AN ASSESSMENT OF THE IMPACT OF OFFSHORE RECREATIONAL FISHING IN NEW SOUTH WALES WATERS ON THE MANAGEMENT OF COMMERCIAL FISHERIES

Final report to

The Fisheries Research & Development Corporation

Project No: 94/053

November 1996

A. S. Steffe, J. J. Murphy, D. J. Chapman, B. E. Tarlinton,
G. N. G. Gordon and A. Grinberg

FISHERIES
RESEARCH &
DEVELOPMENT
CORPORATION

NSW Fisheries Research Institute
PO Box 21,
Cronulla, NSW, 2230

ISBN 0 7310 9405 0

Non-Technical Summary

Background

Need

Objectives

A Statewide Survey of Recreational Fishing Effort for Trailer Boats, Cruisers and Gameboats and the Recreational Harvest of Trailer Boat Anglers for all Large Access Sites to the Marine Waters of New South Wales

Introduction

Objectives

Methods

General

Quality Control

Survey Preparation Phase

Survey Operation Phase

Data Entry, Checking and Manipulation Phase

Sampling Frames

Spatial Frame

Temporal Frame

Weather Frame

Collecting Fishing Effort and Harvest Data

Estimating the Recreational Fishing Effort of Anglers That Use Trailer Boats, Cruisers and Gameboats, and the Harvest of Trailer Boat Anglers

Harvest Comparisons between the Recreational Trailer Boat Fishery and the Oceanic Commercial Fisheries

Detailed Results

Recreational Fishing Effort

Recreational Harvest

Harvest Comparisons Between Recreational Trailer Boat and Oceanic Commercial Fisheries

Regional Comparisons of Harvest Allocations

Non-Technical Summary

Conflict between the recreational and commercial sectors has long been a fisheries management problem. This conflict has been escalating in recent years as both sectors attempt to maximise catches. Consequently, there is increasing pressure being applied to fisheries managers to make appropriate allocation decisions regarding fishing opportunities for the various commercial and recreational user-groups. Accurate estimates of the magnitude of the recreational catch and fishing effort are required before any equitable allocation of resources among the commercial and recreational sectors can be made. Further, the acceptance of any management strategies by the general public and the various user-groups also requires that the calculations that underpin allocation decisions can be demonstrated to be sound and justified.

We have combined on-site surveys at large access sites with data obtained from a recreational boat movement logbook study to estimate the number of daytime recreational trailer boat fishing trips, and the number of daytime recreational cruiser and gameboat fishing trips, for all large sites that provide access for these types of boats to the marine waters of NSW. This same combination of on-site methods has also been used to estimate the day-time harvest of recreational trailer boat anglers, for all large sites that provide trailer boat access to the marine waters of NSW. We estimated that in excess of 217,500 trailer boat trips were made from large access sites throughout the state during the first survey year (September 1993 to August 1994 inclusive) and more than 214,800 trips occurred during the second survey year (September 1994 to August 1995 inclusive). We estimated that in excess of 24,500 cruiser and gameboat trips were made from large access sites throughout the state during the first survey year (September 1993 to August 1994 inclusive) and more than 25,000 trips occurred during the second survey year (September 1994 to August 1995 inclusive).

We also conducted over 10,600 interviews with trailer boat angling parties during the two year period of the survey and found the retained catch of this marine recreational fishery to be extremely diverse. We recorded 210 taxa in the harvest statewide. Despite this diverse harvest, relatively few species accounted for the bulk of the

recreational harvest, by weight and by number of fish. The top ten species always accounted for more than 68% by number, and 59% by weight, of the recreational trailer boat harvest. This pattern of harvesting was consistent among regions and between survey years. The main species, by weight, during the first survey year were eastern blue-spotted flathead (229.3 tonnes), snapper (184.2 tonnes), silver trevally (103.5 tonnes), blue morwong (90.9 tonnes), yellowfin tuna (73.1 tonnes), skipjack tuna (56.8 tonnes), kingfish (53.0 tonnes), silver sweep (47.5 tonnes), slimy mackerel (40.1 tonnes), and albacore (38.7 tonnes). The main species, by weight, during the second survey year were eastern blue-spotted flathead (207.5 tonnes), snapper (187.6 tonnes), silver trevally (112.3 tonnes), yellowfin tuna (59.1 tonnes), blue morwong (54.9 tonnes), silver sweep (43.2 tonnes), skipjack tuna (39.0 tonnes), kingfish (35.8 tonnes), albacore (35.1 tonnes), and sergeant baker (32.0 tonnes). Overall, recreational trailer boat harvests in excess of one tonne statewide were recorded for 55 taxa during the first survey year, and 54 taxa during the second survey year. Latitudinal differences in recreational harvest were evident for some species. For example, during both survey years the harvest of snapper was greatest in the northern region, intermediate in the central region and lowest in the southern region of the state.

We compared the estimates of daytime recreational harvest taken by trailer boat anglers in coastal waters to the declared commercial landings taken from NSW coastal waters. The recreational harvest was greater, or about the same as, the commercial catch for some species, such as eastern blue-spotted flathead, dolphin fish, cobia, blackspot pigfish, maori wrasse, dusky flathead and red scorpioncod. Conversely, the commercial catch was greater than the recreational daytime harvest for many other species such as snapper, mulloway, john dory, kingfish, blue morwong, nannygai , red gurnard, and silver trevally. We have documented great latitudinal changes in the harvesting patterns of many important species by both the recreational and commercial fisheries, which results in regional changes of harvest allocation between the sectors for these species. Examples include eastern blue-spotted flathead, snapper, tiger flathead, and silver trevally.

We estimated that more than 11,100 and 10,900 daytime charter boat trips occurred statewide during the first and second survey years respectively. We estimated that 3,085 charter boat trips were made from the Sydney area during the first survey year and that a further 2,555 trips occurred during the second survey year. A successful charter boat logbook was designed to allow the easy recording of effort and catch on an individual trip basis. This logbook was tested in the Sydney area during the second survey year. A total of 72 taxa were recorded from the retained catch of Sydney charter boat anglers during this period. The Sydney charter boat fishery was characterised by a great diversity of taxa but relatively few species accounted for the bulk of the recreational harvest, by weight and by number of fish. The top ten ranked species, by weight, blue morwong (19.9 tonnes), yellowfin tuna (14.8 tonnes), silver trevally (8.6 tonnes), striped marlin (7.5 tonnes), kingfish (7.4 tonnes), blue marlin (7.2 tonnes), tiger flathead (5.4 tonnes), silver sweep (4.4 tonnes), nannygai (4.2 tonnes), and blue-eye trevalla (3.3 tonnes) accounted for over 83% of the harvest taken by anglers from charter boats in the Sydney area. Overall, harvests in excess of one tonne were recorded for 16 taxa during the year that the logbook was tested.

There was little overlap between the trailer boat and charter boat fisheries. However, the charter boat fishery did target heavily on some SEF quota species such as tiger flathead, nannygai, silver trevally and blue-eye trevalla. There is potential for future conflict between the commercial deepwater dropline fishers and the charter boat fleet because of the increasing recreational effort directed at deepwater species such as blue-eye trevalla. The lack of formal registration in the charter boat industry will make it difficult to monitor the future activities of charter boats. It is recommended that a register of charter boats be established and that a mandatory reporting system to record catch and effort data be considered for this industry.

It is important to note that the estimates of recreational harvest we have presented are underestimates of the total recreational harvest. Our estimates do not consider night-time angling, the harvests of anglers that use large cruisers and gameboats, the harvests of the charter fleets outside Sydney, or the harvests of trailer boat anglers that use medium and small sites to provide them with access to the coastal waters off

NSW. Even so, the estimates of recreational harvest we have obtained are substantial and for many shared species represent a significant portion of the total catch (recreational and commercial combined). It is now clear that the recreational angling sector, as a collective group, does harvest significant quantities of many species from the coastal waters off NSW.

The recreational sector like its commercial counterpart, is a user-group with the potential to impact on many shared fisheries resources. Consequently, the recreational sector should be given more consideration and input into management plans that affect shared fisheries resources. Also, it is imperative that the recreational sector be considered when determining the size of annual quotas for many SEF species. Future recreational research programs that monitor effort and harvest are necessary to improve fisheries management. These programs will contribute to our understanding of sustainable limits of harvest for our coastal fisheries resources.

Background

The task of assessing whether recreational fishing has an impact on fish stocks is enormously difficult because there are several large user-groups within the recreational sector (Fig. 1). Each of these user-groups requires separate consideration to assess its potential impact on fish stocks. The many hundreds of access sites for boats and the unrestricted access for shore-based anglers to most of the NSW coastline create logistical difficulties for conducting field-based surveys over large geographical scales. Initially, NSW Fisheries were to sub-contract the survey work to consultants, however, after extensive discussions, none were prepared to accept our design constraints. Thus, we have had to determine the specific survey methods required for this study, and also had to solve the logistical difficulties of recruiting, organising and supervising field staff at many sites throughout the state.

This study focuses on estimating the size of the recreational harvest taken by boat-based anglers in the marine waters off the NSW coast. We have identified three distinct boat categories (trailer boats, cruisers and gameboats, and charter boats) and have briefly described the main factors that influence the harvesting success of recreational anglers that use these types of vessels (Table 1). These factors are also indicative of the potential impacts that anglers using different types of boats can have on fisheries resources (Table 1). We investigated the feasibility of estimating the recreational harvest and effort, on a statewide scale, for each of these boat categories. This was done by way of pilot studies. On the basis of the pilot study findings we restricted the scope of this work to only include:

(1) A statewide assessment of the number of recreational fishing trips for different boat categories, such as trailer boats, cruisers and gameboats, and charter boats at large access sites. This survey spanned two years.

(2) A statewide assessment of the daytime recreational fishing effort, harvest and harvest rates of anglers using trailer boats at large access sites. This survey spanned two years.

(3) An assessment of the recreational harvest, fishing effort and harvest rates of anglers using charter boats in the Sydney area. This survey spanned one year.

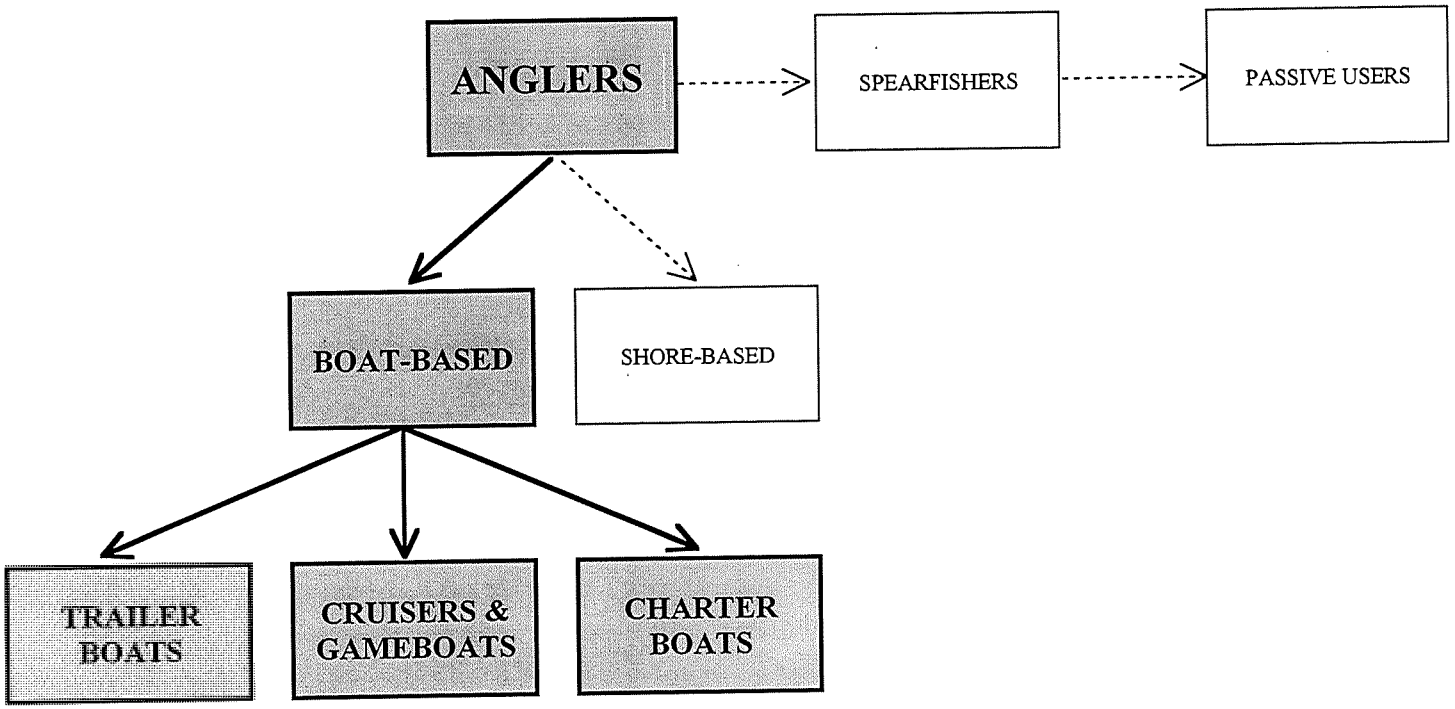


Figure 1. User-groups within the recreational sector. The shaded boxes show the boat-based angling components that were studied during the project.

Table 1. A description of important factors that can affect the harvesting success of anglers that use trailer boats, cruisers and gameboats, and charter boats.

	TRAILER BOATS	CRUISERS AND GAMEBOATS	CHARTER BOATS
ACCESS POINTS TO FISHERY	**MULTIPLE** - mainly ramps beaches, moorings, private jetties, marinas	**MULTIPLE** - marinas, moorings, private jetties, sometimes ramps	**MORE RESTRICTED** - marinas & large wharves
FISHING RANGE	**MODERATE** - most within 5km of shoreline	**LARGE** - most within 20km of shoreline	**LARGE** - most within 20km of shoreline
PREVIOUS EXPERIENCE & KNOWLEDGE OF SKIPPER & CREW	**IMPORTANT** - very variable	**IMPORTANT** - moderately variable	**IMPORTANT** - maximises success of clients
USE OF SOUNDERS & GLOBAL POSITIONING SYSTEMS TO ENHANCE CATCH RATES	**IMPORTANT** - variable use	**IMPORTANT** - widespread use	**IMPORTANT** - widespread use

We found it was impractical to conduct a marina-based survey to estimate the harvest of recreational anglers that fished from cruisers and gameboats. Firstly, many marina operators would not co-operate and allow our staff access to the marina even though they had originally agreed to support the project. Secondly, the pilot study, done at a limited number of marinas, found that a large number of boat movements occurred but very few were offshore recreational fishing trips. This resulted in a low number of successful interviews and was proven to be an inefficient use of limited resources. We advised the FRDC board and received approval to discontinue this component of the project.

This project was submitted initially to the Fisheries Research and Development Corporation (FRDC) as a two year program (Project No. 92/80) and was 1 of 2 projects designed to determine the inter-relationships among the commercial fisheries of South Eastern Australia (by-catch project), and between the commercial and recreational fisheries exploiting a common resource (this project). The original application was not funded by FRDC, however the Corporation did make representations to the Australian Fisheries Management Authority (AFMA) in support of AFMA funding. AFMA agreed to support the project and provided funding for 1993/94. Unfortunately, AFMA withdrew funding for this project in 1994/95 as a consequence of a Commonwealth Government decision to reduce FRRF funding. The continuation and completion of this project was funded by NSW Fisheries and by FRDC (Project No. 94/053) .

Need

Conflict between the recreational and commercial sectors of the fishing industry will continue to escalate in coming years as both sectors attempt to maximise catches. Consequently, there is increasing pressure being applied to fisheries managers to make equitable allocation decisions when dividing the resource among the various user-groups, particularly among the various commercial fisheries and the large amateur angling groups.

Prior to this survey work, there were no reliable estimates available of the size of the recreational harvest for any offshore fish species, even those keenly sought by both the commercial and recreational sectors, e.g. snapper, mulloway, teraglin, silver trevally, blue and jackass morwongs, nannygai, tiger and sand flathead, kingfish, tunas and baitfish such as slimy mackerel and yellowtail. Similarly, there were no estimates of the amount of recreational fishing effort being directed at offshore species. Without these estimates of recreational harvest and effort it was impossible to make equitable allocation decisions for any of the large user-groups.

It is clear that we needed precise estimates of the size of the recreational harvest and the amount of recreational fishing effort before any equitable allocation of resources among the commercial and recreational sectors could be made. Further, the acceptance of these types of management strategies by the general public and among the various user-groups also requires the collection of precise and accurate recreational harvest and effort data so that the calculations that underpin allocation decisions can be demonstrated and justified.

At the start of this project, the limited anecdotal and scientific information available on offshore recreational fishing indicated that the size of the recreational harvest of many popular fish species was large. Preliminary data from our initial pilot studies had also confirmed the contention that the harvest of the recreational sector was large, particularly for snapper and various flathead species. However, too few data were available to allow defensible estimates to be made of the relative size of the recreational harvest for any offshore fish species, including South East Fishery (SEF)

quota species such as orange roughy, gemfish, blue grenadier, ocean perch, school whiting, pink ling, mirror dory, blue eye trevalla and warehou.

Our discussions with recreational angling clubs had indicated that the amount of offshore recreational fishing effort has steadily increased over the past ten years. Should recreational fishing effort continue to increase over time it is likely that the future harvests of offshore fish species by the recreational sector may also increase greatly. This trend may lead to further conflict between recreational and commercial user-groups.

Management of offshore commercial fisheries is further complicated because many species are abundant in both State and Commonwealth waters. For example, many important SEF quota species such as nannygai, tiger flathead and jackass morwong migrate between inshore coastal areas (State managed) which provide nursery grounds and deeper offshore areas (Commonwealth managed) which are used by the greater part of the spawning biomass. Thus, it was clear that estimates of the recreational fishing effort and harvest in NSW waters were also urgently needed for better management of the SEF fishery. Prior to the start of this project, the absence of accurate and precise recreational harvest and effort data made it difficult to set defensible Total Allowable Catches for any offshore fish species or to equitably allocate shares of the resources among the various commercial and recreational user-groups.

Objectives

1. On a statewide scale, we will estimate the total fishing effort, harvest, and harvest rates of recreational anglers that fish in the offshore waters of NSW.

2. On a statewide scale, we will relate the estimates of total harvest obtained the recreational fishing population to the allocation of resources between recreational and commercial users.

A Statewide Survey of Recreational Fishing Effort for Trailer Boats, Cruisers and Gameboats and the Recreational Harvest of Trailer Boat Anglers for all Large Access Sites to the Marine Waters of New South Wales

Introduction

Recreational fishing is one of the most popular leisure activities in Australia. A national survey of participation in recreational fishing, completed in 1984, reported that an estimated 4.5 million people had fished recreationally at least once during the previous year and that these anglers had made collectively about 48 million fishing trips in that year (PA Management Consultants 1984). These survey figures confirmed the large size of the recreational fishing sector within Australia and suggested that amateur angling has the potential to have a considerable impact on fisheries resources.

This study focuses mainly on quantifying the amount of recreational fishing effort and the size of the harvest taken by trailer boat anglers in the marine waters of NSW. In addition, we provide estimates of the recreational fishing effort of anglers that use cruisers and gameboats in the marine waters of NSW. The many hundreds of access sites for boats along the coast of NSW make this large-scale survey work logistically difficult. We have used field based survey methods to sample the recreational fishing effort and harvest.

The recreational trailer boat fleet that operates in the marine waters off the NSW coastline contains a variety of small boats, usually ranging from 4-7 meters in length. The recreational anglers that use trailer boats to access the marine fishery are involved in a great variety of fishing activities. Trailer boat anglers participate in all types of recreational fishing, ranging from fishing for prized food species (e.g. snapper, flathead, mulloway) to actively searching the shelf waters for large gamefish (e.g. marlins and tunas). When planning this study we had little information about the size of this multi-species recreational fishery. The available anecdotal evidence suggested that the size of the recreational harvest made by trailer boat anglers in marine waters

was large. However, the impact of the recreational sector on the resource was unknown.

The specific study objectives that are outlined below are consistent with the overall objectives of this project.

Objectives

1. On a statewide scale, estimate the total daytime fishing effort, daytime harvest, and daytime harvest rates of recreational trailer boat anglers, for all large sites that provide trailer boat access to the marine waters of NSW.

2. On a statewide scale, estimate the total daytime fishing effort of recreational anglers that use cruisers and gameboats, for all large sites that provide these boats access to the marine waters of NSW.

3. On a statewide scale, relate the estimates of total daytime harvest taken by the recreational trailer boat fishing population to the allocation of resources between commercial and recreational users.

Methods

General

Accurate and precise information which describes and quantifies the activities and harvests of recreational anglers is needed to understand changing trends in the recreational harvest over time. The on-site survey methods (surveys conducted at the fishing sites) that we selected to collect this valuable recreational fishing data are well proven for their scientific rigour, but are relatively more expensive per sample unit than off-site surveys (surveys conducted away from fishing sites). On-site methods are still preferred to off-site methods because they allow more information to be verified by trained field staff (Pollock et al. 1994). On-site surveys do not depend on self-reported data and the information that is collected on-site suffers less from the vagaries of the anglers' memory, knowledge, and truthfulness (Pollock et al. 1994). In comparison, off-site methods such as phone surveys and diary surveys, which may be

relatively cheaper per sample unit, are much more biased than on-site methods because they are subject to higher levels of serious response errors (e.g., recall bias, prestige bias, rounding bias, intentional deception, question misinterpretation, species misidentification, and incorrect measurements of fish lengths and weights). Non-response errors are also higher in off-site surveys (Pollock et al. 1994). Clearly, accurate and unbiased statistics for the diverse multi-species recreational fisheries found in the marine waters of NSW are best collected by on-site survey methods. We have combined on-site surveys at large access sites with data obtained from a recreational boat movement logbook study to estimate the number of daytime recreational trailer boat fishing trips, and the number of daytime recreational cruiser and gameboat fishing trips, for all large sites that provide access for these types of boats to the marine waters of NSW. This same combination of on-site methods has also been used to estimate the day-time harvest of recreational trailer boat anglers, for all large sites that provide trailer boat access to the marine waters of NSW.

We follow the terminology of Pollock et al. (1994) to describe the survey designs and analytical methods used to calculate harvest rates, and the expansions of total fishing effort and total harvest that were done to obtain seasonal and annual estimates. Catch is by strict definition the number or weight of fish caught (kept and released), whilst harvest is that part of the catch that is retained, usually measured as the number or weight of fish kept.

Quality Control

We have incorporated important quality control procedures into all phases of the survey. A survey can be useless if the data collected are of poor quality (Pollock et al. 1994). A brief description of the quality control procedures that were implemented during this survey are provided below.

Survey Preparation Phase

Design and pre-testing of survey sheets and procedures

The pilot studies we did were extremely useful for testing and improving the format of the data collection sheets. A standardised interview procedure that was used by all staff during the main survey was developed during the pilot study period.

Field identification kit for fish

We developed a detailed field identification kit for fish during the pilot study period. This identification kit was used to standardise the level of taxonomic precision among workers at different sites. In this way, we were certain that any differences among sites that we detected were real and not just a reflection of the different fish identification skills between individuals working at the different sites. The use of the fish identification kit also facilitated the conduct of interviews and as such was an important part of the interview procedure.

Recruitment and training of field staff

We screened all field staff by means of a rigorous interview to ensure they had good communication, clerical and fish identification skills. All field staff were given explanations of the aims and importance of the study, instructions on standard interview procedures and on the use of the fish identification kit. Testing for correct interview techniques and data recording was done by conducting simulated interviews which contained a complex range of hypothetical situations likely to be encountered in the field. A practical interview component was also included in the training. Field staff were taken to their designated work station (local ramp) during a weekend day and were continually assessed and instructed throughout the day whilst they interviewed anglers.

Press releases

Prior to the start of the main survey we issued a press release to the local media at each of the selected survey sites throughout the State. The press release announced the imminent start of the survey and stated the objectives of the study. This press release was important because it allayed the unfounded suspicions of many anglers and began

the process of building a good working relationship between the field staff and the general angling community.

Survey Operation Phase

Supervision of field staff

Random checks of field staff were carried out during the survey period. We found that this was a cost-effective way of maintaining discipline and thus ensuring data quality. The problems of supervising field staff throughout the State from our Sydney base were minimised by maintaining regular contact with them by telephone.

Preliminary scrutiny of data sheets

We organised a regular fortnightly mailing of photocopied data sheets from all survey sites throughout the State. Preliminary checks of the data sheets were made as they were received and we identified unusual data such as very large catches, fish having very small or very large sizes, the occurrence of uncommon species. The field staff were then contacted and asked to confirm or explain these unusual data. We also obtained detailed explanations of many important comments that had been recorded on the data sheets by the field staff.

Maintaining the co-operation of anglers

We maintained the interest of anglers by providing them with quarterly updates which described the seasonal catch composition and the relative numbers of each species recorded during survey days at their specific location. This simple measure generated a great deal of rapport between the anglers and the field staff and served greatly to maximise the co-operation of anglers and minimise the effects of survey fatigue.

Data Entry, Checking and Manipulation Phase

Data entry and data checking procedures

We used a "double entry" system to check for errors in the data entry process. All errors detected during the double entry process were corrected. Random checks of data subsets were then carried out to validate the effectiveness of the double entry

system. Prior to any analyses the data were subjected to a range of data outlier checks to investigate any unusual data and detect errors which had been missed during our preliminary data checks.

Data manipulation procedures

We edited the raw data and calculated new variables such as the harvest per unit effort (derived from combining harvest and effort variables) and the estimated weights of fishes (derived from length/weight keys - Appendix 2). These new variables would be used to make expansions of total harvest for the recreational trailer boat fishery. We verified the correctness of the computations used to derive these new variables by undertaking random checks on some subsets of these data.

Sampling Frames

In this section we explain the choice of the Spatial and Temporal sampling frames for the statewide survey, the levels of stratification within these frames, and how we dealt with the complex issue of post-stratifying survey days according to weather. Thus, this survey work is based on the principles of stratified random sampling. Pollock et al. (1994) have summarised the advantages of stratification as:

(a) Stratification improves the overall precision of population estimates. An increase in precision (i.e. a reduction in variance) will occur when a relatively heterogeneous population is divided into non-overlapping strata of known size, that are relatively more homogeneous than the whole population.

(b) Stratification makes the administration of the survey work easier because strata can be used to partition large, difficult to sample frames into multiple, smaller units that can each be sampled more easily.

(c) Stratification provides greater information yield. The creation of strata allows us to calculate population estimates for each separate stratum level, thereby providing important information at a smaller scale, as well as providing the overall estimates of population parameters for the entire population by combining the separate stratum totals and their associated variances.

Spatial Frame

The spatial frame of this survey included all large sites from which recreational anglers can access the marine waters along the NSW coast. An access site is defined as any site which provides direct access to the recreational fishery in the marine waters off the NSW coast. Direct access to the coastal fishery can be obtained from access sites such as harbours, ports, bays, rivers/estuarine systems which usually contain multiple access points within them. For example, the Broken Bay access site has 33 boat ramps, many marinas and a multitude of private moorings and jetties. An angling party may use any of these many access points within the Broken Bay system as the origin of their angling trip, but they must pass through the mouth of Broken Bay to directly access the coastal fishery. Also, there are some access sites that consist of a single access point which allows the launching and retrieval of trailer boats directly into and out of the ocean. These types of access sites can be boat ramps on a headland or recognised launching areas across an ocean beach.

We compiled a list of all sites within NSW which could provide access for trailer boats, cruisers and gameboats to the marine waters along the NSW coast (Appendix 1). We then classified all of these access sites for offshore fishing along the NSW coast into three categories (i.e. Large, Medium, Small) according to their relative usage rates by recreational anglers, which were assessed by combining information collected from many sources, such as fishing clubs, fisheries inspectors, local shopkeepers, personal inspections of access sites, fishing magazines and published boat ramp guides (Appendix 1).

It was necessary to restrict the scope of the survey because of limited resources. This meant that we sampled trailer boat harvest only at large access sites. Consequently, all the regional expansions of fishing effort and harvest are made for large access sites only, and do not include any consideration of the effort and harvest made from small and medium size access sites within NSW. Separate lists which classified access sites into size categories on the basis of relative usage patterns were made for trailer boats and for cruisers and gameboats (Appendix 1). The size category classifications given to access sites for these two boat type categories was different (Appendix 1).

Regional stratification

Regional strata were created because it was expected that there would be strong latitudinal differences in the relative abundances and catchability of fish species among sites. The commercial catch statistics held by NSW Fisheries showed that the relative sizes of landed catches for many species varies latitudinally and that these trends were consistent among years. A similar conclusion was also reached when examining the available limited data from the recreational sector.

We used bio-physical boundaries generated by the effects of the East Australian Current (EAC), where possible, as the basis of the regional divisions of the coast (Fig. 2). The EAC is the dominant oceanographic feature affecting circulation along the NSW coast. This current originates in the Coral Sea and carries a mixture of tropical and subtropical waters southwards into the more temperate waters along the NSW coast. The EAC has a large effect on sea temperatures along the coast and thus has a great influence on the distribution and catchability of fishes along the coast. Ortiz and Burchmore (1992) identified three distinct bio-physical regions along the NSW coast which were strongly correlated to the prevailing coastal circulation patterns created by the EAC. The regional boundaries we have selected greatly reflect their findings. The northernmost region, which we term the North Coast region, extends from the New South Wales/Queensland border (28°10′S) to Sugarloaf Point (32°26′S). This northern boundary is identical to the boundary identified by Ortiz and Burchmore (1992). The middle region, which we term the Central Coast region, extends southwards from Sugarloaf Point to an area just north of the mouth of the Shoalhaven River (34°50′S). The southernmost region, which we term the South Coast region, includes the mouth of the Shoalhaven River and extends southwards to Cape Howe at the New South Wales/Victoria border (37°30′S). The boundary between the Central and Southern regions has been conveniently defined at a position some 25 km further north than the bio-physical boundary identified by Ortiz and Burchmore (1992). This convenient boundary allows us to group the recreational anglers originating from Jervis Bay, Currarong and the Shoalhaven River within the same region. This grouping of access

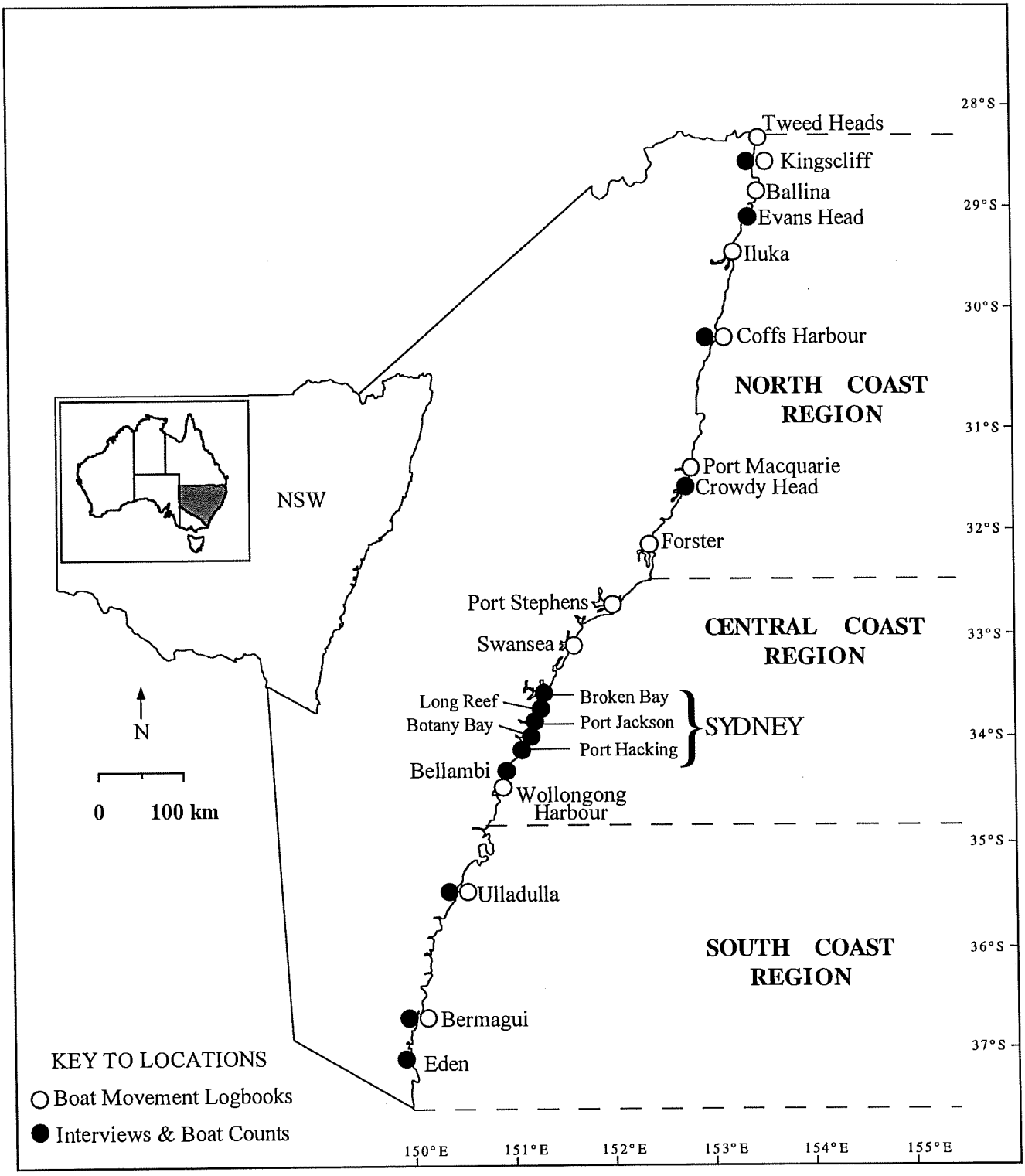


Figure 2. Access sites at which recreational fisheries data were collected during this study.

sites within the South Coast region is logical because most of these anglers use the same fishing grounds (e.g. The Banks) even though they have different ports of origin.

Survey sites within regions

We surveyed recreational anglers at four access sites within the North Coast region. The survey sites were Kingscliff, Evans Head, Coffs Harbour, and Crowdy Head (Fig. 2). Six access sites were surveyed within the Central Coast region. The survey sites were Bellambi (near Wollongong), and the remaining access sites, Broken Bay, Long Reef, Port Jackson, Botany Bay, and Port Hacking were all within the Sydney metropolitan area (Fig. 2). Three access sites were surveyed within the South Coast region. The survey sites were Ulladulla, Bermagui and Eden (Fig. 2). The spread of sites throughout the state provides a good latitudinal range whilst providing coverage of the large Sydney metropolitan recreational fishery and holiday locations within the North and South Coast regions.

Temporal Frame

The temporal frame of this survey spanned a two year period, commencing in September 1993 and concluding at the end of August 1995. Previous angler surveys had shown that fishing effort and harvest varied greatly among years, seasons and day-types (Henry 1984, West and Gordon 1994). Thus, we stratified the two year temporal frame by survey years (Survey Year 1 - September 1993 to August 1994 inclusive; and Survey Year 2 - September 1994 to August 1995 inclusive), seasons within survey years (Spring, Summer, Autumn and Winter), and day-types within seasons (Weekdays and Weekend days). Public holidays were classified as weekend days. Days were regarded as the primary sampling unit for all stratum levels.

By definition, a survey day started at 09:00 hours and ended 15 minutes after sunset. We chose to restrict the coverage within a 24 hour day to this daylight period because data from a pilot study done at the Bellambi ramp (Wollongong) during January, February and March 1993 showed that only 7.5% of fishing trips were completed during the night (20:00 to 06:00 hours) and that only 3.3% of fishing trips were

completed between 06:00 and 09:00 hours. Thus, it was not cost-effective to survey at night nor was it cost-effective to survey in the morning before 09:00 hours. It is important to note that most fishing trips beginning at dawn when harvest rates are believed to be relatively high were completed after 09:00 hours and were included in our survey estimates. Also, this definition of the survey day unit allows any variance associated with changes in the length of the survey days, due to seasonal changes in daylength and the occurrence of daylight saving (Eastern Summer Time), to be incorporated into the seasonal estimates of effort and harvest.

We chose to spread the sampling effort among sites throughout the state, rather than sample more days at fewer sites, because the main aim of this study was to get statewide estimates of recreational effort and harvest for trailer boat anglers. At each selected access site, we collected survey data which quantified the recreational effort and harvest of trailer boat anglers on six replicate survey days per day-type stratum within each season. Data from a pilot study conducted at the Bellambi ramp (Wollongong) during January, February and March 1993 showed that this level of replication at each site was adequate for estimating the harvests of the main species taken by recreational anglers. This level of daily replication provided a sample of 24 weekend days and 24 weekdays for each survey year at each site. This represents annual sampling fractions of about 21% for the weekend day-type stratum and about 10% for the weekday stratum.

Weather Frame

The initial weather frame of this survey included all days when good weather was predicted, regardless of actual weather. The initial weather frame was restricted in this way because we did not want to use our limited resources to disproportionately sample days which coincided with bad weather. This could happen by chance, during seasons such as winter when prolonged periods of bad weather can occur.

A decision was taken to postpone sampling when bad weather was predicted before 06.00 hours on the morning of the intended sampling day. We used the current

regional weather predictions for coastal waters that were issued by the Australian Bureau of Meteorology to classify "Good - predicted" and "Bad - predicted" weather for each survey site. The criteria for "Bad - predicted" weather were a current (at 06.00 hours), strong wind or gale warning (expected wind strength >25 knots - about 12.9 m sec^{-1}) and/or a predicted sea swell greater or equal to three meters. Survey days were initially selected at random within each stratum. Field staff used current weather predictions issued by the Bureau of Meteorology on the morning of rostered survey days (available on a recorded telephone service) to decide whether the survey work should be postponed to another day or if sampling should proceed as scheduled. All postponed survey days were simply re-allocated within the same day-type within season stratum by using a second randomised survey roster.

This re-allocation procedure was intended to give better precision and accuracy for expanded estimates of harvest and effort made during the "Good - predicted" weather days when it was expected that most people would go fishing and the bulk of the harvest would be taken. A conservative approach which excluded "Bad - predicted" weather days from the sampling frame and treated them as zero harvest and effort days was initially proposed. We believed this re-allocation procedure would be an acceptable compromise between increasing the accuracy and precision of harvest and effort estimates for those good weather periods during which most of the coastal fishing occurs, but at the cost of not estimating the harvest and effort that occurred on bad weather days, thereby creating a small underestimate in the expansions of total harvest and effort.

We encountered a problem when using current weather forecasts to decide if sampling should proceed or be postponed. We found there was little concordance between predicted weather and actual weather. The predictions that were routinely issued by the Australian Bureau of Meteorology tended to be cautious and conservative. That is, there were many occasions when strong wind warnings were issued but bad weather did not occur on that day. Instead, the front bringing the expected bad weather arrived later than suggested by the Bureau. Also, on some occasions the weather predictions issued by the Bureau were plainly wrong. The Bureau had predicted good weather but

appalling weather conditions had prevailed. The result of this relatively low correlation between predicted and actual weather meant that we were often forced to postpone sampling even though conditions for coastal angling were good. Also, we often worked when good weather was predicted but bad weather conditions had made coastal fishing very dangerous, thereby deterring all anglers on the day.

We solved this problem by using a post-stratification technique to construct three weather strata by combining weather predictions and actual recorded weather. We had already classified each day of the survey period, for each survey site, as either "Good - predicted" or "Bad - predicted" fishing days by using daily weather predictions issued prior to 06.00 hours (Eastern Standard Time - EST) by the Australian Bureau of Meteorology. You will recall that the criteria for "Bad - predicted" weather days were: a current (at 06.00 hours - EST) strong wind or gale warning (expected wind strength >25 knots - about 12.9 m sec^{-1}), and/or a predicted sea swell greater or equal to three meters. Thus, all other days not meeting these "Bad - predicted" criteria were classified as "Good - predicted" fishing days. We obtained actual weather observations for all coastal weather stations along the coast of NSW from the Bureau of Meteorology. A subset of these weather data were used in conjunction with a subset of fishing effort data taken from an auxiliary dataset (the boat movement logbook data) to investigate the weather conditions that were correlated with low fishing effort.

As a result of this preliminary examination of a small part of these entire datasets we set new criteria, somewhat subjectively, to define "Good - actual" fishing days and "Bad - actual" fishing days. The criteria for "Bad - actual" fishing days were: a gale warning (expected wind strength > 34 knots - about 17.5 m sec^{-1}), and/or a recorded wind speed greater than 7.0 m sec^{-1} (about 13.6 knots) at 08:00 hours (EST), and/or a recorded sea swell greater than 3 meters. Thus, all other days not meeting these "Bad - actual" weather criteria were classified as "Good - actual" fishing days. The inclusion of the gale warning prediction to help define "Bad - actual" weather days was useful because we had found a strong correlation between gale warnings and extremely low levels of coastal fishing effort.

This post-stratification procedure enabled us to classify every single day of the two year survey period, for each large access site, into one of the following three weather strata: (1) "Good - predicted" weather days coupled with both "Good - actual" and "Bad - actual" weather days; (2) "Bad - predicted" weather days coupled with "Good - actual" weather days; and (3) "Bad - predicted" weather days coupled with "Bad - actual" weather days. The first stratum which included all "Good - predicted" weather days coupled with both "Good - actual" and "Bad - actual" weather days, is equivalent to the initial weather frame of this survey.

This post-stratification procedure can be improved by using a more sophisticated data modelling approach to investigate the relationship between recreational fishing effort and weather variables. Detailed modelling of effort counts and weather data would allow better definitions of "Good - actual" and "Bad - actual" fishing days. This approach would also be valuable for predicting site specific and regional patterns in recreational fishing effort by using recorded weather data. It is clear that more work is needed to refine this post-stratification procedure.

Collecting Fishing Effort and Harvest Data

Two independent datasets were collected and used to estimate recreational fishing effort and harvest. These datasets were: (1) boat count and angler interview data taken by field staff during survey days at each survey site; and (2) daily boat movement logbook data collected by members of many volunteer sea-rescue bases throughout NSW. The first dataset provided information about fishing effort, harvest and harvest rates. The second dataset only provided information about fishing effort. Each of these datasets has different biases and imprecisions and both were used to obtain regional and statewide estimates of recreational harvest for trailer boat anglers.

