FISH AND SEAFOOD CONSUMPTION IN AUSTRALIA

A CONSUMER SURVEY

1976-77

Fish and Seafood Consumption in Australia

A Consumer Survey 1976–77

FISHERIES DIVISION
DEPARTMENT OF PRIMARY INDUSTRY

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Foreword

The impending declaration of a 200 mile fishing zone and rising fish prices both in Australia and overseas offer wide scope for further development of the Australian fishing industry. In particular, there is identifiable scope for replacing imported fish on the domestic market.

The Commonwealth Government, in co-operation with the States, has devoted considerable effort to find and prove new fishing grounds in recent years. But, as pointed out in this report, much more needs to be done in this area.

The survey reported here represents a concurrent effort to assist marketers of Australian fish. It provides information about the fish eating habits of Australians and is a base from which more detailed marketing analyses may be undertaken.

The study was requested initially by the Victorian Ministry for Conservation which asked that the Commonwealth carry out a survey of Melbourne consumers. At a meeting in 1975 Ministers responsible for fisheries in all States and the Commonwealth asked that the survey be extended to cover all capital cities. This was to enable a working group on mercury in fish to assess the importance of fish in the Australian diet.

Tenders were called late in 1975 and PA Consulting Services was the successful applicant. Survey interviews commenced in June 1976 and continued over four quarters.

The survey reported here covered a sample of 6000 households in all capital cities except Darwin. Darwin was not included because it is a relatively small market for fish, would have been expensive to survey and at the time of planning the survey was recovering from the destruction caused by Cyclone Tracey.

Additionally, information was collected on the attitudes and opinions of consumers in Melbourne towards fish and other seafood. A separate report on that study will shortly be released.

Data were also obtained from a further 1500 'heavy' fish eaters for use by the working group on mercury in fish.

A number of people contributed to the successful conclusion of this survey. The staff and officers of PA Consulting Services were thorough and painstaking in planning the survey and in the collection and analysis of data. In particular I wish to thank Messrs C. D. A. Maddocks, P. A. Murphy and Ms J. E. Hocking who were responsible for the conduct of the survey.

The consultants received advice and assistance from a number of sources; officers of the Victorian Division of Fisheries and Wildlife, the working group on mercury in fish and a steering group of Commonwealth officers who oversighted the project.

Finally, I would like to express my appreciation to the great number of people who gave their time to provide the information in this report and the other studies.

E. A. PURNELL-WEBB
First Assistant Secretary

Fisheries Division
CANBERRA
March 1978

For further information concerning this survey contact Mr C. Keating, Fisheries Division Phone Canberra 725388.

Contents

1 Highlights

Australians in capital cities ate 10.1 kg of fish and seafood per head annually over the survey period 1976–77. This comprised 7.8 kg of fish and 2.3 kg of seafood. (See pages 10–13 inclusive.)

In Sydney 11.7 kg of fish and seafood were eaten.

- 10.4 kg were eaten in Brisbane
- 9.5 kg were eaten in Perth
- 8.9 kg were eaten in Melbourne
- 8.0 kg were eaten in Canberra
- 7.7 kg were eaten in Adelaide
- 7.2 kg were eaten in Hobart

Some 38% of individuals had not eaten either fish or seafood in the week preceding the interview. A further one third ate the equivalent of less than 10 kg annually. But 6% ate more than 26 kg annually and 2% consumed more than 40 kg.

Three-quarters of all fish was prepared and eaten at home, but only one third of seafood was prepared and eaten at home.

On average some form of fish was eaten just over once a week per household. (pages 13–17.) Tinned fish was eaten more often than any other form—28 times per year. Fresh fish was eaten 18 times per year and cooked fish from takeaway outlets was eaten 8 times per year. Prawns were the most common type of seafood served.

Households with higher incomes ate more fish and seafood, but the relationship was not strong. (page 30.)

Households with adult males only, consumed about twice as much fish and seafood as any other group. (page 32.) They ate much more outside the home and from takeaway outlets.

Persons eating fish for dietary reasons also ate about twice as much fish and seafood than other groups. (page 37.)

Country of origin of the respondent had little effect on overall average fish and seafood consumption. (page 35.) But it had a marked influence on the kind of fish and seafood eaten. Where the householder was of 'Mediterranean' origin, average consumption of fresh fish and seafood was considerably higher than the average of other households.

Generally, younger householders ate more fish and seafood than older ones, but this factor was closely related to income. (page 33.)

Supermarkets were the main overall source of supply for fish. (page 25.) This pattern varied for fresh fish where the retail fish shop (39%) and fish market (18%) were more important sources of supply and leisure fishing accounted for a further quarter of the supply of fresh fish. About one third of households had a person who went fishing for recreation. (page 36.)

Fish was most often served on Friday while seafood was most often served on the weekend. (page 26.)

Fish and seafood were eaten mainly at the evening meal and rarely for breakfast. (page 27.) Tinned fish was mostly consumed at lunchtime.

On about 40% of eating occasions, fish was not cooked but served 'straight'—this was mainly tinned fish. Frying was the predominant method of cooking. (page 28.)

2 Introduction

This report presents the results of a survey of Fish and Seafood Consumption in the Australian capital cities. The survey was conducted by P.A. Consulting Services Pty. Ltd. for the Commonwealth Department of Primary Industry and provides information on how much fish and seafood of different forms is eaten by consumers in the capital cities.

The specific objective of the survey was to provide statistical data on the level and pattern of fish and seafood consumption in Australian capital cities and to provide more detailed information on the differences in fish and seafood consumption from State to State, according to socio-economic and demographic groups.

The study was commissioned with the requirements of a number of potential users in mind. First the working group on mercury in fish set up by the Australian Fisheries Council in 1975 required accurate information on the level and distribution of fish consumed by Australians. In particular, the group was interested in establishing whether certain individuals or groups were eating large quantities of fish or seafood. Second, the Commonwealth Department of Primary Industry and the Victorian Ministry for Conservation sought information on the attitudes of consumers to particular forms of fish and seafood. The results of that survey have been published in another report.[1]

Third, it was expected that the results of the survey would be used by other Government bodies concerned with the administration of Australian fisheries and the marketing of the catch. Finally, it was hoped that the results contained in this report, along with other data collected, would be of considerable use to those individuals and organisations engaged in the catching and marketing of fish and seafood.

2.1 Survey Coverage

The survey was based on 6000 household interviews in seven capital cities over four quarters.

Household fish and seafood consumption data from 6000 households were collected in four rounds of 1500 interviews, each at the following times:

1st Quarter	June, 1976
2nd Quarter	September, 1976
3rd Quarter	December, 1976
4th Quarter	February, 1977

Interviewing extended over three weeks of each quarter.

The interviews were conducted over four quarters in order to take into consideration seasonal variations in the fresh fish catch and different eating patterns throughout the year which might be expected to produce seasonal variations in consumption patterns.

[1] Victorian Division of Fisheries and Wildlife, *Some Aspects of Consumer Attitudes and Opinions Towards Fish and other Seafood in Metropolitan Melbourne*, June 1978.

The following number of household interviews were conducted in each capital city:

Sydney	400 per quarter	= 1600
Melbourne	360 per quarter	= 1440
Brisbane	180 per quarter	= 720
Adelaide	180 per quarter	= 720
Perth	160 per quarter	= 640
Canberra	120 per quarter	= 480
Hobart	100 per quarter	= 400
Total	1500 per quarter	= 6000

From 30% of sample households in each city and each quarter, additional information was obtained on the weight of fish and seafood eaten outside the home by individuals fifteen years old and over.

2.2 Classification of Fish and Seafood

In preliminary investigations, it was found that consumers distinguished clearly between the eating of fish and other seafood because each was perceived to play a different role in the diet. For ease and accuracy of data collection, consumption of seafood was therefore classified into two broad categories:

Fish and **Seafood**

Fish were defined to cover all species of fresh-water and sea-water FIN FISH including sharks, rays and eels

Seafoods were defined to include all species of crustacea (e.g. lobsters and prawns) and molluscs (e.g. oysters and squid).

Fish were then classified according to their form at the time they were obtained, whether fresh and frozen (unpackaged) fish, frozen packaged fish, fish fingers, tinned fish, smoked fish and other fish. 'Frozen Packaged Fish' was defined to exclude frozen fish fingers and frozen fish cakes. Fish fingers were considered sufficiently important to have their own classification and fish cakes, along with rollmops, caviar, dried and salted fish were included in the 'other fish' category.

Similarly, seafoods were categorised as either fresh and frozen (unpackaged), frozen (packaged), tinned or other seafood. Other seafood included jars of seafood such as oysters and mussels and also dried and cured seafood.

Species identification of fish and seafood had to depend on the descriptions used by respondents. Preliminary investigations showed that species identification was less of a problem for regular fish eaters than non-fish eaters or occasional fish eaters. Nevertheless, many commonly used names are not precise. Also if a species of fish had been sold under a name other than its true name, the results will reflect the species name by which the fish was sold.

Species identification problems were most evident in describing fish eaten away from home. On a significant number of occasions when cooked fish was bought at takeaway food outlets, the respondent did not know the species of the 'piece of fish'. In addition, many species were sold under popular names such as whiting, snapper or cod, although they may in fact have been other species.

Similarly, the favourable image of 'barramundi' in the restaurant, club and hotel trade, resulted in many species being sold under this name and consequently reported in this study.

Some foodstuffs were excluded from the study because of the small quantities of seafood ingredients and the difficulty in estimating weight.

These include:

Fish paste
Fish soup
Seafood pizza
Spaghetti marinara
Fried rice.

