
Whiting	394,081	1,181,793
Flathead	886,824	496,335
Bream	728,752	365,383
Garfish	22,672	97,875
Tailor	252,736	190,675
Australian salmon	221,977	790,143
Snapper	116,967	273,159
Trevally	87,530	273,884
Leatherjackets	107,966	117,034
Wrasse/tuskfish/groper	52,373	69,810
Luderick	280,130	503,600
Mackerels	128,627	443,567
Cod (various)	8,133	35,835
Catfish	94,222	28,965
Mulloway/jewfish	273,703	63,796
Morwong	139,929	429,606
Tuna/bonitos	844,480	1,000,500
Sharks/rays	60,186	441,090
Yellowtail kingfish	180,003	137,349
Prawns (saltwater)	104,833	2,346,976
Blue swimmer crab	154,831	165,461
Squid/cuttlefish	65,717	824,183
Mud crab	30,000	135,144
Lobsters	7,398	120,000

Abalone	10,570	304,000
Nippers	15,167	.
Other Saltwater Species	77,633	12,800,300
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European carp	876,661	.
Redfin perch	61,149	.
Golden perch	325,264	.
Trout/salmon	122,235	.
Australian bass/perch	46,575	.
Barramundi	0	.
Murray cod	93,973	.
Crayfish (freshwater)	77,527	.
Grand Total	6,950,824	23,636,463

*data derived from a range of Commonwealth and State sources. Other species data based on a 5 year average of ocean fishery landings into NSW.

Figure 1 Number of Recreational Fishers in NSW

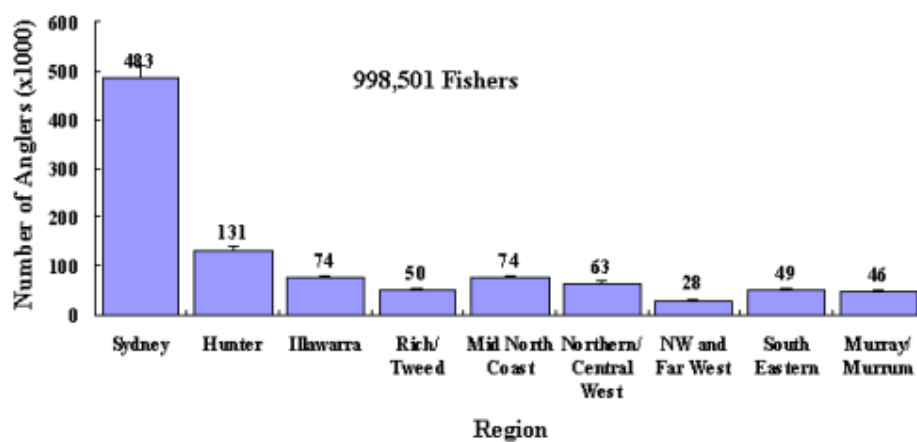


Figure 2 Proportion of the NSW Population that Fishes