Boat counts and interviews conducted by field staff

All boat counts were done to coincide with angler interviews at boat ramps. At each site, we interviewed anglers at the boat ramp which had the most offshore recreational fishing traffic. This was done to maximise the number of interviews obtained and thus

achieve a better coverage of harvest at each survey site on the rostered sampling days. We have assumed that the harvests and harvest rates of anglers using the main ramp were not different to those of anglers that had used other access points within the survey site. Although we did not test this assumption, we have no reason to expect that anglers that had used other minor access points within the survey site would have behaved differently to their angling colleagues that had used the main ramp. Most anglers going to sea from the same access site would tend to frequent the same coastal fishing grounds and also target the same species, regardless of which access point within that site had been used to enter and leave the fishery.

All recreational fishing boats were recorded as they returned from sea and classified according to their boat type category (see Fig. 1) during each rostered survey day. These boat counts were easily collected at some sites that have only one access point, such as Bellambi, Kingscliff, and Crowdy Heads, because field staff could observe all boating traffic whilst obtaining angler interviews. Similarly, boat counts could be made easily at some sites with multiple access points, such as Bermagui and Ulladulla, because all boating traffic had to either use the main boat ramp at which field staff were collecting angler interviews or pass within sight of that ramp to return to other access points further upstream.

The Sydney metropolitan sites were the most difficult access sites at which recreational fishing effort was monitored. Each of the four large access sites within Sydney (Broken Bay, Port Jackson, Botany Bay, and Port Hacking) have large numbers of boat ramps, marinas, private moorings and jetties which can be used by recreational anglers to access the coastal fishery. Accurate counts of recreational fishing boats were made at each of these four large access sites in the Sydney area by placing observers on a headland vantage point overlooking the mouth of each access site. All recreational boating traffic returning from sea was classified according to boat type category (see Fig. 1) and these boat counts were done to coincide with angler interviews at boat ramps.

Daily boat movement logbooks

The members of many volunteer sea-rescue bases throughout the state agreed to assist us, when possible, by keeping logbook records which quantified the movements of recreational fishing boats. The aim of this logbook program was to collect comparative data about recreational fishing effort at many sites along the coast. Recreational boat counts were based on visual sightings by members of the co-operating sea rescue bases and logbook records were kept on an hourly and daily basis. Each recreational boat that was sighted was classified according to its boat type category and activity. The logbook form catered for trailer boats, cruisers and gameboats, charter boats, and when possible separated SCUBA diving and/or spearfishing trips from the boat counts made for the rest of the recreational fleet. The logbook form also separated boats according to their direction of travel, that is, separate records were kept for boats heading seaward and for boats returning from the ocean. This logbook data was a valuable complement to the ramp based estimates of fishing effort because it provided increased spatial coverage of large access sites throughout the state and also because it provided increased temporal coverage (more daily estimates) at many sites.

Estimating the Recreational Fishing Effort of Anglers That Use Trailer Boats, Cruisers and Gameboats, and the Harvest of Trailer Boat Anglers

The raw data used for estimating fishing effort were daily counts of recreational fishing trips for trailer boat anglers, and for anglers using cruisers and gameboats. These data were derived from two independent sources: (a) boat counts taken by field staff on rostered survey days, and (b) daily boat movement logbooks filled out by members of volunteer sea rescue organisations. The daily counts of recreational fishing trips were expanded to provide stratum totals using two methods, which were: (1) the direct expansion from the data to estimate the unknown fraction; and (2) the imputation of missing data to estimate the fishing effort for some strata at some access sites.

The raw data used for estimating harvest were daily estimates of harvest by taxon. Harvest estimates are presented in two ways, in terms of abundance (numbers of fish) and in terms of weight (kilograms of fish). Field staff were instructed, where possible, to measure all identified fish (to the nearest cm) that were seen during interviews with angling parties. It was not always possible to obtain measurements of fish, usually because anglers were in a hurry to leave the ramp. Thus, during many interviews field staff were able to only collect fish measurements for a sub-sample of the entire harvest, or were only able to record counts of identified fish.

We did not measure the weight of fish during interviews. Instead, we converted the length measurements into weights by using length/weight keys. This was done for all taxa for which we had suitable length/weight conversion keys (Appendix 2). Weights were estimated directly from the length/weight keys for those fish that had been measured during interviews. The remaining unmeasured component of the harvest (i.e. those fish seen during interviews but only counted, and those fish which our expansions of data had estimated) was converted to weight according to the following two criteria. We used a seasonal mean weight for a site to estimate the seasonal mass of the unmeasured component of harvest for any taxon that had measurements for twenty or more individuals collected during a season at that site. When less than twenty individuals had been measured during a season at a site we used an annual mean weight for that site to estimate the seasonal mass of the unmeasured component of the harvest.

We did not attempt to make expanded estimates of harvest for any taxa that were considered to have been "rare" at a site. We defined "rare" at a site as being any taxon that had been recorded from only one interview, regardless of the number of individuals harvested in that single trip, at that site during a survey year. This definition of rarity means that a taxon could be "rare" at some sites and still be regarded as common at other sites during the same survey year. Also, a taxon could be "rare" at a site during a survey year and be regarded as common at that same site during another survey year. All taxa which did not meet the criteria for rarity were

classified as common taxa. Expanded estimates of harvest were made for all common taxa at a site.

The daily estimates of harvest for common taxa were expanded to provide stratum totals by a variety of methods, which included: (1) the direct expansion from the data to estimate the unknown fraction; (2) the multiplication of effort data with mean daily harvest rates to derive estimates of harvest at some access sites; (3) the scaling of available harvest estimates for some strata at some access sites using weighted ratios of effort, and (4) the imputation of missing data to estimate the harvest for some strata at some access sites.

We calculated population estimates of fishing effort and harvest for each separate stratum level, thereby providing important information at a small scale. Thus, for every survey site we separately calculated fishing effort and harvest estimates for each non-overlapping combination of day-type (2 levels) by weather stratum (3 levels) within each season. That is, for fishing effort and harvest within each season we made six separate estimates of fishing effort, and six separate estimates of harvest for each taxon, for the following day-type by weather combinations: (1) Weekdays by "Good - predicted" weather days coupled with both "Good - actual" and "Bad - actual" weather days; (2) Weekdays by "Bad - predicted" weather days coupled with "Good - actual" weather days; (3) Weekdays by "Bad - predicted" weather days coupled with "Bad - actual" weather days, (4) Weekend days by "Good - predicted" weather days coupled with both "Good - actual" and "Bad - actual" weather days; (5) Weekend days by "Bad - predicted" weather days coupled with "Good - actual" weather days; and (6) Weekend days by "Bad - predicted" weather days coupled with "Bad - actual" weather days.

Estimates of effort and harvest at higher levels such as seasonal and annual site totals, and regional and statewide totals for large access sites were obtained by summing the separate stratum totals. Similarly, estimates of variance at higher levels were obtained by summing the separate stratum variances. The general equations used to calculate

the stratum estimates of effort and harvest were taken from Pollock et al. (1994) and Mood et al. (1974).

Harvest Comparisons between the Recreational Trailer Boat Fishery and the Oceanic Commercial Fisheries

Recreational harvest estimates were obtained by the methods described in the previous sections. The recreational harvest statistics (estimated weights) were available only for common taxa for which we had suitable length/weight conversion keys (Appendix 2). In contrast, commercial fishers are required by state legislation to provide accurate catch statistics on a monthly basis. These statistics are held by NSW Fisheries. We have used the declared commercial statistics for ocean landings at ports along the coast of NSW to make comparisons with the recreational trailer boat fishery.

These comparisons were made by using the monthly commercial returns to construct regional tables of harvest for the same seasonal periods that had been used to survey the recreational trailer boat fishery. Then it was possible to calculate harvest ratios which simply describe the relative sizes of the harvests (recreational/commercial). When the harvest ratio is greater than one it indicates that the estimated recreational trailer boat harvest is greater than the declared commercial landings taken from ocean waters. Conversely, when the ratio is less than one it indicates that the declared commercial landings taken from ocean waters have exceeded the size of the estimated recreational trailer boat harvest. When the ratio is equal to one the estimated recreational trailer boat harvest is of equal size to the declared commercial landings taken from ocean waters. We have restricted the presentation and discussion of these results to regional and statewide comparisons for each of the two survey years.

Detailed Results

Over the two year survey period we conducted 10,631 interviews with recreational angling parties that had fished from trailer boats in the coastal waters of NSW (Table 2). We collected 5536 of these interviews during the first survey year, and a further 5095 interviews were done in the second survey year. The great majority of anglers were co-operative and keen to provide information about their recreational fishing trips. This co-operation is reflected by the relatively low rate of refused interviews during both survey years (Table 2). We only had refusal rates of 3.28% in survey year 1 and 2.35% in survey year 2.

Recreational Fishing Effort

Statewide - trailer boat trips

We estimated that 217,550 trailer boat trips were made from large access sites throughout the state during the first survey year - September 1993 to August 1994 inclusive, and that a further 214,821 trips occurred during the second survey year - September 1994 to August 1995 inclusive (Table 3). On a statewide scale, the same seasonal patterns of recreational fishing effort were found between survey years (Table 3). The highest levels of effort occurred during Summer (31.6% of annual effort in year 1 and 31.3% of annual effort in year 2) and Autumn (30.5% of annual effort in year 1 and 30.3% of annual effort in year 2), whilst lower levels of effort were recorded during Spring (19.8% of annual effort in year 1 and 18.6% of annual effort in year 2) and Winter (18.1% of annual effort in year 1 and 19.8% of annual effort in year 2).

The regional spread of fishing effort across the state also showed a consistent pattern between years (Table 3). The Central Coast region had the highest regional levels of trailer boat effort (47.7% in year 1 and 50.2% in year 2) in both survey years. This pattern is not surprising because the Central Coast region contains the three largest cities in NSW and hence has a larger resident angling population than the other regions. The South Coast region had the second highest regional levels of effort (31.8% in year 1 and 29.4% in year 2) in both survey years, and the North Coast

Table 2. The number of successfully completed interviews, the number of interview refusals and the proportion of interview refusals for each survey site and survey year during the period - September 1993 to August 1995 inclusive.

	SURVEY YEAR 1			SURVEY YEAR 2		
SITE	Successful Interviews	Interview Refusals	Refusals %	Successful Interviews	Interview Refusals	Refusals %
KINGSCLIFF	224	9	4.02%	229	1	0.44%
EVANS HEAD	333	9	2.70%	544	8	1.47%
COFFS HARBOUR	528	4	0.76%	409	6	1.47%
CROWDY HEAD	262	3	1.15%	288	1	0.35%
SYDNEY	1091	52	4.77%	956	71	7.43%
BELLAMBI	731	15	2.05%	636	10	1.57%
ULLADULLA	598	21	3.51%	604	3	0.50%
BERMAGUI	823	52	6.32%	862	13	1.51%
EDEN	770	11	1.43%	450	4	0.89%
TOTAL	**5360**	**176**	**3.28%**	**4978**	**117**	**2.35%**

Table 3. Statewide and regional estimates of recreational fishing effort (number of boat trips) for Trailer Boats for each day-type and seasonal stratum within each survey year during the two year period - September 1993 to August 1995 inclusive.

CATEGORY: **TRAILER BOATS**

SURVEY YEAR 1

		SPRING 93		SUMMER 93/94		AUTUMN 94		WINTER 94		YEAR 1 TOTAL	
REGION	DAY-TYPE	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.
NORTH COAST	Weekday	4536	258	6673	354	5743	320	5290	232	**22242**	**590**
	Weekend	4715	304	6083	196	5931	347	5592	289	**22321**	**579**
	Total	**9251**	**399**	**12756**	**405**	**11674**	**472**	**10882**	**371**	**44563**	**826**
CENTRAL COAST	Weekday	10243	644	12369	717	8773	774	6661	557	**38046**	**1356**
	Weekend	16976	947	19440	844	15602	611	13716	796	**65734**	**1617**
	Total	**27219**	**1145**	**31809**	**1108**	**24375**	**986**	**20377**	**972**	**103780**	**2110**
SOUTH COAST	Weekday	3735	309	15183	2592	16176	1306	3966	351	**39060**	**2940**
	Weekend	2892	176	9099	816	14121	1097	4035	388	**30147**	**1432**
	Total	**6627**	**356**	**24282**	**2718**	**30297**	**1706**	**8001**	**523**	**69207**	**3270**
STATEWIDE	Weekday	18514	759	34225	2713	30692	1552	15917	698	**99348**	**3291**
	Weekend	24583	1010	34622	1190	35654	1302	23343	932	**118202**	**2236**
	Total	**43097**	**1263**	**68847**	**2963**	**66346**	**2026**	**39260**	**1164**	**217550**	**3979**

SURVEY YEAR 2

		SPRING 94		SUMMER 94/95		AUTUMN 95		WINTER 95		YEAR 2 TOTAL	
REGION	DAY-TYPE	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.
NORTH COAST	Weekday	4714	285	6778	539	5673	473	5493	232	**22658**	**805**
	Weekend	5073	252	4381	344	5756	199	5868	237	**21078**	**527**
	Total	**9787**	**380**	**11159**	**640**	**11429**	**513**	**11361**	**332**	**43736**	**963**
CENTRAL COAST	Weekday	9613	569	14291	1213	11649	852	7341	372	**42894**	**1631**
	Weekend	14519	1236	20967	1433	14132	938	15333	543	**64951**	**2181**
	Total	**24132**	**1360**	**35258**	**1878**	**25781**	**1267**	**22674**	**658**	**107845**	**2723**
SOUTH COAST	Weekday	2970	117	12300	953	16182	911	4110	153	**35562**	**1333**
	Weekend	3156	215	8565	431	11613	708	4344	362	**27678**	**930**
	Total	**6126**	**245**	**20865**	**1046**	**27795**	**1154**	**8454**	**393**	**63240**	**1625**
STATEWIDE	Weekday	17297	647	33369	1634	33504	1334	16944	464	**101114**	**2255**
	Weekend	22748	1279	33913	1535	31501	1193	25545	694	**113707**	**2429**
	Total	**40045**	**1434**	**67282**	**2242**	**65005**	**1789**	**42489**	**835**	**214821**	**3314**

region had the lowest regional effort levels (20.5% in year 1 and 20.4% in year 2) in both survey years (Table 3).

North Coast region - trailer boat trips

We estimated that 44,563 trailer boat trips were made from large access sites throughout the North Coast region during the first survey year - September 1993 to August 1994 inclusive, and that a further 43,736 trips occurred during the second survey year - September 1994 to August 1995 inclusive (Table 3). A seasonal pattern of fishing effort was found during the first survey year. The highest level of effort occurred during Summer (28.6% of annual effort), with lower amounts of effort recorded during Autumn (26.2% of annual effort), Winter (24.4% of annual effort), and Spring (20.8% of annual effort). In contrast, there was no discernible seasonal pattern of fishing effort during the second survey year. Similar levels of fishing effort were found during the Summer (25.5% of annual effort), Autumn (26.1% of annual effort), and Winter (26.0% of annual effort) seasons. The Spring season (22.4% of annual effort) in the second survey year had the lowest level of trailer boat fishing effort (Table 3).

The relative amount of fishing effort associated with each of the day-type strata varied within seasons. The weekday and weekend day strata contributed similar amounts of total fishing effort during the Spring, Autumn and Winter seasons in both survey years However, it was the weekday stratum which contributed a greater part of the total seasonal effort during the Summer in both survey year 1 (52.3% of Summer effort) and survey year 2 (60.7% of Summer effort - Table 3). This Summer pattern of recreational effort probably reflects a seasonal influx of holiday-makers that have the flexibility to go angling at any time during the week.

Central Coast region - trailer boat trips

We estimated that 103,780 trailer boat trips were made from large access sites throughout the Central Coast region during the first survey year - September 1993 to August 1994 inclusive, and that a further 107,845 trips occurred during the second

survey year - September 1994 to August 1995 inclusive (Table 3). In the Central Coast region, the same seasonal pattern of recreational fishing effort was found between survey years (Table 3). The highest level of trailer boat fishing effort always occurred during Summer (30.7% of annual effort in year 1 and 32.7% of annual effort in year 2), intermediate levels of effort were recorded during the Spring (26.2% of annual effort in year 1 and 22.4% of annual effort in year 2) and Autumn (23.5% of annual effort in year 1 and 23.9% of annual effort in year 2) seasons, and the lowest levels of effort were always associated with the Winter (19.6% of annual effort in year 1 and 21.0% of annual effort in year 2) season.

The recreational fishing effort that occurred within the Central Coast region was concentrated mainly during the weekend days. The weekend day stratum was found to have contributed a much greater part of the seasonal fishing effort. This was consistent for all seasons during both survey years within this region (Table 3). The Central Coast region contains the three largest cities in NSW. Thus, it is likely that this interesting pattern of concentrated weekend day fishing effort occurs because the fishing activities of many metropolitan anglers are greatly restricted by their weekday work commitments.

South Coast region - trailer boat trips

We estimated that 69,207 trailer boat trips were made from large access sites throughout the South Coast region during the first survey year - September 1993 to August 1994 inclusive, and that a further 63,240 trips occurred during the second survey year - September 1994 to August 1995 inclusive (Table 3). In the South Coast region, the same seasonal patterns of recreational fishing effort were found between survey years (Table 3). The highest levels of effort always occurred during Autumn (43.7% of annual effort in year 1 and 43.9% of annual effort in year 2) and Summer (35.1% of annual effort in year 1 and 33.0% of annual effort in year 2), with relatively lower levels of effort always recorded during Winter (11.6% of annual effort in year 1 and 13.4% of annual effort in year 2) and Spring (9.6% of annual effort in year 1 and 9.7% of annual effort in year 2).

The peak levels of fishing effort recorded during the Autumn season correspond well to the expected timing of the annual migration of yellowfin tuna through South Coast waters. The yellowfin tuna season is eagerly anticipated by recreational anglers throughout NSW, the ACT, and Victoria. The high levels of effort that were recorded during the Summer season probably reflected the combined effects of good seasonal weather for fishing and the activities of local anglers and a large number of holiday-makers within the region. In contrast, the relatively lower levels of effort recorded during the Winter and Spring seasons may be attributed mainly to the fishing activities of local anglers. The fact that the weekday stratum contributes a much greater part of the total seasonal effort during the Autumn (53.4% of seasonal effort in year 1 and 58.2% of seasonal effort in year 2) and Summer (62.5% of seasonal effort in year 1 and 59.0% of seasonal effort in year 2) in both survey years supports the hypothesis that most of the effort during these seasons is due to visiting anglers that have the flexibility to go fishing at any time during the week.

Statewide - cruiser and gameboat trips

We estimated that 24,502 cruiser and gameboat trips were made from large access sites throughout the state during the first survey year - September 1993 to August 1994 inclusive, and that a further 25,059 trips occurred during the second survey year - September 1994 to August 1995 inclusive (Table 4). On a statewide scale, the same seasonal patterns of recreational fishing effort were found between survey years (Table 4). The highest levels of effort occurred during Summer (36.4% of annual effort in year 1 and 37.4% of annual effort in year 2) and Autumn (26.3% of annual effort in year 1 and 25.1% of annual effort in year 2), whilst lower levels of effort were recorded during Spring (20.9% of annual effort in year 1 and 19.3% of annual effort in year 2) and Winter (16.4% of annual effort in year 1 and 18.2% of annual effort in year 2).

The regional spread of fishing effort across the state also showed a consistent pattern between years (Table 4). The Central Coast region had the highest regional levels of

Table 4. Statewide and regional estimates of recreational fishing effort (number of boat trips) for Cruisers and Gamefishing Boats for each day-type and seasonal stratum within each survey year during the two year period - September 1993 to August 1995 inclusive.

CATEGORY: **CRUISERS & GAMEFISHING BOATS**

SURVEY YEAR 1

		SPRING 93		SUMMER 93/94		AUTUMN 94		WINTER 94		YEAR 1 TOTAL	
REGION	DAY-TYPE	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.
NORTH COAST	Weekday	240	15	501	12	157	6	228	11	1126	23
	Weekend	216	14	449	10	216	15	185	8	1066	25
	Total	**456**	**21**	**950**	**16**	**373**	**16**	**413**	**14**	**2192**	**34**
CENTRAL COAST	Weekday	1759	204	2073	159	1504	148	960	104	6296	316
	Weekend	2479	165	4064	266	2876	216	2371	145	11790	408
	Total	**4238**	**263**	**6137**	**310**	**4380**	**262**	**3331**	**179**	**18086**	**516**
SOUTH COAST	Weekday	237	39	588	81	860	145	168	37	1853	175
	Weekend	199	34	1236	231	832	87	104	21	2371	250
	Total	**436**	**52**	**1824**	**245**	**1692**	**169**	**272**	**42**	**4224**	**305**
STATEWIDE	Weekday	2236	209	3162	179	2521	207	1356	111	9275	362
	Weekend	2894	169	5749	353	3924	234	2660	147	15227	479
	Total	**5130**	**269**	**8911**	**396**	**6445**	**313**	**4016**	**184**	**24502**	**600**

SURVEY YEAR 2

		SPRING 94		SUMMER 94/95		AUTUMN 95		WINTER 95		YEAR 2 TOTAL	
REGION	DAY-TYPE	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.
NORTH COAST	Weekday	140	8	354	18	187	9	213	7	894	23
	Weekend	127	8	233	11	196	23	190	4	746	27
	Total	**267**	**12**	**587**	**21**	**383**	**25**	**403**	**8**	**1640**	**36**
CENTRAL COAST	Weekday	1464	122	3021	225	1934	242	1082	158	7501	386
	Weekend	2614	262	4383	358	2444	180	2645	108	12086	491
	Total	**4078**	**289**	**7404**	**423**	**4378**	**302**	**3727**	**191**	**19587**	**625**
SOUTH COAST	Weekday	264	31	652	64	844	45	136	8	1896	85
	Weekend	232	42	708	83	692	15	304	46	1936	105
	Total	**496**	**53**	**1360**	**105**	**1536**	**47**	**440**	**46**	**3832**	**135**
STATEWIDE	Weekday	1868	126	4027	235	2965	247	1431	158	10291	396
	Weekend	2973	265	5324	368	3332	182	3139	117	14768	503
	Total	**4841**	**294**	**9351**	**436**	**6297**	**307**	**4570**	**197**	**25059**	**640**

cruiser and gameboat effort (73.9% in year 1 and 78.2% in year 2) in both survey years. This pattern is not surprising because the Central Coast region contains the three largest cities in NSW and hence has a larger resident angling population than the other regions. The South Coast region had the second highest regional levels of effort (17.2% in year 1 and 15.3% in year 2) in both survey years, and the North Coast region had the lowest regional effort levels (8.9% in year 1 and 6.5% in year 2) in both survey years (Table 4).

North Coast region - cruiser and gameboat trips

We estimated that 2,192 cruiser and gameboat trips were made from large access sites throughout the North Coast region during the first survey year - September 1993 to August 1994 inclusive, and that a further 1,640 trips occurred during the second survey year - September 1994 to August 1995 inclusive (Table 4).

In the North Coast region, the same seasonal pattern of recreational fishing effort was found between survey years (Table 4). The highest level of cruiser and gameboat fishing effort always occurred during Summer (43.4% of annual effort in year 1 and 35.7% of annual effort in year 2), with lower amounts of effort recorded during Autumn (17.0% of annual effort in year 1 and 23.4% of annual effort in year 2), Winter (18.8% of annual effort in year 1 and 24.6% of annual effort in year 2), and Spring (20.8% of annual effort in year 1 and 16.3% of annual effort in year 2 - Table 4). The relative amount of fishing effort associated with each of the day-type strata showed no obvious pattern within seasons.

Central Coast region - cruiser and gameboat trips

We estimated that 18,086 cruiser and gameboat trips were made from large access sites throughout the Central Coast region during the first survey year - September 1993 to August 1994 inclusive, and that a further 19,587 trips occurred during the second survey year - September 1994 to August 1995 inclusive (Table 4). In the Central Coast region, the same seasonal pattern of recreational fishing effort was found between survey years (Table 4). The highest level of cruiser and gameboat fishing effort always occurred during Summer (34.0% of annual effort in year 1 and

37.8% of annual effort in year 2), intermediate levels of effort were recorded during the Spring (23.4% of annual effort in year 1 and 20.8% of annual effort in year 2) and Autumn (24.2% of annual effort in year 1 and 22.4% of annual effort in year 2) seasons, and the lowest levels of effort were always associated with the Winter (18.4% of annual effort in year 1 and 19.0% of annual effort in year 2) season.

The recreational fishing effort that occurred within the Central Coast region was concentrated mainly during the weekend days. The weekend day stratum was found to have contributed a much greater part of the seasonal fishing effort. This was consistent for all seasons during both survey years within this region (Table 4). The Central Coast region contains the three largest cities in NSW. Thus, it is likely that this interesting pattern of concentrated weekend day fishing effort occurs because the fishing activities of many metropolitan anglers are greatly restricted by their weekday work commitments.

South Coast region - cruiser and gameboat trips

We estimated that 4,224 cruiser and gameboat trips were made from large access sites throughout the South Coast region during the first survey year - September 1993 to August 1994 inclusive, and that a further 3,832 trips occurred during the second survey year - September 1994 to August 1995 inclusive (Table 4). In the South Coast region, the same seasonal patterns of recreational fishing effort were found between survey years (Table 3). The highest levels of effort always occurred during the Summer (43.2% of annual effort in year 1 and 35.5% of annual effort in year 2), and Autumn (40.1% of annual effort in year 1 and 40.1% of annual effort in year 2) seasons, with relatively lower levels of effort always recorded during Spring (10.3% of annual effort in year 1 and 12.9% of annual effort in year 2) and Winter (6.4% of annual effort in year 1 and 11.5% of annual effort in year 2).

The peak levels of fishing effort recorded during the Summer and Autumn seasons correspond well to the expected timing of the annual migrations of billfish and yellowfin tuna through South Coast waters. The high levels of effort that were

recorded during the Summer and Autumn seasons probably reflected the combined effects of good seasonal weather for offshore fishing and the activities of local anglers and a large number of holiday-makers within the region. In contrast, the relatively lower levels of effort recorded during the Winter and Spring seasons may be attributed mainly to the fishing activities of local anglers. The relative amount of fishing effort associated with each of the day-type strata showed no obvious pattern within seasons (Table 4).

Recreational Harvest

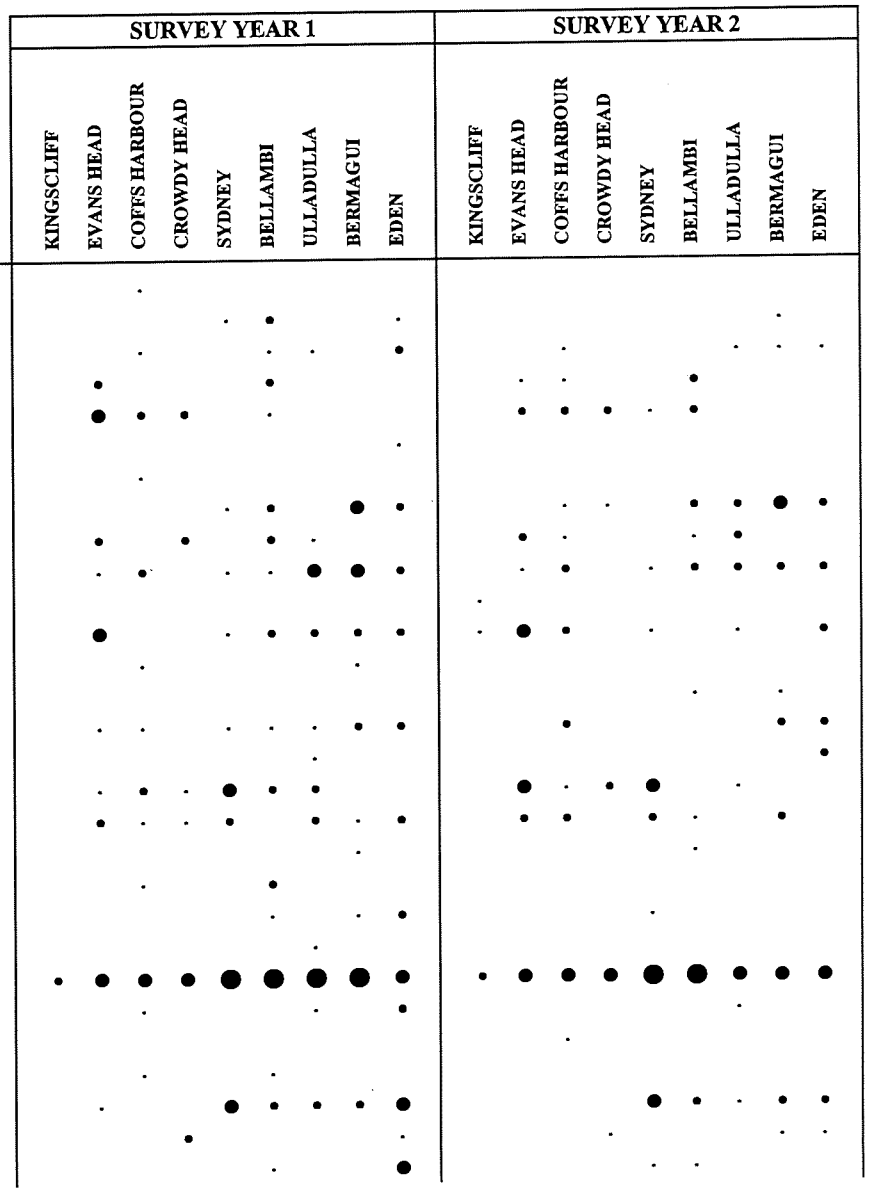
Statewide - trailer boat angling

Overall, we recorded 210 taxa in the retained catch of recreational anglers fishing from trailer boats during the two years of the survey (Table 5). Trailer boat anglers kept 179 taxa during the first survey year and 166 taxa were harvested during the second survey year (Table 5). The ten most commonly harvested taxa, by number, during the first year of the survey (Table 6) were eastern blue-spotted flathead (23.4%), snapper (11.5%), slimy mackerel (10.7%), silver trevally (5.2%), yellowtail and jack mackerel (4.8%), silver sweep (4.3%), nannygai (3.7%), blue morwong (3.6%), maori wrasse (2.9%), and sergeant baker (2.4%). These ten taxa, by number, accounted for 72.5% of the statewide trailer boat harvest during the first survey year - September 1993 to August 1994 inclusive (Table 6).

The ten most commonly harvested taxa, by weight, during the first year of the survey (Table 7) were eastern blue-spotted flathead (229.3 tonnes - 15.0%), snapper (184.2 tonnes - 12.0%), silver trevally (103.5 tonnes - 6.8%), blue morwong (90.9 tonnes - 5.9%), yellowfin tuna (73.1 tonnes - 4.8%), skipjack (56.8 tonnes - 3.7%), kingfish (53.0 tonnes - 3.5%), silver sweep (47.5 tonnes - 3.1%), slimy mackerel (40.1 tonnes - 2.6%), and albacore (38.7 tonnes - 2.5%). These ten taxa, by weight, accounted for 59.9% of the statewide trailer boat harvest during the first survey year - September 1993 to August 1994 inclusive (Table 7).

Table 5. An exponential representation of the estimated recreational harvest, based on numbers of fish, for all taxa kept by trailer boat anglers at all selected survey sites (arranged in order from north to south) for each survey year during the two year period - September 1993 to August 1995 inclusive.

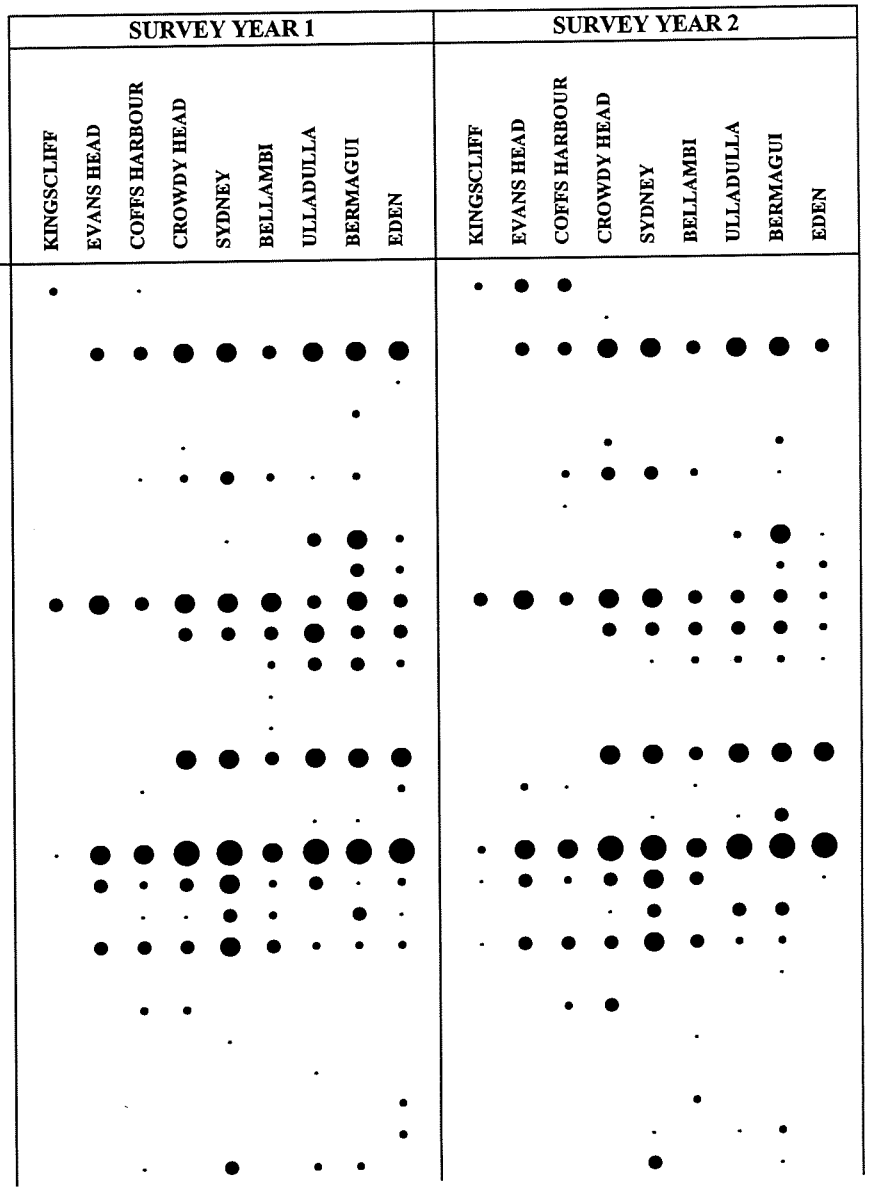
KEY: · 1 - 9, • 10 - 99, ● 100 - 999, ● 1000 - 9999, ● 10000+



HIGHER CLASSIFICATION	COMMON NAME	TAXON
SQUALIDAE	DOGFISHES	*Squalus spp.*
HETERODONTIDAE	PORT JACKSON SHARKS	*Heterodontus spp.*
PARASCYLLIDAE	RUSTY CATSHARK	*Parascyllium ferrugineum*
BRACHAELURIDAE	BLIND SHARK	*Brachaelurus waddi*
ORECTOLOBIDAE	WOBBEGONG SHARKS	*Orectolobus spp.*
SCYLIORHINIDAE	DRAUGHTBOARD SHARK	*Cephaloscyllium laticeps*
LAMNIDAE	WHITE POINTER SHARK	*Carcharodon carcharius*
LAMNIDAE	SHORTFIN MAKO SHARK	*Isurus oxyrinchus*
TRIAKIDAE	SCHOOL SHARK	*Galeorhinus galeus*
TRIAKIDAE	GUMMY SHARK	*Mustelus antarcticus*
CARCHARHINIDAE	BLACK-TIPPED REEFSHARK	*Carcharhinus melanopterus*
CARCHARHINIDAE	WHALER SHARKS	*Carcharhinus spp.*
CARCHARHINIDAE	TIGER SHARK	*Galeocerdo cuvier*
CARCHARHINIDAE	BLUE SHARK	*Prionace glauca*
SPHYRNIDAE	HAMMERHEAD SHARKS	*Sphyrna spp.*
SQUATINIDAE	ANGEL SHARK	*Squatina australis*
RHINOBATIDAE	SHOVELNOSE RAYS	*Aptychotrema spp. & Rhynchobatus spp.*
RHINOBATIDAE	BANJO RAY	*Trygonorhina fasciata*
RAJIDAE	SKATES	*Raja spp.*
UROLOPHIDAE & DASYATIDIDAE	STINGAREES & BLACK STINGRAYS	*Urolophus spp. & Dasyatis spp.*
ANGUILLIFORMES	EELS	All species combined
CLUPEIDAE	PILCHARD	*Sardinops neopilchardus*
AULOPODIDAE	SERGEANT BAKER	*Aulopus purpurissatus*
SYNODONTIDAE	LIZARDFISHES	All species combined
ARIIDAE	FORK-TAILED CATFISH	*Arius graeffei*
PLOTOSIDAE	ESTUARY CATFISH	*Cnidoglanis macrocephalus*
MORIDAE	BEARDED CODS	All species combined
OPHIDIIDAE	ROCK LING	*Genypterus tigerinus*
HEMIRAMPHIDAE	GARFISHES	*Hyporhamphus spp.*

Table 5. An exponential representation of the estimated recreational harvest, based on numbers of fish, for all taxa kept by trailer boat anglers at all selected survey sites (arranged in order from north to south) for each survey year during the two year period - September 1993 to August 1995 inclusive.

KEY: · 1 - 9, • 10 - 99, ● 100 - 999, ● 1000 - 9999, ● 10000+



HIGHER CLASSIFICATION	COMMON NAME	TAXON
BELONIDAE	LONGTOMS	All species combined
BERYCIDAE	ALFONSIN	*Beryx splendens*
BERYCIDAE	NANNYGAI	*Centroberyx affinis*
BERYCIDAE	SWALLOWTAIL REDFISH	*Centroberyx lineatus*
ZEIDAE	SILVER DORY	*Cyttus australis*
ZEIDAE	MIRROR DORY	*Zenopsis nebulosis*
ZEIDAE	JOHN DORY	*Zeus faber*
AULOSTOMIDAE	TRUMPETFISH	*Aulostomus chinensis*
SCORPAENIDAE	OCEAN PERCH	*Helicolenus percoides*
SCORPAENIDAE	COMMON GURNARD PERCH	*Neosebastes scorpaenoides*
SCORPAENIDAE	RED SCORPIONCOD	*Scorpaena cardinalis*
TRIGLIDAE	RED GURNARD	*Chelidonichthys kumu*
TRIGLIDAE	LATCHET	*Pterygotrigla polyommata*
TRIGLIDAE	GURNARDS OTHER	Unidentified Triglid species
PLATYCEPHALIDAE	ROCK FLATHEAD	*Leviprora laevigatus*
PLATYCEPHALIDAE	TIGER FLATHEAD	*Neoplatycephalus richardsoni*
PLATYCEPHALIDAE	NORTHERN SAND FLATHEAD	*Platycephalus arenarius*
PLATYCEPHALIDAE	SOUTHERN SAND FLATHEAD	*Platycephalus bassensis*
PLATYCEPHALIDAE	EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*
PLATYCEPHALIDAE	DUSKY FLATHEAD	*Platycephalus fuscus*
PLATYCEPHALIDAE	LONG-SPINED FLATHEAD	*Platycephalus longispinis*
PLATYCEPHALIDAE	MARBLED FLATHEAD	*Platycephalus marmoratus*
PLATYCEPHALIDAE	SOUTHERN BLUE-SPOTTED FLATHEAD	*Platycephalus speculator*
PLATYCEPHALIDAE	ORANGE-FRECKLED FLATHEAD	*Ratabulus diversidens*
PLATYCEPHALIDAE	TASSEL-SNOUTED FLATHEAD	*Thysanophrys cirronasus*
PLATYCEPHALIDAE	FLATHEADS OTHER	Unidentified Platycephalid species
SERRANIDAE	ORANGE PERCH	*Anthias pulchellus*
SERRANIDAE	BUTTERFLY PERCH	*Caesioperca lepidoptera*
SERRANIDAE	LONG-FINNED PERCH	*Caprodon longimanus*

Table 5. An exponential representation of the estimated recreational harvest, based on numbers of fish, for all taxa kept by trailer boat anglers at all selected survey sites (arranged in order from north to south) for each survey year during the two year period - September 1993 to August 1995 inclusive.