2.3 Survey Method

Extensive desk research of available literature contributed to the development of the questionnaire. This literature search was supported by preliminary discussions with groups and individual consumers, as well as trade interviews. Preliminary developmental interviews were used with around 500 respondents.

Home interviews were conducted with the person responsible for the purchase and preparation of food in the household. The questionnaire reviewed the general frequency of eating all forms of fish and seafood, whether at home or outside the home.

Fish and seafood eaten outside the home included that bought cooked from takeaway outlets and other occasions of eating out; for example, at restaurants, clubs, hotels and at friends' homes.

After establishing the general patterns of consumption, the respondents were asked to review all the main meals and other eating occasions of the previous week and to report each instance when fish and seafood were consumed. Questions on consumption behaviour covered the species and quantity of fish and seafood consumed over the past seven days. They also covered the methods by which fish and seafood were prepared or cooked and the day of the week and the meal at which they were served. So that the consumption patterns could be related to catch or sales statistics for various forms of fish and seafood, the sources of supply and aspects of purchasing behaviour were also determined during the interview.

Purchasing behaviour covered the form in which fish and seafood was purchased, for example, whether it was fresh, frozen or tinned. It also covered the frequency of fish and seafood purchases.

Information was also obtained on recreation fishing habits and occupational influences on fish and seafood consumption, in addition to selected demographic and socio-economic characteristics of the households.

Copies of the questionnaire may be obtained on request from the Department of Primary Industry, Canberra.

2.4 Characteristics of the Sample

The 6000 households interviewed were weighted to represent the 2 693 000 households in the capital cities. Sample design is shown in Appendix II.

2.4.1 Variations in the Sample by Quarter

While the contribution of each city was constant in each quarter, there were some variations in the composition of the sample when examined, according to such variables as household composition, total household income and age groups of respondents as shown in Table 1.

2.4.2 Variations in the Sample by City

The characteristics of the sample households for each capital city can also be

compared on such bases as household composition, total household income and age of the respondent. These variations are shown in Table 2.

Households consisting of adults only, comprised 56% of the sample while the 44% with children included 11% with three or more children. These proportions were fairly constant between cities, although the proportion of households with children was higher in Canberra (54%).

There were considerable variations both in stated household income levels between cities and also in the willingness of respondents to report income. Over all capitals 21% of respondents either could not or would not give total household income. It was estimated that 18% earned less than $6000 per annum, 46%earned between $6000 and $12 000 per annum while 15% earned over $15 000 per annum.

The age of respondents was spread basically across three age groups. Most (43%) were in the 20–39 age groups, 34% in the 40–59 age group while 21% were 60 years of age or over. Just under 2% of respondents were both below 20 years of age and also responsible for the purchase and preparation of food for the household.

Sydney households tended to be very similar in composition to the total sample of households. In Melbourne 18% of the population had incomes estimated at over $15 000 per annum, which was above the average, and the proportion of households with children, 41% was lower.

Brisbane incomes were lower with 20% earning less than $6000 per annum and only 10% earning over $15 000 per annum, while there was also more reluctance to discuss income at 23% of respondents. Although the proportion of households with children was similar to the total estimated for the population at 45%, there was a higher proportion of elderly respondents comprising 28% of the population.

Household composition in Adelaide was close to the average for all cities of those with children and those without, but within these overall groupings there was a tendency for there to be more adult couples than single adults and for families to be smaller. They tended also to be more middle aged (40–59) and middle income with less reluctance to discuss income (only 13% did not state income).

Perth respondents, by contrast were highly reluctant to discuss income (30% not stated). There was a higher proportion than average of young families in Perth.

Hobart households were also inclined not to discuss income and their population also appeared to be older (26% over 60 years old).

Canberra had the highest population of family households (only 9% single person households and 54% with children). It was also the youngest population (56% in the 20–39 year age group) with low reluctance to discuss income (only 13% not stated) and generally higher income, (36% total household incomes in excess of $15 000).

2.5 Interpretation of Results

In interpreting the results of any sample survey there are bound to be differences in estimates based on that sample from the results that would have been obtained by collecting information from the total population.

These differences are called sampling errors. Their effects can be estimated and allowed for in the interpretation of results.

The scale of sampling error is related to total sample size and in the case of respondents having certain attributes, the proportion of respondents holding a particular attribute. To compensate for their small populations, the sample of households drawn in Canberra and Hobart were chosen to be disproportionately large relative to Sydney

and Melbourne. For example, 400 Hobart households were interviewed out of a total of 6000 households in all capital cities, compared to 92 which would have been interviewed on an allocation of sample households proportional to the total number of households in all cities. The allocation of 400 households to Hobart was to reduce sampling error.

For given survey values, proportions or estimates of numbers of households consuming particular forms of fish, estimates of sampling errors are presented in Appendix III—'Estimation of Errors'.

There are also always non-sampling errors which may include:

- errors in reporting by respondents or in recording by interviewers;
- biases which are introduced when non-responding households have different characteristics to households that did respond;
- processing errors in coding or computing.

Considerable effort was made to minimise these errors by careful attention to sampling and survey procedures including careful questionnaire design, intensive training and supervision of interviewers and extensive editing and checking for quality control at all stages of data processing. (See also Appendix II—Sample Methodology).

The above comments could apply to any survey, but there were some special features of this study which introduced further complexities.

There are few groups of food products which are more complex in their variety of species or forms in which they may be obtained than fish and other seafood. In many of the forms the consumer did not know the weight of the fish consumed and consequently it had to be estimated.

Desk research showed that studies of fish consumption conducted overseas encountered all of these problems of species identification, estimation of weight of the products and the allocation of the edible weight to different members of the household at a meal.

In order to overcome these problems, particular attention was paid to visual aids and questionnaire design. Visual aids, such as cards and balsa wood models, which related portion sizes to weight, were used to aid in the estimation of weight of fish on the plate, especially fish eaten outside the home, whether from a takeaway outlet or restaurant.

The Victorian Ministry of Conservation provided recovery weighting factors which related the edible weight of different species to their caught or live weight. These factors were used when the respondent only knew the size of the fish.

Based on earlier research, the average weight of fish in a piece of cooked fish from a takeaway food outlet was recorded as 85 grams. Any other minor assumptions and qualifications are discussed either in the course of the text or in the Appendixes which are attached.

Preliminary studies also showed that species of fish consumed were sometimes not known, but that respondents who were more frequent consumers of fish were more knowledgeable about species than those who ate fish less often and who genuinely did not know the species and responded in those terms.

Some inflation of estimates has been found in consumption studies where a recall period is used because respondents may be less than accurate in determining the cut off dates. In this study collection of data was based on both general frequency of eating and also a recall of meals during the seven days previous to the interview.

Again preliminary studies showed that fish and seafood were less frequent items in the diet of most Australians than other food groups, for example, meat, and were more

easily remembered. Nevertheless, strong emphasis was placed on establishing exactly with respondents the seven days previous to the interview in order to reduce the chances of the inclusion of days prior to the reference period.

Households formed the basic sampling unit for the survey and the respondent was the person responsible for food purchase and preparation. This respondent gave information relating to the household consumption of fish and seafood at home and his or her individual consumption when eating out at restaurants etc. In 30% of households, in each cluster of ten, additional questionnaires were completed by all other household members 15 years of age or older relating to their out of home fish and seafood eating patterns.

Institutions (i.e. non-private dwellings) were not included in this survey.

The sample of households was selected from the Statistical Divisions of the seven capital cities. The results are therefore representative of the 65% of the Australian population who live in these capitals. It cannot consequently be assumed that the results can be applied to represent the total Australian population, i.e. capital city residents together with residents of other urban and rural areas.

All annual consumption figures were calculated by averaging the results of the four survey periods which were then multiplied by fifty-two to obtain an annual estimate.

Finally, it should be noted that in some tables in this report the individual statistics may not sum exactly to the total because of rounding of figures when transferring them from the computer printout.

Table 1 Sample Details by Quarter Percentage of Total Households (2 693 000)

		Total	*First Quarter June 1976*	*Second Quarter Sept. 1976*	*Third Quarter Dec. 1976*	*Fourth Quarter Feb. 1977*
		%	%	%	%	%
City	Total	100.0	100.0	100.0	100.0	100.0
	Sydney	34.8	34.8	34.8	34.8	34.8
	Melbourne	32.1	32.1	32.1	32.1	32.1
	Brisbane	9.7	9.7	9.7	9.7	9.7
	Adelaide	10.5	10.5	10.5	10.5	10.5
	Perth	9.3	9.3	9.3	9.3	9.3
	Hobart	1.5	1.5	1.5	1.5	1.5
	Canberra	2.1	2.1	2.1	2.1	2.1
Household Composition	Adult Males Only	4.8	5.6	3.3	5.1	5.2
	Adult Females Only	11.2	12.4	11.1	9.5	11.6
	Adult Males & Females	39.9	36.9	41.3	38.5	43.0
	Adults with					
	— 1 Child	15.4	15.6	16.1	15.8	14.0
	— 2 Children	17.3	17.5	15.6	19.0	17.0
	— 3 Children or more	11.2	11.2	12.3	12.2	9.2
Total Household Income	Under $4 000	12.5	13.2	14.3	10.8	11.6
	$4 000–$5 999	5.9	7.0	6.4	5.0	5.1
	$6 000–$7 999	14.7	13.9	14.7	16.0	14.2
	$8 000–$9 999	10.5	11.8	9.5	10.4	10.3
	$10 000–$11 999	9.0	10.2	9.5	8.9	7.3
	$12 000–$14 999	11.4	12.1	11.3	11.1	11.1
	$15 000–$17 999	5.6	6.6	5.8	5.5	4.5
	$18 000 and over	9.6	8.2	9.4	11.0	9.8
	Don't Know/Refused	20.9	17.0	19.2	21.4	26.2
Age Group Of Respondent	60 and over	20.8	20.4	22.2	19.1	21.7
	40–59	34.0	32.4	34.9	34.3	34.5
	20–39	43.3	34.8	41.3	44.3	41.7
	15–19	1.8	1.1	1.6	2.2	2.1