KEY: · 1 - 9, • 10 - 99, ● 100 - 999, ● 1000 - 9999, ● 10000+

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SURVEY YEAR 1									SURVEY YEAR 2								
			KINGSCLIFF	EVANS HEAD	COFFS HARBOUR	CROWDY HEAD	SYDNEY	BELLAMBI	ULLADULLA	BERMAGUI	EDEN	KINGSCLIFF	EVANS HEAD	COFFS HARBOUR	CROWDY HEAD	SYDNEY	BELLAMBI	ULLADULLA	BERMAGUI	EDEN
SERRANIDAE	SEAPERCHES OTHER	*Lepidoperca spp.*								·										
SERRANIDAE	YELLOW-BANDED SEAPERCH	*Ellerkeldia annulata*					·									●				
SERRANIDAE	HALF-BANDED SEAPERCH	*Ellerkeldia mccullochi*					●	·	●		●					●	●	●		●
SERRANIDAE	DEEPWATER SEAPERCH	*Ellerkeldia sp.*							·											
SERRANIDAE	BLACK-BANDED SEAPERCH	*Hypoplectrodes nigrorubrum*						•			•					·	·		·	
SERRANIDAE	WIRRAH	*Acanthistius ocellatus*		•	•	·	●	•	•	•	•		•	•		•	•	•	•	•
SERRANIDAE	BAR-COD	*Epinephelus ergastularius*					·							·				·		
SERRANIDAE	BLACK-TIPPED ROCKCOD	*Epinephelus fasciatus*	·											·						
SERRANIDAE	QUEENSLAND GROPER	*Epinephelus lanceolatus*											·							
SERRANIDAE	MAORI COD	*Epinephelus undulatostriatus*	•	•	·						·	•	•							
PLESIOPIDAE	BLUE DEVIL FISH	*Paraplesiops bleekeri*					·													
GLAUCOSOMIDAE	PEARL PERCH	*Glaucosoma scapulare*	●	●	●	·						●	·	●	·					
TERAPONTIDAE	SIX-LINED TRUMPETER	*Pelates quadrilineatus*														·		·		
PRIACANTHIDAE	RED BIGEYES	*Priacanthus spp.*				·														
DINOLESTIDAE	LONG-FINNED SEAPIKE	*Dinolestes lewini*		·	·	·	●	●	●	●	●		·	·		●	●	●	●	●
SILLAGINIDAE	SAND WHITING	*Sillago ciliata*		·		·														
SILLAGINIDAE	SCHOOL WHITING	*Sillago flindersi*				●	●	·	·	·	●			·	●	●	·	●	·	●
SILLAGINIDAE	STOUT WHITING	*Sillago robusta*									●									
POMATOMIDAE	TAILOR	*Pomatomus saltatrix*	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	•	●
RACHYCENTRIDAE	COBIA	*Rachycentron canadum*	●	●	•							•	●	·						
ECHENEIDIDAE	SLENDER SUCKERFISH	*Echeneis naucrates*												·						
CARANGIDAE	RAINBOW RUNNER	*Elegatis bipinnulata*			·		·								·					
CARANGIDAE	AMBERJACK	*Seriola dumerili*	·	•	•								·	•						
CARANGIDAE	SAMSON FISH	*Seriola hippos*	•	●	●	·	●	●				•	●	●	•	•	•			
CARANGIDAE	KINGFISH	*Seriola lalandi*	●	●	●	•	●	●	•	●	●	●	●	●	•	●	●	•	●	•
CARANGIDAE	ALMACO JACK	*Seriola rivoliana*		·	·															
CARANGIDAE	DIAMOND TREVALLY	*Alectis indicus*	·		·															
CARANGIDAE	GOLD-SPOTTED TREVALLY	*Carangoides fulvoguttatus*	·																	
CARANGIDAE	GIANT TREVALLY	*Caranx ignobilis*	•										·							

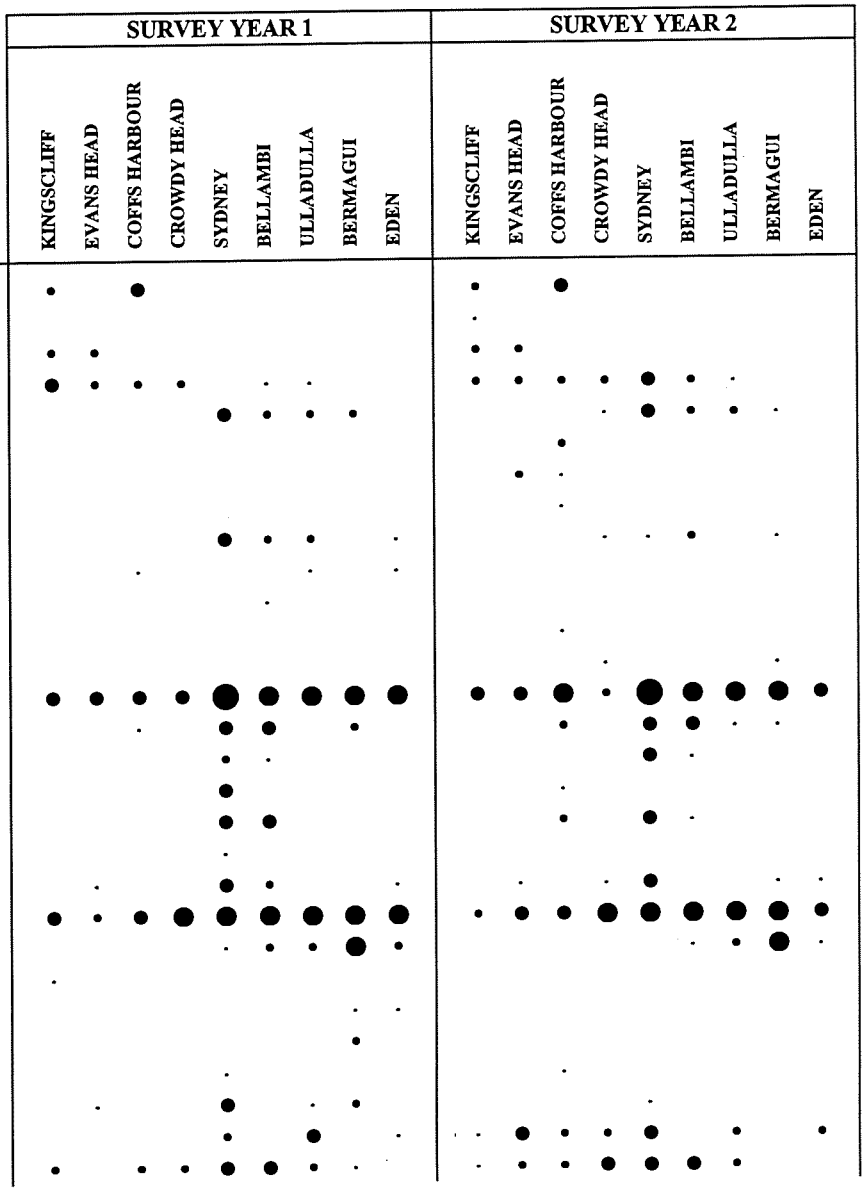
Table 5. An exponential representation of the estimated recreational harvest, based on numbers of fish, for all taxa kept by trailer boat anglers at all selected survey sites (arranged in order from north to south) for each survey year during the two year period - September 1993 to August 1995 inclusive.

KEY: · 1 - 9, • 10 - 99, ● 100 - 999, ● 1000 - 9999, ● 10000+

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SURVEY YEAR 1									SURVEY YEAR 2								
			KINGSCLIFF	EVANS HEAD	COFFS HARBOUR	CROWDY HEAD	SYDNEY	BELLAMBI	ULLADULLA	BERMAGUI	EDEN	KINGSCLIFF	EVANS HEAD	COFFS HARBOUR	CROWDY HEAD	SYDNEY	BELLAMBI	ULLADULLA	BERMAGUI	EDEN
CARANGIDAE	BIGEYE TREVALLY	*Caranx sexfasciatus*		·												·				
CARANGIDAE	RUSSELL'S MACKEREL-SCAD	*Decapterus russelli*	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CARANGIDAE	SILVER TREVALLY	*Pseudocaranx dentex*													·					
CARANGIDAE	SWALLOWTAIL DART	*Trachinotus coppingeri*		●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●
CARANGIDAE	YELLOWTAIL & JACK MACKEREL	*Trachurus novaezelandiae & T. declivis*					•									·				
CARANGIDAE	BASSET-HULLS TREVALLY	*Uraspis uraspis*											·	·						
CARANGIDAE	TREVALLIES OTHER	Unidentified Carangid species	·																	
CORYPHAENIDAE	DOLPHIN FISH	*Coryphaena hippurus*	●	·	●	·	●	•		·			●	●	•	●	•	●	●	·
ARRIPIDAE	SALMON	*Arripis trutta*					●	•	•	●	●					●	•	●	•	●
EMMELICHTHYIDAE	RUBYFISH	*Plagiogeneion macrolepis*								·										
SPARIDAE	YELLOWFIN BREAM	*Acanthopagrus australis*	●	●	●	•	●	●	●		•	●	●	•	•	●	●	•	·	•
SPARIDAE	BLACK BREAM	*Acanthopagrus butcheri*									·									
SPARIDAE	LONG-SPINED SNAPPER	*Argyrops spinifer*														·				
SPARIDAE	SNAPPER	*Pagrus auratus*	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SPARIDAE	TARWHINE	*Rhabdosargus sarba*	●	●	●	•	●					●	●	•	•	●	•			
LETHRINIDAE	COLLARED SEA BREAM	*Gymnocranius audleyi*												•						
LETHRINIDAE	LANCER	*Lethrinus genivittatus*										·								
LETHRINIDAE	GRASS EMPORER	*Lethrinus laticaudis*										•								
LETHRINIDAE	SWEETLIP EMPORER	*Lethrinus miniatus*	·									·	•							•
LETHRINIDAE	SPANGLED EMPORER	*Lethrinus nebulosus*	•	·	•		·					●	•	•						
SCIAENIDAE	MULLOWAY	*Argyrosomus hololepidotus*	•	●	•	•	●					•	●	•	•	●				·
SCIAENIDAE	TERAGLIN	*Atractoscion aequidens*	•	●	•	•	•					•	●	•	•	•				·
LUTJANIDAE	GREEN JOBFISH	*Aprion virescens*			·							•								
LUTJANIDAE	ROSY JOBFISH	*Pristipomoides filamentosus*										·								
LUTJANIDAE	MANGROVE JACK	*Lutjanus argentimaculatus*										·								
LUTJANIDAE	BLACK-SPOT SEAPERCH	*Lutjanus fulviflamma*			·															
LUTJANIDAE	FIVE-LINED SEAPERCH	*Lutjanus quinquelineatus*										·								
LUTJANIDAE	MOSES PERCH	*Lutjanus russelli*	●	●	●							●	●	•						
LUTJANIDAE	RED EMPORER	*Lutjanus sebae*	•																	

Table 5. An exponential representation of the estimated recreational harvest, based on numbers of fish, for all taxa kept by trailer boat anglers at all selected survey sites (arranged in order from north to south) for each survey year during the two year period - September 1993 to August 1995 inclusive.

KEY: · 1 - 9, • 10 - 99, ● 100 - 999, ● 1000 - 9999, ● 10000+



HIGHER CLASSIFICATION	COMMON NAME	TAXON
LUTJANIDAE	SOUTHERN FUSILIER	*Paracaesio xanthurus*
HAEMULIDAE	PAINTED SWEETLIPS	*Diagramma pictum*
HAEMULIDAE	NETTED SWEETLIPS	*Plectorhinchus flavomaculatus*
MULLIDAE	BLACKSPOT GOATFISH	*Parupeneus signatus*
MULLIDAE	BLUE-STRIPED GOATFISH	*Upeneichthys lineatus*
MONODACTYLIDAE	SILVER BATFISH	*Monodactylus argenteus*
MONODACTYLIDAE	LADDER-FINNED POMFRET	*Schuettea scalaripinnis*
GIRELLIDAE	BLUEFISH	*Girella cyanea*
GIRELLIDAE	ROCK BLACKFISH	*Girella elevata*
GIRELLIDAE	LUDERICK	*Girella tricuspidata*
KYPHOSIDAE	SILVER DRUMMER	*Kyphosus sydneyanus*
KYPHOSIDAE	LOW-FINNED DRUMMER	*Kyphosus vaigiensis*
SCORPIDIDAE	SEA SWEEP	*Scorpis aequipinnis*
SCORPIDIDAE	SILVER SWEEP	*Scorpis lineolatus*
MICROCANTHIDAE	MADO	*Atypichthys strigatus*
POMACENTRIDAE	WHITE EAR	*Parma microlepis*
POMACENTRIDAE	GIRDLED PARMA	*Parma unifasciata*
CHIRONEMIDAE	KELPFISH	*Chironemus marmoratus*
APLODACTYLIDAE	ROCK CALE	*Crinodus lophodon*
CHEILODACTYLIDAE	RED MORWONG	*Cheilodactylus fuscus*
CHEILODACTYLIDAE	BLUE MORWONG	*Nemadactylus douglasii*
CHEILODACTYLIDAE	JACKASS MORWONG	*Nemadactylus macropterus*
CHEILODACTYLIDAE	MORWONGS OTHER	Unidentified Cheilodactylid species
LATRIDIDAE	BASTARD TRUMPETER	*Latridopsis forsteri*
LATRIDIDAE	STRIPED TRUMPETER	*Latris lineata*
MUGILIDAE	MULLETS	All species combined
SPHYRAENIDAE	SNOOK	*Sphyraena novaehollandiae*
SPHYRAENIDAE	STRIPED SEAPIKE	*Sphyraena obtusata*
LABRIDAE	BLUE GROPER	*Achoerodus viridis*

Table 5. An exponential representation of the estimated recreational harvest, based on numbers of fish, for all taxa kept by trailer boat anglers at all selected survey sites (arranged in order from north to south) for each survey year during the two year period - September 1993 to August 1995 inclusive.

KEY: · 1 - 9, • 10 - 99, ● 100 - 999, ● 1000 - 9999, ● 10000+

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SURVEY YEAR 1									SURVEY YEAR 2								
			KINGSCLIFF	EVANS HEAD	COFFS HARBOUR	CROWDY HEAD	SYDNEY	BELLAMBI	ULLADULLA	BERMAGUI	EDEN	KINGSCLIFF	EVANS HEAD	COFFS HARBOUR	CROWDY HEAD	SYDNEY	BELLAMBI	ULLADULLA	BERMAGUI	EDEN
LABRIDAE	GOLD-SPOT PIGFISH	*Bodianus perditio*	•						·			•	•							
LABRIDAE	EASTERN FOXFISH	*Bodianus sp.*					·		·							•				
LABRIDAE	BLACK-SPOT PIGFISH	*Bodianus vulpinus*	·	·	•	·	●	●	●	●	●	•	·	•	•	●	●	●	●	·
LABRIDAE	VENUS TUSKFISH	*Choerodon venustus*	●	•	•							●	●	●						
LABRIDAE	TUSKFISHES OTHER	*Choerodon spp.*		·																
LABRIDAE	COMB FISH	*Coris picta*														·				
LABRIDAE	EASTERN KING WRASSE	*Coris sandageri*					·										·			
LABRIDAE	THREE-SPOT WRASSE	*Halichoeres trimaculatus*	·																	
LABRIDAE	PURPLE WRASSE	*Notolabrus fucicola*																		·
LABRIDAE	CRIMSON-BANDED WRASSE	*Notolabrus gymnogenis*	•	●	•	•	●	●	●	●	•	•	●	●	•	●	●	●	•	•
LABRIDAE	BLUE-THROATED WRASSE	*Notolabrus tetricus*								•	●									•
LABRIDAE	MAORI WRASSE	*Ophthalmolepis lineolata*	·	●	●	●	●	●	●	●	●	·	●	●	●	●	●	●	●	●
LABRIDAE	SENATOR WRASSE	*Pictilabrus laticlavius*					•											·		·
LABRIDAE	MOON WRASSE	*Thalassoma lunare*	•									•								
LABRIDAE	WRASSES OTHER	Unidentified Labrid species					·									·				
ODACIDAE	RAINBOW CALE	*Odax acroptilus*					·													
ODACIDAE	HERRING CALE	*Odax cyanomelas*															·			
SCARIDAE	BLUE-BARRED PARROTFISH	*Scarus ghobban*		·																
GEMPYLIDAE	BARRACOUTA	*Thyrsites atun*					·	●	●	●	●					·	•	•	●	●
CENTROLOPHIDAE	WAREHOU	*Seriolella brama*																·		
SCOMBRIDAE	NARROW-BARRED SPANISH MACKEREL	*Scomberomorus commerson*	•	•	•							•	•	•	·					
SCOMBRIDAE	SPOTTED MACKEREL	*Scomberomorus munroi*		●	●								•	●		·				
SCOMBRIDAE	QUEENSLAND SCHOOL MACKEREL	*Scomberomorus queenslandicus*		·								·	·							
SCOMBRIDAE	FRIGATE MACKEREL	*Auxis thazard*			•		●	●	●	●	●	•	·			•	•		●	●
SCOMBRIDAE	SLIMY MACKEREL	*Scomber australasicus*		·	●	●	●	●	●	●	●	●	•	●	●	●	●	●	●	●
SCOMBRIDAE	LEAPING BONITO	*Cybiosarda elegans*			·								·	·	·		•			
SCOMBRIDAE	MACKEREL TUNA	*Euthynnus affinis*	●	•	●	●	•			·		•	●	•	●	●	·		·	
SCOMBRIDAE	SKIPJACK	*Katsuwonus pelamis*			•		●	•	•	●	●			•	·	●	•	•	●	●
SCOMBRIDAE	AUSTRALIAN BONITO	*Sarda australis*	●	●	●	·	●	●	•	●	●	•	●	●	●	●	●	·	●	•

Table 5. An exponential representation of the estimated recreational harvest, based on numbers of fish, for all taxa kept by trailer boat anglers at all selected survey sites (arranged in order from north to south) for each survey year during the two year period - September 1993 to August 1995 inclusive.

KEY: · 1 - 9, • 10 - 99, ● 100 - 999, ● 1000 - 9999, ● 10000+

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SURVEY YEAR 1									SURVEY YEAR 2								
			KINGSCLIFF	EVANS HEAD	COFFS HARBOUR	CROWDY HEAD	SYDNEY	BELLAMBI	ULLADULLA	BERMAGUI	EDEN	KINGSCLIFF	EVANS HEAD	COFFS HARBOUR	CROWDY HEAD	SYDNEY	BELLAMBI	ULLADULLA	BERMAGUI	EDEN
SCOMBRIDAE	ORIENTAL BONITO	*Sarda orientalis*				·							·		·					
SCOMBRIDAE	ALBACORE	*Thunnus alalunga*					·			●	•								●	
SCOMBRIDAE	YELLOWFIN TUNA	*Thunnus albacares*	•		·		·	·	•	●	•			•					●	
SCOMBRIDAE	SOUTHERN BLUEFIN TUNA	*Thunnus maccoyii*														·				
SCOMBRIDAE	BIGEYE TUNA	*Thunnus obesus*					·													
ISTIOPHORIDAE	BLACK MARLIN	*Makaira indica*			·					·										
ISTIOPHORIDAE	STRIPED MARLIN	*Tetrapturus audax*			•				·	•									•	·
ACANTHURIDAE	SURGEON FISHES	All species combined			·															
SIGANIDAE	RABBITFISHES	*Siganus spp.*						·						·						
BOTHIDAE	LARGE-TOOTHED FLOUNDER	*Pseudorhombus arsius*		•	•	•	●	•	•	·	•	·	•	•	•	●	•	•		•
BOTHIDAE	SMALL-TOOTHED FLOUNDER	*Pseudorhombus jenynsii*			·	•	●	•	·		•		·		•	•	•	•	·	
PLEURONECTIDAE	LONG SNOUTED FLOUNDER	*Ammotretis rostratus*															·			
SOLEIDAE	BLACK SOLE	*Synaptura nigra*					·													
BALISTIDAE	BRIDLED TRIGGERFISH	*Sufflamen fraenatus*	·											•						
MONACANTHIDAE	UNICORN LEATHERJACKET	*Aluterus monoceros*							·	·				·						
MONACANTHIDAE	LARGE-SCALED LEATHERJACKET	*Cantheschenia grandisquamis*		·																
MONACANTHIDAE	BLACK REEF LEATHERJACKET	*Eubalichthys bucephalus*					●			●	·					·	·		●	
MONACANTHIDAE	MOSAIC LEATHERJACKET	*Eubalichthys mosaicus*						•	·	·										
MONACANTHIDAE	YELLOW-STRIPED LEATHERJACKET	*Meuschenia flavolineata*					•		·							•	·			
MONACANTHIDAE	SIX-SPINED LEATHERJACKET	*Meuschenia freycineti*			•	•	●	●	•	●	●				·	•	●	•	•	•
MONACANTHIDAE	HORSESHOE LEATHERJACKET	*Meuschenia hippocrepis*					·				•									
MONACANTHIDAE	YELLOW-FINNED LEATHERJACKET	*Meuschenia trachylepis*			•	·	•		•	•	•			•	·	•		•	·	•
MONACANTHIDAE	CHINAMAN LEATHERJACKET	*Nelusetta ayraudi*	·		•	•	●	•	•	●	•	•	·	•	•	●	●	•	●	
MONACANTHIDAE	DUSKY LEATHERJACKET	*Paramonacanthus otisensis*														·				
MONACANTHIDAE	VELVET LEATHERJACKET	*Parika scaber*					·		·	•							•		•	
MONACANTHIDAE	TOOTHBRUSH LEATHERJACKET	*Penicipelta vittiger*					·			•	·						·			
MONACANTHIDAE	ROUGH LEATHERJACKET	*Scobinichthys granulatus*					•	•	•	•						•	•		•	•
MONACANTHIDAE	LEATHERJACKETS OTHER	Unidentified Monacanthid species	·				·		•			•				•				
CEPHALOPODA	COMMON SQUID	*Loligo spp.*	·	·		·	●	•	·						·	●	●		·	·

Table 5. An exponential representation of the estimated recreational harvest, based on numbers of fish, for all taxa kept by trailer boat anglers at all selected survey sites (arranged in order from north to south) for each survey year during the two year period - September 1993 to August 1995 inclusive.

KEY: · 1 - 9, • 10 - 99, ● 100 - 999, ● 1000 - 9999, ● 10000+

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SURVEY YEAR 1									SURVEY YEAR 2							
			KINGSCLIFF	EVANS HEAD	COFFS HARBOUR	CROWDY HEAD	SYDNEY	BELLAMBI	ULLADULLA	BERMAGUI	EDEN	KINGSCLIFF	EVANS HEAD	COFFS HARBOUR	CROWDY HEAD	SYDNEY	BELLAMBI	ULLADULLA	BERMAGUI	EDEN
CEPHALOPODA	ARROW SQUID	*Nototodarus gouldi*							•	●	●						•	•	•	●
CEPHALOPODA	OCTOPUS	*Octopus spp.*			•		●			·	•			·	·	●			·	
CEPHALOPODA	GIANT CUTTLEFISH	*Sepia apama*			·		●	●	•	•	•		•	·		●	●	•		•
CEPHALOPODA	SOUTHERN CALAMARI	*Sepioteuthis australis*			·		●	●	●	●	●		·			●	•	●		•
CRUSTACEA	TWO-SPOT SAND CRABS	*Ovalipes spp.*					·										·			
CRUSTACEA	SPANNER CRAB	*Ranina ranina*					·	•						·						
CRUSTACEA	MUD CRAB	*Scylla serrata*					·													
TOTAL TAXA			49	58	79	51	95	74	74	74	75	52	65	83	58	84	75	59	68	58

Table 6. Statewide estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the two year survey period - September 1993 to August 1995 inclusive.

		SURVEY YEAR 1				SURVEY YEAR 2			
COMMON NAME	**TAXON**	**No. fish**	**s.e.**	**Rank**	**%**	**No. fish**	**s.e.**	**Rank**	**%**
PORT JACKSON SHARKS*	*Heterodontus spp.*	98	34	110	0.004	-	-	-	-
RUSTY CATSHARK*	*Parascyllium ferrugineum*	44	28	119	0.002	-	-	-	-
BLIND SHARK*	*Brachaelurus waddi*	381	74	89	0.016	79	29	105	0.004
WOBBEGONG SHARKS*	*Orectolobus spp.*	1044	209	70	0.044	536	71	79	0.029
SHORTFIN MAKO SHARK*	*Isurus oxyrinchus*	1082	243	69	0.045	790	139	69	0.042
SCHOOL SHARK	*Galeorhinus galeus*	382	78	88	0.016	183	56	97	0.010
GUMMY SHARK	*Mustelus antarcticus*	1470	293	61	0.062	914	136	65	0.049
WHALER SHARKS	*Carcharhinus spp.*	1158	192	66	0.048	994	150	63	0.053
HAMMERHEAD SHARKS*	*Sphyrna spp.*	432	187	87	0.018	221	74	94	0.012
ANGEL SHARK*	*Squatina australis*	-	-	-	-	35	28	115	0.002
SHOVELNOSE RAYS*	*Aptychotrema spp. & Rhynchobatus spp.*	796	190	75	0.033	1524	347	58	0.081
BANJO RAY*	*Trygonorhina fasciata*	531	117	82	0.022	513	175	80	0.027
STINGAREES & BLACK STINGRAYS*	*Urolophus spp. & Dasyatis spp.*	131	65	106	0.005	-	-	-	-
EELS*	All species combined	97	90	111	0.004	-	-	-	-
SERGEANT BAKER	*Aulopus purpurissatus*	56409	2501	10	2.361	47451	2770	10	2.524
LIZARDFISHES	All species combined	289	190	92	0.012	-	-	-	-
BEARDED CODS*	All species combined	2210	420	52	0.093	795	167	68	0.042
ROCK LING	*Genypterus tigerinus*	63	37	115	0.003	20	14	116	0.001
GARFISHES*	*Hyporhamphus spp.*	308	228	91	0.013	-	-	-	-
LONGTOMS*	All species combined	137	50	104	0.006	2250	829	52	0.120
NANNYGAI	*Centroberyx affinis*	87190	5719	7	3.650	64776	5022	7	3.446
SILVER DORY	*Cyttus australis*	107	63	108	0.004	-	-	-	-
MIRROR DORY	*Zenopsis nebulosis*	-	-	-	-	343	76	88	0.018
JOHN DORY	*Zeus faber*	976	157	73	0.041	2008	390	55	0.107
OCEAN PERCH	*Helicolenus percoides*	4602	906	42	0.193	3642	803	39	0.194
COMMON GURNARD PERCH*	*Neosebastes scorpaenoides*	543	169	80	0.023	253	87	92	0.013
RED SCORPIONCOD	*Scorpaena cardinalis*	43050	2517	15	1.802	35184	2176	15	1.872
RED GURNARD	*Chelidonichthys kumu*	11079	966	29	0.464	9108	793	29	0.485
LATCHET	*Pterygotrigla polyommata*	1116	289	68	0.047	545	117	78	0.029

KEY: * Associated estimates of weight are not provided for this taxon in Table 7 because a suitable length/weight conversion key was not available.

Table 6. Statewide estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the two year survey period - September 1993 to August 1995 inclusive.

		SURVEY YEAR 1				SURVEY YEAR 2			
COMMON NAME	**TAXON**	**No. fish**	**s.e.**	**Rank**	**%**	**No. fish**	**s.e.**	**Rank**	**%**
TIGER FLATHEAD	*Neoplatycephalus richardsoni*	48340	9341	13	2.023	41098	4677	12	2.186
NORTHERN SAND FLATHEAD	*Platycephalus arenarius*	125	96	107	0.005	59	20	110	0.003
SOUTHERN SAND FLATHEAD	*Platycephalus bassensis*	-	-	-	-	638	284	74	0.034
EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*	558781	30506	1	23.390	477653	27606	1	25.409
DUSKY FLATHEAD	*Platycephalus fuscus*	8265	859	31	0.346	9191	1113	28	0.489
LONG-SPINED FLATHEAD	*Platycephalus longispinis*	2126	425	53	0.089	1073	328	61	0.057
MARBLED FLATHEAD	*Platycephalus marmoratus*	14007	1306	26	0.586	12227	1076	25	0.650
ORANGE-FRECKLED FLATHEAD*	*Ratabulus diversidens*	222	68	95	0.009	396	93	85	0.021
ORANGE PERCH*	*Anthias pulchellus*	56	40	117	0.002	68	33	107	0.004
BUTTERFLY PERCH*	*Caesioperca lepidoptera*	67	54	114	0.003	88	49	104	0.005
LONG-FINNED PERCH*	*Caprodon longimanus*	1411	562	64	0.059	1885	862	56	0.100
YELLOW-BANDED SEAPERCH*	*Ellerkeldia annulata*	-	-	-	-	512	214	81	0.027
HALF-BANDED SEAPERCH*	*Ellerkeldia mccullochi*	1987	663	56	0.083	1052	393	62	0.056
BLACK-BANDED SEAPERCH*	*Hypoplectrodes nigrorubrum*	157	53	101	0.007	-	-	-	-
WIRRAH	*Acanthistius ocellatus*	4375	610	43	0.183	2630	404	47	0.140
MAORI COD	*Epinephelus undulatostriatus*	727	95	76	0.030	902	104	66	0.048
PEARL PERCH	*Glaucosoma scapulare*	5858	1393	37	0.245	2933	526	43	0.156
SIX-LINED TRUMPETER*	*Pelates quadrilineatus*	-	-	-	-	690	211	71	0.037
LONG-FINNED SEAPIKE	*Dinolestes lewini*	45767	3591	14	1.916	42562	4555	11	2.264
SAND WHITING*	*Sillago ciliata*	37	26	120	0.002	-	-	-	-
SCHOOL WHITING	*Sillago flindersi*	5907	1092	35	0.247	7345	1309	32	0.391
TAILOR	*Pomatomus saltatrix*	52837	8239	11	2.212	36965	6403	13	1.966
COBIA	*Rachycentron canadum*	2839	326	50	0.119	1435	213	59	0.076
AMBERJACK	*Seriola dumerili*	181	44	99	0.008	79	18	105	0.004
SAMSON FISH	*Seriola hippos*	6011	624	34	0.252	3331	290	41	0.177
KINGFISH	*Seriola lalandi*	22462	2578	19	0.940	12842	1384	24	0.683
GIANT TREVALLY*	*Caranx ignobilis*	69	18	113	0.003	-	-	-	-
SILVER TREVALLY	*Pseudocaranx dentex*	125384	9377	4	5.249	159322	13745	3	8.475
YELLOWTAIL & JACK MACKEREL	*Trachurus novaezelandiae & T. declivis*	115141	14159	5	4.820	85133	7221	6	4.529

KEY: * Associated estimates of weight are not provided for this taxon in Table 7 because a suitable length/weight conversion key was not available.

Table 6. Statewide estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the two year survey period - September 1993 to August 1995 inclusive.

		SURVEY YEAR 1				SURVEY YEAR 2			
COMMON NAME	**TAXON**	**No. fish**	**s.e.**	**Rank**	**%**	**No. fish**	**s.e.**	**Rank**	**%**
BASSET-HULLS TREVALLY*	*Uraspis uraspis*	169	86	100	0.007	-	-	-	-
DOLPHIN FISH	*Coryphaena hippurus*	8739	2681	30	0.366	9775	2880	27	0.520
SALMON	*Arripis trutta*	7782	1145	32	0.326	2778	580	46	0.148
YELLOWFIN BREAM	*Acanthopagrus australis*	33612	2991	16	1.407	23308	2030	16	1.240
SNAPPER	*Pagrus auratus*	273700	10309	2	11.457	210293	8471	2	11.187
TARWHINE	*Rhabdosargus sarba*	12815	1854	27	0.536	15454	3091	20	0.822
COLLARED SEA BREAM*	*Gymnocranius audleyi*	-	-	-	-	49	17	111	0.003
GRASS EMPORER*	*Lethrinus laticaudis*	-	-	-	-	46	15	113	0.002
SWEETLIP EMPORER*	*Lethrinus miniatus*	-	-	-	-	202	83	96	0.011
SPANGLED EMPORER*	*Lethrinus nebulosus*	196	45	97	0.008	953	157	64	0.051
MULLOWAY	*Argyrosomus hololepidotus*	5060	1191	40	0.212	2878	617	44	0.153
TERAGLIN	*Atractoscion aequidens*	23891	3101	18	1.000	11222	1092	26	0.597
GREEN JOBFISH*	*Aprion virescens*	-	-	-	-	91	32	103	0.005
FIVE-LINED SEAPERCH*	*Lutjanus quinquelineatus*	-	-	-	-	38	16	114	0.002
MOSES PERCH*	*Lutjanus russelli*	1862	186	57	0.078	2569	349	48	0.137
RED EMPORER*	*Lutjanus sebae*	51	18	118	0.002	-	-	-	-
SOUTHERN FUSILIER*	*Paracaesio xanthurus*	663	263	78	0.028	815	209	67	0.043
NETTED SWEETLIPS*	*Plectorhinchus flavomaculatus*	464	94	85	0.019	582	79	77	0.031
BLACKSPOT GOATFISH	*Parupeneus signatus*	1719	188	58	0.072	2428	443	51	0.129
BLUE-STRIPED GOATFISH	*Upeneichthys lineatus*	982	234	72	0.041	607	195	76	0.032
SILVER BATFISH*	*Monodactylus argenteus*	-	-	-	-	329	88	89	0.018
LADDER-FINNED POMFRET*	*Schuettea scalaripinnis*	-	-	-	-	132	58	102	0.007
ROCK BLACKFISH*	*Girella elevata*	1309	285	65	0.055	168	61	98	0.009
SILVER SWEEP	*Scorpis lineolatus*	102619	8432	6	4.296	90631	9140	5	4.821
MADO*	*Atypichthys strigatus*	2301	434	51	0.096	2866	807	45	0.152
WHITE EAR*	*Parma microlepis*	193	114	98	0.008	632	296	75	0.034
GIRDLED PARMA*	*Parma unifasciata*	567	331	79	0.024	-	-	-	-
KELPFISH*	*Chironemus marmoratus*	1462	333	62	0.061	488	187	83	0.026
RED MORWONG	*Cheilodactylus fuscus*	454	141	86	0.019	417	205	84	0.022

KEY: * Associated estimates of weight are not provided for this taxon in Table 7 because a suitable length/weight conversion key was not available.

Table 6. Statewide estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the two year survey period - September 1993 to August 1995 inclusive.

		SURVEY YEAR 1				SURVEY YEAR 2			
COMMON NAME	**TAXON**	**No. fish**	**s.e.**	**Rank**	**%**	**No. fish**	**s.e.**	**Rank**	**%**
BLUE MORWONG	*Nemadactylus douglasii*	86448	4752	8	3.619	56216	3698	9	2.990
JACKASS MORWONG	*Nemadactylus macropterus*	11115	1941	28	0.465	6208	1741	34	0.330
BASTARD TRUMPETER*	*Latridopsis forsteri*	19	19	121	0.001	-	-	-	-
STRIPED TRUMPETER*	*Latris lineata*	218	85	96	0.009	-	-	-	-
SNOOK*	*Sphyraena novaehollandiae*	1013	576	71	0.042	-	-	-	-
STRIPED SEAPIKE	*Sphyraena obtusata*	1445	953	63	0.060	3352	867	40	0.178
BLUE GROPER	*Achoerodus viridis*	5459	559	39	0.229	4010	561	36	0.213
GOLD-SPOT PIGFISH	*Bodianus perditio*	154	51	102	0.006	308	51	90	0.016
EASTERN FOXFISH	*Bodianus sp.*	-	-	-	-	504	249	82	0.027
BLACK-SPOT PIGFISH	*Bodianus vulpinus*	18930	1440	22	0.792	13496	1049	22	0.718
VENUS TUSKFISH*	*Choerodon venustus*	2873	508	49	0.120	4794	912	35	0.255
COMB FISH	*Coris picta*	-	-	-	-	162	91	99	0.009
CRIMSON-BANDED WRASSE	*Notolabrus gymnogenis*	14364	1167	25	0.601	13340	1520	23	0.710
BLUE-THROATED WRASSE	*Notolabrus tetricus*	670	172	77	0.028	65	55	109	0.003
MAORI WRASSE	*Ophthalmolepis lineolata*	69511	5822	9	2.910	57361	5055	8	3.051
SENATOR WRASSE*	*Pictilabrus laticlavius*	154	91	102	0.006	-	-	-	-
MOON WRASSE	*Thalassoma lunare*	286	80	93	0.012	-	-	-	-
BARRACOUTA	*Thyrsites atun*	16068	2067	23	0.673	2186	686	53	0.116
NARROW-BARRED SPANISH MACKEREL	*Scomberomorus commerson*	538	96	81	0.023	696	90	70	0.037
SPOTTED MACKEREL	*Scomberomorus munroi*	3139	769	47	0.131	652	101	73	0.035
QUEENSLAND SCHOOL MACKEREL	*Scomberomorus queenslandicus*	-	-	-	-	49	20	111	0.003
FRIGATE MACKEREL	*Auxis thazard*	5890	790	36	0.247	2045	491	54	0.109
SLIMY MACKEREL	*Scomber australasicus*	256154	55177	3	10.722	111559	20300	4	5.934
LEAPING BONITO	*Cybiosarda elegans*	-	-	-	-	157	80	100	0.008
MACKEREL TUNA	*Euthynnus affinis*	2974	432	48	0.124	2519	358	50	0.134
SKIPJACK	*Katsuwonus pelamis*	26784	5918	17	1.121	15425	4450	21	0.821
AUSTRALIAN BONITO	*Sarda australis*	20445	2701	21	0.856	18683	4506	17	0.994
ORIENTAL BONITO	*Sarda orientalis*	89	49	112	0.004	67	26	108	0.004
ALBACORE	*Thunnus alalunga*	5595	1289	38	0.234	7375	4615	31	0.392

KEY: * Associated estimates of weight are not provided for this taxon in Table 7 because a suitable length/weight conversion key was not available.

Table 6. Statewide estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the two year survey period - September 1993 to August 1995 inclusive.

		SURVEY YEAR 1				SURVEY YEAR 2			
COMMON NAME	**TAXON**	**No. fish**	**s.e.**	**Rank**	**%**	**No. fish**	**s.e.**	**Rank**	**%**
YELLOWFIN TUNA	*Thunnus albacares*	3432	746	46	0.144	6293	1395	33	0.335
STRIPED MARLIN	*Tetrapturus audax*	281	124	94	0.012	287	90	91	0.015
LARGE-TOOTHED FLOUNDER	*Pseudorhombus arsius*	3550	705	45	0.149	3992	1106	37	0.212
SMALL-TOOTHED FLOUNDER	*Pseudorhombus jenynsii*	4653	653	41	0.195	3816	674	38	0.203
BRIDLED TRIGGERFISH*	*Sufflamen fraenatus*	-	-	-	-	148	47	101	0.008
BLACK REEF LEATHERJACKET	*Eubalichthys bucephalus*	930	258	74	0.039	670	240	72	0.036
MOSAIC LEATHERJACKET	*Eubalichthys mosaicus*	135	48	105	0.006	-	-	-	-
YELLOW-STRIPED LEATHERJACKET*	*Meuschenia flavolineata*	1696	474	59	0.071	215	106	95	0.011
SIX-SPINED LEATHERJACKET	*Meuschenia freycineti*	15633	1252	24	0.654	17423	3472	19	0.927
HORSESHOE LEATHERJACKET	*Meuschenia hippocrepis*	62	52	116	0.003	-	-	-	-
YELLOW-FINNED LEATHERJACKET	*Meuschenia trachylepis*	2090	332	54	0.087	3252	573	42	0.173
CHINAMAN LEATHERJACKET	*Nelusetta ayraudi*	21010	5545	20	0.879	18275	3976	18	0.972
VELVET LEATHERJACKET*	*Parika scaber*	516	252	83	0.022	252	71	93	0.013
TOOTHBRUSH LEATHERJACKET	*Penicipelta vittiger*	480	235	84	0.020	-	-	-	-
ROUGH LEATHERJACKET	*Scobinichthys granulatus*	1613	343	60	0.068	1539	300	57	0.082
LEATHERJACKETS OTHER	Unidentified Monacanthid species	323	189	90	0.014	389	126	86	0.021
COMMON SQUID	*Loligo spp.*	6582	2300	33	0.276	8698	2540	30	0.463
ARROW SQUID	*Nototodarus gouldi*	2020	1025	55	0.085	1075	734	60	0.057
OCTOPUS*	*Octopus spp.*	1124	240	67	0.047	371	154	87	0.020
GIANT CUTTLEFISH	*Sepia apama*	3607	462	44	0.151	2544	443	49	0.135
SOUTHERN CALAMARI	*Sepioteuthis australis*	49301	6535	12	2.064	35372	5926	14	1.882
SPANNER CRAB*	*Ranina ranina*	102	39	109	0.004	-	-	-	-

KEY: * Associated estimates of weight are not provided for this taxon in Table 7 because a suitable length/weight conversion key was not available.

Table 7. Statewide estimates of recreational harvest (kg) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the two year survey period - September 1993 to August 1995 inclusive.

		SURVEY YEAR 1				SURVEY YEAR 2			
COMMON NAME	**TAXON**	**kg**	**s.e.**	**Rank**	**%**	**kg**	**s.e.**	**Rank**	**%**
SCHOOL SHARK	*Galeorhinus galeus*	1076	205	55	0.070	576	213	62	0.047
GUMMY SHARK	*Mustelus antarcticus*	2976	595	47	0.195	1715	389	47	0.139
WHALER SHARKS	*Carcharhinus spp.*	13765	4884	30	0.900	1687	241	48	0.136
SERGEANT BAKER	*Aulopus purpurissatus*	37301	1601	11	2.438	32012	1842	10	2.588
LIZARDFISHES	All species combined	233	129	69	0.015	-	-	-	-
ROCK LING	*Genypterus tigerinus*	9	5	79	0.001	5	4	79	< 0.001
NANNYGAI	*Centroberyx affinis*	24760	1555	16	1.619	18428	1491	16	1.490
SILVER DORY	*Cyttus australis*	17	9	78	0.001	-	-	-	-
MIRROR DORY	*Zenopsis nebulosis*	-	-	-	-	219	43	67	0.018
JOHN DORY	*Zeus faber*	857	135	59	0.056	1630	275	50	0.132
OCEAN PERCH	*Helicolenus percoides*	1567	301	52	0.102	928	203	55	0.075
RED SCORPIONCOD	*Scorpaena cardinalis*	20641	1068	22	1.349	16072	947	21	1.299
RED GURNARD	*Chelidonichthys kumu*	7204	557	41	0.471	5282	457	37	0.427
LATCHET	*Pterygotrigla polyommata*	921	242	57	0.060	314	70	63	0.025
TIGER FLATHEAD	*Neoplatycephalus richardsoni*	21191	4665	21	1.385	18506	2313	15	1.496
NORTHERN SAND FLATHEAD	*Platycephalus arenarius*	32	28	77	0.002	23	9	78	0.002
SOUTHERN SAND FLATHEAD	*Platycephalus bassensis*	-	-	-	-	220	99	66	0.018
EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*	229267	12821	1	14.987	207527	16955	1	16.775
DUSKY FLATHEAD	*Platycephalus fuscus*	7762	784	39	0.507	7509	816	30	0.607
LONG-SPINED FLATHEAD	*Platycephalus longispinis*	360	70	66	0.024	211	69	68	0.017
MARBLED FLATHEAD	*Platycephalus marmoratus*	8757	850	38	0.572	7409	702	31	0.599
WIRRAH	*Acanthistius ocellatus*	2156	274	49	0.141	1622	280	51	0.131
MAORI COD	*Epinephelus undulatostriatus*	682	89	60	0.045	856	93	56	0.069
PEARL PERCH	*Glaucosoma scapulare*	9179	2630	36	0.600	3623	571	44	0.293
LONG-FINNED SEAPIKE	*Dinolestes lewini*	15117	1185	26	0.988	13493	1516	24	1.091
SCHOOL WHITING	*Sillago flindersi*	951	132	56	0.062	747	113	59	0.060
TAILOR	*Pomatomus saltatrix*	35046	4460	12	2.291	25485	3922	12	2.060
COBIA	*Rachycentron canadum*	13933	1821	29	0.911	7618	1068	29	0.616
AMBERJACK	*Seriola dumerili*	438	121	65	0.029	274	65	64	0.022
SAMSON FISH	*Seriola hippos*	7759	807	40	0.507	5102	577	38	0.412

Table 7. Statewide estimates of recreational harvest (kg) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the two year survey period - September 1993 to August 1995 inclusive.

		SURVEY YEAR 1				SURVEY YEAR 2			
COMMON NAME	**TAXON**	**kg**	**s.e.**	**Rank**	**%**	**kg**	**s.e.**	**Rank**	**%**
KINGFISH	*Seriola lalandi*	52979	5598	7	3.463	35839	3335	8	2.897
SILVER TREVALLY	*Pseudocaranx dentex*	103549	9033	3	6.769	112296	11014	3	9.077
YELLOWTAIL & JACK MACKEREL	*Trachurus novaezelandiae & T. declivis*	24367	2783	17	1.593	17817	1412	19	1.440
DOLPHIN FISH	*Coryphaena hippurus*	11791	3133	33	0.771	12752	4282	26	1.031
SALMON	*Arripis trutta*	14725	2557	28	0.963	3963	860	42	0.320
YELLOWFIN BREAM	*Acanthopagrus australis*	21985	1928	20	1.437	14301	1273	23	1.156
SNAPPER	*Pagrus auratus*	184210	6863	2	12.042	187648	8801	2	15.168
TARWHINE	*Rhabdosargus sarba*	6535	1023	43	0.427	6006	916	36	0.485
MULLOWAY	*Argyrosomus hololepidotus*	27217	6068	15	1.779	16315	3142	20	1.319
TERAGLIN	*Atractoscion aequidens*	20068	2466	23	1.312	12547	1224	27	1.014
BLACKSPOT GOATFISH	*Parupeneus signatus*	913	98	58	0.060	1716	319	46	0.139
BLUE-STRIPED GOATFISH	*Upeneichthys lineatus*	340	98	67	0.022	199	60	70	0.016
SILVER SWEEP	*Scorpis lineolatus*	47548	3777	8	3.108	43168	4196	6	3.489
RED MORWONG	*Cheilodactylus fuscus*	616	199	62	0.040	603	296	60	0.049
BLUE MORWONG	*Nemadactylus douglasii*	90871	4965	4	5.940	54932	3848	5	4.440
JACKASS MORWONG	*Nemadactylus macropterus*	8944	1505	37	0.585	5092	1434	40	0.412
STRIPED SEAPIKE	*Sphyraena obtusata*	445	302	64	0.029	754	238	58	0.061
BLUE GROPER	*Achoerodus viridis*	15969	1732	25	1.044	12943	2000	25	1.046
GOLD-SPOT PIGFISH	*Bodianus perditio*	104	35	73	0.007	226	38	65	0.018
EASTERN FOXFISH	*Bodianus sp.*	-	-	-	-	157	75	72	0.013
BLACK-SPOT PIGFISH	*Bodianus vulpinus*	10938	773	34	0.715	6261	492	33	0.506
COMB FISH	*Coris picta*	-	-	-	-	31	16	77	0.003
CRIMSON-BANDED WRASSE	*Notolabrus gymnogenis*	6199	415	44	0.405	5102	575	38	0.412
BLUE-THROATED WRASSE	*Notolabrus tetricus*	677	184	61	0.044	81	69	74	0.007
MAORI WRASSE	*Ophthalmolepis lineolata*	23970	1860	18	1.567	18342	1452	17	1.483
MOON WRASSE	*Thalassoma lunare*	110	35	72	0.007	-	-	-	-
BARRACOUTA	*Thyrsites atun*	15108	1930	27	0.988	1427	441	52	0.115
NARROW-BARRED SPANISH MACKEREL	*Scomberomorus commerson*	4797	882	45	0.314	6719	981	32	0.543
SPOTTED MACKEREL	*Scomberomorus munroi*	12133	2775	31	0.793	3679	787	43	0.297
QUEENSLAND SCHOOL MACKEREL	*Scomberomorus queenslandicus*	-	-	-	-	38	16	76	0.003

Table 7. Statewide estimates of recreational harvest (kg) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the two year survey period - September 1993 to August 1995 inclusive.

		SURVEY YEAR 1				SURVEY YEAR 2			
COMMON NAME	**TAXON**	**kg**	**s.e.**	**Rank**	**%**	**kg**	**s.e.**	**Rank**	**%**
FRIGATE MACKEREL	*Auxis thazard*	3751	526	46	0.245	1644	402	49	0.133
SLIMY MACKEREL	*Scomber australasicus*	40069	9427	9	2.619	18165	3483	18	1.468
LEAPING BONITO	*Cybiosarda elegans*	-	-	-	-	81	41	74	0.007
MACKEREL TUNA	*Euthynnus affinis*	11986	1776	32	0.784	6097	635	34	0.493
SKIPJACK	*Katsuwonus pelamis*	56783	13326	6	3.712	39024	11286	7	3.154
AUSTRALIAN BONITO	*Sarda australis*	34289	4544	13	2.241	28220	8426	11	2.281
ORIENTAL BONITO	*Sarda orientalis*	93	52	74	0.006	102	39	73	0.008
ALBACORE	*Thunnus alalunga*	38696	9461	10	2.530	35148	24921	9	2.841
YELLOWFIN TUNA	*Thunnus albacares*	73098	16568	5	4.778	59135	13738	4	4.780
STRIPED MARLIN	*Tetrapturus audax*	31848	12755	14	2.082	25237	8043	13	2.040
LARGE-TOOTHED FLOUNDER	*Pseudorhombus arsius*	1639	246	51	0.107	1426	379	53	0.115
SMALL-TOOTHED FLOUNDER	*Pseudorhombus jenynsii*	2210	262	48	0.144	1753	269	45	0.142
BLACK REEF LEATHERJACKET	*Eubalichthys bucephalus*	317	99	68	0.021	207	73	69	0.017
MOSAIC LEATHERJACKET	*Eubalichthys mosaicus*	41	15	76	0.003	-	-	-	-
SIX-SPINED LEATHERJACKET	*Meuschenia freycineti*	10339	797	35	0.676	10359	2035	28	0.837
HORSESHOE LEATHERJACKET	*Meuschenia hippocrepis*	65	48	75	0.004	-	-	-	-
YELLOW-FINNED LEATHERJACKET	*Meuschenia trachylepis*	1153	166	54	0.075	1231	221	54	0.100
CHINAMAN LEATHERJACKET	*Nelusetta ayraudi*	6706	1558	42	0.438	6028	1284	35	0.487
TOOTHBRUSH LEATHERJACKET	*Penicipelta vittiger*	222	77	70	0.015	-	-	-	-
ROUGH LEATHERJACKET	*Scobinichthys granulatus*	498	109	63	0.033	593	116	61	0.048
LEATHERJACKETS OTHER	Unidentified Monacanthid species	118	63	71	0.008	191	68	71	0.015
COMMON SQUID	*Loligo spp.*	2072	685	50	0.135	4666	1230	41	0.377
ARROW SQUID	*Nototodarus gouldi*	1258	573	53	0.082	813	572	57	0.066
GIANT CUTTLEFISH	*Sepia apama*	22429	3248	19	1.466	15272	3647	22	1.234
SOUTHERN CALAMARI	*Sepioteuthis australis*	18995	2274	24	1.242	21680	3627	14	1.752

The ten most commonly harvested taxa, by number, during the second year of the survey (Table 6) were eastern blue-spotted flathead (25.4%), snapper (11.2%), silver trevally (8.5%), slimy mackerel (5.9%), silver sweep (4.8%), yellowtail and jack mackerel (4.5%), nannygai (3.4%), maori wrasse (3.1%), blue morwong (3.0%), and sergeant baker (2.5%). These ten taxa, by number, accounted for 72.3% of the statewide trailer boat harvest during the second survey year - September 1994 to August 1995 inclusive (Table 6).

The ten most commonly harvested taxa, by weight, during the second year of the survey (Table 7) were eastern blue-spotted flathead (207.5 tonnes - 16.8%), snapper (187.6 tonnes - 15.2%), silver trevally (112.3 tonnes - 9.1%), yellowfin tuna (59.1 tonnes - 4.8%), blue morwong (54.9 tonnes - 4.4%), silver sweep (43.2 tonnes - 3.5%), skipjack (39.0 tonnes - 3.2%), kingfish (35.8 tonnes - 2.9%), albacore (35.1 tonnes - 2.8%), and sergeant baker (32.0 tonnes - 2.6%). These ten taxa, by weight, accounted for 65.3% of the statewide trailer boat harvest during the second survey year - September 1994 to August 1995 inclusive (Table 7).

North Coast region - trailer boat angling

Overall, we recorded 143 taxa in the retained catch of recreational anglers fishing from trailer boats during the two years of the survey (Table 5). Trailer boat anglers kept 112 taxa during the first survey year and 117 taxa were harvested during the second survey year (Table 5). The ten most commonly harvested taxa, by number, during the first year of the survey (Table 8) were eastern blue-spotted flathead (32.3%), snapper (26.3%), nannygai (6.9%), teraglin (4.5%), red scorpioncod (2.8%), silver trevally (2.2%), tailor (2.1%), sergeant baker (1.7%), blue morwong (1.6%), and yellowfin bream (1.6%). These ten taxa, by number, accounted for 82.0% of the annual trailer boat harvest from the North Coast Region during the first survey year - September 1993 to August 1994 inclusive (Table 8).

The ten most commonly harvested taxa, by weight, during the first year of the survey (Table 9) were snapper (93.8 tonnes - 25.2%), eastern blue-spotted flathead (69.9

Table 8. Regional estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the first survey year - September 1993 to August 1994 inclusive.

		NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
COMMON NAME	TAXON	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%
PORT JACKSON SHARKS*	*Heterodontus spp.*	-	-	-	-	98	34	75	0.009	-	-	-	-
RUSTY CATSHARK*	*Parascyllium ferrugineum*	-	-	-	-	-	-	-	-	44	28	76	0.006
BLIND SHARK*	*Brachaelurus waddi*	108	35	60	0.020	273	65	61	0.026	-	-	-	-
WOBBEGONG SHARKS*	*Orectolobus spp.*	1044	209	34	0.197	-	-	-	-	-	-	-	-
SHORTFIN MAKO SHARK*	*Isurus oxyrinchus*	-	-	-	-	168	49	66	0.016	914	238	37	0.116
SCHOOL SHARK	*Galeorhinus galeus*	297	71	46	0.056	85	32	76	0.008	-	-	-	-
GUMMY SHARK	*Mustelus antarcticus*	176	45	56	0.033	-	-	-	-	1294	290	33	0.164
WHALER SHARKS	*Carcharhinus spp.*	518	123	41	0.098	145	58	68	0.014	495	136	46	0.063
HAMMERHEAD SHARKS*	*Sphyrna spp.*	-	-	-	-	-	-	-	-	432	187	51	0.055
SHOVELNOSE RAYS*	*Aptychotrema spp. & Rhynchobatus spp.*	244	94	49	0.046	499	162	57	0.047	53	34	75	0.007
BANJO RAY*	*Trygonorhina fasciata*	179	55	55	0.034	123	76	73	0.011	229	71	58	0.029
STINGAREES & BLACK STINGRAYS*	*Urolophus spp. & Dasyatis spp.*	-	-	-	-	131	65	72	0.012	-	-	-	-
EELS*	All species combined	-	-	-	-	-	-	-	-	97	90	69	0.012
SERGEANT BAKER	*Aulopus purpurissatus*	8914	617	8	1.685	39688	2313	11	3.710	7807	723	13	0.988
LIZARDFISHES	All species combined	-	-	-	-	-	-	-	-	289	190	56	0.037
BEARDED CODS*	All species combined	-	-	-	-	1478	288	44	0.138	732	305	39	0.093
ROCK LING	*Genypterus tigerinus*	63	37	65	0.012	-	-	-	-	-	-	-	-
GARFISHES*	*Hyporhamphus spp.*	-	-	-	-	-	-	-	-	308	228	54	0.039
LONGTOMS*	All species combined	137	50	58	0.026	-	-	-	-	-	-	-	-
NANNYGAI	*Centroberyx affinis*	36363	3424	3	6.872	25972	3925	13	2.428	24855	2362	7	3.146
SILVER DORY	*Cyttus australis*	-	-	-	-	-	-	-	-	107	63	67	0.014
JOHN DORY	*Zeus faber*	280	48	48	0.053	589	140	54	0.055	107	54	67	0.014
OCEAN PERCH	*Helicolenus percoides*	-	-	-	-	-	-	-	-	4602	906	19	0.583
COMMON GURNARD PERCH*	*Neosebastes scorpaenoides*	-	-	-	-	-	-	-	-	543	169	44	0.069
RED SCORPIONCOD	*Scorpaena cardinalis*	14671	1276	5	2.773	21789	1971	15	2.037	6590	906	15	0.834
RED GURNARD	*Chelidonichthys kumu*	1028	147	35	0.194	3008	518	36	0.281	7043	802	14	0.892
LATCHET	*Pterygotrigla polyommata*	-	-	-	-	134	52	71	0.013	982	284	36	0.124
TIGER FLATHEAD	*Neoplatycephalus richardsoni*	7528	898	11	1.423	4410	1000	29	0.412	36402	9244	4	4.608
NORTHERN SAND FLATHEAD	*Platycephalus arenarius*	-	-	-	-	-	-	-	-	125	96	65	0.016
EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*	170773	12648	1	32.274	143259	13762	1	13.391	244749	24109	1	30.983
DUSKY FLATHEAD	*Platycephalus fuscus*	2538	374	27	0.480	5141	733	26	0.481	586	248	42	0.074
LONG-SPINED FLATHEAD	*Platycephalus longispinis*	-	-	-	-	1333	253	46	0.125	793	342	38	0.100
MARBLED FLATHEAD	*Platycephalus marmoratus*	6309	617	14	1.192	7277	1145	23	0.680	421	115	52	0.053
ORANGE-FRECKLED FLATHEAD*	*Ratabulus diversidens*	222	68	51	0.042	-	-	-	-	-	-	-	-
ORANGE PERCH*	*Anthias pulchellus*	-	-	-	-	-	-	-	-	56	40	74	0.007
BUTTERFLY PERCH*	*Caesioperca lepidoptera*	-	-	-	-	-	-	-	-	67	54	71	0.008
LONG-FINNED PERCH*	*Caprodon longimanus*	-	-	-	-	1228	553	48	0.115	183	99	61	0.023
HALF-BANDED SEAPERCH*	*Ellerkeldia mccullochi*	-	-	-	-	1508	624	43	0.141	479	225	48	0.061

KEY: * Associated estimates of weight are not provided for this taxon in Table 9 because a suitable length/weight conversion key was not available.

Table 8. Regional estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the first survey year - September 1993 to August 1994 inclusive.

		NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
COMMON NAME	TAXON	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%
BLACK-BANDED SEAPERCH*	*Hypoplectrodes nigrorubrum*	-	-	-	-	141	50	69	0.013	16	16	80	0.002
WIRRAH	*Acanthistius ocellatus*	226	52	50	0.043	3492	583	31	0.326	657	173	41	0.083
MAORI COD	*Epinephelus undulatostriatus*	727	95	37	0.137	-	-	-	-	-	-	-	-
PEARL PERCH	*Glaucosoma scapulare*	5858	1393	16	1.107	-	-	-	-	-	-	-	-
LONG-FINNED SEAPIKE	*Dinolestes lewini*	-	-	-	-	41543	3516	9	3.883	4224	730	21	0.535
SAND WHITING*	*Sillago ciliata*	-	-	-	-	-	-	-	-	37	26	77	0.005
SCHOOL WHITING	*Sillago flindersi*	2823	449	24	0.534	1694	906	41	0.158	1390	412	32	0.176
TAILOR	*Pomatomus saltatrix*	10880	1609	7	2.056	38732	8044	12	3.620	3225	761	26	0.408
COBIA	*Rachycentron canadum*	2839	326	23	0.537	-	-	-	-	-	-	-	-
AMBERJACK	*Seriola dumerili*	181	44	54	0.034	-	-	-	-	-	-	-	-
SAMSON FISH	*Seriola hippos*	1981	254	28	0.374	4030	570	30	0.377	-	-	-	-
KINGFISH	*Seriola lalandi*	5859	484	15	1.107	12906	2310	19	1.206	3697	1037	23	0.468
GIANT TREVALLY*	*Caranx ignobilis*	69	18	64	0.013	-	-	-	-	-	-	-	-
SILVER TREVALLY	*Pseudocaranx dentex*	11711	1173	6	2.213	107786	9238	2	10.075	5887	1097	16	0.745
YELLOWTAIL & JACK MACKEREL	*Trachurus novaezelandiae & T. declivis*	5033	865	17	0.951	82443	13214	4	7.706	27665	5011	6	3.502
BASSET-HULLS TREVALLY*	*Uraspis uraspis*	-	-	-	-	169	86	65	0.016	-	-	-	-
DOLPHIN FISH	*Coryphaena hippurus*	3610	751	19	0.682	5129	2574	27	0.479	-	-	-	-
SALMON	*Arripis trutta*	-	-	-	-	3291	882	33	0.308	4491	730	20	0.569
YELLOWFIN BREAM	*Acanthopagrus australis*	8661	755	10	1.637	24475	2890	14	2.288	476	149	49	0.060
SNAPPER	*Pagrus auratus*	139082	7164	2	26.284	106679	6920	3	9.971	27939	2656	5	3.537
TARWHINE	*Rhabdosargus sarba*	4157	368	18	0.786	8658	1817	22	0.809	-	-	-	-
SPANGLED EMPORER*	*Lethrinus nebulosus*	196	45	52	0.037	-	-	-	-	-	-	-	-
MULLOWAY	*Argyrosomus hololepidotus*	1972	295	29	0.373	3088	1154	35	0.289	-	-	-	-
TERAGLIN	*Atractoscion aequidens*	23589	3097	4	4.458	302	149	60	0.028	-	-	-	-
MOSES PERCH*	*Lutjanus russelli*	1862	186	30	0.352	-	-	-	-	-	-	-	-
RED EMPORER*	*Lutjanus sebae*	51	18	68	0.010	-	-	-	-	-	-	-	-
SOUTHERN FUSILIER*	*Paracaesio xanthurus*	663	263	39	0.125	-	-	-	-	-	-	-	-
NETTED SWEETLIPS*	*Plectorhinchus flavomaculatus*	464	94	43	0.088	-	-	-	-	-	-	-	-
BLACKSPOT GOATFISH	*Parupeneus signatus*	1719	188	31	0.325	-	-	-	-	-	-	-	-
BLUE-STRIPED GOATFISH	*Upeneichthys lineatus*	-	-	-	-	862	229	52	0.081	120	48	66	0.015
ROCK BLACKFISH*	*Girella elevata*	-	-	-	-	1167	277	49	0.109	142	66	63	0.018
SILVER SWEEP	*Scorpis lineolatus*	7161	1545	12	1.353	77830	7729	5	7.275	17628	2996	10	2.232
MADO*	*Atypichthys strigatus*	-	-	-	-	2229	431	38	0.208	72	48	70	0.009
WHITE EAR*	*Parma microlepis*	-	-	-	-	193	114	63	0.018	-	-	-	-
GIRDLED PARMA*	*Parma unifasciata*	-	-	-	-	567	331	55	0.053	-	-	-	-
KELPFISH*	*Chironemus marmoratus*	-	-	-	-	1462	333	45	0.137	-	-	-	-
RED MORWONG	*Cheilodactylus fuscus*	-	-	-	-	454	141	58	0.042	-	-	-	-
BLUE MORWONG	*Nemadactylus douglasii*	8688	623	9	1.642	40319	3316	10	3.769	37441	3347	3	4.740

KEY: * Associated estimates of weight are not provided for this taxon in Table 9 because a suitable length/weight conversion key was not available.

Table 8. Regional estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the first survey year - September 1993 to August 1994 inclusive.

		NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
COMMON NAME	TAXON	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%
JACKASS MORWONG	*Nemadactylus macropterus*	-	-	-	-	553	260	56	0.052	10562	1924	12	1.337
BASTARD TRUMPETER*	*Latridopsis forsteri*	-	-	-	-	-	-	-	-	19	19	79	0.002
STRIPED TRUMPETER*	*Latris lineata*	-	-	-	-	-	-	-	-	218	85	60	0.028
SNOOK*	*Sphyraena novaehollandiae*	-	-	-	-	750	567	53	0.070	263	100	57	0.033
STRIPED SEAPIKE	*Sphyraena obtusata*	-	-	-	-	177	101	64	0.017	1268	948	34	0.161
BLUE GROPER	*Achoerodus viridis*	676	119	38	0.128	4628	537	28	0.433	155	98	62	0.020
GOLD-SPOT PIGFISH	*Bodianus perditio*	154	51	57	0.029	-	-	-	-	-	-	-	-
BLACK-SPOT PIGFISH	*Bodianus vulpinus*	325	55	44	0.061	13638	1187	18	1.275	4967	812	18	0.629
VENUS TUSKFISH*	*Choerodon venustus*	2873	508	22	0.543	-	-	-	-	-	-	-	-
CRIMSON-BANDED WRASSE	*Notolabrus gymnogenis*	886	101	36	0.167	11513	1087	21	1.076	1965	412	30	0.249
BLUE-THROATED WRASSE	*Notolabrus tetricus*	-	-	-	-	-	-	-	-	670	172	40	0.085
MAORI WRASSE	*Ophthalmolepis lineolata*	2914	269	21	0.551	42026	4804	8	3.928	24571	3277	8	3.110
SENATOR WRASSE*	*Pictilabrus laticlavius*	-	-	-	-	154	91	67	0.014	-	-	-	-
MOON WRASSE	*Thalassoma lunare*	286	80	47	0.054	-	-	-	-	-	-	-	-
BARRACOUTA	*Thyrsites atun*	-	-	-	-	1569	270	42	0.147	14499	2050	11	1.835
NARROW-BARRED SPANISH MACKEREL	*Scomberomorus commerson*	538	96	40	0.102	-	-	-	-	-	-	-	-
SPOTTED MACKEREL	*Scomberomorus munroi*	3139	769	20	0.593	-	-	-	-	-	-	-	-
FRIGATE MACKEREL	*Auxis thazard*	57	17	67	0.011	1912	412	39	0.179	3921	674	22	0.496
SLIMY MACKEREL	*Scomber australasicus*	6745	1033	13	1.275	44452	5187	7	4.155	204957	54923	2	25.945
MACKEREL TUNA	*Euthynnus affinis*	2762	392	25	0.522	212	180	62	0.020	-	-	-	-
SKIPJACK	*Katsuwonus pelamis*	314	94	45	0.059	6000	2552	25	0.561	20470	5339	9	2.591
AUSTRALIAN BONITO	*Sarda australis*	2621	269	26	0.495	15535	2571	17	1.452	2289	784	28	0.290
ORIENTAL BONITO	*Sarda orientalis*	89	49	61	0.017	-	-	-	-	-	-	-	-
ALBACORE	*Thunnus alalunga*	-	-	-	-	-	-	-	-	5595	1289	17	0.708
YELLOWFIN TUNA	*Thunnus albacares*	112	48	59	0.021	-	-	-	-	3320	745	24	0.420
STRIPED MARLIN	*Tetrapturus audax*	62	24	66	0.012	-	-	-	-	219	122	59	0.028
LARGE-TOOTHED FLOUNDER	*Pseudorhombus arsius*	482	74	42	0.091	2937	700	37	0.275	131	46	64	0.017
SMALL-TOOTHED FLOUNDER	*Pseudorhombus jenynsii*	1167	188	32	0.221	3428	625	32	0.320	58	28	73	0.007
BLACK REEF LEATHERJACKET	*Eubalichthys bucephalus*	-	-	-	-	352	158	59	0.033	578	204	43	0.073
MOSAIC LEATHERJACKET	*Eubalichthys mosaicus*	-	-	-	-	135	48	70	0.013	-	-	-	-
YELLOW-STRIPED LEATHERJACKET*	*Meuschenia flavolineata*	-	-	-	-	1696	474	40	0.159	-	-	-	-
SIX-SPINED LEATHERJACKET	*Meuschenia freycineti*	196	43	52	0.037	12708	1138	20	1.188	2729	520	27	0.345
HORSESHOE LEATHERJACKET	*Meuschenia hippocrepis*	-	-	-	-	-	-	-	-	62	52	72	0.008
YELLOW-FINNED LEATHERJACKET	*Meuschenia trachylepis*	76	19	63	0.014	1024	265	50	0.096	990	199	35	0.125
CHINAMAN LEATHERJACKET	*Nelusetta ayraudi*	1134	233	33	0.214	18249	5532	16	1.706	1627	282	31	0.206
VELVET LEATHERJACKET*	*Parika scaber*	-	-	-	-	-	-	-	-	516	252	45	0.065
TOOTHBRUSH LEATHERJACKET	*Penicipelta vittiger*	-	-	-	-	-	-	-	-	480	235	47	0.061
ROUGH LEATHERJACKET	*Scobinichthys granulatus*	-	-	-	-	1320	325	47	0.123	293	108	55	0.037

KEY: * Associated estimates of weight are not provided for this taxon in Table 9 because a suitable length/weight conversion key was not available.

Table 8. Regional estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the first survey year - September 1993 to August 1994 inclusive.

		NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
COMMON NAME	TAXON	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%
LEATHERJACKETS OTHER	Unidentified Monacanthid species	-	-	-	-	-	-	-	-	323	189	53	0.041
COMMON SQUID	*Loligo spp.*	-	-	-	-	6582	2300	24	0.615	-	-	-	-
ARROW SQUID	*Nototodarus gouldi*	-	-	-	-	-	-	-	-	2020	1025	29	0.256
OCTOPUS*	*Octopus spp.*	79	21	62	0.015	1008	237	51	0.094	37	29	77	0.005
GIANT CUTTLEFISH	*Sepia apama*	-	-	-	-	3173	450	34	0.297	434	105	50	0.055
SOUTHERN CALAMARI	*Sepioteuthis australis*	-	-	-	-	46045	6396	6	4.304	3256	1341	25	0.412
SPANNER CRAB*	*Ranina ranina*	-	-	-	-	102	39	74	0.010	-	-	-	-

KEY: * Associated estimates of weight are not provided for this taxon in Table 9 because a suitable length/weight conversion key was not available.

Table 9. Regional estimates of recreational harvest (kg) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the first survey year - September 1993 to August 1994 inclusive.

		NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
COMMON NAME	TAXON	kg	s.e.	Rank	%	kg	s.e.	Rank	%	kg	s.e.	Rank	%
SCHOOL SHARK	*Galeorhinus galeus*	906	194	32	0.244	170	65	51	0.027	-	-	-	-
GUMMY SHARK	*Mustelus antarcticus*	207	74	46	0.056	-	-	-	-	2769	591	28	0.532
WHALER SHARKS	*Carcharhinus spp.*	995	229	30	0.268	419	159	46	0.066	12351	4876	11	2.372
SERGEANT BAKER	*Aulopus purpurissatus*	6234	436	15	1.678	25376	1433	8	3.981	5691	567	19	1.093
LIZARDFISHES	All species combined	-	-	-	-	-	-	-	-	233	129	46	0.045
ROCK LING	*Genypterus tigerinus*	9	5	54	0.002	-	-	-	-	-	-	-	-
NANNYGAI	*Centroberyx affinis*	10172	879	11	2.737	6849	1057	22	1.075	7739	726	16	1.486
SILVER DORY	*Cyttus australis*	-	-	-	-	-	-	-	-	17	9	58	0.003
JOHN DORY	*Zeus faber*	323	57	42	0.087	502	121	43	0.079	32	16	56	0.006
OCEAN PERCH	*Helicolenus percoides*	-	-	-	-	-	-	-	-	1567	301	34	0.301
RED SCORPIONCOD	*Scorpaena cardinalis*	5280	406	17	1.421	11072	884	19	1.737	4289	441	23	0.824
RED GURNARD	*Chelidonichthys kumu*	771	114	33	0.207	1824	341	34	0.286	4609	425	21	0.885
LATCHET	*Pterygotrigla polyommata*	-	-	-	-	103	41	53	0.016	818	239	36	0.157
TIGER FLATHEAD	*Neoplatycephalus richardsoni*	3225	411	23	0.868	1827	429	33	0.287	16139	4627	9	3.099
NORTHERN SAND FLATHEAD	*Platycephalus arenarius*	-	-	-	-	-	-	-	-	32	28	56	0.006
EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*	69910	5120	2	18.813	68031	6793	3	10.673	91326	9593	1	17.538
DUSKY FLATHEAD	*Platycephalus fuscus*	2797	394	25	0.753	4565	657	28	0.716	400	168	45	0.077
LONG-SPINED FLATHEAD	*Platycephalus longispinis*	-	-	-	-	240	46	49	0.038	120	53	50	0.023
MARBLED FLATHEAD	*Platycephalus marmoratus*	4183	380	20	1.126	4397	760	29	0.690	177	45	48	0.034
WIRRAH	*Acanthistius ocellatus*	178	42	47	0.048	1407	220	36	0.221	571	158	41	0.110
MAORI COD	*Epinephelus undulatostriatus*	682	89	36	0.184	-	-	-	-	-	-	-	-
PEARL PERCH	*Glaucosoma scapulare*	9179	2630	13	2.470	-	-	-	-	-	-	-	-
LONG-FINNED SEAPIKE	*Dinolestes lewini*	-	-	-	-	13513	1159	18	2.120	1604	247	33	0.308
SCHOOL WHITING	*Sillago flindersi*	279	51	43	0.075	206	110	50	0.032	466	52	42	0.089
TAILOR	*Pomatomus saltatrix*	11934	1663	8	3.211	19725	4102	9	3.095	3387	545	25	0.650
COBIA	*Rachycentron canadum*	13933	1821	5	3.749	-	-	-	-	-	-	-	-
AMBERJACK	*Seriola dumerili*	438	121	39	0.118	-	-	-	-	-	-	-	-
SAMSON FISH	*Seriola hippos*	5063	683	18	1.362	2696	431	31	0.423	-	-	-	-
KINGFISH	*Seriola lalandi*	15359	1385	4	4.133	29515	4828	6	4.631	8105	2473	15	1.556
SILVER TREVALLY	*Pseudocaranx dentex*	11284	1973	9	3.037	87535	8773	1	13.733	4730	858	20	0.908
YELLOWTAIL & JACK MACKEREL	*Trachurus novaezelandiae & T. declivis*	709	104	35	0.191	15410	2089	12	2.418	8248	1836	14	1.584
DOLPHIN FISH	*Coryphaena hippurus*	5536	1156	16	1.490	6255	2912	25	0.981	-	-	-	-
SALMON	*Arripis trutta*	-	-	-	-	8425	2311	20	1.322	6300	1094	18	1.210
YELLOWFIN BREAM	*Acanthopagrus australis*	4109	333	21	1.106	15051	1879	13	2.361	2825	273	27	0.543
SNAPPER	*Pagrus auratus*	93784	4765	1	25.238	70494	4471	2	11.060	19932	2100	8	3.828
TARWHINE	*Rhabdosargus sarba*	1656	151	26	0.446	4879	1012	27	0.765	-	-	-	-
MULLOWAY	*Argyrosomus hololepidotus*	12261	1654	6	3.299	14956	5838	14	2.346	-	-	-	-
TERAGLIN	*Atractoscion aequidens*	19712	2459	3	5.305	356	177	47	0.056	-	-	-	-

Table 9. Regional estimates of recreational harvest (kg) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the first survey year - September 1993 to August 1994 inclusive.

COMMON NAME	TAXON	NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
		kg	s.e.	Rank	%	kg	s.e.	Rank	%	kg	s.e.	Rank	%
BLACKSPOT GOATFISH	*Parupeneus signatus*	913	98	31	0.246	-	-	-	-	-	-	-	-
BLUE-STRIPED GOATFISH	*Upeneichthys lineatus*	-	-	-	-	291	96	48	0.046	49	20	55	0.009
SILVER SWEEP	*Scorpis lineolatus*	2844	619	24	0.765	37168	3472	5	5.831	7536	1353	17	1.447
RED MORWONG	*Cheilodactylus fuscus*	-	-	-	-	616	199	42	0.097	-	-	-	-
BLUE MORWONG	*Nemadactylus douglasii*	10047	777	12	2.704	37715	2903	4	5.917	43109	3952	3	8.278
JACKASS MORWONG	*Nemadactylus macropterus*	-	-	-	-	681	330	41	0.107	8263	1468	13	1.587
STRIPED SEAPIKE	*Sphyraena obtusata*	-	-	-	-	37	21	55	0.006	408	301	44	0.078
BLUE GROPER	*Achoerodus viridis*	1625	261	27	0.437	13546	1586	17	2.125	798	644	37	0.153
GOLD-SPOT PIGFISH	*Bodianus perditio*	104	35	50	0.028	-	-	-	-	-	-	-	-
BLACK-SPOT PIGFISH	*Bodianus vulpinus*	237	50	44	0.064	6376	529	24	1.000	4325	561	22	0.831
CRIMSON-BANDED WRASSE	*Notolabrus gymnogenis*	338	41	41	0.091	4166	363	30	0.654	1695	196	32	0.326
BLUE-THROATED WRASSE	*Notolabrus tetricus*	-	-	-	-	-	-	-	-	677	184	39	0.130
MAORI WRASSE	*Ophthalmolepis lineolata*	1056	95	29	0.284	14154	1413	16	2.221	8760	1205	12	1.682
MOON WRASSE	*Thalassoma lunare*	110	35	49	0.030	-	-	-	-	-	-	-	-
BARRACOUTA	*Thyrsites atun*	-	-	-	-	988	167	38	0.155	14120	1923	10	2.712
NARROW-BARRED SPANISH MACKEREL	*Scomberomorus commerson*	4797	882	19	1.291	-	-	-	-	-	-	-	-
SPOTTED MACKEREL	*Scomberomorus munroi*	12133	2775	7	3.265	-	-	-	-	-	-	-	-
FRIGATE MACKEREL	*Auxis thazard*	81	28	52	0.022	1377	325	37	0.216	2293	413	30	0.440
SLIMY MACKEREL	*Scomber australasicus*	736	139	34	0.198	6584	725	23	1.033	32749	9398	6	6.289
MACKEREL TUNA	*Euthynnus affinis*	11065	1595	10	2.978	921	781	40	0.144	-	-	-	-
SKIPJACK	*Katsuwonus pelamis*	1175	347	28	0.316	14435	5324	15	2.265	41173	12211	4	7.907
AUSTRALIAN BONITO	*Sarda australis*	3281	399	22	0.883	27554	4356	7	4.323	3454	1228	24	0.663
ORIENTAL BONITO	*Sarda orientalis*	93	52	51	0.025	-	-	-	-	-	-	-	-
ALBACORE	*Thunnus alalunga*	-	-	-	-	-	-	-	-	38696	9461	5	7.431
YELLOWFIN TUNA	*Thunnus albacares*	419	181	40	0.113	-	-	-	-	72679	16568	2	13.957
STRIPED MARLIN	*Tetrapturus audax*	7761	2974	14	2.089	-	-	-	-	24087	12404	7	4.626
LARGE-TOOTHED FLOUNDER	*Pseudorhombus arsius*	210	33	45	0.057	969	241	39	0.152	460	41	43	0.088
SMALL-TOOTHED FLOUNDER	*Pseudorhombus jenynsii*	670	97	37	0.180	1458	242	35	0.229	82	21	52	0.016
BLACK REEF LEATHERJACKET	*Eubalichthys bucephalus*	-	-	-	-	162	81	52	0.025	155	57	49	0.030
MOSAIC LEATHERJACKET	*Eubalichthys mosaicus*	-	-	-	-	41	15	54	0.006	-	-	-	-
SIX-SPINED LEATHERJACKET	*Meuschenia freycineti*	169	39	48	0.045	7791	642	21	1.222	2379	471	29	0.457
HORSESHOE LEATHERJACKET	*Meuschenia hippocrepis*	-	-	-	-	-	-	-	-	65	48	54	0.012
YELLOW-FINNED LEATHERJACKET	*Meuschenia trachylepis*	44	13	53	0.012	431	113	44	0.068	678	121	38	0.130
CHINAMAN LEATHERJACKET	*Nelusetta ayraudi*	589	126	38	0.159	5480	1550	26	0.860	637	107	40	0.122
TOOTHBRUSH LEATHERJACKET	*Penicipelta vittiger*	-	-	-	-	-	-	-	-	222	77	47	0.043
ROUGH LEATHERJACKET	*Scobinichthys granulatus*	-	-	-	-	427	105	45	0.067	71	27	53	0.014
LEATHERJACKETS OTHER	Unidentified Monacanthid species	-	-	-	-	-	-	-	-	118	63	51	0.023
COMMON SQUID	*Loligo spp.*	-	-	-	-	2072	685	32	0.325	-	-	-	-

Table 9. Regional estimates of recreational harvest (kg) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the first survey year - September 1993 to August 1994 inclusive.

		NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
COMMON NAME	**TAXON**	**kg**	**s.e.**	**Rank**	**%**	**kg**	**s.e.**	**Rank**	**%**	**kg**	**s.e.**	**Rank**	**%**
ARROW SQUID	*Nototodarus gouldi*	-	-	-	-	-	-	-	-	1258	573	35	0.242
GIANT CUTTLEFISH	*Sepia apama*	-	-	-	-	19042	3145	10	2.987	3387	812	25	0.650
SOUTHERN CALAMARI	*Sepioteuthis australis*	-	-	-	-	17118	2201	11	2.686	1877	571	31	0.360

tonnes - 18.8%), teraglin (19.7 tonnes - 5.3%), kingfish (15.4 tonnes - 4.1%), cobia (13.9 tonnes - 3.7%), mulloway (12.3 tonnes - 3.3%), spotted mackerel (12.1 tonnes - 3.3%), tailor (11.9 tonnes - 3.2%), silver trevally (11.3 tonnes - 3.0%), and mackerel tuna (11.1 tonnes - 3.0%). These ten taxa, by weight, accounted for 72.9% of the annual trailer boat harvest from the North Coast Region during the first survey year - September 1993 to August 1994 inclusive (Table 9).

The ten most commonly harvested taxa, by number, during the second year of the survey (Table 10) were eastern blue-spotted flathead (27.9%), snapper (26.9%), nannygai (5.0%), silver trevally (3.9%), tailor (3.7%), red scorpioncod (3.0%), slimy mackerel (2.7%), teraglin (2.3%), yellowfin bream (2.1%), and blue morwong (1.9%). These ten taxa, by number, accounted for 79.4% of the annual trailer boat harvest from the North Coast Region during the second survey year - September 1994 to August 1995 inclusive (Table 10).

The ten most commonly harvested taxa, by weight, during the second year of the survey (Table 11) were snapper (107.7 tonnes - 32.3%), eastern blue-spotted flathead (64.3 tonnes - 19.3%), tailor (14.1 tonnes - 4.2%), kingfish (13.5 tonnes - 4.1%), silver trevally (13.4 tonnes - 4.0%), teraglin (11.5 tonnes - 3.4%), blue morwong (9.2 tonnes - 2.7%), mulloway (8.2 tonnes - 2.4%), cobia (7.6 tonnes - 2.3%), and narrow-barred spanish mackerel (6.7 tonnes - 2.0%). These ten taxa, by weight, accounted for 76.7% of the annual trailer boat harvest from the North Coast Region during the second survey year - September 1994 to August 1995 inclusive (Table 11).

Central Coast region - trailer boat angling

Overall, we recorded 128 taxa in the retained catch of recreational anglers fishing from trailer boats during the two years of the survey (Table 5). Trailer boat anglers kept 111 taxa during the first survey year and 101 taxa were harvested during the second survey year (Table 5). The ten most commonly harvested taxa, by number, during the first year of the survey (Table 8) were eastern blue-spotted flathead (13.4%), silver trevally (10.1%), snapper (10.0%), yellowtail and jack mackerel

Table 10. Regional estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the second survey year - September 1994 to August 1995 inclusive.

		NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
COMMON NAME	TAXON	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%
BLIND SHARK*	*Brachaelurus waddi*	-	-	-	-	79	29	74	0.008	-	-	-	-
WOBBEGONG SHARKS*	*Orectolobus spp.*	440	60	48	0.100	96	38	72	0.010	-	-	-	-
SHORTFIN MAKO SHARK*	*Isurus oxyrinchus*	-	-	-	-	88	32	73	0.009	702	136	34	0.159
SCHOOL SHARK	*Galeorhinus galeus*	69	19	69	0.016	-	-	-	-	114	52	57	0.026
GUMMY SHARK	*Mustelus antarcticus*	336	49	53	0.076	305	103	62	0.031	273	74	44	0.062
WHALER SHARKS	*Carcharhinus spp.*	962	147	36	0.218	-	-	-	-	32	32	65	0.007
HAMMERHEAD SHARKS*	*Sphyrna spp.*	41	17	76	0.009	-	-	-	-	180	72	49	0.041
ANGEL SHARK*	*Squatina australis*	-	-	-	-	-	-	-	-	35	28	63	0.008
SHOVELNOSE RAYS*	*Aptychotrema spp. & Rhynchobatus spp.*	545	121	45	0.123	979	326	44	0.098	-	-	-	-
BANJO RAY*	*Trygonorhina fasciata*	114	25	62	0.026	236	142	65	0.024	163	100	53	0.037
SERGEANT BAKER	*Aulopus purpurissatus*	6338	412	12	1.436	36528	2699	8	3.663	4585	471	17	1.039
BEARDED CODS*	All species combined	-	-	-	-	622	147	49	0.062	173	80	51	0.039
ROCK LING	*Genypterus tigerinus*	-	-	-	-	-	-	-	-	20	14	69	0.005
LONGTOMS*	All species combined	2250	829	26	0.510	-	-	-	-	-	-	-	-
NANNYGAI	*Centroberyx affinis*	21888	3256	3	4.960	29776	3246	11	2.986	13112	2021	6	2.970
MIRROR DORY	*Zenopsis nebulosis*	246	50	57	0.056	-	-	-	-	97	58	60	0.022
JOHN DORY	*Zeus faber*	537	63	46	0.122	1471	385	40	0.148	-	-	-	-
OCEAN PERCH	*Helicolenus percoides*	-	-	-	-	-	-	-	-	3642	803	20	0.825
COMMON GURNARD PERCH*	*Neosebastes scorpaenoides*	-	-	-	-	-	-	-	-	253	87	45	0.057
RED SCORPIONCOD	*Scorpaena cardinalis*	13327	796	6	3.020	17094	1865	14	1.714	4763	788	16	1.079
RED GURNARD	*Chelidonichthys kumu*	1273	141	32	0.288	3478	638	29	0.349	4357	448	18	0.987
LATCHET	*Pterygotrigla polyommata*	-	-	-	-	254	62	63	0.025	291	99	42	0.066
TIGER FLATHEAD	*Neoplatycephalus richardsoni*	5735	1208	13	1.300	10625	2176	18	1.066	24738	3960	3	5.604
NORTHERN SAND FLATHEAD	*Platycephalus arenarius*	59	20	72	0.013	-	-	-	-	-	-	-	-
SOUTHERN SAND FLATHEAD	*Platycephalus bassensis*	-	-	-	-	-	-	-	-	638	284	35	0.145
EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*	123281	11729	1	27.935	182820	21514	1	18.335	171552	12716	1	38.864
DUSKY FLATHEAD	*Platycephalus fuscus*	1626	183	29	0.368	7539	1097	26	0.756	26	20	66	0.006
LONG-SPINED FLATHEAD	*Platycephalus longispinis*	-	-	-	-	352	173	60	0.035	721	279	33	0.163
MARBLED FLATHEAD	*Platycephalus marmoratus*	3990	341	17	0.904	7931	1018	24	0.795	306	79	41	0.069
ORANGE-FRECKLED FLATHEAD*	*Ratabulus diversidens*	396	93	52	0.090	-	-	-	-	-	-	-	-
ORANGE PERCH*	*Anthias pulchellus*	-	-	-	-	68	33	76	0.007	-	-	-	-
BUTTERFLY PERCH*	*Caesioperca lepidoptera*	-	-	-	-	-	-	-	-	88	49	61	0.020
LONG-FINNED PERCH*	*Caprodon longimanus*	-	-	-	-	1885	862	36	0.189	-	-	-	-
YELLOW-BANDED SEAPERCH*	*Ellerkeldia annulata*	-	-	-	-	512	214	52	0.051	-	-	-	-
HALF-BANDED SEAPERCH*	*Ellerkeldia mccullochi*	-	-	-	-	948	389	45	0.095	104	53	59	0.024
WIRRAH	*Acanthistius ocellatus*	407	57	50	0.092	1697	327	38	0.170	526	231	38	0.119
MAORI COD	*Epinephelus undulatostriatus*	902	104	38	0.204	-	-	-	-	-	-	-	-
PEARL PERCH	*Glaucosoma scapulare*	2933	526	20	0.665	-	-	-	-	-	-	-	-

KEY: * Associated estimates of weight are not provided for this taxon in Table 11 because a suitable length/weight conversion key was not available.