Table 2 Characteristics of The Sample in each Capital City Percentage of Total Households

		Total	*Sydney*	*Melbourne*	*Brisbane*	*Adelaide*	*Perth*	*Hobart*	*Canberra*
Household Composition	Adult Males Only	% 4.8	% 5.7	% 4.7	% 4.7	% 2.4	% 4.7	% 3.5	% 4.2
	Adult Females Only	11.2	10.1	12.2	12.9	13.5	8.8	11.4	4.6
	Adult Males & Females	39.9	38.7	41.6	37.6	40.8	40.3	41.2	37.2
	Adults with								
	— 1 Child	15.4	16.4	14.0	14.0	14.9	18.3	14.4	14.6
	— 2 Children	17.3	17.0	17.5	17.2	19.2	14.0	16.4	24.2
	— 3 Children or more	11.2	11.9	9.4	13.6	9.1	14.0	12.1	15.3
Age Group of Respondent	60 and over	20.8	19.7	19.8	28.2	23.8	19.8	26.0	8.4
	40–59	34.0	36.2	34.0	28.6	34.2	32.4	32.1	32.4
	20–39	43.3	42.6	43.9	42.3	40.6	45.5	39.1	55.9
	15–19	1.8	1.5	2.2	1.0	1.2	2.0	2.7	2.9
Total Household Income	Under $4 000	12.5	12.2	10.6	16.4	14.4	14.3	14.4	6.9
	$4 000–5 999	5.9	6.4	5.6	3.7	7.7	5.6	6.2	3.8
	$6 000–7 999	14.7	13.7	13.7	19.0	17.7	15.2	15.1	7.7
	$8 000–9 999	10.5	9.8	11.7	10.4	11.3	8.3	11.7	8.6
	$10 000–11 999	9.0	8.7	9.6	7.6	10.6	7.5	6.2	9.0
	$12 000–14 999	11.4	12.2	11.4	9.3	12.4	8.6	10.9	15.7
	$15 000–17 999	5.6	5.3	6.8	4.3	3.7	5.0	5.2	11.1
	$18 000 and over	9.6	9.3	11.5	6.1	9.1	5.0	5.5	24.8
	Don't Know/Refused	20.9	22.3	19.0	23.2	12.9	30.4	24.9	12.5
	000 Household	2693	937	864	261	283	250	42	56
	% of total household	100.0	34.8	32.1	9.7	10.5	9.3	1.5	2.1

3 Detailed Findings

3.1 Consumption of Fish and Seafood Per Person

3.1.1 Consumption per Person in Capital Cities

Over the seven capital cities the average weight of all fish and seafood consumed annually per person was 10.1 kg (Table 3). This comprised 7.1 kg of fish and 1.7 kg of seafood either consumed within the household unit or known by the respondent to have been eaten outside the home. However, account was also taken of consumption by other family members outside the home which was estimated to have been an additional 1.3 kg of fish and seafood per head.

Between cities consumption per person ranged from about 7 kg in Hobart to about 12 kg in Sydney.

There were differences in the relative contributions of fish or seafood to total consumption in each city. For example, although Sydney had the highest consumption of both types, Brisbane and Perth had a high consumption of total fish and seafood because of the relatively high proportion of seafood eaten.

Table 3 Annual Per Capita Consumption of Fish and Seafood in Capital Cities

City	*Fish kg*	*Seafood kg*	*Total kg*
Sydney	8.35	3.34	11.69
Melbourne	7.66	1.28	8.94
Brisbane	8.02	2.34	10.36
Adelaide	6.36	1.33	7.69
Perth	7.30	2.24	9.54
Hobart	5.55	1.60	7.15
Canberra	5.88	2.14	8.02
All Cities	7.80	2.27	10.07

All tables are based on four-quarter summary figures unless otherwise noted.

3.1.2 Form of Fish and Seafood Consumed per Person

Consumers were asked how often all forms of fish and seafood were eaten in three situations:

- At home;
- Bought ready to eat from takeaway food outlets;
- Out at restaurants, clubs, hotels, friends' homes.

The weight of fish consumed at home accounted for three quarters of all fish eaten. The seafood eaten at home accounted for 45% of seafood consumption. (Table 4).

On average, each person annually ate about 6 kg of fish at home of which fresh fish served accounted for about half and tinned fish nearly another third.

The weight of seafood served at home was one sixth the weight of fish served at home and was predominantly fresh seafood. Tinned and frozen seafood were eaten in small quantities only.

Cooked fish bought from takeaway outlets accounted for 14% of the total weight of fish eaten per person and a further 10% of all fish consumed was eaten when dining out.

A considerable quantity of seafood eaten was not cooked in the home; about one quarter was bought from takeaway outlets and one third was eaten at restaurants or other dining establishments.

Although the total weight of seafood consumed was small compared to fish (less than a third) almost the same weight of seafood per person was eaten out as of fish.

Table 4 Per Capita Consumption of Each Form of Fish and Seafood: All Cities

Forms of Fish and Seafood	*Fish*	*Seafood*	*Total*
	kg	kg	kg
Fresh and frozen	2.90	0.80	3.70
Fish fingers	0.66	—	0.66
Frozen packaged	0.30	0.09	0.39
Tinned	1.81	0.12	1.93
Smoked	0.24	—	0.24
Other	0.04	0.02	0.06
Total at Home	5.96	1.03	6.99
Takeaway	1.10	0.54	1.64
Eaten out	0.82	0.70	1.52
Total	7.88	2.27	10.14

3.1.3 Consumption According to City and Form

There were significant variations between cities in the consumption of each form of fish and seafood, as shown in Table 5.

Fresh fish consumption was highest in Brisbane where one third of the fresh fish eaten was caught or gift. Canberra, the only inland city surveyed, had the lowest per capita consumption of fresh fish.

Adelaide respondents had the highest consumption of tinned fish per person (2.3 kg per annum) of the capital cities. This consumption may be influenced by historical factors as well as the availability and promotion of tinned fish associated with the presence in that State of Australia's largest tuna canning firm. Consumption of tinned fish was lowest in Hobart at 0.7 kg per person annually. Melbourne consumers ate the most cooked fish from takeaway outlets per person (1.3 kg per annum). The consumption of cooked fish from takeaways was lowest in Canberra (0.6 kg per annum).

Although the highest per capita consumption of seafood was in Sydney, Perth households ate the largest amount of seafood per head at home. This was largely a result of the high consumption of fresh seafood in Perth (1.4 kg per annum). This is consistent with the concentration of prawn and rock lobster fishing in Western Australia and the popularity of fishing as a recreation there (see Table 34).

Canberra consumers had the lowest consumption of fresh seafood (0.4 kg per annum) per person as they had of fresh fish.

Table 5 Annual Per Capita Consumption by City and Form

	Total	*Sydney*	*Melbourne*	*Perth*	*Brisbane*	*Adelaide*	*Canberra*	*Hobart*
	kg	kg	kg	kg	kg	kg	kg	kg
FISH: (At Home)	2.90	3.16	2.71	2.70	3.49	2.49	1.80	2.50
Fresh	0.66	0.75	0.66	0.52	0.50	0.63	0.65	0.47
Fish Fingers	0.30	0.28	0.35	0.38	0.21	0.27	0.26	0.20
Frozen Packaged	1.82	1.99	1.68	1.64	1.53	2.26	1.83	0.73
Tinned Fish	0.24	0.29	0.21	0.27	0.26	0.21	0.25	0.21
Smoked Fish	0.04	0.03	0.02	0.08	—	0.10	—	0.07
Other Fish								
Sub-Total	5.96	6.50	5.63	5.59	5.99	5.96	4.79	4.18
Cooked from Takeaway Outlets:	1.10	1.06	1.26	1.04	1.10	0.96	0.59	0.92
Eaten Outside the Home:	0.74	0.79	0.77	0.67	0.93	0.44	0.50	0.45
Total Fish	7.80	8.35	7.66	7.30	8.02	6.36	5.88	5.55
SEAFOOD: (At Home)	0.80	0.93	0.46	1.37	0.97	0.75	0.38	0.69
Fresh	0.09	0.13	0.06	0.07	0.02	0.13	0.07	0.09
Frozen	0.12	0.12	0.16	0.08	0.05	0.09	0.12	0.04
Tinned	0.02	0.01	0.03	0.01	0.04	0.03	0.05	—
Other								
Sub-Total	1.03	1.19	0.71	1.53	1.08	1.00	0.62	0.82
Cooked from Takeaway Outlets:	0.54	0.96	0.20	0.37	0.61	0.12	0.55	0.31
Eaten Outside the Home:	0.70	1.19	0.37	0.34	0.65	0.21	0.97	0.47
Total Seafood	2.27	3.34	1.28	2.24	2.34	1.33	2.14	1.60
Total Fish and Seafood	10.07	11.69	8.94	9.54	10.36	7.69	8.02	7.15

The proportion of seafood eaten when dining outside the home was particularly high in Sydney and Canberra. In Sydney it equalled the amount eaten at home and in Canberra exceeded it. Canberra respondents dined out more frequently than elsewhere, individually their incomes were higher, and there was a greater proportion of households with more than one income earner.

3.1.4 Distribution of Fish and Seafood Consumption

Average estimates of consumption often conceal marked variations between individuals. An indication of these variations in this survey are shown in Table 6 which presents a distribution of the percentage of individuals falling into selected consumption levels in the week before the interview. The table does not include consumption by individuals outside the home of which the respondent was unaware.

Some 38% of individuals had not eaten fish or seafood in the week before the interview. The proportion in Hobart was 50%.

A further one third of persons ate less than 201 grams of fish and seafood in the survey week—equivalent to less than 10 kg on an annual basis. At the other end of the scale, about 6% of individuals ate more than 500 grams over the week prior to the survey (26 kg annually) and 2% consumed in excess of 750 grams (almost 40 kg annually). About 9% of Sydney consumers ate more than 500 grams during the survey week as against less than 5% in Canberra and Hobart.

The quantity of fish and seafood consumed is a function of the frequency of eating and the weight of each portion served. The following two sections present some survey findings on each of these aspects.

3.2 Frequency of Consumption of Fish and Seafood

Frequency of consumption was ascertained on the basis of both the household as the consuming unit and also the individual members. However, some people 'never' ate fish or seafood. A person was classed as never eating a particular form of fish or seafood if he could not recall consuming it for at least two years before the interview.

3.2.1 Households and Persons Never Eating Fish

When the household is considered as the consuming unit, there were very few households indeed where no form of fish or seafood was ever served (Table 10). In just under 5% of total households, fish was never served in any form. There were higher proportions not consuming particular forms of fish, e.g. 13% of households never served tinned fish, 18% never served fresh fish, 35% never ate cooked fish from takeaway outlets, 40% never ate fish when dining out, rising to 74% of households who claimed never to serve frozen packaged fish.

When considering individuals instead of households, the proportion of people who never ate fish was 7.8% across all capital cities (Table 7). This proportion varied strongly with age. The younger age groups were more likely not to eat fish. This was especially noticeable (and not unexpected) with the very young as nearly a third of the 0–2 years age group never ate fish. The other individuals under 20 years of age were also more likely to be in the 'never eat fish' category than the average.

Sydney was the only capital city where a much higher than average proportion of individuals never served fish (11%). It was especially noticeable that a high percentage of younger people (up to 19 years) in Sydney were not eating fish.

Table 6 Percentage Distribution of Fish and Seafood Consumed Grams per Person Weekly

Grams per Week	*Total* %	*Sydney* %	*Melbourne* %	*Brisbane* %	*Adelaide* %	*Perth* %	*Hobart* %	*Canberra* %
None consumed in past week	37.8	37.6	37.6	40.7	36.6	34.1	49.5	43.0
1 to 100 grams	17.9	16.4	19.4	16.0	17.2	21.9	17.9	19.0
101 to 200 grams	17.5	16.6	17.8	17.1	19.6	18.6	15.1	16.8
201 to 300 grams	10.9	11.6	10.7	9.9	11.3	11.0	6.3	8.8
301 to 400 grams	6.1	6.2	6.2	5.8	6.2	5.4	4.8	4.9
401 to 500 grams	3.4	3.7	2.9	3.3	3.1	3.7	2.1	3.6
501 to 750 grams	4.2	4.9	3.7	4.4	4.2	3.5	2.9	2.9
Over 750 grams	2.2	3.0	1.5	2.6	1.9	2.0	1.1	1.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 7 Individuals Never Eating Fish by Age Group in Each Capital City Percentage of Consumers

Age Group	*Total Persons*	*Sydney*	*Melb.*	*Brisb.*	*Adel.*	*Perth*	*Hobart*	*Canberra*
	%	%	%	%	%	%	%	%
Total	7.8	10.7	6.1	7.5	5.9	6.2	5.8	5.6
Over 60	7.6	9.6	5.7	7.7	6.9	6.4	12.9	3.5
40–59	4.9	6.9	3.5	6.3	2.3	4.4	1.7	2.6
20–39	5.7	8.9	3.9	4.3	3.8	4.9	3.3	3.1
15–19	9.5	14.7	6.5	8.1	4.9	7.9	2.9	3.2
10–14	8.7	13.4	5.0	10.3	5.9	4.8	2.9	5.3
3–9	7.8	8.7	7.8	6.2	9.1	5.4	5.3	9.9
0–2	31.3	35.0	31.5	26.1	26.7	26.1	38.8	30.4

3.2.2 Households and Persons Never Eating Seafood

Almost 20% of households in the sample never served any form of seafood (Table 11). There was a strong relationship between total household income and propensity not to serve seafood. In about 5% of households with an income of $18 000 or more, seafood was never served whereas the proportion was 39% where the income was $4000 or less.

Differences between cities were quite marked; some 10% of households never served seafood in Canberra compared with 23% in Melbourne and Adelaide.

Older respondents came more frequently into the category of non-seafood eaters than younger respondents. Some 41% of persons over 60 years old never ate seafood; these tended to be persons with relatively low incomes (Table 9).

3.2.2 Frequency of Eating Fish and Seafood

The number of times per week each form of fish and seafood was served is shown in Tables 10 and 11. It should be borne in mind that the statistics presented in these tables

Table 8 Non-Consumption of Seafood by Total Income: All Cities Percentage of Households in Each Group

Total Income	*Never Serve Seafood*
$	%
Under 4 000	38.8
4 000– 5 999	23.4
6 000– 7 999	23.8
8 000– 9 999	18.3
10 000–11 999	11.5
12 000–14 999	11.6
15 000–17 999	5.2
18 000 and over	4.9
Not stated	22.1
All households	19.4

Table 9 Non-Consumption of Seafood by Age: All Cities Percentage of Households in Each Group

Age group of household respondent	*Never serve seafood*
	%
Over 60 years	41.1
40–59 ,,	17.3
20–39 ,,	10.8
15–19 ,,	11.8
All households	19.4

Table 10 Frequency of Serving All Forms of Fish: All Cities Percentage of Consumers and Average Times Served

	Cooked Fish	*Fresh and Frozen Fish*	*Fish Fingers*	*Frozen Pack-aged Fish*	*Tinned Fish*	*Smoked Fish*	*Other Fish*	*Total Fish at Home*	*Fish Eaten Out*
	%	%	%	%	%	%	%	%	%
Never Serve	35.4	18.0	49.6	74.3	12.8	61.9	95.1	4.7	39.6
None in past week	50.1	56.3	38.0	22.1	50.4	34.7	4.0	35.4	49.4
% Serving in past 7 days	14.6	25.7	12.4	3.6	36.8	3.4	0.9	59.9	10.9
of which:	13.1	19.3	10.3	3.2	26.2	3.0	0.6	30.4	9.7
Once	1.2	4.7	1.6	0.2	6.9	0.3	0.2	17.0	1.1
Twice	0.2	1.0	0.3	0.1	2.3	0.1	—	7.1	0.1
Three	0.1	0.4	0.1	—	0.7	—	—	2.6	0.1
Four	—	0.3	—	—	0.7	—	—	2.8	—
Five or Over									
Average times per week	0.16	0.35	0.15	0.04	0.54	0.04	0.01	1.15	0.13
Average times per annum	8.3	18.2	7.8	2.1	28.1	2.1	0.5	59.8	6.8

Table 11 Frequency of Serving All Forms of Seafood: All Cities Percentage of Consumers and Average Times Served

	Cooked Seafood	*Fresh Seafood*	*Frozen Seafood*	*Tinned Seafood*	*Other Seafood*	*Seafood Eaten Out*	*Total Seafood*
	63.2	45.3	83.8	65.9	96.6	37.0	19.4
Never Serve	31.2	47.0	14.9	29.5	3.1	52.6	56.6
None in past week	5.6	7.7	1.2	4.6	0.3	10.4	24.0
% Households serving in past week							
of which:	5.2	6.1	1.1	4.0	0.2	8.1	15.9
Times served in past week:	0.3	1.2	0.1	0.5	—	2.0	5.6
Once	—	0.2	—	0.1	—	0.2	1.6
Twice	—	0.1	—	—	—	—	0.6
Three	—	—	—	—	—	—	0.2
Four							
Five or over							
Average times per week	0.06	0.10	0.02	0.06	0.0	0.13	0.37
Average times per annum	3.1	5.0	1.0	3.1	0.1	6.8	19.2

do not necessarily relate to frequency of purchase. For example, one purchase occasion for forms of tinned fish and fish fingers may be sufficient for two or more servings.

During the week preceding the interview, some form of fish was served in the home by 60% of households. Cooked fish from takeaway outlets was eaten by 15% of households and 11% of respondents ate fish when dining out. Some 24% of households consumed seafood in the one week either at home or when eating out.

Tinned fish was eaten more frequently than any other form of fish or seafood. It was served by 37% of households in the survey week compared with fresh fish which was eaten by 26% of households.

Tinned fish was consumed much more frequently than fresh fish yet the total weight of tinned fish eaten was only about two-thirds the edible weight of fresh fish (Table 5). The reason for this apparent contradiction is that the portion size served of tinned fish was approximately one third that of fresh fish. The next section of this report relating to portion sizes and weight of fish consumed will show these relationships in greater detail.

Seventy-four per cent of respondents claimed to never serve packaged frozen fish. Frozen fish was served with the same frequency as smoked fish—about twice a year.

Fresh fish was eaten at home once a week, or more often, in 26% of households in the capital cities (Table 12). Fresh fish was served at home most frequently in Brisbane (21 times per year) and least frequently in Canberra (11 times per year).