Table 10. Regional estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the second survey year - September 1994 to August 1995 inclusive.

COMMON NAME	TAXON	NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
		No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%
SIX-LINED TRUMPETER*	*Pelates quadrilineatus*	-	-	-	-	576	196	50	0.058	114	78	57	0.026
LONG-FINNED SEAPIKE	*Dinolestes lewini*	-	-	-	-	38708	4380	6	3.882	3854	1253	19	0.873
SCHOOL WHITING	*Sillago flindersi*	3789	777	18	0.859	1048	344	43	0.105	2508	995	22	0.568
TAILOR	*Pomatomus saltatrix*	16153	2403	5	3.660	17260	5803	13	1.731	3552	1245	21	0.805
COBIA	*Rachycentron canadum*	1435	213	31	0.325	-	-	-	-	-	-	-	-
AMBERJACK	*Seriola dumerili*	79	18	67	0.018	-	-	-	-	-	-	-	-
SAMSON FISH	*Seriola hippos*	2856	244	22	0.647	475	157	55	0.048	-	-	-	-
KINGFISH	*Seriola lalandi*	2861	274	21	0.648	7775	1279	25	0.780	2206	451	24	0.500
SILVER TREVALLY	*Pseudocaranx dentex*	17377	2742	4	3.938	136486	13432	2	13.688	5459	992	15	1.237
YELLOWTAIL & JACK MACKEREL	*Trachurus novaezelandiae & T. declivis*	5358	763	15	1.214	70934	7027	5	7.114	8841	1479	10	2.003
DOLPHIN FISH	*Coryphaena hippurus*	2169	655	27	0.491	5536	2533	28	0.555	2070	1202	25	0.469
SALMON	*Arripis trutta*	-	-	-	-	893	231	46	0.090	1885	532	27	0.427
YELLOWFIN BREAM	*Acanthopagrus australis*	9354	771	9	2.120	13780	1877	17	1.382	174	65	50	0.039
SNAPPER	*Pagrus auratus*	118695	6177	2	26.896	75532	5492	3	7.575	16066	1856	5	3.640
TARWHINE	*Rhabdosargus sarba*	6678	554	11	1.513	8776	3041	21	0.880	-	-	-	-
COLLARED SEA BREAM*	*Gymnocranius audleyi*	49	17	73	0.011	-	-	-	-	-	-	-	-
GRASS EMPORER*	*Lethrinus laticaudis*	46	15	75	0.010	-	-	-	-	-	-	-	-
SWEETLIP EMPORER*	*Lethrinus miniatus*	81	23	66	0.018	-	-	-	-	121	79	56	0.027
SPANGLED EMPORER*	*Lethrinus nebulosus*	953	157	37	0.216	-	-	-	-	-	-	-	-
MULLOWAY	*Argyrosomus hololepidotus*	1047	154	34	0.237	1831	598	37	0.184	-	-	-	-
TERAGLIN	*Atractoscion aequidens*	10364	995	8	2.348	858	448	47	0.086	-	-	-	-
GREEN JOBFISH*	*Aprion virescens*	91	32	63	0.021	-	-	-	-	-	-	-	-
FIVE-LINED SEAPERCH*	*Lutjanus quinquelineatus*	38	16	77	0.009	-	-	-	-	-	-	-	-
MOSES PERCH*	*Lutjanus russelli*	2569	349	23	0.582	-	-	-	-	-	-	-	-
SOUTHERN FUSILIER*	*Paracaesio xanthurus*	815	209	39	0.185	-	-	-	-	-	-	-	-
NETTED SWEETLIPS*	*Plectorhinchus flavomaculatus*	582	79	44	0.132	-	-	-	-	-	-	-	-
BLACKSPOT GOATFISH	*Parupeneus signatus*	1021	87	35	0.231	1407	435	41	0.141	-	-	-	-
BLUE-STRIPED GOATFISH	*Upeneichthys lineatus*	-	-	-	-	468	145	56	0.047	139	130	55	0.031
SILVER BATFISH*	*Monodactylus argenteus*	329	88	54	0.075	-	-	-	-	-	-	-	-
LADDER-FINNED POMFRET*	*Schuettea scalaripinnis*	132	58	61	0.030	-	-	-	-	-	-	-	-
ROCK BLACKFISH*	*Girella elevata*	-	-	-	-	168	61	68	0.017	-	-	-	-
SILVER SWEEP	*Scorpis lineolatus*	5590	680	14	1.267	72641	8773	4	7.285	12400	2470	8	2.809
MADO*	*Atypichthys strigatus*	403	155	51	0.091	2463	792	33	0.247	-	-	-	-
WHITE EAR*	*Parma microlepis*	-	-	-	-	632	296	48	0.063	-	-	-	-
KELPFISH*	*Chironemus marmoratus*	236	86	58	0.053	252	166	64	0.025	-	-	-	-
RED MORWONG	*Cheilodactylus fuscus*	-	-	-	-	393	204	58	0.039	24	18	67	0.005
BLUE MORWONG	*Nemadactylus douglasii*	8567	638	10	1.941	34719	3339	10	3.482	12930	1456	7	2.929
JACKASS MORWONG	*Nemadactylus macropterus*	-	-	-	-	-	-	-	-	6208	1741	13	1.406

KEY: * Associated estimates of weight are not provided for this taxon in Table 11 because a suitable length/weight conversion key was not available.

Table 10. Regional estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the second survey year - September 1994 to August 1995 inclusive.

		NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
COMMON NAME	TAXON	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%
STRIPED SEAPIKE	*Sphyraena obtusata*	1539	376	30	0.349	1606	775	39	0.161	207	97	48	0.047
BLUE GROPER	*Achoerodus viridis*	412	83	49	0.093	3441	551	30	0.345	157	56	54	0.036
GOLD-SPOT PIGFISH	*Bodianus perditio*	308	51	55	0.070	-	-	-	-	-	-	-	-
EASTERN FOXFISH	*Bodianus sp.*	-	-	-	-	504	249	53	0.051	-	-	-	-
BLACK-SPOT PIGFISH	*Bodianus vulpinus*	710	196	41	0.161	10439	937	19	1.047	2347	429	23	0.532
VENUS TUSKFISH*	*Choerodon venustus*	4794	912	16	1.086	-	-	-	-	-	-	-	-
COMB FISH	*Coris picta*	-	-	-	-	162	91	69	0.016	-	-	-	-
CRIMSON-BANDED WRASSE	*Notolabrus gymnogenis*	2269	312	25	0.514	10135	1475	20	1.016	936	193	31	0.212
BLUE-THROATED WRASSE	*Notolabrus tetricus*	-	-	-	-	-	-	-	-	65	55	62	0.015
MAORI WRASSE	*Ophthalmolepis lineolata*	3085	250	19	0.699	38116	4413	7	3.823	16160	2453	4	3.661
BARRACOUTA	*Thyrsites atun*	-	-	-	-	120	44	71	0.012	2066	685	26	0.468
NARROW-BARRED SPANISH MACKEREL	*Scomberomorus commerson*	696	90	42	0.158	-	-	-	-	-	-	-	-
SPOTTED MACKEREL	*Scomberomorus munroi*	652	101	43	0.148	-	-	-	-	-	-	-	-
QUEENSLAND SCHOOL MACKEREL	*Scomberomorus queenslandicus*	49	20	73	0.011	-	-	-	-	-	-	-	-
FRIGATE MACKEREL	*Auxis thazard*	87	27	64	0.020	561	177	51	0.056	1397	458	29	0.316
SLIMY MACKEREL	*Scomber australasicus*	11719	2948	7	2.655	29256	3837	12	2.934	70584	19715	2	15.990
LEAPING BONITO	*Cybiosarda elegans*	-	-	-	-	157	80	70	0.016	-	-	-	-
MACKEREL TUNA	*Euthynnus affinis*	2032	181	28	0.460	487	309	54	0.049	-	-	-	-
SKIPJACK	*Katsuwonus pelamis*	82	24	65	0.019	5685	1761	27	0.570	9658	4086	9	2.188
AUSTRALIAN BONITO	*Sarda australis*	2288	192	24	0.518	8411	1537	23	0.844	7984	4232	11	1.809
ORIENTAL BONITO	*Sarda orientalis*	67	26	70	0.015	-	-	-	-	-	-	-	-
ALBACORE	*Thunnus alalunga*	-	-	-	-	-	-	-	-	7375	4615	12	1.671
YELLOWFIN TUNA	*Thunnus albacares*	269	70	56	0.061	-	-	-	-	6024	1393	14	1.365
STRIPED MARLIN	*Tetrapturus audax*	-	-	-	-	-	-	-	-	287	90	43	0.065
LARGE-TOOTHED FLOUNDER	*Pseudorhombus arsius*	494	84	47	0.112	3187	1099	31	0.320	311	84	40	0.070
SMALL-TOOTHED FLOUNDER	*Pseudorhombus jenynsii*	754	89	40	0.171	2896	656	32	0.290	166	125	52	0.038
BRIDLED TRIGGERFISH*	*Sufflamen fraenatus*	148	47	60	0.034	-	-	-	-	-	-	-	-
BLACK REEF LEATHERJACKET	*Eubalichthys bucephalus*	-	-	-	-	444	189	57	0.045	226	147	46	0.051
YELLOW-STRIPED LEATHERJACKET*	*Meuschenia flavolineata*	-	-	-	-	215	106	67	0.022	-	-	-	-
SIX-SPINED LEATHERJACKET	*Meuschenia freycineti*	177	38	59	0.040	15522	3456	16	1.557	1724	332	28	0.391
YELLOW-FINNED LEATHERJACKET	*Meuschenia trachylepis*	74	18	68	0.017	2298	555	35	0.230	880	142	32	0.199
CHINAMAN LEATHERJACKET	*Nelusetta ayraudi*	1102	142	33	0.250	16600	3971	15	1.665	573	136	36	0.130
VELVET LEATHERJACKET*	*Parika scaber*	-	-	-	-	218	68	66	0.022	34	18	64	0.008
ROUGH LEATHERJACKET	*Scobinichthys granulatus*	-	-	-	-	1124	267	42	0.113	415	136	39	0.094
LEATHERJACKETS OTHER	Unidentified Monacanthid species	66	23	71	0.015	323	124	61	0.032	-	-	-	-
COMMON SQUID	*Loligo spp.*	-	-	-	-	8674	2540	22	0.870	24	16	67	0.005
ARROW SQUID	*Nototodarus gouldi*	-	-	-	-	77	27	75	0.008	998	733	30	0.226
OCTOPUS*	*Octopus spp.*	-	-	-	-	371	154	59	0.037	-	-	-	-

KEY: * Associated estimates of weight are not provided for this taxon in Table 11 because a suitable length/weight conversion key was not available.

Table 10. Regional estimates of recreational harvest (numbers of fish) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the second survey year - September 1994 to August 1995 inclusive.

		NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
COMMON NAME	TAXON	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%	No. fish	s.e.	Rank	%
GIANT CUTTLEFISH	*Sepia apama*	33	14	78	0.007	2303	438	34	0.231	208	64	47	0.047
SOUTHERN CALAMARI	*Sepioteuthis australis*	-	-	-	-	34804	5924	9	3.490	568	155	37	0.129

KEY: * Associated estimates of weight are not provided for this taxon in Table 11 because a suitable length/weight conversion key was not available.

Table 11. Regional estimates of recreational harvest (kg) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the second survey year - September 1994 to August 1995 inclusive.

		NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
COMMON NAME	TAXON	kg	s.e.	Rank	%	kg	s.e.	Rank	%	kg	s.e.	Rank	%
SCHOOL SHARK	*Galeorhinus galeus*	118	34	50	0.035	-	-	-	-	458	210	35	0.137
GUMMY SHARK	*Mustelus antarcticus*	357	59	42	0.107	818	323	41	0.144	540	208	32	0.162
WHALER SHARKS	*Carcharhinus spp.*	1626	233	27	0.487	-	-	-	-	61	61	52	0.018
SERGEANT BAKER	*Aulopus purpurissatus*	4973	342	15	1.490	23660	1771	6	4.155	3379	371	17	1.012
ROCK LING	*Genypterus tigerinus*	-	-	-	-	-	-	-	-	5	4	58	0.001
NANNYGAI	*Centroberyx affinis*	5913	882	11	1.772	8538	999	18	1.499	3977	668	15	1.191
MIRROR DORY	*Zenopsis nebulosis*	207	43	46	0.062	-	-	-	-	12	7	56	0.004
JOHN DORY	*Zeus faber*	585	69	37	0.175	1045	266	38	0.183	-	-	-	-
OCEAN PERCH	*Helicolenus percoides*	-	-	-	-	-	-	-	-	928	203	30	0.278
RED SCORPIONCOD	*Scorpaena cardinalis*	5499	326	14	1.648	7974	799	21	1.400	2599	389	20	0.778
RED GURNARD	*Chelidonichthys kumu*	944	97	31	0.283	1939	329	32	0.340	2399	301	21	0.718
LATCHET	*Pterygotrigla polyommata*	-	-	-	-	154	38	51	0.027	160	58	42	0.048
TIGER FLATHEAD	*Neoplatycephalus richardsoni*	2579	545	23	0.773	5295	1231	24	0.930	10632	1881	10	3.184
NORTHERN SAND FLATHEAD	*Platycephalus arenarius*	23	9	57	0.007	-	-	-	-	-	-	-	-
SOUTHERN SAND FLATHEAD	*Platycephalus bassensis*	-	-	-	-	-	-	-	-	220	99	39	0.066
EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*	64286	10417	2	19.265	82116	9466	2	14.419	61125	9453	1	18.305
DUSKY FLATHEAD	*Platycephalus fuscus*	1554	182	28	0.466	5937	795	22	1.043	18	15	55	0.005
LONG-SPINED FLATHEAD	*Platycephalus longispinis*	-	-	-	-	52	27	57	0.009	159	64	43	0.048
MARBLED FLATHEAD	*Platycephalus marmoratus*	2541	213	24	0.761	4710	667	27	0.827	158	43	44	0.047
WIRRAH	*Acanthistius ocellatus*	198	29	47	0.059	1110	256	36	0.195	314	110	37	0.094
MAORI COD	*Epinephelus undulatostriatus*	856	93	33	0.257	-	-	-	-	-	-	-	-
PEARL PERCH	*Glaucosoma scapulare*	3623	571	19	1.086	-	-	-	-	-	-	-	-
LONG-FINNED SEAPIKE	*Dinolestes lewini*	-	-	-	-	11869	1409	12	2.084	1624	560	24	0.486
SCHOOL WHITING	*Sillago flindersi*	396	77	41	0.119	151	49	52	0.027	200	68	40	0.060
TAILOR	*Pomatomus saltatrix*	14125	2177	3	4.233	9763	3186	16	1.714	1597	703	25	0.478
COBIA	*Rachycentron canadum*	7618	1068	9	2.283	-	-	-	-	-	-	-	-
AMBERJACK	*Seriola dumerili*	274	65	43	0.082	-	-	-	-	-	-	-	-
SAMSON FISH	*Seriola hippos*	4662	546	16	1.397	440	187	44	0.077	-	-	-	-
KINGFISH	*Seriola lalandi*	13524	1592	4	4.053	15515	2239	8	2.724	6800	1891	11	2.036
SILVER TREVALLY	*Pseudocaranx dentex*	13438	2048	5	4.027	95481	10808	1	16.766	3377	558	18	1.011
YELLOWTAIL & JACK MACKEREL	*Trachurus novaezelandiae & T. declivis*	879	151	32	0.263	14230	1300	10	2.499	2708	530	19	0.811
DOLPHIN FISH	*Coryphaena hippurus*	3964	1185	17	1.188	5241	2269	25	0.920	3547	3433	16	1.062
SALMON	*Arripis trutta*	-	-	-	-	1680	443	33	0.295	2283	737	22	0.684
YELLOWFIN BREAM	*Acanthopagrus australis*	5764	548	12	1.727	8442	1149	19	1.482	95	41	47	0.028
SNAPPER	*Pagrus auratus*	107716	6071	1	32.280	64035	5814	3	11.244	15897	2606	6	4.761
TARWHINE	*Rhabdosargus sarba*	2821	234	22	0.845	3185	886	31	0.559	-	-	-	-
MULLOWAY	*Argyrosomus hololepidotus*	8159	1200	8	2.445	8156	2903	20	1.432	-	-	-	-
TERAGLIN	*Atractoscion aequidens*	11466	1062	6	3.436	1081	609	37	0.190	-	-	-	-

Table 11. Regional estimates of recreational harvest (kg) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the second survey year - September 1994 to August 1995 inclusive.

COMMON NAME	TAXON	NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
		kg	s.e.	Rank	%	kg	s.e.	Rank	%	kg	s.e.	Rank	%
BLACKSPOT GOATFISH	*Parupeneus signatus*	774	64	34	0.232	942	312	39	0.165	-	-	-	-
BLUE-STRIPED GOATFISH	*Upeneichthys lineatus*	-	-	-	-	159	47	49	0.028	40	38	53	0.012
SILVER SWEEP	*Scorpis lineolatus*	2291	313	25	0.687	34536	3974	4	6.064	6341	1309	12	1.899
RED MORWONG	*Cheilodactylus fuscus*	-	-	-	-	573	295	42	0.101	30	22	54	0.009
BLUE MORWONG	*Nemadactylus douglasii*	9166	690	7	2.747	30558	2922	5	5.366	15208	2407	7	4.554
JACKASS MORWONG	*Nemadactylus macropterus*	-	-	-	-	-	-	-	-	5092	1434	14	1.525
STRIPED SEAPIKE	*Sphyraena obtusata*	175	45	49	0.052	496	230	43	0.087	83	39	49	0.025
BLUE GROPER	*Achoerodus viridis*	1310	311	29	0.393	11149	1965	14	1.958	484	213	34	0.145
GOLD-SPOT PIGFISH	*Bodianus perditio*	226	38	44	0.068	-	-	-	-	-	-	-	-
EASTERN FOXFISH	*Bodianus sp.*	-	-	-	-	157	75	50	0.028	-	-	-	-
BLACK-SPOT PIGFISH	*Bodianus vulpinus*	507	152	39	0.152	4786	443	26	0.840	968	152	29	0.290
COMB FISH	*Coris picta*	-	-	-	-	31	16	58	0.005	-	-	-	-
CRIMSON-BANDED WRASSE	*Notolabrus gymnogenis*	751	90	35	0.225	3938	561	30	0.691	413	90	36	0.124
BLUE-THROATED WRASSE	*Notolabrus tetricus*	-	-	-	-	-	-	-	-	81	69	50	0.024
MAORI WRASSE	*Ophthalmolepis lineolata*	1124	96	30	0.337	11656	1201	13	2.047	5562	810	13	1.666
BARRACOUTA	*Thyrsites atun*	-	-	-	-	96	36	54	0.017	1331	439	26	0.399
NARROW-BARRED SPANISH MACKEREL	*Scomberomorus commerson*	6719	981	10	2.014	-	-	-	-	-	-	-	-
SPOTTED MACKEREL	*Scomberomorus munroi*	3679	787	18	1.102	-	-	-	-	-	-	-	-
QUEENSLAND SCHOOL MACKEREL	*Scomberomorus queenslandicus*	38	16	55	0.011	-	-	-	-	-	-	-	-
FRIGATE MACKEREL	*Auxis thazard*	100	31	53	0.030	420	145	47	0.074	1124	374	28	0.337
SLIMY MACKEREL	*Scomber australasicus*	2855	1118	21	0.856	4225	587	29	0.742	11085	3246	9	3.320
LEAPING BONITO	*Cybiosarda elegans*	-	-	-	-	81	41	55	0.014	-	-	-	-
MACKEREL TUNA	*Euthynnus affinis*	5675	569	13	1.701	422	281	46	0.074	-	-	-	-
SKIPJACK	*Katsuwonus pelamis*	415	127	40	0.124	15469	5034	9	2.716	23140	10100	5	6.930
AUSTRALIAN BONITO	*Sarda australis*	3373	297	20	1.011	10192	1585	15	1.790	14655	8270	8	4.389
ORIENTAL BONITO	*Sarda orientalis*	102	39	52	0.031	-	-	-	-	-	-	-	-
ALBACORE	*Thunnus alalunga*	-	-	-	-	-	-	-	-	35148	24921	3	10.525
YELLOWFIN TUNA	*Thunnus albacares*	2022	552	26	0.606	-	-	-	-	57113	13727	2	17.103
STRIPED MARLIN	*Tetrapturus audax*	-	-	-	-	-	-	-	-	25237	8043	4	7.557
LARGE-TOOTHED FLOUNDER	*Pseudorhombus arsius*	190	31	48	0.057	1129	377	35	0.198	107	29	46	0.032
SMALL-TOOTHED FLOUNDER	*Pseudorhombus jenynsii*	526	63	38	0.158	1132	250	34	0.199	95	77	47	0.028
BLACK REEF LEATHERJACKET	*Eubalichthys bucephalus*	-	-	-	-	140	59	53	0.025	67	43	51	0.020
SIX-SPINED LEATHERJACKET	*Meuschenia freycineti*	104	22	51	0.031	8981	2020	17	1.577	1274	241	27	0.382
YELLOW-FINNED LEATHERJACKET	*Meuschenia trachylepis*	50	13	54	0.015	907	217	40	0.159	274	41	38	0.082
CHINAMAN LEATHERJACKET	*Nelusetta ayraudi*	597	91	36	0.179	5309	1280	23	0.932	122	34	45	0.037
ROUGH LEATHERJACKET	*Scobinichthys granulatus*	-	-	-	-	431	100	45	0.076	162	59	41	0.049
LEATHERJACKETS OTHER	Unidentified Monacanthid species	26	9	56	0.008	165	67	48	0.029	-	-	-	-
COMMON SQUID	*Loligo spp.*	-	-	-	-	4654	1230	28	0.817	12	7	56	0.004

Table 11. Regional estimates of recreational harvest (kg) with associated standard errors, and the ranked size and proportional contribution for all common taxa taken by trailer boat anglers at large access sites during the second survey year - September 1994 to August 1995 inclusive.

		NORTH COAST REGION				CENTRAL COAST REGION				SOUTH COAST REGION			
COMMON NAME	**TAXON**	**kg**	**s.e.**	**Rank**	**%**	**kg**	**s.e.**	**Rank**	**%**	**kg**	**s.e.**	**Rank**	**%**
ARROW SQUID	*Nototodarus gouldi*	-	-	-	-	53	20	56	0.009	760	572	31	0.228
GIANT CUTTLEFISH	*Sepia apama*	214	98	45	0.064	12926	2400	11	2.270	2132	2744	23	0.638
SOUTHERN CALAMARI	*Sepioteuthis australis*	-	-	-	-	21158	3624	7	3.715	522	149	33	0.156

(7.7%), silver sweep (7.3%), southern calamari (4.3%), slimy mackerel (4.2%), maori wrasse (3.9%), long-finned seapike (3.9%), and blue morwong (3.8%). These ten taxa, by number, accounted for 68.6% of the annual trailer boat harvest from the Central Coast Region during the first survey year - September 1993 to August 1994 inclusive (Table 8).

The ten most commonly harvested taxa, by weight, during the first year of the survey (Table 9) were silver trevally (87.5 tonnes - 13.7%), snapper (70.5 tonnes - 11.1%), eastern blue-spotted flathead (68.0 tonnes - 10.7%), blue morwong (37.7 tonnes - 5.9%), silver sweep (37.2 tonnes - 5.8%), kingfish (29.5 tonnes - 4.6%), Australian bonito (27.6 tonnes - 4.3%), sergeant baker (25.4 tonnes - 4.0%), tailor (19.7 tonnes - 3.1%), and giant cuttlefish (19.0 tonnes - 3.0%). These ten taxa, by weight, accounted for 66.2% of the annual trailer boat harvest from the Central Coast Region during the first survey year - September 1993 to August 1994 inclusive (Table 9).

The ten most commonly harvested taxa, by number, during the second year of the survey (Table 10) were eastern blue-spotted flathead (18.3%), silver trevally (13.7%), snapper (7.6%), silver sweep (7.3%), yellowtail and jack mackerel (7.1%), long-finned seapike (3.9%), maori wrasse (3.8%), sergeant baker (3.7%), southern calamari (3.5%), and blue morwong (3.5%). These ten taxa, by number, accounted for 72.4% of the annual trailer boat harvest from the Central Coast Region during the second survey year - September 1994 to August 1995 inclusive (Table 10).

The ten most commonly harvested taxa, by weight, during the second year of the survey (Table 11) were silver trevally (95.5 tonnes - 16.8%), eastern blue-spotted flathead (82.1 tonnes - 14.4%), snapper (64.0 tonnes - 11.2%), silver sweep (34.5 tonnes - 6.1%), blue morwong (30.6 tonnes - 5.4%), sergeant baker (23.7 tonnes - 4.2%), southern calamari (21.2 tonnes - 3.7%), kingfish (15.5 tonnes - 2.7%), skipjack (15.5 tonnes - 2.7%), and yellowtail and jack mackerel (14.2 tonnes - 2.5%). These ten taxa, by weight, accounted for 69.7% of the annual trailer boat harvest from the Central Coast Region during the second survey year - September 1994 to August 1995 inclusive (Table 11).

South Coast region - trailer boat angling

Overall, we recorded 120 taxa in the retained catch of recreational anglers fishing from trailer boats during the two years of the survey (Table 5). Trailer boat anglers kept 108 taxa during the first survey year and 90 taxa were harvested during the second survey year (Table 5). The ten most commonly harvested taxa, by number, during the first year of the survey (Table 8) were eastern blue-spotted flathead (31.0%), slimy mackerel (25.9%), blue morwong (4.7%), tiger flathead (4.6%), snapper (3.5%), yellowtail and jack mackerel (3.5%), nannygai (3.1%), maori wrasse (3.1%), skipjack (2.6%), and silver sweep (2.2%). These ten taxa, by number, accounted for 84.2% of the annual trailer boat harvest from the South Coast Region during the first survey year - September 1993 to August 1994 inclusive (Table 8).

The ten most commonly harvested taxa, by weight, during the first year of the survey (Table 9) were eastern blue-spotted flathead (91.3 tonnes - 17.5%), yellowfin tuna (72.7 tonnes - 14.0%), blue morwong (43.1 tonnes - 8.3%), skipjack (41.2 tonnes - 7.9%), albacore (38.7 tonnes - 7.4%), slimy mackerel (32.7 tonnes - 6.3%), striped marlin (24.1 tonnes - 4.6%), snapper (19.9 tonnes - 3.8%), tiger flathead (16.1 tonnes - 3.1%), and barracouta (14.1 tonnes - 2.7%). These ten taxa, by weight, accounted for 75.6% of the annual trailer boat harvest from the South Coast Region during the first survey year - September 1993 to August 1994 inclusive (Table 9).

The ten most commonly harvested taxa, by number, during the second year of the survey (Table 10) were eastern blue-spotted flathead (38.9%), slimy mackerel (16.0%), tiger flathead (5.6%), maori wrasse (3.7%), snapper (3.6%), nannygai (3.0%), blue morwong (2.9%), silver sweep (2.8%), skipjack (2.2%), yellowtail and jack mackerel 2.0%), These ten taxa, by number, accounted for 80.7% of the annual trailer boat harvest from the South Coast Region during the second survey year - September 1994 to August 1995 inclusive (Table 10).

The ten most commonly harvested taxa, by weight, during the second year of the survey (Table 11) were eastern blue-spotted flathead (61.1 tonnes - 18.3%), yellowfin tuna (57.1 tonnes - 17.1%), albacore (35.1 tonnes - 10.5%), striped marlin (25.2 tonnes - 7.6%), skipjack (23.1 tonnes - 6.9%), snapper (15.9 tonnes - 4.8%), blue morwong (15.2 tonnes - 4.6%), Australian bonito (14.7 tonnes - 4.4%), slimy mackerel (11.1 tonnes - 3.3%), and tiger flathead (10.6 tonnes - 3.2%). These ten taxa, by weight, accounted for 80.7% of the annual trailer boat harvest from the South Coast Region during the second survey year - September 1994 to August 1995 inclusive (Table 11).

Regional comparisons of harvesting patterns

These data presented above show clearly that there are large differences among regions in the species composition and proportional contribution of important fish species in the recreational trailer boat harvest (Tables 5, 8, 9, 10 and 11). Steffe and Murphy (1995) proposed three main related reasons to explain these patterns. Firstly, we know that there are latitudinal differences in the relative abundances and the catchability of fish species among regions. This has been clearly demonstrated for numerous taxa (see Table 5). Some examples of taxa that show large latitudinal differences in relative abundances and catchability are: pearl perch, mulloway, teraglin, narrow-barred spanish mackerel, cobia, jackass morwong, barracouta, and Australian salmon (Table 5). Secondly, anglers assign different subjective values to different fish species (a social phenomenon) and these perceived values vary among sites and regions of the coast. Steffe and Murphy (1995) cited the eastern blue-spotted flathead as an example of a species whose perceived value by anglers changes latitudinally. This flathead species is highly prized in the south of the state and as expected many recreational anglers target and harvest eastern blue-spotted flathead in great quantities. In contrast, anglers in the far north of the state have low regard for this species resulting in little targeting and relatively small harvests by the recreational sector. It is interesting to note that the eastern blue-spotted flathead is abundant in these northern waters as it is a large and regular part of the retained commercial by-catch of trawlers engaged in the offshore king prawn trawl fishery (Steffe and Murphy

1995). Thirdly, anglers target their fishing effort at favoured species (directed fishing effort). It is a complex combination of factors which influences the species targeting of anglers. The expectation that many recreational anglers have when they go fishing strongly influences their choice of target species. For example, a selected fishing location may have a reputation for producing large individuals of a certain species and it is not surprising that anglers would tend to target that species at that location. The directed fishing effort of most anglers would also be linked to the relative abundance and catchability of a species at a particular site and its perceived value by those anglers (Steffe and Murphy 1995).

Harvest Comparisons Between Recreational Trailer Boat and Oceanic Commercial Fisheries

Statewide

Conflict between the recreational and commercial sectors has long been a fisheries management problem. This conflict may escalate in coming years as both sectors attempt to maximise catches. Consequently, there is increasing pressure being applied to fisheries managers to make appropriate allocation decisions regarding fishing opportunity among the various commercial and recreational user-groups. We have compared the estimates of daytime recreational harvest taken by trailer boat anglers in coastal waters to the declared commercial landings taken from the ocean waters of NSW. These comparisons between the marine recreational trailer boat fishery and the marine commercial fisheries have been made for those common taxa for which we had suitable length/weight conversion keys (Appendix 2). We further restricted the recreational/commercial contrasts such that we only compared the harvests for those common taxa for which an annual harvest of at least one tonne (recreational or commercial) had been recorded during either of the two survey years (Table 12).

On a statewide scale, the recreational harvest was greater than the declared commercial catch for some species (Table 12). The taxa that were harvested in greater amounts by the recreational trailer boat anglers (i.e. taxa with harvest ratios greater than one) during both survey years were: eastern blue-spotted flathead, sergeant baker,

Table 12. Comparison of statewide estimates of annual recreational harvest (kg) taken by trailer boat anglers at large access sites, and the declared statewide commercial landings (kg) taken from ocean waters for each survey year during the two year period - September 1993 to August 1995 inclusive. The harvest ratios are a measure of the relative harvest allocations between the recreational and commercial fisheries for the two survey years.

KEY
* - Denotes SEF quota species.
# - Estimates of recreational harvest for species within this family were pooled for comparison with declared commercial landings.
Rec - no comparative commercial landings recorded - recreational estimates dominate harvest.
Com - no comparative recreational estimates recorded - commercial landings dominate harvest.

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SURVEY YEAR 1			SURVEY YEAR 2		
			ALL REGIONS COMBINED			ALL REGIONS COMBINED		
			Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)
TRIAKIDAE	SCHOOL SHARK	*Galeorhinus galeus*	1076	33258	0.032	576	25471	0.023
TRIAKIDAE	GUMMY SHARK	*Mustelus antarcticus*	2976	45997	0.065	1715	47077	0.036
AULOPODIDAE	SERGEANT BAKER	*Aulopus purpurissatus*	37301	762	48.951	32012	150	213.413
OPHIDIIDAE	PINK LING*	*Genypterus blacodes*	-	424924	Com	-	416638	Com
MERLUCCIIDAE	BLUE GRENADIER*	*Macruronus novaezelandiae*	-	134934	Com	-	59353	Com
TRACHICHTHYIDAE	ORANGE ROUGHY*	*Hoplostethus atlanticus*	-	9697	Com	-	8707	Com
BERYCIDAE	NANNYGAI*	*Centroberyx affinis*	24760	1517734	0.016	18428	985328	0.019
ZEIDAE	SILVER DORY	*Cyttus australis*	17	27456	0.001	-	32673	Com
ZEIDAE	MIRROR DORY*	*Zenopsis nebulosis*	-	162257	Com	219	140192	0.002
ZEIDAE	JOHN DORY*	*Zeus faber*	857	287603	0.003	1630	207203	0.008
SCORPAENIDAE	OCEAN PERCH*	*Helicolenus percoides*	1567	224246	0.007	928	217485	0.004
SCORPAENIDAE	RED SCORPIONCOD	*Scorpaena cardinalis*	20641	7064	2.922	16072	6249	2.572
TRIGLIDAE	RED GURNARD	*Chelidonichthys kumu*	7204	56003	0.129	5282	39250	0.135
TRIGLIDAE	LATCHET	*Pterygotrigla polyommata*	921	64258	0.014	314	53290	0.006
PLATYCEPHALIDAE	TIGER FLATHEAD*	*Neoplatycephalus richardsoni*	21191	762966	0.028	18506	554603	0.033
PLATYCEPHALIDAE	EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*	229267	142351	1.611	207527	135701	1.529
PLATYCEPHALIDAE	DUSKY FLATHEAD	*Platycephalus fuscus*	7762	2180	3.561	7509	4931	1.523
PLATYCEPHALIDAE	MARBLED FLATHEAD	*Platycephalus marmoratus*	8757	11	796.091	7409	378	19.601
SERRANIDAE	WIRRAH	*Acanthistius ocellatus*	2156	2151	1.002	1622	11989	0.135
GLAUCOSOMIDAE	PEARL PERCH	*Glaucosoma scapulare*	9179	12861	0.714	3623	12836	0.282
DINOLESTIDAE	LONG-FINNED SEAPIKE	*Dinolestes lewini*	15117	2507	6.030	13493	1567	8.611
SILLAGINIDAE	SCHOOL WHITING*	*Sillago flindersi*	951	595470	0.002	747	731437	0.001
POMATOMIDAE	TAILOR	*Pomatomus saltatrix*	35046	53228	0.658	25485	34747	0.733
RACHYCENTRIDAE	COBIA	*Rachycentron canadum*	13933	6263	2.225	7618	3795	2.007
CARANGIDAE	SAMSON FISH	*Seriola hippos*	7759	18550	0.418	5102	15373	0.332
CARANGIDAE	KINGFISH	*Seriola lalandi*	52979	353056	0.150	35839	271485	0.132
CARANGIDAE	SILVER TREVALLY*	*Pseudocaranx dentex*	103549	589716	0.176	112296	556034	0.202

Table 12. Comparison of statewide estimates of annual recreational harvest (kg) taken by trailer boat anglers at large access sites, and the declared statewide commercial landings (kg) taken from ocean waters for each survey year during the two year period - September 1993 to August 1995 inclusive. The harvest ratios are a measure of the relative harvest allocations between the recreational and commercial fisheries for the two survey years.

KEY
* - Denotes SEF quota species.
# - Estimates of recreational harvest for species within this family were pooled for comparison with declared commercial landings.
Rec - no comparative commercial landings recorded - recreational estimates dominate harvest.
Com - no comparative recreational estimates recorded - commercial landings dominate harvest.

			SURVEY YEAR 1			SURVEY YEAR 2		
			ALL REGIONS COMBINED			ALL REGIONS COMBINED		
HIGHER CLASSIFICATION	COMMON NAME	TAXON	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)
CARANGIDAE	YELLOWTAIL & JACK MACKEREL	*Trachurus novaezelandiae & T. declivis*	24367	215118	0.113	17817	218446	0.082
CORYPHAENIDAE	DOLPHIN FISH	*Coryphaena hippurus*	11791	6461	1.825	12752	11294	1.129
ARRIPIDAE	SALMON	*Arripis trutta*	14725	464651	0.032	3963	1155993	0.003
SPARIDAE	YELLOWFIN BREAM	*Acanthopagrus australis*	21985	254973	0.086	14301	134974	0.106
SPARIDAE	SNAPPER	*Pagrus auratus*	184210	487093	0.378	187648	376715	0.498
SPARIDAE	TARWHINE	*Rhabdosargus sarba*	6535	40035	0.163	6006	34615	0.174
SCIAENIDAE	MULLOWAY	*Argyrasomus hololepidotus*	27217	87407	0.311	16315	71932	0.227
SCIAENIDAE	TERAGLIN	*Atractoscion aequidens*	20068	24092	0.833	12547	21161	0.593
MULLIDAE#	GOATFISH	All species combined	1253	25323	0.049	1915	23168	0.083
SCORPIDIDAE	SILVER SWEEP	*Scorpis lineolatus*	47548	134159	0.354	43168	112186	0.385
CHEILODACTYLIDAE	RED MORWONG	*Cheilodactylus fuscus*	616	8576	0.072	603	7278	0.083
CHEILODACTYLIDAE	BLUE MORWONG	*Nemadactylus douglasii*	90871	188574	0.482	54932	178572	0.308
CHEILODACTYLIDAE	JACKASS MORWONG*	*Nemadactylus macropterus*	8944	214071	0.042	5092	174687	0.029
LABRIDAE	BLACK-SPOT PIGFISH	*Bodianus vulpinus*	10938	6465	1.692	6261	7326	0.855
LABRIDAE	CRIMSON-BANDED WRASSE	*Notolabrus gymnogenis*	6199	160	38.744	5102	23	221.826
LABRIDAE	MAORI WRASSE	*Ophthalmolepis lineolata*	23970	490	48.918	18342	611	30.020
GEMPYLIDAE	GEMFISH*	*Rexea solandri*	-	191511	Com	-	124484	Com
GEMPYLIDAE	BARRACOUTA	*Thyrsites atun*	15108	44772	0.337	1427	28286	0.050
CENTROLOPHIDAE	BLUE-EYE TREVALLA*	*Hyperoglyphe antarctica*	-	199607	Com	-	200577	Com
CENTROLOPHIDAE	WAREHOU*	*Seriolella spp.*	-	323701	Com	-	453750	Com
SCOMBRIDAE	NARROW-BARRED SPANISH MACKEREL	*Scomberomorus commerson*	4797	17094	0.281	6719	7509	0.895
SCOMBRIDAE	SPOTTED MACKEREL	*Scomberomorus munroi*	12133	27109	0.448	3679	7669	0.480
SCOMBRIDAE	FRIGATE MACKEREL	*Auxis thazard*	3751	819	4.580	1644	23467	0.070
SCOMBRIDAE	SLIMY MACKEREL	*Scomber australasicus*	40069	338111	0.119	18165	311504	0.058
SCOMBRIDAE	LEAPING BONITO	*Cybiosarda elegans*	-	7123	Com	81	15437	0.005
SCOMBRIDAE	MACKEREL TUNA	*Euthynnus affinis*	11986	23100	0.519	6097	6973	0.874
SCOMBRIDAE	SKIPJACK	*Katsuwonus pelamis*	56783	1645592	0.035	39024	659446	0.059

Table 12. Comparison of statewide estimates of annual recreational harvest (kg) taken by trailer boat anglers at large access sites, and the declared statewide commercial landings (kg) taken from ocean waters for each survey year during the two year period - September 1993 to August 1995 inclusive. The harvest ratios are a measure of the relative harvest allocations between the recreational and commercial fisheries for the two survey years.

KEY
* - Denotes SEF quota species.
# - Estimates of recreational harvest for species within this family were pooled for comparison with declared commercial landings.
Rec - no comparative commercial landings recorded - recreational estimates dominate harvest.
Com - no comparative recreational estimates recorded - commercial landings dominate harvest.

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SURVEY YEAR 1 ALL REGIONS COMBINED			SURVEY YEAR 2 ALL REGIONS COMBINED		
			Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)
SCOMBRIDAE	AUSTRALIAN BONITO	*Sarda australis*	34289	163625	0.210	28220	137670	0.205
SCOMBRIDAE	ALBACORE	*Thunnus alalunga*	38696	203613	0.190	35148	230723	0.152
SCOMBRIDAE	YELLOWFIN TUNA	*Thunnus albacares*	73098	503423	0.145	59135	487016	0.121
ISTIOPHORIDAE	STRIPED MARLIN	*Tetrapturus audax*	31848	14160	2.249	25237	18571	1.359
BOTHIDAE#	FLOUNDER	All species combined	3849	28409	0.135	3179	39444	0.081
MONACANTHIDAE#	LEATHERJACKETS	All species combined	19459	969969	0.020	18609	151556	0.123
CEPHALOPODA	ARROW SQUID	*Nototodarus gouldi*	1258	248413	0.005	813	217623	0.004
CEPHALOPODA	GIANT CUTTLEFISH	*Sepia apama*	22429	414537	0.054	15272	426771	0.036
CEPHALOPODA	SOUTHERN CALAMARI	*Sepioteuthis australis*	18995	64062	0.297	21680	68235	0.318

striped marlin, maori wrasse, red scorpioncod, long-finned seapike, dolphin fish, cobia, dusky flathead, marbled flathead, crimson-banded wrasse (Table 12). The recreational harvest of blackspot pigfish, wirrah, and frigate mackerel were greater than the commercial landings only during survey year 1 (Table 12). Potential conflicts between the commercial and recreational sectors may occur should the relative allocation of these taxa change in favour of the commercial industry. In particular, any increased commercial targeting of eastern blue-spotted flathead, which is the mainstay of the recreational trailer boat fishery in marine waters in the Central Coast and South Coast regions, should be actively opposed by fisheries managers.

Those taxa which are keenly targeted and harvested by both recreational and commercial fishers and which form the basis of large shared fisheries by both sectors have the greatest potential for causing allocation disputes between them. We objectively identified these taxa, on a statewide scale, by using the following two criteria: (1) The annual harvest ratio must be greater than 0.10 for at least one survey year, regardless of the size of the recreational harvest. This criterion indicates that the relative size of the recreational harvest was greater than 10% of the size of the commercial fishery; or (2) The estimated recreational harvest had to be greater than 5 tonnes during at least one survey year, regardless of the annual harvest ratios. The taxa which met either of these two criteria were regarded as "shared" by the two fishing sectors. These shared taxa, which were landed in greater amounts by the commercial sector but which also provided a considerable recreational harvest were: snapper, yellowfin bream, tarwhine, mulloway, teraglin, kingfish, blue morwong, silver sweep, leatherjackets, flounders, skipjack, mackerel tuna, Australian bonito, albacore, yellowfin tuna, slimy mackerel, yellowtail and jack mackerel, red gurnard, pearl perch, tailor, barracouta, samson fish, Australian salmon, narrow-barred spanish mackerel, spotted mackerel, giant cuttlefish and southern calamari (Table 12). The South East Fishery (SEF) quota species nannygai, tiger flathead, silver trevally and jackass morwong are also classified as shared taxa (Table 12).

The recreational sector like its commercial counterpart, is a user-group with the potential to impact on many shared fisheries resources. Consequently, the recreational

sector should be given more consideration and input into management plans that affect shared fisheries resources. Also, it is imperative that the recreational sector be considered when making stock assessments to determine the size of annual quotas for many species, particularly SEF species. Future recreational research programs that monitor effort and harvest are necessary to improve fisheries management. These programs will contribute to our understanding of sustainable limits of harvest for our coastal fisheries resources.

On a statewide scale, the declared commercial catch of some species far outweighed the relatively small harvests taken by recreational trailer boat anglers (Table 12). The taxa that were harvested in greater amounts by commercial fishers (i.e. taxa with annual harvest ratios less than 0.10 and an estimated recreational harvest less than 5 tonnes per survey year) were: school sharks, gummy sharks, latchets, goatfish, red morwong, leaping bonito and arrow squid (Table 12). Many of the South East Fishery (SEF) quota species mirror dory, john dory, ocean perch, school whiting, pink ling, orange roughy, blue grenadier, gemfish, blue and spotted warehou were also identified as taxa having a relatively negligible recreational harvest (Table 12).

Regional Comparisons of Harvest Allocations

We have already documented the great latitudinal changes in harvesting patterns observed in the recreational trailer boat fishery that operates in the marine waters of NSW. The commercial catch statistics also show that the relative size of commercial catches for many species is strongly correlated with changes in latitude. These latitudinal harvesting patterns for both recreational and commercial fisheries are in part due to latitudinal differences in the relative abundances and catchability of the fishes. However, socio-economic factors, such as changing market values for commercial operators or the perceived value of a species by recreational anglers also influence the targeting of recreational and commercial fishers. These socio-economic factors may help explain why the harvest ratios, which indicate the relative sizes of the recreational and commercial harvests, vary greatly among regions for many taxa (Tables 13 and 14). We have chosen four examples, eastern blue-spotted flathead,

Table 13. Comparison of regional estimates of annual recreational harvest (kg) taken by trailer boat anglers at large access sites, and the declared regional commercial landings (kg) taken from ocean waters during the first survey year - September 1993 to August 1994 inclusive. The harvest ratios are a measure of the relative harvest allocations between the recreational and commercial fisheries for the first survey year.

KEY
* - Denotes SEF quota species.
# - Estimates of recreational harvest for species within this family were pooled for comparison with declared commercial landings.
Rec - no comparative commercial landings recorded - recreational estimates dominate harvest.
Com - no comparative recreational estimates recorded - commercial landings dominate harvest.

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SURVEY YEAR 1								
			NORTH COAST REGION			CENTRAL COAST REGION			SOUTH COAST REGION		
			Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)
TRIAKIDAE	SCHOOL SHARK	*Galeorhinus galeus*	906	5750	0.158	170	18766	0.009	-	8742	Com
TRIAKIDAE	GUMMY SHARK	*Mustelus antarcticus*	207	6693	0.031	-	9917	Com	2769	29387	0.094
AULOPODIDAE	SERGEANT BAKER	*Aulopus purpurissatus*	6234	57	109.368	25376	-	Rec	5691	705	8.072
OPHIDIIDAE	PINK LING*	*Genypterus blacodes*	-	787	Com	-	19005	Com	-	405132	Com
MERLUCCIIDAE	BLUE GRENADIER*	*Macruronus novaezelandiae*	-	2	Com	-	947	Com	-	133985	Com
TRACHICHTHYIDAE	ORANGE ROUGHY*	*Hoplostethus atlanticus*	-	1	Com	-	7392	Com	-	2304	Com
BERYCIDAE	NANNYGAI*	*Centroberyx affinis*	10172	10912	0.932	6849	338847	0.020	7739	1167975	0.007
ZEIDAE	SILVER DORY	*Cyttus australis*	-	78	Com	-	4545	Com	17	22833	0.001
ZEIDAE	MIRROR DORY*	*Zenopsis nebulosis*	-	3923	Com	-	83254	Com	-	75080	Com
ZEIDAE	JOHN DORY*	*Zeus faber*	323	11296	0.029	502	142345	0.004	32	133962	< 0.001
SCORPAENIDAE	OCEAN PERCH*	*Helicolenus percoides*	-	6198	Com	-	62542	Com	1567	155506	0.010
SCORPAENIDAE	RED SCORPIONCOD	*Scorpoena cardinalis*	5280	3675	1.437	11072	528	20.970	4289	2861	1.499
TRIGLIDAE	RED GURNARD	*Chelidonichthys kumu*	771	2415	0.319	1824	7762	0.235	4609	45826	0.101
TRIGLIDAE	LATCHET	*Pterygotrigla polyommata*	-	3971	Com	103	30400	0.003	818	29887	0.027
PLATYCEPHALIDAE	TIGER FLATHEAD*	*Neoplatycephalus richardsoni*	3225	29302	0.110	1827	159584	0.011	16139	574080	0.028
PLATYCEPHALIDAE	EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*	69910	81910	0.853	68031	51087	1.332	91326	9354	9.763
PLATYCEPHALIDAE	DUSKY FLATHEAD	*Platycephalus fuscus*	2797	909	3.077	4565	1202	3.798	400	69	5.797
PLATYCEPHALIDAE	MARBLED FLATHEAD	*Platycephalus marmoratus*	4183	6	697.167	4397	5	879.400	177	-	Rec
SERRANIDAE	WIRRAH	*Acanthistius ocellatus*	178	1280	0.139	1407	510	2.759	571	361	1.582
GLAUCOSOMIDAE	PEARL PERCH	*Glaucosoma scapulare*	9179	11911	0.771	-	542	Com	-	408	Com
DINOLESTIDAE	LONG-FINNED SEAPIKE	*Dinolestes lewini*	-	1966	Com	13513	444	30.435	1604	97	16.536
SILLAGINIDAE	SCHOOL WHITING*	*Sillago flindersi*	279	349674	< 0.001	206	227536	0.001	466	18260	0.026
POMATOMIDAE	TAILOR	*Pomatomus saltatrix*	11934	18994	0.628	19725	33665	0.586	3387	569	5.953
RACHYCENTRIDAE	COBIA	*Rachycentron canadum*	13933	6066	2.297	-	180	Com	-	17	Com
CARANGIDAE	SAMSON FISH	*Seriola hippos*	5063	17066	0.297	2696	444	6.072	-	1040	Com
CARANGIDAE	KINGFISH	*Seriola lalandi*	15359	91493	0.168	29515	88230	0.335	8105	173333	0.047

Table 13. Comparison of regional estimates of annual recreational harvest (kg) taken by trailer boat anglers at large access sites, and the declared regional commercial landings (kg) taken from ocean waters during the first survey year - September 1993 to August 1994 inclusive. The harvest ratios are a measure of the relative harvest allocations between the recreational and commercial fisheries for the first survey year.

KEY
* - Denotes SEF quota species.
# - Estimates of recreational harvest for species within this family were pooled for comparison with declared commercial landings.
Rec - no comparative commercial landings recorded - recreational estimates dominate harvest.
Com - no comparative recreational estimates recorded - commercial landings dominate harvest.

			SURVEY YEAR 1								
			NORTH COAST REGION			CENTRAL COAST REGION			SOUTH COAST REGION		
HIGHER CLASSIFICATION	COMMON NAME	TAXON	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)
CARANGIDAE	SILVER TREVALLY*	*Pseudocaranx dentex*	11284	126475	0.089	87535	191183	0.458	4730	272058	0.017
CARANGIDAE	YELLOWTAIL & JACK MACKEREL	*Trachurus novaezelandiae & T. declivis*	709	12300	0.058	15410	167846	0.092	8248	34972	0.236
CORYPHAENIDAE	DOLPHIN FISH	*Coryphaena hippurus*	5536	4402	1.258	6255	593	10.548	-	1466	Com
ARRIPIDAE	SALMON	*Arripis trutta*	-	12037	Com	8425	14881	0.566	6300	437733	0.014
SPARIDAE	YELLOWFIN BREAM	*Acanthopagrus australis*	4109	84792	0.048	15051	154299	0.098	2825	15882	0.178
SPARIDAE	SNAPPER	*Pagrus auratus*	93784	380521	0.246	70494	84482	0.834	19932	22090	0.902
SPARIDAE	TARWHINE	*Rhabdosargus sarba*	1656	11275	0.147	4879	28323	0.172	-	437	Com
SCIAENIDAE	MULLOWAY	*Argyrosomus hololepidotus*	12261	50874	0.241	14956	35447	0.422	-	1086	Com
SCIAENIDAE	TERAGLIN	*Atractoscion aequidens*	19712	23038	0.856	356	1054	0.338	-	-	-
MULLIDAE#	GOATFISH	All species combined	913	21768	0.042	291	3499	0.083	49	56	0.875
SCORPIDIDAE	SILVER SWEEP	*Scorpis lineolatus*	2844	48571	0.059	37168	75490	0.492	7536	10098	0.746
CHEILODACTYLIDAE	RED MORWONG	*Cheilodactylus fuscus*	-	3931	Com	616	2971	0.207	-	1674	Com
CHEILODACTYLIDAE	BLUE MORWONG	*Nemadactylus douglasii*	10047	107619	0.093	37715	40125	0.940	43109	40830	1.056
CHEILODACTYLIDAE	JACKASS MORWONG*	*Nemadoctylus macropterus*	-	8194	Com	681	4001	0.170	8263	201876	0.041
LABRIDAE	BLACK-SPOT PIGFISH	*Bodianus vulpinus*	237	4544	0.052	6376	953	6.690	4325	968	4.468
LABRIDAE	CRIMSON-BANDED WRASSE	*Notolabrus gymnogenis*	338	5	67.600	4166	-	Rec	1695	155	10.935
LABRIDAE	MAORI WRASSE	*Ophthalmolepis lineolata*	1056	9	117.333	14154	-	Rec	8760	481	18.212
GEMPYLIDAE	GEMFISH*	*Rexea solandri*	-	2403	Com	-	130614	Com	-	58494	Com
GEMPYLIDAE	BARRACOUTA	*Thyrsites atun*	-	15	Com	988	27	36.593	14120	44730	0.316
CENTROLOPHIDAE	BLUE-EYE TREVALLA*	*Hyperoglyphe antarctica*	-	18976	Com	-	50703	Com	-	129928	Com
CENTROLOPHIDAE	WAREHOU*	*Seriolella spp.*	-	-	-	-	368	Com	-	323333	Com
SCOMBRIDAE	NARROW-BARRED SPANISH MACKERE	*Scomberomorus commerson*	4797	16995	0.282	-	97	Com	-	2	Com
SCOMBRIDAE	SPOTTED MACKEREL	*Scomberomorus munroi*	12133	26872	0.452	-	8	Com	-	229	Com
SCOMBRIDAE	FRIGATE MACKEREL	*Auxis thazard*	81	746	0.109	1377	21	65.571	2293	52	44.096
SCOMBRIDAE	SLIMY MACKEREL	*Scomber australasicus*	736	6873	0.107	6584	153610	0.043	32749	177628	0.184
SCOMBRIDAE	LEAPING BONITO	*Cybiosarda elegans*	-	5457	-	-	1191	Com	-	475	Com

Table 13. Comparison of regional estimates of annual recreational harvest (kg) taken by trailer boat anglers at large access sites, and the declared regional commercial landings (kg) taken from ocean waters during the first survey year - September 1993 to August 1994 inclusive. The harvest ratios are a measure of the relative harvest allocations between the recreational and commercial fisheries for the first survey year.

KEY
* - Denotes SEF quota species.
# - Estimates of recreational harvest for species within this family were pooled for comparison with declared commercial landings.
Rec - no comparative commercial landings recorded - recreational estimates dominate harvest.
Com - no comparative recreational estimates recorded - commercial landings dominate harvest.

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SURVEY YEAR 1								
			NORTH COAST REGION			CENTRAL COAST REGION			SOUTH COAST REGION		
			Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)
SCOMBRIDAE	MACKEREL TUNA	*Euthynnus affinis*	11065	12344	0.896	921	441	2.088	-	10315	Com
SCOMBRIDAE	SKIPJACK	*Katsuwonus pelamis*	1175	1880	0.625	14435	6600	2.187	41173	1637112	0.025
SCOMBRIDAE	AUSTRALIAN BONITO	*Sarda australis*	3281	69244	0.047	27554	14176	1.944	3454	80205	0.043
SCOMBRIDAE	ALBACORE	*Thunnus alalunga*	-	4712	Com	-	27389	Com	38696	171512	0.226
SCOMBRIDAE	YELLOWFIN TUNA	*Thunnus albacares*	419	57990	0.007	-	104923	Com	72679	340510	0.213
ISTIOPHORIDAE	STRIPED MARLIN	*Tetrapturus audax*	7761	1849	4.197	-	1909	Com	24087	10402	2.316
BOTHIDAE#	FLOUNDER	All species combined	880	13241	0.066	2427	14274	0.170	542	894	0.606
MONACANTHIDAE#	LEATHERJACKETS	All species combined	802	99403	0.008	14332	30338	0.472	4325	840228	0.005
CEPHALOPODA	ARROW SQUID	*Nototodarus gouldi*	-	46544	Com	-	46721	Com	1258	155148	0.008
CEPHALOPODA	GIANT CUTTLEFISH	*Sepia apama*	-	242330	Com	19042	108734	0.175	3387	63473	0.053
CEPHALOPODA	SOUTHERN CALAMARI	*Sepioteuthis australis*	-	12107	Com	17118	49299	0.347	1877	2656	0.707

Table 14. Comparison of regional estimates of annual recreational harvest (kg) taken by trailer boat anglers at large access sites, and the declared regional commercial landings (kg) taken from ocean waters during the second survey year - September 1994 to August 1995 inclusive. The harvest ratios are a measure of the relative harvest allocations between the recreational and commercial fisheries for the second survey year.

KEY
* - Denotes SEF quota species.
# - Estimates of recreational harvest for species within this family were pooled for comparison with declared commercial landings.
Rec - no comparative commercial landings recorded - recreational estimates dominate harvest.
Com - no comparative recreational estimates recorded - commercial landings dominate harvest.

			SURVEY YEAR 2								
			NORTH COAST REGION			CENTRAL COAST REGION			SOUTH COAST REGION		
HIGHER CLASSIFICATION	COMMON NAME	TAXON	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)
TRIAKIDAE	SCHOOL SHARK	*Galeorhinus galeus*	118	8064	0.015	-	12082	Com	458	5325	0.086
TRIAKIDAE	GUMMY SHARK	*Mustelus antarcticus*	357	6928	0.052	818	8099	0.101	540	32050	0.017
AULOPODIDAE	SERGEANT BAKER	*Aulopus purpurissatus*	4973	135	36.837	23660	15	1577.333	3379	-	Rec
OPHIDIIDAE	PINK LING*	*Genypterus blacodes*	-	581	Com	-	36406	Com	-	379651	Com
MERLUCCIIDAE	BLUE GRENADIER*	*Macruronus novaezelandiae*	-	79	Com	-	917	Com	-	58357	Com
TRACHICHTHYIDAE	ORANGE ROUGHY*	*Hoplostethus atlanticus*	-	160	Com	-	268	Com	-	8279	Com
BERYCIDAE	NANNYGAI*	*Centroberyx affinis*	5913	10622	0.557	8538	239243	0.036	3977	735463	0.005
ZEIDAE	SILVER DORY	*Cyttus australis*	-	7	Com	-	1128	Com	-	31538	Com
ZEIDAE	MIRROR DORY*	*Zenopsis nebulosis*	207	1490	0.139	-	70940	Com	12	67762	Com
ZEIDAE	JOHN DORY*	*Zeus faber*	585	9256	0.063	1045	93206	0.011	-	104741	Com
SCORPAENIDAE	OCEAN PERCH*	*Helicolenus percoides*	-	3569	Com	-	87937	Com	928	125979	0.007
SCORPAENIDAE	RED SCORPIONCOD	*Scorpoena cardinalis*	5499	3250	1.692	7974	609	13.094	2599	2390	1.087
TRIGLIDAE	RED GURNARD	*Chelidonichthys kumu*	944	984	0.959	1939	10803	0.179	2399	27463	0.087
TRIGLIDAE	LATCHET	*Pterygotrigla polyommata*	-	5779	Com	154	26170	0.006	160	21341	0.007
PLATYCEPHALIDAE	TIGER FLATHEAD*	*Neoplatycephalus richardsoni*	2579	32038	0.080	5295	150658	0.035	10632	371907	0.029
PLATYCEPHALIDAE	EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*	64286	85143	0.755	82116	42727	1.922	61125	7831	7.806
PLATYCEPHALIDAE	DUSKY FLATHEAD	*Platycephalus fuscus*	1554	2269	0.685	5937	1789	3.319	18	873	Com
PLATYCEPHALIDAE	MARBLED FLATHEAD	*Platycephalus marmoratus*	2541	279	9.108	4710	99	47.576	158	-	Rec
SERRANIDAE	WIRRAH	*Acanthistius ocellatus*	198	1487	0.133	1110	287	3.868	314	10215	0.031
GLAUCOSOMIDAE	PEARL PERCH	*Glaucosoma scapulare*	3623	11438	0.317	-	405	Com	-	993	Com
DINOLESTIDAE	LONG-FINNED SEAPIKE	*Dinolestes lewini*	-	215	Com	11869	526	22.565	1624	826	1.966
SILLAGINIDAE	SCHOOL WHITING*	*Sillago flindersi*	396	502052	0.001	151	208003	0.001	200	21382	0.009
POMATOMIDAE	TAILOR	*Pomatomus saltatrix*	14125	14558	0.970	9763	15343	0.636	1597	4846	0.330
RACHYCENTRIDAE	COBIA	*Rachycentron canadum*	7618	3498	2.178	-	249	Com	-	48	Com
CARANGIDAE	SAMSON FISH	*Seriola hippos*	4662	15151	0.308	440	222	1.982	-	-	-
CARANGIDAE	KINGFISH	*Seriola lalandi*	13524	92521	0.146	15515	55799	0.278	6800	123165	0.055

Table 14. Comparison of regional estimates of annual recreational harvest (kg) taken by trailer boat anglers at large access sites, and the declared regional commercial landings (kg) taken from ocean waters during the second survey year - September 1994 to August 1995 inclusive. The harvest ratios are a measure of the relative harvest allocations between the recreational and commercial fisheries for the second survey year.

KEY
* - Denotes SEF quota species.
# - Estimates of recreational harvest for species within this family were pooled for comparison with declared commercial landings.
Rec - no comparative commercial landings recorded - recreational estimates dominate harvest.
Com - no comparative recreational estimates recorded - commercial landings dominate harvest.

			SURVEY YEAR 2								
			NORTH COAST REGION			CENTRAL COAST REGION			SOUTH COAST REGION		
HIGHER CLASSIFICATION	COMMON NAME	TAXON	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)
CARANGIDAE	SILVER TREVALLY*	*Pseudocaranx dentex*	13438	98394	0.137	95481	142536	0.670	3377	315104	0.011
CARANGIDAE	YELLOWTAIL & JACK MACKEREL	*Trachurus novaezelandiae & T. declivis*	879	10743	0.082	14230	153748	0.093	2708	53955	0.050
CORYPHAENIDAE	DOLPHIN FISH	*Coryphaena hippurus*	3964	5713	0.694	5241	2781	1.885	3547	2800	1.267
ARRIPIDAE	SALMON	*Arripis trutta*	-	46066	Com	1680	500424	0.003	2283	609503	0.004
SPARIDAE	YELLOWFIN BREAM	*Acanthopagrus australis*	5764	27257	0.211	8442	102422	0.082	95	5295	0.018
SPARIDAE	SNAPPER	*Pagrus auratus*	107716	295109	0.365	64035	64865	0.987	15897	16741	0.950
SPARIDAE	TARWHINE	*Rhabdosargus sarba*	2821	14436	0.195	3185	19894	0.160	-	285	Com
SCIAENIDAE	MULLOWAY	*Argyrosomus hololepidotus*	8159	36579	0.223	8156	33962	0.240	-	1391	Com
SCIAENIDAE	TERAGLIN	*Atractoscion aequidens*	11466	20260	0.566	1081	471	2.295	-	430	Com
MULLIDAE#	GOATFISH	All species combined	774	20303	0.038	1101	2806	0.392	40	59	0.678
SCORPIDIDAE	SILVER SWEEP	*Scorpis lineolatus*	2291	51357	0.045	34536	56594	0.610	6341	4235	1.497
CHEILODACTYLIDAE	RED MORWONG	*Cheilodactylus fuscus*	-	3067	Com	573	3096	0.185	30	1115	0.027
CHEILODACTYLIDAE	BLUE MORWONG	*Nemadactylus douglasii*	9166	99283	0.092	30558	53241	0.574	15208	26048	0.584
CHEILODACTYLIDAE	JACKASS MORWONG*	*Nemadactylus macropterus*	-	6380	Com	-	3522	Com	5092	164785	0.031
LABRIDAE	BLACK-SPOT PIGFISH	*Bodianus vulpinus*	507	5444	0.093	4786	1294	3.699	968	588	1.646
LABRIDAE	CRIMSON-BANDED WRASSE	*Notolabrus gymnogenis*	751	23	32.652	3938	-	Rec	413	-	Rec
LABRIDAE	MAORI WRASSE	*Ophthalmolepis lineolata*	1124	34	33.059	11656	8	1457.000	5562	569	9.775
GEMPYLIDAE	GEMFISH*	*Rexea solandri*	-	4337	Com	-	84064	Com	-	36083	Com
GEMPYLIDAE	BARRACOUTA	*Thyrsites atun*	-	140	Com	96	138	0.696	1331	28008	0.048
CENTROLOPHIDAE	BLUE-EYE TREVALLA*	*Hyperoglyphe antarctica*	-	25516	Com	-	67895	Com	-	107166	Com
CENTROLOPHIDAE	WAREHOU*	*Seriolella spp.*	-	-	-	-	194	Com	-	453556	Com
SCOMBRIDAE	NARROW-BARRED SPANISH MACKERE	*Scomberomorus commerson*	6719	7306	0.920	-	112	Com	-	91	Com
SCOMBRIDAE	SPOTTED MACKEREL	*Scomberomorus munroi*	3679	7536	0.488	-	87	Com	-	46	Com
SCOMBRIDAE	FRIGATE MACKEREL	*Auxis thazard*	100	22553	0.004	420	45	9.333	1124	869	1.293
SCOMBRIDAE	SLIMY MACKEREL	*Scomber australasicus*	2855	1381	2.067	4225	158162	0.027	11085	151961	0.073
SCOMBRIDAE	LEAPING BONITO	*Cybiosarda elegans*	-	8928	Com	81	2635	0.031	-	3874	Com

Table 14. Comparison of regional estimates of annual recreational harvest (kg) taken by trailer boat anglers at large access sites, and the declared regional commercial landings (kg) taken from ocean waters during the second survey year - September 1994 to August 1995 inclusive. The harvest ratios are a measure of the relative harvest allocations between the recreational and commercial fisheries for the second survey year.

KEY
* - Denotes SEF quota species.
# - Estimates of recreational harvest for species within this family were pooled for comparison with declared commercial landings.
Rec - no comparative commercial landings recorded - recreational estimates dominate harvest.
Com - no comparative recreational estimates recorded - commercial landings dominate harvest.

			SURVEY YEAR 2								
			NORTH COAST REGION			CENTRAL COAST REGION			SOUTH COAST REGION		
HIGHER CLASSIFICATION	COMMON NAME	TAXON	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)	Recreational Harvest (kg)	Commercial Harvest (kg)	Harvest Ratio (Recreational/ Commercial)
SCOMBRIDAE	MACKEREL TUNA	*Euthynnus affinis*	5675	2077	2.732	422	537	0.786	-	4359	Com
SCOMBRIDAE	SKIPJACK	*Katsuwonus pelamis*	415	3024	0.137	15469	6259	2.471	23140	650163	0.036
SCOMBRIDAE	AUSTRALIAN BONITO	*Sarda australis*	3373	78231	0.043	10192	19408	0.525	14655	40031	0.366
SCOMBRIDAE	ALBACORE	*Thunnus alalunga*	-	11028	Com	-	42687	Com	35148	177008	0.199
SCOMBRIDAE	YELLOWFIN TUNA	*Thunnus albacares*	2022	119193	0.017	-	111616	Com	57113	256207	0.223
ISTIOPHORIDAE	STRIPED MARLIN	*Tetrapturus audax*	-	3066	Com	-	3069	Com	25237	12436	2.029
BOTHIDAE#	FLOUNDER	All species combined	716	22241	0.032	2261	15860	0.143	202	1343	0.150
MONACANTHIDAE#	LEATHERJACKETS	All species combined	777	92972	0.008	15933	24094	0.661	1899	34490	0.055
CEPHALOPODA	ARROW SQUID	*Natotodarus gouldi*	-	49806	Com	53	43256	0.001	760	124561	0.006
CEPHALOPODA	GIANT CUTTLEFISH	*Sepia apama*	214	275530	0.001	12926	91634	0.141	2132	59607	0.036
CEPHALOPODA	SOUTHERN CALAMARI	*Sepioteuthis australis*	-	10566	Com	21158	51545	0.410	522	6124	0.085

snapper, tiger flathead and silver trevally, to illustrate these differences in the regional allocation of harvest. These regional differences in the relative sizes (actual allocations) of recreational and commercial harvests suggest that for some shared fisheries it may be better for fisheries managers to begin managing these important fisheries on a regional basis.

Example 1: Eastern blue-spotted flathead

The commercial catch of eastern blue-spotted flathead shows a strong latitudinal pattern. The commercial catch was greatest in the North Coast region, intermediate in the Central Coast region and lowest in the South Coast region (Tables 13 and 14). This pattern of commercial harvesting is mainly attributable to the different types of commercial fisheries that operate throughout the State. The eastern blue-spotted flathead is a large and regular part of the retained commercial by-catch of trawlers engaged in the offshore king prawn trawl fishery in the north of NSW. In the Central Coast region of NSW this flathead species is mainly taken commercially by fish trawlers, whereas in the South Coast of the state this species is rarely targeted by commercial operators because the trawl fisheries in this region are located in deeper waters. Thus, in the South Coast region it is the tiger flathead which is the main target flathead species for trawl operators, even though eastern blue-spotted flathead are very abundant in the shallower coastal waters.

The eastern blue-spotted flathead has been cited as an example of a species whose perceived value by recreational anglers changes latitudinally (Steffe and Murphy 1995). This flathead species is highly prized in the south and central parts of the state and as expected many recreational anglers target and harvest eastern blue-spotted flathead in great quantities. In contrast, anglers in the far north of the state have relatively low regard for this species resulting in little targeting and relatively small harvests by the recreational sector (Steffe and Murphy 1995). The combined effect created by the very different harvesting patterns of the commercial and recreational fishers is expressed in terms of large regional differences in harvest ratios. A huge increase in harvest allocation, which strongly favours the recreational sector, is seen as

latitude increases. This pattern of harvest allocation was consistent between survey years (Tables 13 and 14). The harvest ratios were lowest in the North Coast region (0.853 harvest ratio in the first survey year, and 0.755 harvest ratio in the second survey year), intermediate in the Central Coast region (1.332 harvest ratio in the first survey year, and 1.922 harvest ratio in the second survey year) and highest in the South Coast region (9.763 harvest ratio in the first survey year, and 7.806 harvest ratio in the second survey year - Tables 13 and 14). These figures make a good case for regional management of the eastern blue-spotted flathead resource and also strongly suggest that any increases in commercial fishing effort directed towards this species will create conflict between the recreational and commercial sectors.

Example 2: Snapper

The commercial and recreational fisheries both show marked declines in harvests as latitude increases. That is, the harvests for both groups are largest in the North Coast region, intermediate in the Central Coast region and lowest in the South Coast region (Tables 13 and 14). We know that snapper are highly regarded and keenly sought along the entire length of the NSW coast. Thus, this southward gradient of decline in snapper harvest strongly suggests that the relative abundance of snapper changes latitudinally. Yet, the harvest ratios, which are a measure of the realised allocation between the two user-groups, does not remain constant among regions. Instead, the harvest ratio is lowest in the North Coast region (0.246 harvest ratio in the first survey year, and 0.365 harvest ratio in the second survey year) where snapper harvests are greatest for both sectors, indicating that the commercial fishery is harvesting the greatest portion of the resource. The recreational share of the snapper harvest is found to increase markedly in the Central Coast (0.834 harvest ratio in the first survey year, and 0.987 harvest ratio in the second survey year) and South Coast regions (0.902 harvest ratio in the first survey year, and 0.950 harvest ratio in the second survey year), indicating that recreational trailer boat anglers are large users of the snapper resource in these two regions.

Example 3: Tiger flathead

The commercial fishery for tiger flathead shows a marked decline in total catch as latitude decreases. That is, the largest commercial catches of tiger flathead were taken in the South Coast region, intermediate catches were landed in the Central Coast region, and relatively low commercial catches were made in the North Coast region. This pattern of commercial harvesting was found in both survey years (Tables 13 and 14). The recreational trailer boat fishery tended to reflect this same pattern. Largest recreational harvests were taken in the South Coast region and lower but still considerable recreational harvests were made in the Central and North Coast regions (Tables 13 and 14). Interestingly, harvest ratios showed the opposite pattern to harvest. The largest harvest ratios were recorded outside the area of the South East Fishery (SEF) in the North Coast region (0.110 harvest ratio in the first survey year, and 0.080 harvest ratio in the second survey year), and lower harvest ratios were found in the Central Coast (0.011 harvest ratio in the first survey year, and 0.035 harvest ratio in the second survey year) and South Coast regions (0.028 harvest ratio in the first survey year, and 0.029 harvest ratio in the second survey year - Tables 13 and 14). The large recreational harvests inside and outside the SEF area and the regional differences in the realised allocation of the tiger flathead resource strongly suggests that the recreational sector should be considered when making stock assessments to determine the size of annual quotas for many shared species.

Example 4: Silver trevally

The commercial fishery for silver trevally shows a marked decline in total catch as latitude decreases. That is, the largest commercial catches of silver trevally were taken in the South Coast region, intermediate catches were landed in the Central Coast region, and the lowest commercial catches were made in the North Coast region. This pattern of commercial harvesting was found in both survey years (Tables 13 and 14). In contrast, recreational trailer boat harvests were greatest in the Central Coast region, with lower but still considerable recreational harvests of silver trevally recorded from the North and South Coast regions. This pattern of recreational harvesting was found in both survey years (Tables 13 and 14). Thus, it is not surprising that the greatest

harvest ratio in each survey year was recorded in the Central Coast region (0.458 harvest ratio in the first survey year, and 0.670 harvest ratio in the second survey year) and smaller harvest ratios were found in the North Coast (0.089 harvest ratio in the first survey year, and 0.137 harvest ratio in the second survey year) and South Coast regions (0.017 harvest ratio in the first survey year, and 0.011 harvest ratio in the second survey year - Tables 13 and 14). We strongly believe that these regional differences in harvest ratios for silver trevally are due to regional differences in fishing behaviour and preferences of recreational anglers. It appears that large numbers of anglers in the Central Coast region actively target and harvest large quantities of silver trevally, whereas in the other regions recreational anglers are not targeting this species as much.

Conclusions

- The successful implementation of the recreational boat movement logbook at many large access sites throughout the state has allowed us to make precise estimates of recreational fishing effort at regional and statewide scales.

- The increased spatial and temporal coverage of recreational fishing effort that has been provided by the recreational boat movement logbook has also led to an increase in the precision of harvest estimates made at regional and statewide scales.

- We estimated that 217,550 trailer boat trips were made from large access sites throughout the state during the first survey year - September 1993 to August 1994 inclusive, and that a further 214,821 trips occurred during the second survey year - September 1994 to August 1995 inclusive. These levels of recreational fishing effort show that the recreational trailer boat fishery in the marine waters of NSW is large.

- We estimated that 24,502 cruiser and gameboat trips were made from large access sites throughout the state during the first survey year - September 1993 to August 1994 inclusive, and that a further 25,059 trips occurred during the second survey year - September 1994 to August 1995 inclusive. These levels of recreational fishing effort show that the recreational cruiser and gameboat fishery in the marine waters of NSW is of moderate size.

- The recreational trailer boat fishery is an extremely diverse multi-species fishery. We recorded 210 taxa in the retained catch of trailer boat anglers during the two years of the survey.

- Despite the great taxonomic diversity of the harvest, relatively few taxa accounted for the bulk of the recreational harvest. The top ten species always accounted for more than 68% by number, and 59% by weight, of the recreational trailer boat harvest. This pattern of harvesting was consistent among regions and between survey years.

- We found that there were large latitudinal differences in the pattern of recreational harvesting. The trailer boat fishery was characterised by regional differences in the taxonomic composition of the harvest, and differences in the proportional contributions made by important taxa to the total harvest.

- The survey figures that we present in this report show that recreational fishing does have the potential to impact fisheries resources. We have found that recreational trailer boat anglers, as a collective group, do harvest large quantities of many species.

- Three species had estimated statewide recreational harvests in excess of 100 tonnes in each survey year. The recreational trailer boat harvest of eastern blue-spotted flathead was in excess of 229 tonnes in the first survey year, and a further 207 tonnes were harvested during the second survey year. The recreational trailer boat harvest of snapper was in excess of 184 tonnes in the first survey year, and a further 187 tonnes were harvested during the second survey year. The recreational trailer boat harvest of silver trevally was in excess of 103 tonnes in the first survey year, and a further 112 tonnes were harvested during the second survey year.

- Overall, recreational trailer boat harvests in excess of one tonne statewide were recorded for 55 taxa during the first survey year, and 54 taxa during the second survey year.

- We have identified many "shared" taxa that are keenly targeted and harvested by recreational and commercial fishers alike and which form the basis of large shared fisheries by both sectors.

- We have documented latitudinal changes in the harvesting patterns of many important species by both the recreational and commercial fisheries, which results in regional changes of harvest allocation between the sectors for these species.

Examples include eastern blue-spotted flathead, snapper, tiger flathead, and silver trevally.

- It is important to note that the estimates of recreational harvest we have presented are underestimates of the total recreational harvest. Our estimates do not consider night-time angling, the harvests of anglers that use large cruisers and gameboats, the harvests of the charter boat fleets, or the harvests of trailer boat anglers that use medium and small sites to provide them with access to the coastal waters off NSW. Even so, the estimates of recreational harvest we have obtained are substantial and for many shared species represent a significant portion of the commercial catch.

Recommendations

1. More research should be done using data modelling approaches to investigate the relationship between recreational fishing effort and weather variables. This research may allow accurate regional predictions of recreational fishing effort to be made from known weather information.

2. Resources should be allocated to continuing and expanding the recreational boat movement logbook program at large access sites throughout NSW. This proven logbook program should be viewed as a long-term (decades) sampling method for monitoring the changing levels of recreational fishing effort in the marine waters of NSW.

3. The Department should consider a formal agreement with the individual sea-rescue bases that participate in the boat movement logbook program which would include a nominal annual donation to each participating base. This type of agreement would ensure the maintenance of data quality and would provide important recognition for the valuable work provided by the volunteer members of these sea-rescue bases.

4. The recreational sector should be given more consideration and input into management plans that affect shared fisheries resources.

5. It is imperative that the recreational sector be considered when making stock assessments to determine the size of annual quotas for many shared species, particularly SEF species.

6. Fisheries managers should consider managing many of the important shared fisheries on a regional basis because we have found large regional differences in the relative sizes (actual allocations) of recreational and commercial harvests.

7. Future recreational research programs that monitor effort and harvest over large spatial scales are necessary to improve fisheries management. These programs will

contribute to our understanding of the effects of recreational angling on finfish resources and the sustainable limits of harvest for our coastal fisheries resources.

8. Future monitoring programmes should also incorporate increased levels of replication for providing more accurate estimates of recreational angling effort and harvest.

A Statewide Survey of Recreational Fishing Effort for Charter Boats, and the Recreational Harvest Taken by Charter Boat Anglers in the Marine Waters of the Sydney Area

Introduction

The recreational fishing charter boat fleet that operates in the marine waters off the NSW coastline contains boats of all sizes which are engaged in a great variety of fishing activities. The lack of formal registration in this industry has made it difficult to monitor the activities of charter boats. In fact, the exact number of charter boats that operate in NSW waters is unknown. Thus, it is not surprising that there have been no previous studies on the NSW charter boat industry.

Pilot studies were carried out in the Sydney area during May and July 1993 to develop the survey methods that were used in the survey of trailer boat angling (see previous chapter). During these pilot studies we recorded all recreational boating movements at each of the four large metropolitan access sites (Broken Bay, Sydney Harbour, Botany Bay and Port Hacking) by placing observers at selected headland vantage points. Observations taken during six weekend days showed that an average of 20.2 (S.E.=1.5) charter boat trips per weekend day had taken place in the Sydney area during the period of the pilot study. These data suggested that the recreational charter fleet was large and that the charter boat industry had the potential to significantly impact on fish stocks.

There are large logistic difficulties associated when attempting to survey any fishery for which a complete sampling frame does not exist (Pollock et al. 1994). We decided to reduce the scope of this part of the project so that an achievable outcome was possible. The specific charter boat study objectives that are outlined below are consistent with the overall objectives of this project.

Objectives

1. On a statewide scale, estimate the number of charter boat trips that occur in the marine waters of NSW.
2. Estimate total fishing effort, harvest, and harvest rates of recreational anglers that use charter boats to fish in the marine waters of the Sydney area.
3. Develop an effective logbook to record harvest and effort data from charter boats.

Methods

General

We combined access site survey methods with data obtained from a recreational boat movement logbook study (see previous Chapter) to estimate the number of daytime charter boat fishing trips for all large sites that provide charter boat access to the coastal waters off NSW (Fig. 2). A voluntary logbook program was implemented in the Sydney area to collect harvest information on a daily trip basis. Thus, we had on-site counts of charter boat effort at many large access sites throughout the state that were independent of the logbook method that was used to collect harvest data.

We contacted charter boat operators in the Sydney area and asked them to participate in this voluntary logbook program. Many operators, for a variety of reasons, did not wish to participate in the voluntary logbook program. The co-operative skippers that we found were given explanations of the aims and importance of the study and provided with instructions on how to fill out the logbook forms. The skippers of these participating vessels were given a fish identification kit to prevent species misidentifications and to standardise the levels of taxonomic precision among charter boats. We also used many of the same data quality control procedures discussed in the previous chapter.

Estimation Procedures for Calculating Fishing Effort and Harvest

The estimation procedures used for calculating the fishing effort of charter boats in the Sydney area, and for obtaining estimates of total fishing effort for charter boats

throughout the state are identical to the methods used for cruisers and gameboats, and trailer boats. These methods are described in detail in the previous chapter and a brief summary is provided here.

The raw data used for estimating fishing effort were daily counts of recreational fishing trips for charter boats. These data were derived from two independent sources: (a) boat counts taken by field staff on rostered survey days, and (b) daily boat movement logbooks filled out by members of volunteer sea rescue organisations. The daily counts of recreational fishing trips made by charter boats were expanded to provide stratum totals using two methods, which were: (1) the direct expansion from the data to estimate the unknown fraction; and (2) the imputation of missing data to estimate the fishing effort for some strata at some access sites.

We divided each seasonal stratum into six half monthly (circa fortnightly) periods. These periods of approximately two weeks were regarded as the primary sampling units for harvest. This meant that we pooled all logsheets for each primary sample unit before calculating a separate harvest rate and a separate harvest estimate for each of the primary sampling units. This pooling procedure eliminates the day-type stratification for harvest and requires us to assume that the harvest rates and taxonomic composition of the harvest do not change between day-types. This assumption is reasonable to make for this relatively deepwater fishery which concentrates most of its fishing effort during the weekend day stratum. Thus, the within season stratum variances for harvest rates are based on the variance among the fortnightly primary sampling units. Seasonal harvest was calculated simply by multiplying the mean harvest rate for a season (calculated from the six primary sample units per season) by the estimated fishing effort for that season (calculated by direct expansion). The calculations that are made in these estimation procedures follow those outlined by Pollock et al. (1994).