Fresh seafood was eaten in 8% of households in all capital cities during the survey week. Between cities this percentage ranged from about 10% in Perth and Sydney to just under 5% in Canberra. Seafood was bought ready to eat from takeaway outlets by 6% of households and 10% of respondents ate some seafood when dining out in the survey week.

Fish was more frequently prepared and eaten at home (80% of occasions) rather than away from home. However, from an examination of more detailed tables, it was clear that certain fish had important roles in eating out. For example, John Dory and barramundi were very important in the restaurant trade, but were not often cooked at home.

By contrast, other seafoods were more frequently eaten out (51% of occasions), but some forms had important roles in home consumption. For example, prawns were often served at home as a part of household celebrations, as well as being eaten out at restaurants.

Species eaten are discussed in more detail in Section 3.4.

3.3 Weight of an average serving of fish and seafood

Servings for different forms of fish and seafood covered a wide range from titbits to whole fish or lobsters. Average serving sizes were derived by dividing the weight consumed for each form of fish by the number of times served. These are set out in Table 13.

Different average weights of servings produced some variations in the generally strong relationship between the frequency and the weight of fish and seafood consumed. For example, an average serving of fresh fish weighed almost three times that of an average serving of tinned fish. An average portion of fresh seafood weighed four times that of an average serving of tinned seafood.

The quantity of 'other' types of seafood consumed was too small to reliably estimate an average portion size.

Table 12 Frequency of Serving Fresh Fish in Each Capital City Percentage of Consumers and Average Times Served

	Total	*Sydney*	*Melbourne*	*Brisbane*	*Adelaide*	*Perth*	*Hobart*	*Canberra*
Total Respondents ('000)	2693	937	864	261	283	250	42	56
	%	%	%	%	%	%	%	%
Never Serve	18.0	17.8	18.8	13.9	18.7	20.5	14.4	15.5
Serve but not in past week	56.3	54.6	56.6	57.0	56.8	57.2	64.0	66.4
% Households serving of which:	25.7	27.6	24.6	29.1	24.4	22.3	21.7	18.2
Times served in past week:								
Once	19.3	21.1	18.6	20.7	18.8	15.8	15.9	15.0
Twice	4.7	4.8	4.2	6.2	4.7	5.2	4.8	2.7
Three	1.0	0.9	1.3	1.4	0.5	0.8	0.5	0.2
Four	0.4	0.6	0.3	0.4	0.3	0.3	0.3	—
Five or over	0.3	0.2	0.2	0.4	0.1	0.2	0.3	0.2
Average times per week	0.35	0.38	0.33	0.42	0.32	0.31	0.29	0.22
Average times per annum	18.2	19.8	17.2	21.8	16.6	16.1	15.1	11.4

It was assumed that one piece of cooked fish bought from takeaway outlets weighed 85 grams. Thus, the average serving was slightly more than one piece.

Table 13 Weight of an Average Serving of Each Form of Fish and Seafood: All Cities

Form of Fish	*Average Weight*	*Form of Seafood*	*Average Weight*
Fresh and frozen fish	168 gram	Fresh and frozen seafood	152 gram
Fish fingers	89 gram	Packaged frozen seafood	86 gram
Packaged frozen fish	155 gram	Tinned seafood	38 gram
Tinned fish	68 gram	Other seafood	n.e.
Smoked fish	120 gram	Seafood from takeaways	113 gram
Other fish	80 gram	Seafood eaten out	43 gram
Cooked fish	88 gram		
Fish eaten out	157 gram		

3.4 Species of fish and seafood

As noted earlier in section 2.2, names which are used in this report to describe fish and seafood purchased and consumed are the names which respondents used in describing their purchases or catch. The various species of fish which may be included under one common name are discussed in Appendix V.

3.4.1 Species of Fish Consumed in Different Situations

Only 2% of respondents considered they did not know the type of fish served at home. There was a greater uncertainty about the species consumed out of the home, whether when dining out (20% did not know species consumed) or bought from a takeaway outlet (16% did not know species).

The share of occasions on which each species was consumed varied greatly by the different eating situations as can be seen in Table 14.

Table 14 Species of Fish Consumed in Different Situations: All Cities Proportion of Consumption Occasions

Species	*Cooked Fish From Takeaway*	*Fish Served at Home*	*Fish Eaten Out*
	%	%	%
Whiting	7.6	4.6	17.1
Snapper	10.9	3.5	7.8
Bream	12.1	3.6	5.6
Flathead	4.0	3.4	1.1
Flounder	2.8	3.0	10.5
Tuna	—	18.4	4.0
Salmon	—	16.9	5.1
Fish Fingers[a]	0.1	9.4	0.6
Sardines	—	7.9	0.4
Flake	27.0	1.2	2.3
Cod	2.4	6.3	2.1
Butterfish	4.7	0.3	0.1
Other	12.3	19.7	23.6
Don't Know	16.1	2.1	19.7
Total	100.0	100.0	100.0

[a]Cod is believed to be the main species used in fish fingers consumed in Australia.

Table 15 Species of Fish Served Most Often in Each City Percentage of Consumption Occasions

	Cooked Fish from takeaway outlets		*Fish served at home*		*Fish served at home (excluding tinned)*		*Fish eaten when Dining Out*	
		%		%		%		%
All Cities	Flake	27.1	Tuna	18.4	Bream	11.3	Whiting	17.1
	Don't Know	16.1						
Sydney	Bream	31.0	Salmon	20.9	Bream	6.7	Bream	12.8
	Don't Know	38.4						
Melbourne	Flake	65.4	Tuna	18.8	Whiting	6.2	Whiting	27.6
Perth	Snapper	67.2	Tuna	14.1	Herrings	7.1	Dhufish	17.5
Brisbane	Cod	21.1	Salmon	17.6	Mullet	7.5	Barramundi	26.4
	Don't Know	28.9						
Adelaide	Butterfish	42.0	Tuna	26.8	Whiting	8.0	Whiting	46.4
	Garfish	21.2						
Canberra	Bream	34.8	Tuna	27.2	Bream	4.6	Barramundi	11.1
	Don't Know	33.2						
Hobart	Flake	50.8	Salmon	14.7	Flathead	6.5	Flounder	48.0

Where the name was stated, 12 varieties of fish accounted for 70% or more of all species named by respondents as eaten out at restaurants etc., 80% of fish served at home and 85% of cooked fish bought from takeaway outlets.

In fact the concentration was greater when certain species were eliminated from certain situations. For example, tuna, salmon, sardines and fish fingers are very rarely purchased from takeaway outlets and eight varieties of fish accounted for 85% of those known and named.

Table 15 highlights differences between cities in the main fish varieties served in various eating situations.

3.4.2 Species of Fish Served at Home

Tuna was the species of fish most frequently served at home because of its dominance among tinned fish and was served on 18% of the occasions when fish was eaten at home. Tinned salmon (17%) was served with almost the same frequency.

Other processed fish types were eaten considerably more frequently than individual species of fresh and frozen fish. Fish fingers were eaten on some 9% of occasions and tinned sardines on 8% compared with fresh and frozen species such as whiting, snapper, bream, flathead and flounder which each had between 3% and 5% share of occasions.

For each form of fish served at home, the varieties most commonly reported eaten were:

Tinned fish:	Tuna	Fish Fingers:	Cod
	Salmon	Frozen Packaged fish:	Whiting
	Sardines		Flounder
Fresh fish:	Bream	Smoked fish:	Cod
	Snapper	Other fish:	Herrings
	Flathead		
	Whiting		

The proportion of each species consumed by form is shown in Table 16 and the subsequent Table 17 examines differences by cities.

Table 16 Species of Fish Eaten at Home By Form when Obtained: All Cities Percentage of Consumption Occasions

Species	*Total*	*Fresh and Frozen*	*Fish Fingers*	*Frozen Packaged Fish*	*Tinned Fish*	*Smoked Fish*	*Other Fish*
	%	%	%	%	%	%	%
Tuna	18.4	0.7	0.4	1.7	38.1	0.4	2.4
Salmon	16.9	1.0	0.3	—	34.8	4.1	1.1
Fish Fingers	9.4	0.2	69.7	—	—	—	—
Sardines	7.9	0.8	—	—	16.1	0.6	1.7
Cod—Smoked	1.3	—	—	—	—	36.4	—
—Other	5.0	2.6	24.8	12.9	—	10.7	5.4
Whiting	4.6	10.2	0.7	35.3	—	—	—
Snapper	3.5	11.0	—	2.1	0.1	—	—
Bream	3.6	11.3	0.1	1.0	—	—	—
Flathead	3.4	10.6	0.1	1.8	—	—	—
Flounder	3.0	6.6	0.2	23.8	—	0.6	—
Mullet	2.1	6.3	—	0.9	0.1	1.1	—
Herrings	2.3	0.9	—	—	2.8	5.8	47.3
Other (mainly Fresh Fish)	18.6	38.5	3.7	20.5	8.0	40.3	42.1
Total	100	100	100	100	100	100	100

Table 17 Species of Fish Served at Home in Each City Percentage of Consumption Occasions

Species	*Total*	*Sydney*	*Melbourne*	*Perth*	*Brisbane*	*Adelaide*	*Canberra*	*Hobart*
	%	%	%	%	%	%	%	%
Tuna	18.4	17.8	18.8	14.1	14.2	26.8	27.2	7.8
Salmon	16.9	20.9	15.0	13.5	17.6	11.2	17.3	14.7
Fish Fingers	9.4	7.4	9.8	11.1	9.4	12.7	14.1	13.2
Sardines	7.9	7.2	8.3	10.9	8.2	6.3	7.8	10.6
Cod—Smoked	1.3	0.9	2.5	0.3	1.0	0.4	1.6	2.0
—Other	5.0	6.2	5.3	3.8	4.7	1.7	2.8	5.1
Whiting	4.6	2.1	6.2	3.5	7.0	8.0	2.4	2.4
Snapper	3.5	3.7	3.6	5.0	1.1	4.1	2.6	0.3
Bream	3.6	6.7	1.3	—	5.6	0.3	4.6	1.3
Flathead	3.4	4.3	4.6	—	1.9	0.1	2.2	6.5
Flounder	3.0	3.1	4.0	1.7	1.5	2.1	2.6	4.4
Mullet	2.1	1.8	0.6	1.5	7.5	3.9	0.4	—
Herrings	2.3	1.2	2.2	7.1	3.0	2.3	2.0	2.7
Other (mainly Fresh Fish)	18.6	16.7	17.8	27.5	17.3	20.1	13.4	29.0
Total	100	100	100	100	100	100	100	100

Table 18 Species of Fish Bought Cooked from Takeaway Outlets in Each City Percentage of Consumption Occasions

	Total	*Sydney*	*Melbourne*	*Brisbane*	*Adelaide*	*Perth*	*Hobart*	*Canberra*
	%	%	%	%	%	%	%	%
Whiting	7.6	2.3	10.9	10.0	15.9	1.8	1.8	2.7
Snapper	10.9	2.8	6.0	5.6	1.6	67.2	8.0	—
Bream	12.1	31.0	4.1	6.6	—	—	3.7	34.8
Flathead	4.0	12.0	0.8	1.1	—	—	—	4.0
Flounder	2.8	2.8	4.1	1.1	0.8	—	12.7	5.3
Mullet	1.7	1.4	0.4	8.9	2.5	1.8	—	—
Herrings	—	—	—	—	—	—	—	—
Butterfish	4.7	—	—	—	42.0	—	—	—
Flake	27.9	3.2	65.4	—	5.6	1.8	50.8	5.4
Garfish	2.4	—	—	—	21.2	—	—	—
Cod	2.4	—	—	21.1	—	—	—	—
Others	8.1	6.1	5.6	16.7	8.8	20.3	10.2	47.8
Don't Know	16.1	38.4	2.3	28.9	1.6	7.1	33.2	—
Total %	100	100	100	100	100	100	100	100

3.4.3 *Species of Fish Bought Cooked from Takeaway Outlets*

The problems of fish naming and identification were already discussed in Section 2.2, where it was noted that this was particularly acute for fish bought from takeaway outlets. This subject is also covered in Appendix IV.

Bearing these shortcomings in mind, Table 18 shows the relative popularity of various fish types in the different capital cities. Consumers reported flake to be the most common species of cooked fish purchased largely because of its predominance in Melbourne and Hobart.

3.4.4 *Species of Fish Eaten when Dining Out*

There were considerable differences also in the species of fish eaten out in each city as shown in Table 19.

Table 19 Species of Fish Eaten When Dining Out in Each City Proportion of Consumption Occasions

	Total	*Sydney*	*Melbourne*	*Perth*	*Brisbane*	*Adelaide*	*Canberra*	*Hobart*
	%	%	%	%	%	%	%	%
Don't Know	19.7	29.4	10.5	28.8	36.1	2.3	16.7	2.0
Whiting	17.1	4.3	27.6	2.5	8.3	46.4	9.7	6.1
Flounder	10.5	6.9	16.6	5.0	2.8	6.1	8.3	48.0
Snapper	7.8	11.2	5.5	13.7	1.4	4.7	8.4	2.0
Bream	5.6	12.8	2.0	—	4.2	—	9.7	2.0
Tinned Salmon	5.1	6.4	4.5	8.7	4.2	1.1	2.8	—
Barramundi	4.9	2.7	4.5	—	26.4	—	11.1	—
Tinned Tuna	4.0	1.1	6.0	2.5	—	11.4	2.8	1.9
Dhufish	1.9	0.5	—	17.5	—	—	1.4	4.0
Others	23.4	24.7	22.8	21.3	16.6	28.0	29.1	34.0
Total	100	100	100	100	100	100	100	100

About 20% of respondents did not know the variety of fish they ate in a number of dining out situations. For example, where it might have been served at a friend's home, at a barbecue, ordered by someone else or sold as a 'fisherman's basket' without further identification.

Whiting reportedly dominated fish purchases in Adelaide and Melbourne restaurants and was important in several other cities. Flounder was by far the most important species in Hobart and was important in Melbourne and to a lesser extent other cities; and in Brisbane barramundi dominated restaurant purchases. Other species named were more evenly spread across cities. Canberra and Sydney consumers reported eating a wider range of species when dining out than did residents of the other cities.

3.4.5 *Species of Seafood*

Prawns were by far the most common variety of seafood eaten either at home or outside the home in all cities (Tables 20, 21 and 22). Prawns accounted for almost half of the seafood served at home, 60% of cooked seafood bought at takeaway outlets and 40% of seafood eaten out. Seafood cocktails were the next most common form in which seafood was eaten out and these usually contain some prawns.

Lobsters was also important when dining out, being eaten on 18% of occasions—the proportion was particularly high in Hobart and Adelaide.

Table 20 Species of Seafood Served at Home in Each City Proportion of Consumption Occasions

Species	Total	Sydney	Melbourne	Perth	Brisbane	Adelaide	Canberra	Hobart
	%	%	%	%	%	%	%	%
Prawns	38.8	48.1	27.8	36.5	52.3	34.2	45.6	2.1
Crabs	7.5	4.8	2.9	27.9	13.1	4.1	7.6	2.2
Lobster/Crayfish	6.1	2.6	5.4	14.0	—	17.7	1.3	28.4
Oysters	14.3	17.6	13.3	6.2	15.9	10.3	26.6	13.1
Smoked Oysters	10.7	10.7	14.5	3.9	6.5	9.4	11.4	8.8
Mussels	5.3	4.0	9.1	2.3	—	6.4	2.6	2.2
Scallops	4.2	3.3	6.2	1.6	1.9	2.9	2.5	28.0
Squid	3.2	1.8	4.6	3.9	0.9	5.9	1.3	2.2
Seafood Cocktail	4.1	2.6	5.4	3.9	8.4	2.1	—	6.5
Others	5.8	4.5	10.8	—	1.0	7.0	1.1	6.5
Total	100	100	100	100	100	100	100	100

Table 21 Species of Seafood Consumed from Takeaway Outlets in each City as a Percentage of Consumption Occasions

Species	Total	Sydney	Melbourne	Perth	Brisbane	Adelaide	Canberra	Hobart
	%	%	%	%	%	%	%	%
Prawns	59.5	81.2	15.3	66.7	70.7	77.6	84.0	25.3
Crabs	1.4	0.9	—	—	9.7	—	—	—
Lobster/Crayfish	2.2	0.9	4.2	—	—	8.9	—	8.6
Oysters (inc. smoked oysters)	2.1	3.4	1.4	—	—	—	8.0	—
Scallops	24.9	6.0	70.8	—	12.2	—	4.0	49.3
Seafood Cocktail	6.5	4.3	4.2	29.6	2.4	13.5	4.0	16.7
All Others	3.4	4.2	4.2	3.7	5.0	—	—	0.1
Total	100	100	100	100	100	100	100	100

Table 22 Species of Seafood Eaten when Dining Out in each City as a Percentage of Consumption Occasions

Species	Total	Sydney	Melbourne	Perth	Brisbane	Adelaide	Canberra	Hobart
	%	%	%	%	%	%	%	%
Prawns	40.1	46.0	28.1	38.6	41.8	39.1	48.9	22.0
Crabs	2.6	1.3	3.4	4.2	8.6	1.9	—	1.7
Lobster/Crayfish	18.0	14.7	22.5	19.0	9.8	26.7	15.0	52.3
Oysters	11.0	10.3	12.5	10.3	9.8	11.8	18.7	4.2
Smoked Oysters	0.2	—	0.2	0.2	0.3	1.2	1.0	0.8
Mussels	0.4	0.4	0.7	0.5	—	0.3	—	—
Scallops	3.7	3.1	8.3	—	0.9	0.6	2.5	12.1
Squid	2.8	1.6	2.9	7.7	—	6.2	2.2	—
Seafood Cocktail	20.8	22.5	21.0	18.0	27.7	12.3	12.4	6.7
All Others	0.4	0.1	0.4	1.5	1.1	—	—	0.2
Total	100	100	100	100	100	100	100	100

Melbourne and Hobart consumers differed markedly from other respondents in that scallops were by far the most imporrant species of seafood purchased from takeaway outlets. Hobart consumers also served relatively few prawns at home: they mainly ate lobster, scallops or oysters.

3.5 Sources of Supply of Fish and Seafood

3.5.1 Fish

Sources of supply of fish and seafood varied more according to the form in which the food was obtained than by city.

Almost all tinned fish (95%), fish fingers (93%) and frozen packaged fish (78%) were obtained from supermarkets. Fresh fish was generally bought from a retail fish shop (39%) or fish market (18%), although leisure fishermen were also an important source of supply. Fish which was caught or received as a gift accounted for 27% of supply. The main sources of supply for each form of fish are shown in Table 23.