Harvest estimates are presented in two ways, in terms of abundance (numbers of fish) and in terms of weight (kilograms of fish). Boat skippers were instructed, where possible, to measure all identified fish (to the nearest cm) that were seen during their

interviews with angling parties. In most cases, fish weights were not provided by the boat skippers. We converted the length measurements into weights by using length/weight keys. This was done for all taxa for which we had suitable length/weight conversion keys (Appendix 2). Weights were estimated directly from the length/weight keys for those fish that had been measured during interviews. The remaining unmeasured component of the harvest (i.e. those fish seen during interviews but only counted, and those fish which our expansions of data had estimated) was converted to weight according to the following two criteria. We used a seasonal mean weight to estimate the seasonal mass of the unmeasured component of harvest for any taxon that had measurements for twenty or more individuals collected during a season in the Sydney area. When less than twenty individuals had been measured during a season we used an annual mean weight for the Sydney area to estimate the seasonal mass of the unmeasured component of the harvest.

We did not attempt to make expanded estimates of harvest for any taxa that were considered to have been "rare" in the Sydney area. We defined "rare" in the Sydney area, as being any taxon that had been recorded from only one interview, regardless of the number of individuals harvested in that single trip, during the year surveyed. All taxa which did not meet the criteria for rarity were classified as common taxa. Expanded estimates of harvest were made for all common taxa in the Sydney area.

Estimates of effort and harvest at higher levels such as the seasonal and annual site totals, and regional and statewide totals for large access sites were obtained by summing the separate stratum totals. Similarly, estimates of variance at higher levels were obtained by summing the separate stratum variances. The general equations used to calculate the stratum estimates of effort and harvest were taken from Pollock et al. (1994) and Mood et al. (1974).

Harvest Comparisons for the Charter Boat Recreational Fishery and the Oceanic Commercial Fisheries in the Sydney Area

Recreational harvest estimates were obtained by the methods described in the previous sections. The recreational harvest statistics (estimated weights) were available only for common taxa for which we had suitable length/weight conversion keys (Appendix 2). In contrast, commercial fishers are required by state legislation to provide accurate catch statistics on a monthly basis. These statistics are held by NSW Fisheries. We have used the declared commercial statistics for ocean landings at ports in the Sydney area to make comparisons with the recreational harvests taken by the charter boat fishery.

These comparisons were made by using the monthly commercial returns to construct tables of harvest for the Sydney area that also corresponded to the same seasonal periods that had been used to survey the charter boat fishery. Then it was possible to calculate harvest ratios which simply describe the relative sizes of the harvests (recreational/commercial). When the harvest ratio is greater than one it indicates that the estimated recreational harvest taken from charter boats is greater than the declared commercial landings taken from ocean waters in the Sydney area. Conversely, when the ratio is less than one it indicates that the declared commercial landings taken from ocean waters in the Sydney area have exceeded the size of the estimated recreational harvest taken by charter boat anglers in the Sydney area. When the ratio is equal to one the estimated recreational harvest taken from charter boats in the Sydney area is of equal size to the declared commercial landings taken from ocean waters in the Sydney area. We have restricted the presentation and discussion of these results to annual comparisons for the Sydney area.

Detailed Results

Description of the Charter Boat Fishery in the Sydney Area

A charter boat skipper is essentially a professional fishing guide that strives to maximise the success rate of his clients. Fishing success can be measured either as harvest or as the number of fish caught and released. Thus, the professional fishing guide provides recreational fishing opportunities to recreational anglers that usually do not have the means to access the fishery alone.

The charter boat fleet in the Sydney area consists of many different sized vessels which target and catch a great diversity of fish species. We have recognised many different types of charter boat fishing that occurs regularly within the Sydney area. Each type of charter fishing targets and harvests different types of fishes making the charter industry extremely diverse. However, this industry may be grouped into four broad types of charter fishing. A brief description of these different types of charter fishing in the Sydney area is provided below.

(1) Large gameboats which mainly target billfish and tunas. These boats can cover large distances when fishing, and usually frequent recognised gamefish grounds located near seamounts and the edge of the continental shelf. Gameboats usually cater for relatively small numbers of anglers (2-6) and fishing is usually done by trolling.

(2) Large generalist boats that are often referred to as "Bottom bombers". These boats usually cater for large numbers of anglers (10-20). Fishing is usually done by drifting across reefs and sand patches whilst targeting demersal species. Relatively heavy gear is used.

(3) Smaller specialised boats. These boats cater for small groups of anglers (3-6). Fishing is done using more specialised methods such as anchoring, berleying, and occasionally live baiting depending on the target species. These types of boats usually target prized food and sport species such as snapper, kingfish, yellowfin tuna. It is interesting to note that we have observed Japanese tourists hiring these vessels so that they can combine some sight-seeing with yellowtail *Trachurus novaezelandiae* fishing. The harvest is preferably killed by the *ike-jime* method and then ice slurried for later consumption as *sashimi*.

(4) Large specialised boats. These boats are "Bottom bombers" that have invested in specialised fishing gear for targeting deepwater species on seamounts. They cater for large groups of anglers (10-20) and use strong braided cord lines, deck winches and ample lead to reach the bottom. The target species are blue-eye trevalla, hapuka and bass groper.

The voluntary charter boat logbook program started with 8 participating skippers who forwarded a total of 95 logsheets in the Spring season of Survey Year 2. A steady decline in participation was evident throughout the rest of the year. The Summer season had 6 participating skippers (74 logsheets), the Autumn season had 5 participating skippers (61 logsheets) and the Winter season had 4 participating skippers (42 logsheets).

Charter Boat Fishing Effort

Statewide

We estimated that 11,103 charter boat trips were made from large access sites throughout the state during the first survey year - September 1993 to August 1994 inclusive, and that a further 10,934 trips occurred during the second survey year - September 1994 to August 1995 inclusive (Table 15). On a statewide scale, the same seasonal patterns of recreational fishing effort were found between survey years (Table 15). The highest levels of effort occurred during Summer (29.7% of annual effort in year 1 and 30.5% of annual effort in year 2) and Autumn (30.0% of annual effort in year 1 and 28.4% of annual effort in year 2), whilst lower levels of effort were recorded during Spring (23.1% of annual effort in year 1 and 20.4% of annual effort in year 2) and Winter (17.2% of annual effort in year 1 and 20.7% of annual effort in year 2).

The regional spread of fishing effort across the state also showed a consistent pattern between years (Table 15). The Central Coast region had the highest regional level of charter boat effort (59.0% in year 1 and 49.4% in year 2) in both survey years. This pattern is not surprising because the Central Coast region contains the three largest

Table 15. Statewide and regional estimates of recreational fishing effort (number of boat trips) for Charter Boats for each day-type and seasonal stratum within each survey year during the two year period - September 1993 to August 1995.

CATEGORY: **CHARTER BOATS**

SURVEY YEAR 1

		SPRING 93		SUMMER 93/94		AUTUMN 94		WINTER 94		YEAR 1 TOTAL	
REGION	DAY-TYPE	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.
NORTH COAST	Weekday	235	13	397	9	241	6	268	10	1141	19
	Weekend	142	11	298	18	182	7	143	10	765	25
	Total	**377**	**17**	**695**	**20**	**423**	**10**	**411**	**14**	**1906**	**31**
CENTRAL COAST	Weekday	445	67	374	64	275	42	105	37	1199	109
	Weekend	1544	85	1383	68	1313	58	1118	73	5358	143
	Total	**1989**	**108**	**1757**	**93**	**1588**	**72**	**1223**	**82**	**6557**	**180**
SOUTH COAST	Weekday	90	27	464	83	688	96	124	20	1366	131
	Weekend	114	17	384	73	632	45	144	25	1274	91
	Total	**204**	**32**	**848**	**110**	**1320**	**106**	**268**	**32**	**2640**	**160**
STATEWIDE	Weekday	770	74	1235	105	1204	105	497	43	3706	171
	Weekend	1800	87	2065	101	2127	74	1405	78	7397	171
	Total	**2570**	**114**	**3300**	**146**	**3331**	**128**	**1902**	**89**	**11103**	**242**

SURVEY YEAR 2

		SPRING 94		SUMMER 94/95		AUTUMN 95		WINTER 95		YEAR 2 TOTAL	
REGION	DAY-TYPE	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.
NORTH COAST	Weekday	363	31	432	31	364	29	287	10	1446	45
	Weekend	173	16	178	16	183	12	217	2	751	21
	Total	**536**	**35**	**610**	**35**	**547**	**32**	**504**	**10**	**2197**	**49**
CENTRAL COAST	Weekday	184	114	329	38	212	61	274	65	999	150
	Weekend	1064	70	1363	70	942	71	1037	57	4406	174
	Total	**1248**	**80**	**1692**	**80**	**1154**	**94**	**1311**	**86**	**5405**	**230**
SOUTH COAST	Weekday	160	35	584	35	840	42	156	7	1740	58
	Weekend	292	31	452	31	560	15	288	36	1592	55
	Total	**452**	**47**	**1036**	**47**	**1400**	**45**	**444**	**37**	**3332**	**79**
STATEWIDE	Weekday	707	60	1345	60	1416	80	717	66	4185	167
	Weekend	1529	78	1993	78	1685	73	1542	67	6749	184
	Total	**2236**	**99**	**3338**	**99**	**3101**	**108**	**2259**	**94**	**10934**	**248**

cities in NSW and hence has a larger resident angling population than the other regions. The South Coast region had the second highest regional level of effort (23.8% in year 1 and 30.5% in year 2) in both survey years, and the North Coast region had the lowest regional effort level (17.2% in year 1 and 20.1% in year 2) in both survey years (Table 15).

North Coast region

We estimated that 1,906 charter boat trips were made from large access sites throughout the North Coast region during the first survey year - September 1993 to August 1994 inclusive, and that a further 2,197 trips occurred during the second survey year - September 1994 to August 1995 inclusive (Table 15). A seasonal pattern of fishing effort was found during both survey years. The highest level of effort occurred during Summer (36.4% of annual effort in year 1 and 27.8% of annual effort in year 2), with lower amounts of effort recorded during Autumn (22.2% of annual effort in year 1 and 24.9% of annual effort in year 2) Winter (21.6% of annual effort in year 1 and 22.9% of annual effort in year 2) and Spring (19.8% of annual effort in year 1 and 24.4% of annual effort in year 2 - Table 15).

The fishing effort of the North Coast charter boat fleet was not distributed evenly across day-types but was concentrated mainly during the weekday stratum (Table 15). This pattern was consistent between years and among seasons (Table 15). The large amount of charter boat fishing effort on weekdays in the North Coast region probably reflects the continual influx of holiday anglers into the region. These holiday anglers have the flexibility to go angling at any time during the week.

Central Coast region

We estimated that 6,557 charter boat trips were made from large access sites throughout the Central Coast region during the first survey year - September 1993 to August 1994 inclusive, and that a further 5,405 trips occurred during the second survey year - September 1994 to August 1995 inclusive (Table 15).

In the Central Coast region, there was no consistent seasonal pattern of charter boat fishing effort between survey years (Table 15). The first survey year was characterised by having the highest level of effort during Spring (30.3% of annual effort), followed by a steady decline in charter boat effort during the Summer (26.8% of annual effort), Autumn (24.2% of annual effort), and Winter (18.7% of annual effort) seasons in that survey year. In contrast, a marked seasonal pattern of charter boat fishing effort was found during the second survey year. The peak level of effort occurred during Summer (31.2% of annual effort), with lower amounts of effort recorded during Winter (24.3% of annual effort), Spring (23.1% of annual effort), and Autumn (21.4% of annual effort - Table 15).

The charter boat fishing effort that occurred within the Central Coast region was concentrated mainly during the weekend days. The weekend day stratum was found to have contributed a much greater part of the seasonal and annual fishing effort (81.7% of annual effort in year 1 and 81.5% of annual effort in year 2). This was consistent for all seasons during both survey years within this region (Table 15). The Central Coast region contains the three largest cities in NSW. Thus, it is likely that this interesting pattern of concentrated weekend day fishing effort occurs because the fishing activities of many metropolitan anglers are greatly restricted by their weekday work commitments.

South Coast region

We estimated that 2,640 charter boat trips were made from large access sites throughout the South Coast region during the first survey year - September 1993 to August 1994 inclusive, and that a further 3,332 charter trips occurred during the second survey year - September 1994 to August 1995 inclusive (Table 15). In the South Coast region, the same seasonal patterns of recreational fishing effort were found between survey years (Table 15). The highest levels of effort always occurred during Autumn (50.0% of annual effort in year 1 and 42.0% of annual effort in year 2) and Summer (32.1% of annual effort in year 1 and 31.1% of annual effort in year 2),

with relatively lower levels of effort were always recorded during Winter (10.2% of annual effort in year 1 and 13.3% of annual effort in year 2) and Spring (7.7% of annual effort in year 1 and 13.6% of annual effort in year 2).

The peak levels of fishing effort recorded during the Autumn season correspond well to the expected timing of the annual migration of yellowfin tuna through South Coast waters. The yellowfin tuna season is eagerly anticipated by recreational anglers throughout NSW, the ACT, and Victoria. The high levels of effort that were recorded during the Summer season probably reflected the combined effects of good seasonal weather for fishing and the activities of local anglers and a large number of holiday-makers within the region. In contrast, the relatively lower levels of effort recorded during the Winter and Spring seasons may be attributed mainly to the fishing activities of local anglers. The fact that the weekday stratum contributes a much greater part of the total seasonal effort during the Autumn (52.1% of seasonal effort in year 1 and 60.0% of seasonal effort in year 2) and Summer (54.7% of seasonal effort in year 1 and 56.4% of seasonal effort in year 2) in both survey years supports the hypothesis that most of the effort during these seasons is due to visiting anglers that have the flexibility to go fishing at any time during the week. In contrast, the charter boat fishing effort was concentrated during the weekend day stratum during the Spring (55.9% of seasonal effort in year 1 and 64.6% of seasonal effort in year 2) and Winter (53.7% of seasonal effort in year 1 and 64.9% of seasonal effort in year 2) seasons during both survey years. This pattern probably reflects the combined effects of seasonally low numbers of holiday anglers and a relatively localised grouping of charter boat clients that have weekday work commitments.

Sydney area

We estimated that 3,085 charter boat trips were made from the four large access sites in the Sydney area during the first survey year - September 1993 to August 1994 inclusive, and that a further 2,555 charter trips occurred during the second survey year - September 1994 to August 1995 inclusive (Table 16). The patterns of charter boat fishing effort recorded for the Sydney area are similar to those documented for the

Table 16. Sydney area estimates of recreational fishing effort (number of boat trips) for Charter boats for each day-type and seasonal stratum within each survey year during the two year period - September 1993 to August 1995 inclusive.

		SURVEY YEAR 1		SURVEY YEAR 2	
SEASON	DAY-TYPE	Estimated No. Trips	s.e.	Estimated No. Trips	s.e.
SPRING	Weekday	200	42.7	73	75.9
	Weekend	730	49.9	488	87.1
	TOTAL	**930**	**65.7**	**561**	**115.5**
SUMMER	Weekday	164	41.9	144	25.2
	Weekend	718	44.0	658	43.6
	TOTAL	**882**	**60.8**	**802**	**50.3**
AUTUMN	Weekday	125	24.9	94	31.6
	Weekend	598	34.4	493	38.8
	TOTAL	**723**	**42.5**	**587**	**50.0**
WINTER	Weekday	21	12.8	125	33.9
	Weekend	529	41.7	480	29.1
	TOTAL	**550**	**43.6**	**605**	**44.7**
ANNUAL	**Weekday**	**510**	**66.1**	**436**	**92.4**
	Weekend	**2575**	**85.7**	**2119**	**108.8**
	TOTAL	**3085**	**108.3**	**2555**	**142.7**

Central Coast region. This is not surprising given that the charter boat fleet in the Sydney area is large and that the results from this area would have had a great influence on the regional expansion of effort.

In the Sydney area, there was no consistent seasonal pattern of charter boat fishing effort between survey years (Table 16). The first survey year was characterised by having the highest level of effort during Spring (30.2% of annual effort), followed by a steady decline in charter boat effort during the Summer (28.6% of annual effort), Autumn (23.4% of annual effort), and Winter (17.8% of annual effort) seasons in that survey year. In contrast, a marked seasonal pattern of charter boat fishing effort was found during the second survey year. The peak level of effort occurred during Summer (31.3% of annual effort), with lower amounts of effort recorded during Winter (23.7% of annual effort), Autumn (23.0% of annual effort), and Spring (22.0% of annual effort - Table 16).

The fishing effort of the Sydney charter boat fleet was not distributed evenly across day-types but occurred mainly on weekend days (Table 16). This pattern was consistent between years and among seasons (Table 16). The large concentration of charter boat fishing effort on weekends in the Sydney area probably reflects the normal weekly routines of people living in the Sydney metropolitan area. That is, the majority of Sydney charter boat clients living in the metropolitan area have work commitments on weekdays and so most of their recreational fishing activities take place on weekends.

Charter Boat Harvest - Sydney Area

The voluntary logbook program which provided harvest information for the Sydney charter boat fleet was started during the second survey year. The data collected during this logbook program were self-reported and thus subject to a variety of biases such as prestige bias, recall bias, rounding bias, intentional deception, question misinterpretation, and non-response errors (Pollock et al. 1994). In view of these problems we made some assumptions about the sample harvest data provided by the

logbook program. The main assumption was that the logbook returns we received were representative of all charter boats in the Sydney fleet. This may or may not have been the case. We could not test this assumption. However, throughout the surveyed year the respondents included boats which targeted gamefish only, boats which catered for large groups of anglers and used unspecialised methods such as heavy gear and drifting across reef and sand areas, boats which catered for small groups of anglers and which used more specialised methods such as anchoring, light gear, berley, and occasionally livebait to target prized reef species; and finally a boat which catered for large groups of anglers and targeted deepwater seamount associated species with strong braided cord lines, deck winches and ample lead to reach the bottom. Therefore, the expansions of harvest and the associated variances that have been calculated and presented in this report should be considered as coarse approximations which provide a preliminary view of the Sydney charter boat industry.

Even when considering the inherent weaknesses of self reported (fishery dependent) information it is true that these logbook data have allowed us to gain some insights about the taxonomic composition of the harvest, the main species targeted and harvested, and the overlap and potential conflicts between the charter boat industry and other recreational and commercial fisheries in the area.

Overall, we recorded 72 taxa in the retained catch of recreational anglers fishing from charter boats in the Sydney area during the year of the voluntary logbook program (Table 17). The ten most commonly harvested taxa, by number, during the survey year (Table 17) were blue morwong (24.3%), nannygai (17.4%), tiger flathead (11.2%), silver sweep (11.1%), silver trevally (9.4%), snapper (3.9%), long-finned perch (3.2%), black-spot pigfish (2.2%), chinaman leatherjacket (1.8%), and dolphin fish (1.6%). These ten taxa, by number, accounted for 86.1% of the charter boat harvest for the Sydney area during the survey year - September 1994 to August 1995 inclusive (Table 17).

The ten most commonly harvested taxa, by weight, during the survey year (Table 17) were blue morwong (19.9 tonnes - 20.0%), yellowfin tuna (14.8 tonnes - 15.0%),

Table 17. Sydney area estimates of recreational harvest, by weight (kg) and abundance (numbers of fish), with their associated standard errors, and the ranked size and proportional contribution, for all taxa taken by charter boat anglers during the second survey year - September 1994 to August 1995 inclusive.

KEY
* Associated estimates of weight (kg) are not provided for this taxon because a suitable length/weight conversion key was not available.
# Expanded estimates of harvest have not been calculated. This observation was classified as a rare event during this year thus the occurrence is simply noted (for details see Methods).

HIGHER CLASSIFICATION	COMMON NAME	TAXON	HARVEST							
			kg	s.e.	Rank	%	No. fish	s.e	Rank	%
SQUALIDAE	DOGFISHES	*Squalus spp.*	180	18	24	0.181	421	41	19	0.476
HETERODONTIDAE	PORT JACKSON SHARKS*	*Heterodontus spp.*	-	-	-	-	#2	-	51	0.002
LAMNIDAE	SHORTFIN MAKO SHARK*	*Isurus oxyrinchus*	-	-	-	-	#1	-	52	0.001
TRIAKIDAE	SCHOOL SHARK	*Galeorhinus galeus*	-	-	-	-	#4	-	49	0.005
TRIAKIDAE	GUMMY SHARK	*Mustelus antarcticus*	52	4	34	0.052	46	3	38	0.052
CARCHARHINIDAE	WHALER SHARKS	*Carcharhinus spp.*	-	-	-	-	#1	-	52	0.001
CARCHARHINIDAE	BLUE SHARK*	*Prionace glauca*	-	-	-	-	#1	-	52	0.001
RHINOBATIDAE	SHOVELNOSE RAYS*	*Aptychotrema spp. & Rhynchobatus spp.*	-	-	-	-	#1	-	52	0.001
AULOPODIDAE	SERGEANT BAKER	*Aulopus purpurissatus*	1127	53	16	1.135	1361	59	11	1.537
MORIDAE	BEARDED CODS*	All species combined	-	-	-	-	97	6	33	0.110
BERYCIDAE	NANNYGAI	*Centroberyx affinis*	4218	230	9	4.248	15390	770	2	17.384
ZEIDAE	SILVER DORY	*Cyttus australis*	-	-	-	-	#1	-	52	0.001
ZEIDAE	JOHN DORY	*Zeus faber*	101	5	30	0.102	144	7	31	0.163
SCORPAENIDAE	OCEAN PERCH	*Helicolenus percoides*	38	3	36	0.038	132	8	32	0.149
SCORPAENIDAE	RED SCORPIONCOD	*Scorpaena cardinalis*	110	6	28	0.111	259	12	24	0.293
TRIGLIDAE	RED GURNARD	*Chelidonichthys kumu*	627	35	19	0.631	1230	59	14	1.389
TRIGLIDAE	LATCHET	*Pterygotrigla polyommata*	68	4	32	0.068	59	3	36	0.067
PLATYCEPHALIDAE	TIGER FLATHEAD	*Neoplatycephalus richardsoni*	5360	398	7	5.398	9883	750	3	11.163
PLATYCEPHALIDAE	EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*	646	45	18	0.651	1300	73	12	1.468
PLATYCEPHALIDAE	DUSKY FLATHEAD	*Platycephalus fuscus*	-	-	-	-	#1	-	52	0.001
PLATYCEPHALIDAE	MARBLED FLATHEAD	*Platycephalus marmoratus*	56	5	33	0.056	204	20	26	0.230
PLATYCEPHALIDAE	ORANGE-FRECKLED FLATHEAD*	*Ratabulus diversidens*	-	-	-	-	40	2	40	0.045
SERRANIDAE	BUTTERFLY PERCH*	*Caesioperca lepidoptera*	-	-	-	-	278	21	22	0.314
SERRANIDAE	LONG-FINNED PERCH*	*Caprodon longimanus*	-	-	-	-	2871	140	7	3.243
SERRANIDAE	DEEPWATER SEAPERCH*	*Ellerkeldia sp.*	-	-	-	-	#1	-	52	0.001
SERRANIDAE	WIRRAH	*Acanthistius ocellatus*	-	-	-	-	#1	-	52	0.001
SERRANIDAE	BAR-COD	*Epinephelus ergastularius*	-	-	-	-	#1	-	52	0.001
DINOLESTIDAE	LONG-FINNED SEAPIKE	*Dinolestes lewini*	102	6	29	0.103	344	17	21	0.389
POMATOMIDAE	TAILOR	*Pomatomus saltatrix*	-	-	-	-	#6	-	48	0.007
CARANGIDAE	KINGFISH	*Seriola lalandi*	7420	394	5	7.473	1277	59	13	1.442

Table 17. Sydney area estimates of recreational harvest, by weight (kg) and abundance (numbers of fish), with their associated standard errors, and the ranked size and proportional contribution, for all taxa taken by charter boat anglers during the second survey year - September 1994 to August 1995 inclusive.

KEY
* Associated estimates of weight (kg) are not provided for this taxon because a suitable length/weight conversion key was not available.
# Expanded estimates of harvest have not been calculated. This observation was classified as a rare event during this year thus the occurrence is simply noted (for details see Methods).

HIGHER CLASSIFICATION	COMMON NAME	TAXON	HARVEST							
			kg	s.e.	Rank	%	No. fish	s.e	Rank	%
CARANGIDAE	SILVER TREVALLY	*Pseudocaranx dentex*	8636	515	3	8.698	8352	400	5	9.434
CARANGIDAE	YELLOWTAIL & JACK MACKEREL	*Trachurus novaezelandiae & T. declivis*	-	-	-	-	#30	-	44	0.034
CORYPHAENIDAE	DOLPHIN FISH	*Coryphaena hippurus*	1725	120	13	1.737	1440	98	10	1.627
ARRIPIDAE	SALMON	*Arripis trutta*	-	-	-	-	#2	-	51	0.002
SPARIDAE	YELLOWFIN BREAM	*Acanthopagrus australis*	-	-	-	-	#1	-	52	0.001
SPARIDAE	SNAPPER	*Pagrus auratus*	2873	160	11	2.894	3493	179	6	3.945
SPARIDAE	TARWHINE	*Rhabdosargus sarba*	52	5	34	0.052	156	15	29	0.176
SCIAENIDAE	MULLOWAY	*Argyrosomus hololepidotus*	385	41	21	0.388	95	6	34	0.107
MULLIDAE	BLACKSPOT GOATFISH	*Parupeneus signatus*	-	-	-	-	#1	-	52	0.001
SCORPIDIDAE	SILVER SWEEP	*Scorpis lineolatus*	4431	273	8	4.463	9791	609	4	11.059
MICROCANTHIDAE	MADO*	*Atypichthys strigatus*	-	-	-	-	#1	-	52	0.001
CHEILODACTYLIDAE	BLUE MORWONG	*Nemadactylus douglasii*	19871	1277	1	20.013	21555	971	1	24.347
CHEILODACTYLIDAE	JACKASS MORWONG	*Nemadactylus macropterus*	163	11	26	0.164	215	13	25	0.243
LATRIDIDAE	BASTARD TRUMPETER*	*Latridopsis forsteri*	-	-	-	-	27	2	45	0.030
SPHYRAENIDAE	STRIPED SEAPIKE	*Sphyraena obtusata*	-	-	-	-	#2	-	51	0.002
LABRIDAE	BLUE GROPER	*Achoerodus viridis*	-	-	-	-	#2	-	51	0.002
LABRIDAE	EASTERN FOXFISH	*Bodianus sp.*	31	2	37	0.031	49	4	37	0.055
LABRIDAE	BLACK-SPOT PIGFISH	*Bodianus vulpinus*	741	43	17	0.746	1946	103	8	2.198
LABRIDAE	CRIMSON-BANDED WRASSE	*Notolabrus gymnogenis*	10	1	40	0.010	43	3	39	0.049
LABRIDAE	BLUE-THROATED WRASSE	*Notolabrus tetricus*	-	-	-	-	#1	-	52	0.001
LABRIDAE	MAORI WRASSE	*Ophthalmolepis lineolata*	89	7	31	0.090	401	24	20	0.453
GEMPYLIDAE	BARRACOUTA	*Thyrsites atun*	175	18	25	0.176	191	19	27	0.216
TRICHIURIDAE	SOUTHERN FROSTFISH	*Lepidopus caudatus*	313	21	23	0.315	149	11	30	0.168
CENTROLOPHIDAE	BLUE-EYE TREVALLA	*Hyperoglyphe antarctica*	3317	267	10	3.341	264	17	23	0.298
SCOMBRIDAE	SLIMY MACKEREL	*Scomber australasicus*	-	-	-	-	#1	-	52	0.001
SCOMBRIDAE	LEAPING BONITO	*Cybiosarda elegans*	-	-	-	-	#1	-	52	0.001
SCOMBRIDAE	SKIPJACK	*Katsuwonus pelamis*	2443	201	12	2.460	885	76	16	1.000
SCOMBRIDAE	AUSTRALIAN BONITO	*Sarda australis*	1690	168	14	1.702	964	68	15	1.089
SCOMBRIDAE	ALBACORE	*Thunnus alalunga*	1664	187	15	1.676	70	6	35	0.079
SCOMBRIDAE	YELLOWFIN TUNA	*Thunnus albacares*	14845	920	2	14.951	464	21	18	0.524

Table 17. Sydney area estimates of recreational harvest, by weight (kg) and abundance (numbers of fish), with their associated standard errors, and the ranked size and proportional contribution, for all taxa taken by charter boat anglers during the second survey year - September 1994 to August 1995 inclusive.

KEY
* Associated estimates of weight (kg) are not provided for this taxon because a suitable length/weight conversion key was not available.
# Expanded estimates of harvest have not been calculated. This observation was classified as a rare event during this year thus the occurrence is simply noted (for details see Methods).

			HARVEST							
HIGHER CLASSIFICATION	**COMMON NAME**	**TAXON**	kg	s.e.	Rank	%	No. fish	s.e	Rank	%
ISTIOPHORIDAE	BLUE MARLIN	*Makaira mazara*	7166	420	6	7.217	19	1	47	0.021
ISTIOPHORIDAE	STRIPED MARLIN	*Tetrapturus audax*	7491	437	4	7.544	38	2	41	0.043
BOTHIDAE	SMALL-TOOTHED FLOUNDER	*Pseudorhombus jenynsii*	-	-	-	-	#1	-	52	0.001
MONACANTHIDAE	BLACK REEF LEATHERJACKET	*Eubalichthys bucephalus*	10	1	40	0.010	38	2	41	0.043
MONACANTHIDAE	SIX-SPINED LEATHERJACKET	*Meuschenia freycineti*	317	21	22	0.319	668	34	17	0.755
MONACANTHIDAE	YELLOW-FINNED LEATHERJACKET	*Meuschenia trachylepis*	-	-	-	-	#3	-	50	0.003
MONACANTHIDAE	CHINAMAN LEATHERJACKET	*Nelusetta ayraudi*	583	37	20	0.587	1598	99	9	1.805
MONACANTHIDAE	VELVET LEATHERJACKET*	*Parika scaber*	-	-	-	-	#1	-	52	0.001
MONACANTHIDAE	ROUGH LEATHERJACKET	*Scobinichthys granulatus*	12	1	39	0.012	159	9	28	0.180
CEPHALOPODA	OCTOPUS*	*Octopus spp.*	-	-	-	-	#1	-	52	0.001
CEPHALOPODA	GIANT CUTTLEFISH	*Sepia apama*	124	12	27	0.125	22	2	46	0.025
CEPHALOPODA	SOUTHERN CALAMARI	*Sepioteuthis australis*	29	2	38	0.029	35	3	43	0.040

silver trevally (8.6 tonnes - 8.7%), striped marlin (7.5 tonnes - 7.5%), kingfish (7.4 tonnes - 7.5%), blue marlin (7.2 tonnes - 7.2%), tiger flathead (5.4 tonnes - 5.4%), silver sweep (4.4 tonnes - 4.5%), nannygai (4.2 tonnes - 4.2%), and blue-eye trevalla (3.3 tonnes - 3.3%). These ten taxa, by weight, accounted for 83.3% of the charter boat harvest for the Sydney area during the survey year - September 1994 to August 1995 inclusive (Table 17).

These harvest data show that the charter boat fishery is extremely diverse, and that the industry actively targets and harvests a wide range of taxa. It is interesting to note that within this diverse fishery a relatively small number of taxa accounted for the bulk of the recreational harvest.

Harvest Comparisons Between the Charter Boat Recreational Fishery and Oceanic Commercial Fisheries in the Sydney Area

Conflict between the recreational and commercial sectors has long been a fisheries management problem. This conflict may escalate in coming years as both sectors attempt to maximise catches. Consequently, there is increasing pressure being applied to fisheries managers to make appropriate allocation decisions regarding fishing opportunity among the various commercial and recreational user-groups. We have compared the estimates of daytime recreational harvest taken by charter boat anglers in the marine waters of the Sydney area to the declared commercial landings taken from the ocean waters of the same area. These comparisons between the recreational charter boat fishery and the marine commercial fisheries of the Sydney area have been made for those common taxa for which we had suitable length/weight conversion keys (Appendix 2). We further restricted the recreational/commercial contrasts such that we only compared the harvests for those common taxa for which an annual harvest of at least 100 kg (recreational or commercial) had been recorded during the survey year (Table 18).

The recreational charter boat harvest was greater than the declared commercial catch for some species (Table 18). The taxa that were harvested in greater amounts by the

Table 18. Comparison of Sydney area estimates of annual recreational harvest (kg) taken by charter boat anglers and the declared Sydney area commercial landings (kg) taken from ocean waters for the second survey year - September 1994 to August 1995 inclusive. The harvest ratios are a measure of the relative harvest allocations between the recreational and commercial fisheries for the second survey year.

KEY
* - Denotes SEF quota species.
# - Estimates of recreational harvest for species within this family were pooled for comparison with declared commercial landings.
Rec - no comparative commercial landings recorded - recreational estimates dominate harvest.
Com - no comparative recreational estimates recorded - commercial landings dominate harvest.

			SURVEY YEAR 2		
HIGHER CLASSIFICATION	**COMMON NAME**	**TAXON**	**Recreational Harvest (kg)**	**Commercial Harvest (kg)**	**Harvest Ratio (Recreational/ Commercial)**
SQUALIDAE	DOGFISHES	*Squalus spp.*	180	31698	0.006
TRIAKIDAE	GUMMY SHARK	*Mustelus antarcticus*	52	3580	0.015
AULOPODIDAE	SERGEANT BAKER	*Aulopus purpurissatus*	1127	-	Rec
OPHIDIIDAE	PINK LING*	*Genypterus blacodes*	-	25802	Com
MERLUCCIIDAE	BLUE GRENADIER*	*Macruronus novaezelandiae*	-	54	Com
TRACHICHTHYIDAE	ORANGE ROUGHY*	*Hoplostethus atlanticus*	-	4	Com
BERYCIDAE	NANNYGAI*	*Centroberyx affinis*	4218	90243	0.047
ZEIDAE	MIRROR DORY*	*Zenopsis nebulosis*	-	41159	Com
ZEIDAE	JOHN DORY*	*Zeus faber*	101	48534	0.002
SCORPAENIDAE	OCEAN PERCH*	*Helicolenus percoides*	38	60716	0.001
SCORPAENIDAE	RED SCORPIONCOD	*Scorpaena cardinalis*	110	99	1.111
TRIGLIDAE	RED GURNARD	*Chelidonichthys kumu*	627	1445	0.434
TRIGLIDAE	LATCHET	*Pterygotrigla polyommata*	68	8492	0.008
PLATYCEPHALIDAE	TIGER FLATHEAD*	*Neoplatycephalus richardsoni*	5360	45234	0.118
PLATYCEPHALIDAE	EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*	646	10082	0.064
DINOLESTIDAE	LONG-FINNED SEAPIKE	*Dinolestes lewini*	102	206	0.495
SILLAGINIDAE	SCHOOL WHITING*	*Sillago flindersi*	-	715	Com
CARANGIDAE	KINGFISH	*Seriola lalandi*	7420	30196	0.246
CARANGIDAE	SILVER TREVALLY*	*Pseudocaranx dentex*	8636	47081	0.183
CORYPHAENIDAE	DOLPHIN FISH	*Coryphaena hippurus*	1725	2140	0.806
SPARIDAE	SNAPPER	*Pagrus auratus*	2873	5765	0.498
SPARIDAE	TARWHINE	*Rhabdosargus sarba*	52	2076	0.025
SCIAENIDAE	MULLOWAY	*Argyrosomus hololepidotus*	385	8532	0.045
SCORPIDIDAE	SILVER SWEEP	*Scorpis lineolatus*	4431	12246	0.362
CHEILODACTYLIDAE	BLUE MORWONG	*Nemadactylus douglasii*	19871	7013	2.833

Table 18. Comparison of Sydney area estimates of annual recreational harvest (kg) taken by charter boat anglers and the declared Sydney area commercial landings (kg) taken from ocean waters for the second survey year - September 1994 to August 1995 inclusive. The harvest ratios are a measure of the relative harvest allocations between the recreational and commercial fisheries for the second survey year.

KEY
* - Denotes SEF quota species.
# - Estimates of recreational harvest for species within this family were pooled for comparison with declared commercial landings.
Rec - no comparative commercial landings recorded - recreational estimates dominate harvest.
Com - no comparative recreational estimates recorded - commercial landings dominate harvest.

			SURVEY YEAR 2		
HIGHER CLASSIFICATION	**COMMON NAME**	**TAXON**	**Recreational Harvest (kg)**	**Commercial Harvest (kg)**	**Harvest Ratio (Recreational/ Commercial)**
CHEILODACTYLIDAE	JACKASS MORWONG*	*Nemadactylus macropterus*	163	36	4.528
LABRIDAE	BLACK-SPOT PIGFISH	*Bodianus vulpinus*	741	99	7.485
GEMPYLIDAE	GEMFISH*	*Rexea solandri*	-	18574	Com
GEMPYLIDAE	BARRACOUTA	*Thyrsites atun*	175	10	17.500
TRICHIURIDAE	SOUTHERN FROSTFISH	*Lepidopus caudatus*	313	54783	0.006
CENTROLOPHIDAE	BLUE-EYE TREVALLA*	*Hyperoglyphe antarctica*	3317	30684	0.108
CENTROLOPHIDAE	WAREHOU*	*Seriolella spp.*	-	140	Com
SCOMBRIDAE	SKIPJACK	*Katsuwonus pelamis*	2443	5868	0.416
SCOMBRIDAE	AUSTRALIAN BONITO	*Sarda australis*	1690	11768	0.144
SCOMBRIDAE	ALBACORE	*Thunnus alalunga*	1664	42066	0.040
SCOMBRIDAE	YELLOWFIN TUNA	*Thunnus albacares*	14845	83592	0.178
ISTIOPHORIDAE	STRIPED MARLIN	*Tetrapturus audax*	7491	1437	5.213
MONACANTHIDAE#	LEATHERJACKETS	All species combined	922	2117	0.436
CEPHALOPODA	GIANT CUTTLEFISH	*Sepia apama*	124	29739	0.004
CEPHALOPODA	SOUTHERN CALAMARI	*Sepioteuthis australis*	29	12913	0.002

recreational charter boat anglers (i.e. taxa with harvest ratios greater than one) during the year of the survey were: blue morwong, striped marlin, sergeant baker, black-spot pigfish, red scorpioncod, barracouta and jackass morwong (Table 18). Potential conflict between the commercial sector and the recreational charter boat industry is likely to occur should the relative allocation of some of these taxa change in favour of the commercial industry. For example, there is a great potential for conflict should the commercial sector target additional fishing effort towards blue morwong in the Sydney area because it is the most important species, both by weight and abundance, to the recreational anglers that use charter boats in the Sydney area.

Those taxa which are keenly targeted and harvested by both recreational and commercial fishers and which form the basis of large shared fisheries by both sectors have the greatest potential for causing allocation disputes between them. We objectively identified these taxa, for the recreational charter boat fishery in the Sydney area, by using either of the following two criteria: (1) The annual harvest ratio must be greater than 0.10 for the year surveyed, regardless of the size of the recreational harvest. This criterion indicates that the relative size of the recreational harvest was greater than 10% of the size of the commercial fishery; or (2) The estimated recreational harvest had to be greater than 300 kg during the year surveyed, regardless of the annual harvest ratios. This tonnage criterion has been set at a lower level than the similar criterion used to identify "shared" taxa in the recreational trailer boat fishery. This has been done because the comparisons we make for charter boats are only for the Sydney area, whereas, the trailer boat comparisons were made over a statewide scale. The taxa which met either of the two criteria outlined above were regarded as "shared" by the two fishing sectors. These shared taxa, which were landed in greater amounts by the commercial sector but which also provided a considerable recreational harvest were: snapper, dolphin fish, yellowfin tuna, skipjack, silver sweep, kingfish, mulloway, leatherjackets, red gurnard, eastern blue-spotted flathead, albacore, Australian bonito, long-finned seapike and southern frostfish (Table 18). The South East Fishery (SEF) quota species nannygai, tiger flathead, silver trevally and blue-eye trevalla are also classified as shared taxa (Table 18).

The declared commercial catch of some species far outweighed the relatively small recreational harvests taken by charter boat anglers (Table 18). The taxa that were harvested in greater amounts by commercial fishers (i.e. taxa with annual harvest ratios less than 0.10 and an estimated recreational harvest less than 300 kg during the year surveyed) were: gummy sharks, latchets, giant cuttlefish, and southern calamari (Table 18). The South East Fishery (SEF) quota species mirror dory, john dory, ocean perch, school whiting, pink ling, orange roughy, blue grenadier, gemfish, blue and spotted warehou were also identified as taxa having a relatively negligible recreational harvest (Table 18).

Conclusions

- We estimated that 11,103 charter boat trips were made from large access sites throughout the state during the first survey year - September 1993 to August 1994 inclusive, and that a further 10,934 trips occurred during the second survey year - September 1994 to August 1995 inclusive. These levels of fishing effort show that the recreational charter boat fishery in the marine waters of NSW is of moderate size.

- We estimated that 3,085 charter boat trips were made from the Sydney area during the first survey year - September 1993 to August 1994 inclusive, and that a further 2,555 trips occurred during the second survey year - September 1994 to August 1995 inclusive. These levels of fishing effort show that the recreational charter boat fishery in the marine waters of the Sydney area makes up a relatively large amount of the total effort statewide.

- The recreational charter boat fishery is a diverse, multi-species fishery. We recorded 72 taxa in the retained catch of charter boat anglers during the year of the survey.

- Despite the taxonomic diversity of the harvest, relatively few taxa accounted for the bulk of the recreational harvest in the Sydney area. Ten species accounted for more than 86.1% by number, and 83.3% by weight, of the recreational charter boat harvest.

- The charter boat industry has the potential to impact on many shared fisheries resources. We have found that recreational anglers fishing from charter boats, as a collective group, do harvest large quantities of many species.

- The activities of charter boats should be routinely monitored because increases in fishing effort can potentially have impacts on shared fish stocks.

- We have observed that many skippers are diversifying their fishing activities by travelling further offshore to target deepwater species, such as blue-eye trevalla. This is likely to cause conflict with some commercial fishers.

- The harvests taken from charter boats appear to have more overlap with the commercial industry than they do with the recreational trailer boat fishery which tends to concentrate its fishing effort closer to the coast. For example, charter boat anglers and commercial fishers target heavily on tiger flathead and blue-eye trevalla which tend to be found in deep waters, whereas the trailer boat anglers target the eastern blue-spotted flathead which are found in more shallow coastal waters.