Table 23 Source of Supply of Each Form of Fish for Home Consumption: All Cities Percentage of Occasions each Form Bought

Source	*Fresh Fish*	*Fish Fingers*	*Frozen Packaged Fish*	*Tinned Fish*	*Smoked Fish*	*Other Fish*	*Total*
'000 of Occasions	2208	1357	691	2349	1025	131	7761
	%	%	%	%	%	%	%
Fish Market	18.1	0.1	1.6	—	4.4	2.3	6.0
Retail Fish Shop	38.6	0.7	4.6	0.2	16.1	4.6	13.8
Supermarket	7.3	92.9	78.3	95.0	37.0	41.2	59.7
Delicatessen	1.7	1.0	2.2	1.2	19.6	29.8	4.3
Caught/Gift	27.1	0.1	2.6	0.2	1.4	1.5	8.2
Other	7.1	5.2	10.7	3.2	21.6	20.0	8.0
Total	100	100	100	100	100	100	100

Although the dominant position of supermarkets in the sale of certain forms of fish did not vary greatly according to city, the importance of each of the sources of supply for fresh fish did vary by city (Table 24).

Table 24 Source of Supply of Fresh Fish for Home Consumption in Each City Percentage of Households Buying Each Form

	Sydney	*Melbourne*	*Perth*	*Brisbane*	*Adelaide*	*Canberra*	*Hobart*	*Total*
'000 of households	770	702	199	225	230	46	36	2208
	%	%	%	%	%	%	%	%
Retail Fish Shop	52.5	29.0	26.1	36.0	35.0	58.0	13.9	38.7
Caught/Gift	22.2	22.8	46.7	33.2	29.6	24.9	52.9	27.0
Fish Market	17.1	29.0	9.5	6.2	11.7	6.4	13.9	18.1
Others	8.2	19.5	17.6	24.9	23.5	10.6	19.4	16.2
Total	34.9	31.8	9.0	10.2	10.4	2.1	1.6	100.0

Fish caught by the respondent or received as a gift was a major source of fresh fish especially in Perth and Hobart, where it comprised about half of all fresh fish eaten. It was estimated that over a third of all capital city households included leisure fishermen and the proportions were particularly high in Canberra, Perth and Hobart. Recreational fishing is discussed further in section 3.9.6.

The proportion of fish caught by leisure fishermen varied over the seasons. It was highest (32%) in the summer month—February and lowest (22%) in the winter month—August. This decline in August, 1976, was especially noticeable in Perth where

the category 'caught or gift' fell from being the source of supply of fresh fish on 51% of occasions in June, 1976, to 35% of occasions in August, 1976. This drop coincided with a marked fall in the weight of fresh fish consumed in Perth in the second quarter of the survey.

3.5.2 Seafood

The great bulk of frozen and tinned seafood eaten at home was purchased through supermarkets (Table 25). Retail fish shops (46%) were the principal source of fresh seafood although fish markets (23%) were also significant. About 16% of fresh seafood was caught or obtained as a gift.

Table 25 Source of Supply of Each Form of Seafood for Consumption At Home: All Cities Percentage of Occasions each Form Bought June Quarter, 1976

Source	*Total*	*Fresh*	*Frozen*	*Tinned*	*Other*
Fish market	12.8	23.2	2.5	0.3	3.3
Retail fish shop	25.8	45.6	8.3	0.3	17.1
Supermarket	40.0	3.7	70.1	91.5	7.2
Delicatessen	3.1	2.1	4.6	3.2	13.3
Caught/gift	9.2	15.6	2.8	0.7	16.8
Other sources	9.1	9.8	11.7	4.1	42.3
Total	100.0	100.0	100.0	100.0	100.0

3.6 Days of the week on which fish and seafood was served

3.6.1 Fish

Friday was the day on which fish was most often served and accounted for just over a fifth of all servings. It was served least often on Sunday and with virtually constant frequency on the other five days of the week (Table 26). Canberra varied from this total pattern in that fish was most frequently served on Wednesday.

Table 26 Day of the Week Each Form of Fish Served at Home: All Cities Thousands of Occasions and Percentage of Consumption Occasions

		Totals	*Fresh Fish*	*Fish Fingers*	*Frozen Fish*	*Tinned Fish*	*Smoked Fish*	*Other Fish*
Friday	000	646	255	94	33	229	29	7
	%	21.3	27.1	23.2	29.1	15.9	27.7	19.6
Saturday	000	396	125	57	10	178	22	4
	%	13.0	13.2	14.0	9.1	12.4	21.1	12.6
Sunday	000	311	84	39	8	161	13	4
	%	10.2	8.9	9.5	7.0	11.2	12.4	17.7
Monday	000	399	104	55	16	213	7	4
	%	13.1	11.0	13.6	14.6	14.8	6.7	11.4
Tuesday	000	407	111	48	13	220	9	6
	%	13.4	11.7	11.8	11.8	15.3	8.8	17.8
Wednesday	000	437	120	62	12	230	11	2
	%	14.4	12.7	15.2	10.6	15.9	11.0	6.8
Thursday	000	423	139	50	19	199	12	5
	%	13.9	14.8	12.3	16.8	13.8	11.2	13.4
No Answer	000	20	6	1	1	10	1	
	%	.7	.6	.4	1.0	.7	1.1	.7
Total	000	3040	942	406	113	1440	104	35
	%	100	100	100	100	100	100	100

In all cities, the elderly and households with three or more children were more likely to follow the tradition of eating fish on Friday. Friday accounted for a quarter of all occasions of serving fish for these groups.

Of all forms of fish, the predominance of Friday meals was most obvious for fresh fish. Fresh fish was eaten twice as often on Friday as on any other day of the week.

The incidence of serving tinned fish was constant for each of the weekdays, but dropped on the weekend. As will be shown in the following section, tinned fish was mainly eaten at lunchtime so the steady frequency of consumption from Monday to Friday probably resulted from its use in sandwiches for school or work and in home lunches.

Each of the other forms of fish were also eaten most often on Friday.

3.6.2 Seafood

Table 27 shows the percentage of households serving seafood on each day. Some caution is advised in interpreting some of the figures as they are based on very small numbers, especially in the case of frozen and tinned seafood.

Table 27 Day of the Week Each Form of Seafood was Served at Home: All Cities Thousands of Occasions and Percentage of Consumption Occasions

		Totals	*Fresh Seafood*	*Frozen Seafood*	*Tinned Seafood*	*Other Seafood*
Friday	000	81	52	6	20	3
	%	18.3	20.4	17.5	14.9	15.3
Saturday	000	99	56	8	31	3
	%	22.2	21.9	24.3	22.7	17.6
Sunday	000	87	51	6	28	2
	%	19.6	20.0	17.9	20.4	12.1
Monday	000	44	25	2	15	3
	%	9.9	9.8	4.6	10.8	15.9
Tuesday	000	39	22	3	13	2
	%	8.9	8.7	7.6	9.4	9.6
Wednesday	000	37	18	4	12	2
	%	8.3	7.1	11.3	9.0	12.5
Thursday	000	55	31	6	15	3
	%	12.3	12.1	16.9	10.9	16.5
No Answer	000	3	—	—	2	—
	%	0.6	0.0	0.0	1.8	0.6
Totals	000	445	225	35	136	19
	%	100	100	100	100	100

Seafood was served most often on the weekend—Saturday and Sunday. Friday was the third highest day for seafood consumption.

As with fresh fish, fresh seafood was served more often on Friday than the other forms of seafood.

3.7 Meals at which fish and seafood were served

3.7.1 Fish

Fish was eaten at the evening meal on just over half of the occasions when it was served (Table 28). On 39% of all occasions it was served at midday and only on 5% of

Table 28 Meal at Which Each Form of Fish Served at Home: All Cities Thousands and Percentages of Occasions

Meal		*Totals*	*Fresh Fish*	*Fish Fingers*	*Frozen Fish*	*Tinned Fish*	*Smoked Fish*	*Other Fish*
Breakfast	000	157	33	36	5	65	15	3
	%	5.2	3.5	8.9	4.5	4.5	14.3	9.7
Mid-day	000	1196	154	106	17	883	23	13
	%	39.4	16.4	26.3	15.0	61.3	21.8	38.2
Evening	000	1592	751	255	89	419	62	16
	%	52.4	79.8	63.0	78.5	29.1	59.0	46.1
Other	000	94	3	8	2	74	5	2
	%	3.1	.3	1.9	1.9	5.1	4.9	6.0
Total	000	3040	942	406	113	1440	104	35
	%	100	100	100	100	100	100	100

occasions for breakfast. Fresh and frozen fish was served for the evening meal on about 80% of occasions compared with 52% for all fish.

Tinned fish was eaten mainly at lunchtime. On a number of occasions smoked fish (14%) and fish fingers (9%) were eaten at breakfast.

3.7.2 Seafood

Seafood was usually served at the evening meal and almost never at breakfast. Seafood was eaten for lunch on almost a quarter of occasions (Table 29).

Table 29 Meal at Which Each Form of Seafood was Served at Home: All Cities Thousands and Percentage of Occasions

Meal	*Totals*	*Fresh Seafood*	*Frozen Seafood*	*Tinned Seafood*	*Other Seafood*
Breakfast	2	1	0.0%	1	0.6%
	0.5%	0.3%		1.0%	
Mid-day	103	59	6	32	6
	23.3%	23.2%	16.2%	23.8%	32.8%
Evening	271	176	26	62	6
	60.9%	68.8%	75.9%	46.1%	33.1%
Other	68	20	3	39	6
	15.3%	7.7%	8.0%	29.1%	33.5%
Totals	445	.255	35	136	19
	100.0%	100.0%	100.0%	100.0%	100.0%

Seafood, especially tinned, was often eaten at other times such as snacks or supper.