- We have now developed and tested a logbook which can be used to collect information about charter boat fishing effort, harvest and harvest rates.

- The implementation of a charter boat register and mandatory logbook system is needed to better manage this industry.

Recommendations

1. Definitions of "charter fishing" and "charter fishing vessel" are required in the current state legislation to more effectively manage this industry.

2. A register of charter boats should be established as soon as is practicable. At present, the lack of formal registration in this industry makes it is difficult to determine the exact number of charter boats operating in the waters of NSW.

3. Charter boat activities throughout the state should be routinely monitored by NSW Fisheries. This can be done by introducing a mandatory logbook system to record fishing effort and harvest on a daily trip basis. This logbook system should be introduced without delay.

4. Recreational harvests taken by charter boat anglers should be incorporated into the stock assessments of species that are shared by the recreational and commercial sectors. This is particularly important for many of the coastal species that occur in NSW waters and also for some of the SEF quota species.

5. Representatives from the charter boat should be invited to participate on advisory committees to allow input into management plans that affect shared fisheries resources.

Literature Cited

Blackburn, M. (1960). A study of condition (weight for length) of Australian barracouta, *Thyrsites atun* (Euphrasen). *Australian Journal of Marine and Freshwater Research* **11**: 14-41.

Campbell, G. and Collins, R.A. (1975). The age and growth of the Pacific bonito, *Sarda chiliensis,* in the Eastern North Pacific. *California Fish & Game* **61**(4): 181-200.

Demestre, M., Moli, B., Recasens, L. and Sánchez, P. (1993). Life history and fishery of *Lepidopus caudatus* (Pisces: Trichiuridae) in the Catalan Sea (Northwestern Mediterranean). *Marine Biology* **115**: 23-32.

Diplock, J. (1986). A synopsis of available data on nannygai *Centroberyx affinis* from NSW waters. *In* NSW Trawl Fishery Assessment and Monitoring Programme. Progress report - November 1986. Fisheries Research Institute, NSW Department of Agriculture.

Foreman, T.J. (1980). Synopsis of biological data on the albacore tuna, *Thunnus alalunga* (Bonnaterre, 1788), in the Pacific Ocean. *In Synopses of Biological Data on Eight Species of Scombrids.* Editor W.H. Bayliff. Special Report Inter-American Tropical Tuna Commission **2**: 17-70.

Habib, G. (1978). Skipjack biology and the 1976-77 purse-seine fishery. *Occasional Publications Fisheries Research Division New Zealand Ministry of Agriculture and Fisheries* **15**: 17-26.

Hall, D.A. (1986). An assessment of the mulloway (*Argyrosomus hololepidotus*) fishery in South Australia with particular reference to the Coorong Lagoon. Discussion paper from the Department of Fisheries, South Australia, October 1986, 41 pp.

Henry, G.W. (1984). Commercial and recreational fishing in Sydney estuary. Fisheries Bulletin No. 1. NSW Agriculture and Fisheries.

Klinmuang, H. (1981). Studies on the size distribution and length-weight relationship of the tunas in the Gulf of Thailand. *Fisheries Report Marine Fisheries Division. Department of Fisheries, Bangkok* **24**: 39 pp.

Knaggs, E.H. and Parrish, R.H. (1973). Maturation and growth of Pacific mackerel, *Scomber japonicus* Houttyn. *California Fish & Game* **59** (2): 114-120.

Lindholm, R. (1984). Observations on the chinaman leatherjacket *Nelusetta ayraudi* (Quoy & Gaimard) in the Great Australian Bight. *Australian Journal of Marine and Freshwater Research* **35**: 597-599.

Lyle, J.M. and Ford, W.B. (1993). Review of Trawl Research 1979-1987, With Summaries of Biological Information for the Major Species. Department of Sea Fisheries, Tasmania Marine Laboratories, Technical Report 46, 169 pp.

Malcolm, W.B. (1966). Synopsis for F.A.O. species and stocks thesaurus of data on *Arripis trutta* (Bloch and Schneider). Pages 1-17 *In* Commonwealth-States Fisheries Conference, Southern Pelagic Project Committee Technical Session, Cronulla, 1966. Volume 3, SPP(T)66/1/4, CSIRO, Cronulla.

McPherson, G.R. (1992). Age and growth of the narrow-barred spanish mackerel *Scomberomorus commerson* (Lacépède, 1800) in north-eastern Queensland waters. *Australian Journal of Marine and Freshwater Research* **43**: 1269-1282.

Montgomery, S.S. (1986). Studies on the population dynamics of the tiger flathead *Platycephalus richardsoni* (Castelnau) (Pisces: Platycephalidae), I - age determination and growth. *In* NSW Trawl Fishery Assessment and Monitoring Programme. Progress Report November 1986. Fisheries Research Institute, NSW Department of Agriculture.

Mood, A.M., Graybill, F.A., and Boes, D.C. (1974). *Introduction to the Theory of Statistics*. Third ed. McGraw-Hill: Tokyo, 564 pp.

Moran, M.J. and Burton, C. (1990). Relationships among partial and whole lengths and weights for Western Australian pink snapper *Chrysophrys auratus* (Sparidae). *Fisheries Research Report, Fisheries Department of Western Australia* **89**: 1-13.

Nakamura, E.L. and Uchiyama, J.H. (1966). Length-weight relations of Pacific tunas. Pages 197-201, *In* Proceedings of the Governor's Conference on Central Pacific Fisheries Resources. Editor T.A. Manar, Hawaii.

Olsen, A.M. (1954). The biology, migration, and growth rate of the school shark, *Galeorhinus australis* (Macleay) (Carcharhinidae) in south-eastern Australian waters. *Australian Journal of Marine and Freshwater Research* **5**(3): 353-410.

Ortiz, E. and Burchmore, J.J. (1992). The development of a representative system of marine and estuarine protected areas for New South Wales. Progress report to Ocean Rescue 2000 Steering Committee. NSW Fisheries, Sydney.

P.A. Management Consultants (1984). The Australian Recreational Fishing Confederation. National Survey of Participation in Recreational Fishing.

Pollock, K.H., Jones, C.M. and Brown, T.L. (1994). *Angler Survey Methods and Their Implications in Fisheries Management.* American Fisheries Society Special Publication **25**.

Richards, C.E. (1967). Age, growth and fecundity of the cobia, *Rachycentron canadum*, from Chesapeake Bay and adjacent mid-Atlantic waters. *Transactions of the American Fisheries Society* **96**(3): 343-50.

Rose, C.D. and Hassler, W.W. (1969). Age and growth of the dolphin fish, *Coryphaena hippurus* (Linnaeus), in North Carolina waters. *Transactions of the American Fisheries Society* **98**(1): 94-103.

Smith, D.C. (1982). Age and growth of jackass morwong *Nemadactylus macropterus* (Bloch and Schneider) in eastern Australian waters. *Australian Journal of Marine and Freshwater Research* **33**: 245-53.

State Pollution Control Commission (1981). The Ecology of Fish in Botany Bay - biology of commercially and recreationally valuable species. Environmental Control Study of Botany Bay, BBS **23**: Sydney. 287 pp.

Steffe, A.S. and Murphy, J.J. (1995). A survey of recreational trailer boat fishing in the marine waters of New South Wales - a case study. Pages 106-112, *In* Recreational fishing: what's the catch? Editor D.A. Hancock. Workshop Proceedings, Canberra 30-31 August 1994. Australian Society for Fish Biology, Canberra.

Walker, T.I. (1983). Investigations of the Gummy Shark, *Mustelus antarcticus* Günther, from South-Eastern Australian Waters. Report to the Fishing Industry Research Committee of the Commercial Fisheries Branch, Fisheries and Wildlife Division of the Ministry for Conservation, Victoria, 94 pp.

West R.J. and Gordon G.N.G. (1994). Commercial and recreational harvest of fish from two Australian Coastal Rivers. *Australian Journal of Marine and Freshwater Research*, **45**, 1259-79.

Wild, A. (1986). Growth of yellowfin tuna, *Thunnus albacares*, in the eastern Pacific Ocean based on otolith increments. *Bulletin of the Inter-American Tropical Tuna Commission* **18**(6): 423-82.

Wild, A. (1991*a*). A review of the biology and fisheries for skipjack tuna, *Katsuwonus pelamis*, in the eastern Pacific Ocean. Pages 1-51, *In* Proceedings of the First FAO Expert Consultation on Interactions of Pacific Tuna Fisheries, 3-11 December 1991, Noumea, New Caledonia *FAO Fisheries Technical Paper* **336**(2).

Wild, A. (1991*b*). A review of the biology and fisheries for yellowfin tuna, *Thunnus albacares*, in the eastern Pacific Ocean. Pages 52-107 *In* Proceedings of the First FAO Expert Consultation on Interactions of Pacific Tuna Fisheries, 3-11 December 1991, Noumea, New Caledonia. *FAO Fisheries Technical Paper* **336**(2).

Wilson, M.A. (1981). Aspects of the biology and production of mackerel tuna in Oceania. Pages 45-50 *In* Northern Pelagic Fish Seminar, Darwin, Northern Territory,. 20-21 January 1981. Editors C.J. Grant and D.G. Walker. 177 pp.

Yesaki, M. and Arce, F. (1991). A review of the *Auxis* fisheries of the Philippines and some aspects of the biology of frigate (*A. thazard*) and bullet (*A. rochei*) tunas in the

Indo-Pacific region. Special Report Inter-American Tropical Tuna Commission **7**: 409-439.

Acknowledgements

We would like to thank the following organisations and persons:
The Fisheries Research and Development Corporation and the Australian Fisheries Management Authority for funding this project.

All members of the sea-rescue bases that participated in the recreational boat movement logbook program. These dedicated men and women have provided us with valuable data describing the levels of recreational fishing effort along the coast of NSW. Their voluntary commitment to making boating safer is often overlooked by the general public and government departments. We greatly appreciate the excellent work they have done for this project.

The charter boat skippers that participated in the charter boat logbook program. Their assistance made it possible to gain a valuable insight into the charter boat industry.

We thank the "cast of thousands" - those people that collected the boat count data and conducted the interviews with anglers throughout the state. A list of these persons is provided in the Staff section.

We thank B. Gillanders, N. Otway, B. Pease, J. Pepperell, K. Rowling, and R. West for providing unpublished length/weight data.

John James from the Australian Bureau of Meteorology (Sydney) provided vast amounts of weather data.

Nick James and Alan Wilmot provided some much needed technical support at various stages during the project.

Rick Fletcher and Gary Henry provided comments on the draft report.

Finally, we would like to thank all of the anglers that participated in the survey. The successful completion of this work was only made possible by their continual co-operation and support.

Benefits

The data collected during this study will benefit all sectors of the fishing community, commercial and recreational. The results of this study could be used by fisheries managers and research scientists in State and Commonwealth departments in many ways. Recreational effort and harvest data can be used: (a) to describe total resource use, (b) to monitor harvests and changes in harvest rates as indices of relative abundance of key species, (c) to estimate the relative impacts (realised allocation) that commercial and recreational fishing have on shared stocks of finfish species, (d) to minimise resource use conflicts between the commercial and recreational sectors, and (e) as auxiliary input data when developing stock assessment models for important shared species.

Detailed data about recreational harvest can also be used by managers to review the effectiveness of harvest controls on the recreational sector, such as bag limits and minimum legal lengths. Similarly, data on recreational fisheries can be used in public forums to support management decisions on quota allocation and to educate the public when revisions of bag limits and minimum legal lengths are needed.

Intellectual Property

There will be no patents arising from this research and all results will be published in the public domain literature.

Further Development

We recommend that the results of this project be disseminated to the recreational and commercial fishers and the general public through a series of public seminars to be held near the sites at which the angler interviews were obtained. This would allow an open debate on the many important findings of this project.

Staff

The following staff have worked on this project.

A. Steffe (Principal investigator), J. Murphy (Technical officer), D. Chapman (Technical assistant), B. Tarlinton (Technical assistant), G. Gordon (Biometrician), A. Grinberg (Database programmer).

The majority of persons employed during this project were involved in collecting the boat count and angler interview data. This project has directly employed the following persons:

Ron Avery, Peter Barnes, Geoff Barrett, Craig Blount, Patrick Caleo, Doug Chapman, Peter Cook, John Cowie, Kevin Cross, Glen Cuthbert, Kerrie Deguara, Peter Donohoe, Sharon Donohoe, Gavin Edmondson, Ken Egan, Ted Elliot, Dan Elmes, David Farr-Wharton, Chris Farrell, Geoff Flewin, Rex Gosby, Bob Gosford, Barry Hawkes, Matthew Hawkes, Andrew Henderson, Peter Horrobin, Paul Howe, Winton Irving, Max Jackson, Jeremy Koster, Michael Letvic, Bruce Libbis, Mark Macmillan, Kirrily Moore, Michael Moore, Paul Morris, Gary Murphy, Jeff Murphy, Derek Newboult, Rod Payne, Paul Rebuck, Darren Redman, Peter Roper, Mark Rose, Neil Rouse, Ron Sheaves, Clem Smith, Jervis Sparks, Fiona Staines, John Staines, Darryl Sullings, Brett Tarlinton, Graham Turner, Gary Wade, Stuart Wagland, Warren Webb, Alan Wilmot, Bob Winchester, Bill Wood

Appendix 1. A list of access sites, and their associated waterways, for the North Coast, Central Coast, and South Coast regions of New South Wales. Each access site (waterway) has been classified into a size grouping by using the relative recreational usage rates among access sites for different boat categories.

REGION	ACCESS SITE (WATERWAY)	SIZE CLASSIFICATION		
		TRAILER BOATS	CHARTER BOATS	CRUISERS AND GAMEBOATS
NORTH COAST	Tweed Heads (Tweed River)	Large	Medium	Medium
NORTH COAST	Kingscliff (Cudgen Creek)	Large	-	Small
NORTH COAST	Hastings Point (Cudgera Creek)	Small	-	-
NORTH COAST	Pottsville (Mooball Creek)	Small	-	-
NORTH COAST	Brunswick Heads (Brunswick River)	Small	Small	Small
NORTH COAST	Byron Bay (Byron Bay)	Small	-	-
NORTH COAST	Ballina (Richmond River)	Large	Small	Medium
NORTH COAST	Evans Head (Evans River)	Large	Small	Medium
NORTH COAST	Iluka/Yamba (Clarence River)	Large	Small	Medium
NORTH COAST	Brooms Head (Brooms Head)	Small	-	-
NORTH COAST	Sandon (Sandon River)	Small	-	-
NORTH COAST	Minnie Water (Minnie Water)	Small	-	-
NORTH COAST	Wooli (Wooli River)	Large	-	-
NORTH COAST	Red Rock (Corindi River)	Small	-	-
NORTH COAST	Woolgoolga (Woolgoolga)	Medium	-	-
NORTH COAST	Emerald Beach (Emerald Beach)	Small	-	-
NORTH COAST	Coffs Harbour (Coffs Harbour)	Large	Large	Large
NORTH COAST	Sawtell (Sawtell)	Small	-	-
NORTH COAST	Urunga (Bellinger River)	Small	-	-
NORTH COAST	Third Head (Third Head)	Small	-	-
NORTH COAST	Nambucca Heads (Nambucca River)	Large	-	-
NORTH COAST	Scotts Head (Scotts Head)	Small	-	-
NORTH COAST	South West Rocks (Macleay River)	Large	Small	Medium
NORTH COAST	South West Rocks (Back Creek)	Small	-	-
NORTH COAST	Trial Bay (Trial Bay)	Small	-	-
NORTH COAST	Hat Head (Korogoro Creek)	Small	-	-
NORTH COAST	Crescent Head (Killick Creek)	Small	-	-
NORTH COAST	Port Macquarie (Hastings River)	Large	Large	Large
NORTH COAST	Lake Cathie (Lake Cathie)	Small	-	-
NORTH COAST	Camden Haven (Camden Haven River)	Large	Medium	Medium
NORTH COAST	Crowdy Head (Crowdy Head)	Large	-	Small
NORTH COAST	Taree/Harrington (Manning River)	Small	-	-
NORTH COAST	Forster/Tuncurry (Wallis Lake)	Large	Large	Large
NORTH COAST	Sand Bar (Smiths Lake)	Small	-	-
NORTH COAST	Seal Rocks (Seal Rocks)	Small	-	-
CENTRAL COAST	Port Stephens (Port Stephens)	Large	Large	Large
CENTRAL COAST	Boat Harbour (Anna Bay)	Small	-	-
CENTRAL COAST	Newcastle (Hunter River)	Large	Large	Large
CENTRAL COAST	Swansea (Lake Macquarie)	Large	Small	Large
CENTRAL COAST	Norah Head (Norah Head)	Medium	-	-
CENTRAL COAST	The Entrance (Tuggerah Lakes)	Small	-	-
CENTRAL COAST	Toowoon Bay (Toowoon Bay)	Small	-	-
CENTRAL COAST	Terrigal (Terrigal Harbour)	Large	Large	Small
CENTRAL COAST	Broken Bay (Broken Bay)	Large	Large	Large
CENTRAL COAST	Long Reef (Long Reef)	Medium	-	-
CENTRAL COAST	Port Jackson (Port Jackson)	Large	Large	Large
CENTRAL COAST	Gordons Bay (Gordons Bay)	Small	-	-
CENTRAL COAST	Long Bay (Long Bay)	Small	-	-
CENTRAL COAST	Botany Bay (Botany Bay)	Large	Large	Large
CENTRAL COAST	Port Hacking (Port Hacking)	Large	Large	Large
CENTRAL COAST	Austinmer (Austinmer)	Small	-	-
CENTRAL COAST	Bellambi (Bellambi)	Large	-	Small

Appendix 1. A list of access sites, and their associated waterways, for the North Coast, Central Coast, and South Coast regions of New South Wales. Each access site (waterway) has been classified into a size grouping by using the relative recreational usage rates among access sites for different boat categories.

REGION	ACCESS SITE (WATERWAY)	SIZE CLASSIFICATION		
		TRAILER BOATS	CHARTER BOATS	CRUISERS AND GAMEBOATS
CENTRAL COAST	Wollongong Harbour (Wollongong Harbour)	Large	Large	Large
CENTRAL COAST	Port Kembla (Port Kembla)	Medium	-	Small
CENTRAL COAST	Lake Illawarra (Lake Illawarra)	Small	-	-
CENTRAL COAST	Shellharbour (Shellharbour)	Large	-	Small
CENTRAL COAST	Minnamurra (Minnamurra River)	Small	-	-
CENTRAL COAST	Kiama (Kiama Harbour)	Large	Large	Small
CENTRAL COAST	Gerringong (Gerringong)	Medium	-	-
CENTRAL COAST	Gerroa (Gerroa)	Small	-	-
SOUTH COAST	Shoalhaven Heads (Shoalhaven River)	Small	-	-
SOUTH COAST	Greenwell Point (Crookhaven River)	Large	Large	Medium
SOUTH COAST	Currarong (Currarong)	Medium	-	-
SOUTH COAST	Jervis Bay (Jervis Bay)	Large	Large	Large
SOUTH COAST	Sussex Inlet (Sussex Inlet)	Medium	-	-
SOUTH COAST	Bendalong (Bendalong)	Medium	-	-
SOUTH COAST	Lake Conjola (Lake Conjola)	Small	-	-
SOUTH COAST	Narrawallee Inlet (Narrawallee Inlet)	Small	-	-
SOUTH COAST	Ulladulla (Ulladulla Harbour)	Large	Large	Large
SOUTH COAST	Burrill Lake (Burrill Lake)	Small	-	-
SOUTH COAST	Bawley Point (Bawley Point)	Small	-	-
SOUTH COAST	South Durrass (Durrass Lake)	Small	-	-
SOUTH COAST	Batemans Bay (Batemans Bay)	Large	Large	Large
SOUTH COAST	Tomakin (Tomakin)	Small	-	-
SOUTH COAST	Mossy Point (Mossy Point)	Small	-	-
SOUTH COAST	Broulee (Broulee)	Small	-	-
SOUTH COAST	Moruya (Moruya River)	Medium	Small	Small
SOUTH COAST	Tuross Head (Tuross Lake)	Small	-	-
SOUTH COAST	Potato Point (Potato Point)	Small	-	-
SOUTH COAST	Dalmeny (Dalmeny)	Small	-	-
SOUTH COAST	Narooma (Wagonga Inlet)	Large	Large	Large
SOUTH COAST	Mystery Bay (Mystery Bay)	Small	-	-
SOUTH COAST	Wallaga Lake (Wallaga Lake)	Small	-	-
SOUTH COAST	Bermagui (Bermagui River)	Large	Large	Large
SOUTH COAST	Tathra (Kianinny Bay)	Large	-	-
SOUTH COAST	Merimbula (Merimbula Lake)	Large	Medium	Large
SOUTH COAST	Pambula (Pambula Lake)	Small	-	Small
SOUTH COAST	Eden (Twofold Bay)	Large	Large	Large
SOUTH COAST	Wonboyn (Wonboyn Lake)	Small	-	-

Appendix 2. Length/weight conversion keys [$W(grams) = a * L(cm)^{b}$] used to estimate weights for various taxa. Relevant details which describe the sample material used to calculate the length/weight keys is provided.

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SEX	SAMPLE SIZE	SIZE RANGE (cm)	LENGTH/WEIGHT KEY $W(grams) = a * L(cm)^{b}$	ADJUSTED r^2	REGION OF SAMPLE	SOURCE OF KEY
SQUALIDAE	DOGFISHES*	*Squalus spp.*	-	-	-	SCHOOL SHARK KEY USED	-	-	-
TRIAKIDAE	SCHOOL SHARK	*Galeorhinus galeus*	Combined	532	30.0-165.0	$W=0.00219083*TL^{3.175}$	Not Given	S. Aust. waters	Olsen (1954)
TRIAKIDAE	GUMMY SHARK	*Mustelus antarcticus*	Combined	531	30.0-175.0	$W=0.000285542*TL^{3.49}$	Not Given	S. Aust., Tas. & Vic.	Walker (1983)
CARCHARHINIDAE	WHALER SHARKS*	All species combined	-	-	-	SCHOOL SHARK KEY USED	-	-	-
AULOPODIDAE	SERGEANT BAKER	*Aulopus purpurissatus*	Combined	97	22.5-52.0	$W=0.012641832*FL^{3.01162}$	0.984	NSW	This study
SYNODONTIDAE	LIZARDFISH*	All species combined	-	-	-	SERGEANT BAKER KEY USED	-	-	-
OPHIDIIDAE	PINK LING	*Genypterus blacodes*	Combined	560	27.0-112.0	$W=0.0117*FL^{2.736}$	0.883	S. E. Aust.	Lyle & Ford (1993)
OPHIDIIDAE	ROCK LING*	*Genypterus tigerinus*	-	-	-	PINK LING KEY USED	-	-	-
BERYCIDAE	NANNYGAI	*Centroberyx affinis*	Females	979	14.5-37.0	$W=0.0477*FL^{2.8213}$	0.983	NSW	Diplock (1986)
ZEIDAE	SILVER DORY*	*Cyttus australis*	-	-	-	MIRROR DORY KEY USED	-	-	-
ZEIDAE	MIRROR DORY	*Zenopsis nebulosis*	Combined	522	20.0-58.0	$W=0.00770*FL^{3.148}$	0.936	S. Aust., Tas. & Vic.	Lyle & Ford (1993)
ZEIDAE	JOHN DORY	*Zeus faber*	Combined	624	6.0-57.0	$W=0.019046273*FL^{2.96287}$	0.980	NSW	This study
SCORPAENIDAE	OCEAN PERCH	*Helicolenus percoides*	Combined	276	14.0-47.0	$W=0.0181*FL^{2.977}$	0.981	S. Aust. & Vic.	Lyle & Ford (1993)
SCORPAENIDAE	RED SCORPIONCOD	*Scorpaena cardinalis*	Combined	214	13.0-46.0	$W=0.020104348*FL^{3.01823}$	0.980	NSW	This study
TRIGLIDAE	RED GURNARD	*Chelidonichthys kumu*	Combined	553	10.0-45.3	$W=0.0081543622*FL^{3.09853}$	0.990	NSW	This study, SPCC (1981)
TRIGLIDAE	LATCHET	*Pterygotrigla polyommata*	Combined	191	21.0-52.0	$W=0.0111*FL^{3.052}$	0.981	Tas. & Vic.	Lyle & Ford (1993)
PLATYCEPHALIDAE	TIGER FLATHEAD	*Neoplatycephalus richardsoni*	Females	720	22.5-65.5	$W=0.00365*FL^{3.1922}$	0.988	S. Coast of NSW	Montgomery (1986)
PLATYCEPHALIDAE	NORTHERN SAND FLATHEAD*	*Platycephalus arenarius*	-	-	-	EASTERN BLUE-SPOTTED FLATHEAD KEY USED	-	-	-
PLATYCEPHALIDAE	SOUTHERN SAND FLATHEAD*	*Platycephalus bassensis*	-	-	-	EASTERN BLUE-SPOTTED FLATHEAD KEY USED	-	-	-
PLATYCEPHALIDAE	EASTERN BLUE-SPOTTED FLATHEAD	*Platycephalus caeruleopunctatus*	Combined	272	20.1-66.5	$W=0.0022403713*FL^{3.29590}$	0.995	NSW	This study

KEY
* Length/weight equation for this taxon was not available. Estimates of weight were obtained by using a length/weight key for a closely related taxon.
FL - Fork Length, ML - Mantle Length, TL - Total Length.

Appendix 2. Length/weight conversion keys [$W(grams) = a * L(cm)^b$] used to estimate weights for various taxa. Relevant details which describe the sample material used to calculate the length/weight keys is provided.

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SEX	SAMPLE SIZE	SIZE RANGE (cm)	LENGTH/WEIGHT KEY $W(grams) = a * L(cm)^b$	ADJUSTED r^2	REGION OF SAMPLE	SOURCE OF KEY
PLATYCEPHALIDAE	DUSKY FLATHEAD	*Platycephalus fuscus*	Combined	589	20.3-88.0	$W=0.0026864577*FL^{3.22910}$	0.992	NSW	This study, SPCC (1981)
PLATYCEPHALIDAE	LONG-SPINED FLATHEAD*	*Platycephalus longispinis*	-	-	-	EASTERN BLUE-SPOTTED FLATHEAD KEY USED	-	-	-
PLATYCEPHALIDAE	MARBLED FLATHEAD	*Platycephalus marmoratus*	Combined	58	23.5-54.0	$W=0.0023467131*FL^{3.29759}$	0.983	NSW	This study
SERRANIDAE	WIRRAH	*Acanthistius ocellatus*	Combined	67	19.8-48.0	$W=0.013524151*FL^{3.09921}$	0.975	NSW	This study
SERRANIDAE	GREY-BANDED COD (BAR-COD)	*Epinephelus ergastularius*	Combined	78	24.0-105.0	$W=0.020083065*FL^{2.96428}$	0.986	NSW	Kevin Rowling (unpublished data)
SERRANIDAE	MAORI COD*	*Epinephelus undulatostriatus*	-	-	-	GREY-BANDED COD KEY USED	-	-	-
GLAUCOSOMIDAE	PEARL PERCH	*Glaucosoma scapulare*	Combined	90	27.0-58.5	$W=0.048802267*FL^{2.74049}$	0.980	NSW	This study
DINOLESTIDAE	LONG-FINNED SEAPIKE	*Dinolestes lewini*	Combined	87	13.0-43.5	$W=0.0024685959*FL^{3.30752}$	0.995	NSW	This study, SPCC (1981)
SILLAGINIDAE	SCHOOL WHITING	*Sillago flindersi*	Combined	1492	6.0-29.0	$W=0.00556*FL^{3.188}$	0.989	Tasmania	Lyle & Ford (1993)
SILLAGINIDAE	STOUT WHITING*	*Sillago robusta*	-	-	-	SCHOOL WHITING KEY USED	-	-	-
POMATOMIDAE	TAILOR	*Pomatomus saltatrix*	Combined	1028	10.0-58.5	$W=0.0075039512*FL^{3.15753}$	0.994	NSW	This study
RACHYCENTRIDAE	COBIA	*Rachycentron canadum*	Combined	270	20.0-155.0	$W=0.0079533483*FL^{3.08800}$	Not Given	Chesapeake Bay	Richards (1967)
CARANGIDAE	AMBERJACK*	*Seriola dumerili*	-	-	-	KINGFISH KEY USED	-	-	-
CARANGIDAE	SAMSON FISH*	*Seriola hippas*	-	-	-	KINGFISH KEY USED	-	-	-
CARANGIDAE	KINGFISH	*Seriola lalandi*	Combined	123	41.5-160.0	$W=0.017234949*FL^{2.92134}$	0.988	NSW	This study
CARANGIDAE	SILVER TREVALLY	*Pseudocaranx dentex*	Combined	43	19.5-39.0	$W=0.033516603*FL^{2.84574}$	0.991	NSW	This study
CARANGIDAE	YELLOWTAIL & JACK MACKEREL	*Trachurus novaezelandiae*	Combined	740	10.0-32.5	$W=0.0088204349*FL^{3.14215}$	0.987	Botany Bay, NSW	This study, SPCC (1981)
CORYPHAENIDAE	DOLPHIN FISH	*Coryphaena hippurus*	Combined	501	26.0-137.0	$W=0.0372726*FL^{2.67}$	Not Given	N. Carolina, USA	Rose & Hassler (1969)
ARRIPIDAE	SALMON	*Arripis trutta*	Combined	8232	4.0-77.0	$W=0.0132678*FL^{3.0485}$	Not Given	E. & W. Australia	Malcolm (1966)
SPARIDAE	YELLOWFIN BREAM	*Acanthopagrus australis*	Combined	758	15.0-40.5	$W=0.024787915*FL^{2.99584}$	0.980	NSW	This study, SPCC (1981)

KEY

* Length/weight equation for this taxon was not available. Estimates of weight were obtained by using a length/weight key for a closely related taxon.

FL - Fork Length, ML - Mantle Length, TL - Total Length.

Appendix 2. Length/weight conversion keys [$W(grams) = a * L(cm)^b$] used to estimate weights for various taxa. Relevant details which describe the sample material used to calculate the length/weight keys is provided.

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SEX	SAMPLE SIZE	SIZE RANGE (cm)	LENGTH/WEIGHT KEY $W(grams) = a * L(cm)^b$	ADJUSTED r^2	REGION OF SAMPLE	SOURCE OF KEY
SPARIDAE	SNAPPER	*Pagrus auratus*	Combined	2646	6.5-82.0	$W=0.0467727*FL^{2.781}$	0.990	W.A.	Moran & Burton (1990)
SPARIDAE	TARWHINE	*Rhabdosargus sarba*	Combined	730	10.0-30.5	$W=0.014914888*FL^{3.16297}$	0.986	NSW	This study, SPCC (1981)
SCIAENIDAE	MULLOWAY	*Argyrosomus hololepidotus*	Combined	141	21.7-139.0	$W=0.01355*FL^{2.94}$	Not Given	S. Aust.	Hall (1986)
SCIAENIDAE	TERAGLIN	*Atractoscion aequidens*	Combined	59	36.0-57.0	$W=0.017450184*FL^{2.85053}$	0.956	N. Coast NSW	This study
MULLIDAE	GOATFISH	*Parupeneus signatus* & *Upeneichthys lineatus*	Combined	67	12.5-30.5	$W=0.0288642*FL^{2.90988}$	0.979	NSW	This study
SCORPIDIDAE	SILVER SWEEP	*Scorpis lineolatus*	Combined	82	14.5-32.0	$W=0.071518764*FL^{2.64994}$	0.947	NSW	This study
CHEILODACTYLIDAE	RED MORWONG*	*Cheilodactylus fuscus*	-	-	-	BLUE MORWONG KEY USED	-	-	-
CHEILODACTYLIDAE	BLUE MORWONG	*Nemadactylus douglasii*	Combined	569	20.3-55.5	$W=0.024707568*FL^{2.95280}$	0.978	NSW	This study
CHEILODACTYLIDAE	JACKASS MORWONG	*Nemadactylus macropterus*	Combined	2149	23.5-47.5	$W=0.017*FL^{3.031}$	0.979	Eden, NSW	Smith (1982)
SPHYRAENIDAE	STRIPED SEAPIKE*	*Sphyraena obtusata*	-	-	-	LONG-FINNED SEAPIKE KEY USED	-	-	-
LABRIDAE	BLUE GROPER	*Achoerodus viridis*	Combined	416	9.0-82.0	$W=0.0267029*FL^{2.94405}$	0.995	NSW	This study, Gillanders (unpublished data)
LABRIDAE	GOLD-SPOT PIGFISH*	*Bodianus perditio*	-	-	-	BLACK-SPOT PIGFISH KEY USED	-	-	-
LABRIDAE	EASTERN FOXFISH*	*Bodianus sp.*	-	-	-	BLACK-SPOT PIGFISH KEY USED	-	-	-
LABRIDAE	BLACK-SPOT PIGFISH	*Bodianus vulpinus*	Combined	114	22.0-43.5	$W=0.018394162*FL^{2.96947}$	0.965	NSW	This study
LABRIDAE	COMB FISH*	*Coris picta*	-	-	-	MAORI WRASSE KEY USED	-	-	-
LABRIDAE	CRIMSON-BANDED WRASSE	*Notolabrus gymnogenis*	Combined	24	20.0-33.5	$W=0.057253231*FL^{2.6490}$	0.957	NSW	This study
LABRIDAE	BLUE-THROATED WRASSE	*Notolabrus tetricus*	Combined	87	21.0-43.0	$W=0.014558613*FL^{3.08296}$	0.990	NSW	This study
LABRIDAE	MAORI WRASSE	*Ophthalmolepis lineolata*	Combined	133	20.5-37.5	$W=0.0077003418*FL^{3.12098}$	0.942	NSW	This study
LABRIDAE	MOON WRASSE*	*Thalassoma lunare*	-	-	-	MAORI WRASSE KEY USED	-	-	-
GEMPYLIDAE	BARRACOUTA	*Thyrsites atun*	Combined	6571	31.0-111.0	$W=0.05720*FL^{2.360588}$	Not Given	Victoria	Blackburn (1960)
TRICHIURIDAE	SOUTHERN FROSTFISH	*Lepidopus caudatus*	Combined	590	70.0-190.0	$W=0.0000002362*TL^{3.2280}$	0.990	NW Mediterranean	Demestre *et. al.* (1993)

KEY

* Length/weight equation for this taxon was not available. Estimates of weight were obtained by using a length/weight key for a closely related taxon.

FL - Fork Length, ML - Mantle Length, TL - Total Length.

Appendix 2. Length/weight conversion keys [$W(grams) = a * L(cm)^b$] used to estimate weights for various taxa. Relevant details which describe the sample material used to calculate the length/weight keys is provided.

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SEX	SAMPLE SIZE	SIZE RANGE (cm)	LENGTH/WEIGHT KEY $W(grams) = a * L(cm)^b$	ADJUSTED r^2	REGION OF SAMPLE	SOURCE OF KEY
CENTROLOPHIDAE	DEEPSEA TREVALLA (BLUE EYE)	*Hyperoglyphe antarctica*	Combined	468	46.0-105.0	$W=0.0058278719*FL^{3.29956}$	0.980	NSW	Kevin Rowling (unpublished data)
SCOMBRIDAE	NARROW-BARRED SPANISH MACKERE	*Scomberomorus commerson*	Females	579	47.0-155.0	$W=0.0099*FL^{2.95}$	Not Given	Qld.	McPherson (1992)
SCOMBRIDAE	SPOTTED MACKEREL*	*Scomberomorus munroi*	-	-	-	NARROW-BARRED SPANISH MACKEREL KEY USED	-	-	-
SCOMBRIDAE	QUEENSLAND SCHOOL MACKEREL*	*Scomberomorus queenslandicus*	-	-	-	NARROW-BARRED SPANISH MACKEREL KEY USED	-	-	-
SCOMBRIDAE	FRIGATE MACKEREL	*Auxis thazard*	Combined	364	21.0-49.0	$W=0.02000*FL^{2.9900}$	Not Given	Gulf of Thailand	Klinmuang (1981), Yesaki & Arce (1991)
SCOMBRIDAE	AUSTRALIAN BONITO	*Sarda australis*	Combined	2824	29.0-77.0	$W=0.009611*FL^{3.08338}$	0.990	E.& N. Pacific	Campbell & Collins (1975)
SCOMBRIDAE	SLIMY MACKEREL*	*Scomber australasicus*	-	-	-	CHUB MACKEREL KEY USED	-	-	-
SCOMBRIDAE	CHUB MACKEREL	*Scomber japonicus*	Combined	1232	13.0-48.0	$W=0.001366*FL^{3.39358}$	0.994	California, USA	Knaggs & Parrish (1973)
SCOMBRIDAE	LEAPING BONITO*	*Cybiosarda elegans*	-	-	-	AUSTRALIAN BONITO KEY USED	-	-	-
SCOMBRIDAE	MACKEREL TUNA	*Euthynnus affinis*	Combined	Not Given	<75.0	$W=0.0065*FL^{3.22}$	Not Given	Papua New Guinea	Wilson (1981)
SCOMBRIDAE	SKIPJACK	*Katsuwonus pelamis*	Combined	120	38.0-71.0	$W=0.006781878*FL^{3.28916}$	Not Given	New Zealand	Habib (1978), Wild (1991a)
SCOMBRIDAE	ORIENTAL BONITO*	*Sarda orientalis*	-	-	-	AUSTRALIAN BONITO KEY USED	-	-	-
SCOMBRIDAE	ALBACORE	*Thunnus alalunga*	Combined	Not Given	49.6-127.6	$W=0.025955*FL^{2.9495}$	Not Given	Hawaii & N. Pacific	Nakamura & Uchiyama (1966), Foreman (1980)
SCOMBRIDAE	YELLOWFIN TUNA	*Thunnus albacares*	Combined	196	30.0-168.0	$W=0.013908645*FL^{3.086}$	Not Given	Eastern Pacific	Wild (1986), Wild (1991b)
ISTIOPHORIDAE	BLUE MARLIN	*Makaira mazara*	Combined	83	188.0-325.0	$W=0.0007264*FL^{3.4583274193}$	Not Given	E. Coast Aust.	J. Pepperell (unpublished data)
ISTIOPHORIDAE	STRIPED MARLIN	*Tetrapturus audax*	Combined	111	160.0-282.0	$W=0.0041969*FL^{3.0875897922}$	Not Given	E. Coast Aust.	J. Pepperell (unpublished data)
BOTHIDAE	LARGE-TOOTHED FLOUNDER	*Pseudorhombus arsius*	Combined	1061	15.0-31.5	$W=0.0053053006*FL^{3.18944}$	0.971	Botany Bay, NSW	This study, SPCC (1981)
BOTHIDAE	SMALL-TOOTHED FLOUNDER	*Pseudorhombus jenynsii*	Combined	138	15.0-33.4	$W=0.0014768963*FL^{3.62935}$	0.961	Botany Bay, NSW	This study, SPCC (1981)
MONACANTHIDAE	BLACK REEF LEATHERJACKET*	*Eubalichthys bucephalus*	-	-	-	SIX-SPINED LEATHERJACKET KEY USED	-	-	-
MONACANTHIDAE	MOSAIC LEATHERJACKET*	*Eubalichthys mosaicus*	-	-	-	SIX-SPINED LEATHERJACKET KEY USED	-	-	-
MONACANTHIDAE	SIX-SPINED LEATHERJACKET	*Meuschenia freycineti*	Combined	223	10.0-41.0	$W=0.016472898*FL^{3.01383}$	0.994	NSW	This study, SPCC (1981)
MONACANTHIDAE	HORSESHOE LEATHERJACKET*	*Meuschenia hippocrepis*	-	-	-	SIX-SPINED LEATHERJACKET KEY USED	-	-	-
MONACANTHIDAE	YELLOW-FINNED LEATHERJACKET*	*Meuschenia trachylepis*	-	-	-	SIX-SPINED LEATHERJACKET KEY USED	-	-	-
MONACANTHIDAE	CHINAMAN LEATHERJACKET	*Nelusetta ayraudi*	Females	154	23.0-54.0	$W=0.017*FL^{2.83}$	Not Given	Great Aust. Bight	Lindholm (1984)
MONACANTHIDAE	TOOTHBRUSH LEATHERJACKET*	*Penicipelta vittiger*	-	-	-	SIX-SPINED LEATHERJACKET KEY USED	-	-	-
MONACANTHIDAE	ROUGH LEATHERJACKET*	*Scobinichthys granulatus*	-	-	-	SIX-SPINED LEATHERJACKET KEY USED	-	-	-

KEY
* Length/weight equation for this taxon was not available. Estimates of weight were obtained by using a length/weight key for a closely related taxon.
FL - Fork Length, ML - Mantle Length, TL - Total Length.

Appendix 2. Length/weight conversion keys [$W(grams) = a * L(cm)^b$] used to estimate weights for various taxa. Relevant details which describe the sample material used to calculate the length/weight keys is provided.

HIGHER CLASSIFICATION	COMMON NAME	TAXON	SEX	SAMPLE SIZE	SIZE RANGE (cm)	LENGTH/WEIGHT KEY $W(grams) = a * L(cm)^b$	ADJUSTED r^2	REGION OF SAMPLE	SOURCE OF KEY
MONACANTHIDAE	LEATHERJACKET OTHER*	Unidentified Monacanthid species	-	-	-	SIX-SPINED LEATHERJACKET KEY USED	-	-	-
CEPHALOPODA	COMMON SQUID*	*Loliga spp.*	-	-	-	SOUTHERN CALAMARI KEY USED	-	-	-
CEPHALOPODA	ARROW SQUID*	*Nototodarus gouldi*	-	-	-	SOUTHERN CALAMARI KEY USED	-	-	-
CEPHALOPODA	GIANT CUTTLEFISH	*Sepia apama*	Combined	28	19.0-50.0	$W=0.2203433*ML^{2.8347}$	0.967	NSW	This study
CEPHALOPODA	SOUTHERN CALAMARI	*Sepioteuthis australis*	Combined	101	11.0-39.0	$W=0.24976409*ML^{2.44095}$	0.977	NSW	This study

This study - refers to the amalgamation of material from a variety of sources and the recalculation of a length/weight key. These sources include material from market measuring, boat ramp measuring, and unpublished material taken from the Botany Bay project (SPCC 1981), the Northern Rivers project and the Deep Ocean Outfall Monitoring project.

KEY
* Length/weight equation for this taxon was not available. Estimates of weight were obtained by using a length/weight key for a closely related taxon.
FL - Fork Length, ML - Mantle Length, TL - Total Length.