3.8 Cooking methods for fish and seafood

3.8.1 Fish

On 40% of occasions fish, mainly tinned, was served 'straight' i.e. without cooking, mainly for sandwiches and salads (Table 30). There was little variety in the methods of cooking fish at home. On a third of occasions, the fish was fried. Fish was infrequently served grilled, baked, boiled, as mornay or other methods.

Table 30 Cooking Method for Each Form of Fish Served At Home: All Cities Thousands and Percentage of Occasions

Cooking Method		*Totals*	*Fresh Fish*	*Fish Fingers*	*Frozen Packaged*	*Tinned Fish*	*Smoked Fish*	*Other Fish*
Fried	000	997	563	308	66	44	6	10
	%	32.8	59.8	76.0	58.7	3.1	5.3	27.7
Boiled	000	98	31	3	3	6	55	
	%	3.2	3.3	.7	2.8	.4	53.0	1.0
Baked	000	105	79	12	5	7	2	
	%	3.4	8.3	3.1	4.2	.5	1.5	.0
Steamed	000	97	62		14	8	10	2
	%	3.2	6.6	.1	12.5	.6	10.0	4.3
Mornay	000	138	8		1	125	4	1
	%	4.5	.8	.0	.9	8.7	3.4	1.7
Straight	000	1189	3	2	3	1146	17	18
	%	39.1	.4	.4	2.6	79.6	16.5	51.7
Grilled	000	199	124	56	13	2	3	1
	%	6.6	13.2	13.8	11.9	.1	2.8	2.8
Other	000	206	66	22	7	99	8	4
	%	6.8	7.0	5.5	5.9	6.9	7.3	10.7
No Answer	000	10	6	2	1	2	—	—
	%	.3	.6	.4	.6	.2	.1	.0
Total	000	3039	942	406	113	1440	104	35
	%	100	100	100	100	100	100	100

3.8.2 Seafood

The many ways in which seafood was presented required 'cooking' to be defined as any further preparation in the home. Although most seafood was obtained in forms which allowed it to be eaten as it was, some further preparation was involved to serve it, e.g. as oysters mornay, prawn quiche etc. Most seafood was not cooked or further prepared at home, but rather was eaten 'straight' i.e. without further cooking as shown in Table 31. This was particularly so with tinned seafood which was served 'straight' on over three-quarters of occasions. This included tinned prawns and smoked oysters eaten with biscuits.

Table 31 Cooking Method for Each Form of Seafood Served At Home: All Cities Thousands and Percentage of Occasions

Cooking Method		*Totals*	*Fresh Seafood*	*Frozen Seafood*	*Tinned Seafood*	*Other Seafood*
Fried	000	67	40	16	10	1
	%	15.1	15.7	46.8	7.3	4.1
Boiled	000	46	41	1	4	
	%	10.3	15.9	4.0	2.7	0.0
Straight	000	249	116	10	106	18
	%	56.1	45.5	28.3	78.1	91.6
Other	000	81	58	7	15	1
	%	18.2	22.5	20.9	11.4	4.3
No Answer	000	2	1		1	
	%	0.4	0.4	0.0	0.4	0.0
Totals	000	445	255	35	136	19
	%	100.0	100.0	100.0	100.0	100.0

Fresh seafood served 'straight' also included prawns and lobsters purchased from the fish shop and served without further preparation.

Seafood was quite often fried, for example when frozen prawns were used in fried rice or fresh prawns were crumbed or breaded and fried. Seafood was also used in casseroles and mornays.

3.9 Other factors influencing fish consumption

Prior to the survey a number of factors suggested themselves as being likely to influence differences in household consumption patterns for fish and seafood. Some of these were expected to arise from variations in supply and distribution in different parts of Australia and from household location (coast or inland).

In addition to these geographically based supply factors, other demographic, socio-economic and behavioural characteristics of the households and the persons living in them were expected to influence consumption including:

- City of residence
- Household income
- Occupation
- Education
- Household composition
- Age of respondent
- Country of origin
- Religion of respondent
- Recreation fishing habits
- Dietary considerations

Information has already been presented in earlier sections on differences between the weight and frequency of fish and seafood consumed between households and individuals according to city of residence. The following sections show variations between average household consumption according to the more important of the other factors listed above.

3.9.1 Total Household Income

In general, education, occupation and income classifications were quite closely related. This would appear to suggest some relationship between these three factors for individual consumers; in other words persons with particular educational qualifications were more likely to fall into certain occupational categories and broadly similar income levels. However, the separate effect of each of these three factors has yet to be calculated and this will form part of more detailed analyses to be conducted by the Department of Primary Industry.

However, it would seem that income, and in particular total household income, would be more important than the other two factors in explaining differences between households in total consumption of fish and seafoods although for particular items, occupation and education may be important influences on consuming behaviour.

Table 32 sets out consumption of each form of fish and seafood according to total household income.

Table 32 Annual Per Capita Consumption of Fish and Seafood: By Total Household Income All Capital Cities

	Not Known	*Under $4 000*	*$4 000–$5 999*	*$6 000–$7 999*	*$8 000–$9 999*	*$10 000–$11 999*	*$12 000–$14 999*	*$15 000–$17 999*	*$18 000 and over*
	kg	kg	kg	kg	kg	kg	kg	kg	kg
Fish									
Fresh	3.04	2.84	3.16	2.89	2.47	2.65	2.88	2.74	3.31
Fish fingers	0.64	0.43	0.73	0.76	0.82	0.74	0.57	0.51	0.61
Frozen packaged	0.36	0.34	0.15	0.16	0.29	0.37	0.31	0.29	0.36
Tinned	1.72	1.73	1.78	2.00	1.60	1.88	1.81	1.61	2.21
Smoked	0.30	0.29	0.18	0.15	0.25	0.28	0.14	0.19	0.34
Other	0.03	0.03	0.05	0.05	0.02	0.06	0.03	0.06	0.03
Sub Total	6.09	5.66	6.05	6.01	5.45	5.98	5.74	5.40	6.86
Cooked from takeaway outlets	0.95	0.80	0.68	1.05	1.13	1.26	1.43	1.50	1.12
Eaten when dining out	0.46	0.69	0.64	0.53	0.74	0.65	1.15	1.06	1.04
Total Fish	7.50	7.15	7.37	7.59	7.32	7.89	8.32	7.96	9.02
Seafood									
Fresh	0.81	0.52	1.11	0.71	0.79	0.72	0.56	1.03	1.13
Frozen	0.03	0.08	0.06	0.04	0.04	0.10	0.26	0.10	0.09
Tinned	0.08	0.04	0.16	0.08	0.15	0.12	0.12	0.13	0.23
Other	0.02	0.01	—	0.02	0.04	0.01	0.03	—	0.04
Sub Total	0.94	0.65	1.33	0.85	1.02	0.95	0.97	1.26	1.49
Cooked from takeaway outlets	0.59	0.33	0.61	0.21	0.90	0.66	0.35	0.51	0.64
Eaten when dining out	0.33	0.26	0.50	0.62	0.81	1.15	0.87	0.26	1.36
Total Seafood	1.86	1.24	2.44	1.68	2.73	2.76	2.19	2.03	3.49
Total Fish and Seafood	9.36	8.39	9.81	9.27	10.05	10.65	10.51	9.99	12.51

In general, persons from households with higher total incomes ate more fish and seafood than those from lower income households. This trend was not strong and is not clear from the eight groupings in Table 32. For example, average consumption of three of these groups was less than the average for groups with incomes immediately lower than them. However, the trend becomes clearer when the eight groups are amalgamated into four as follows:

Income Group	*Consumption per Person of Fish and Seafood*
less than $6 000	8.9 kg
$6 000 to $9 999	9.6 kg
$10 000 to $14 999	10.6 kg
$15 000 and over	11.5 kg

The group of consumers in households with total income greater than $18 000 had the highest average consumption of most forms of fish and seafood. This was especially marked in the case of seafood eaten outside the home, tinned seafood and fresh and smoked fish.

Other notable differences between income groups were:

- Fish fingers were eaten mainly by lower and middle income groups, those in the $4 000 to $11 999 range.
- Differences between income groups in average tinned fish consumption was relatively small.
- Cooked fish was largely eaten in higher income households, but it was notable that those with incomes of $18 000 or more on average, ate significantly less than those between $12 000 and $17 999.

3.9.2 Composition of Household

Households comprising only adult males ate considerably more fish and seafood per person than any other group (see Table 33). Their average consumption per person at some 17 kg annually was almost twice the average of the other households. This high consumption was largely because this group ate much more fish and seafood at meal serving establishments and from takeaway outlets. They also had a relatively high consumption of convenience foods such as fish fingers and frozen packaged fish.

However, it will be recalled from Table 1 that households with adult males only, represented just under 5% of all households in the estimated population. The largest single grouping of households, adult males and females with no children (40% of the total), were also relatively high eaters of fish and seafood—about 12 kg annually per person. They also ate above average quantities of fish and seafood when dining out and were high consumers of fresh fish.

Couples with children had relatively low average consumption of fish and seafood per person and the larger the family, the lower the amount eaten per head. Fish fingers was the only form of fish which was eaten in greater quantities per person as family size increased.

However, the calculation of consumption per person takes account of all persons in a household, including small children. It would seem reasonable to suppose that children might have had relatively small servings of fish and seafood. Evidence to support this is

presented in Table 34 which shows the frequency of serving fish according to household composition and provides a comparison between groups which excludes size of individual servings. Generally, this shows that couples with children ate fish more frequently than other household groups. This was most noticeable in the case of fish fingers and tinned fish and seafood.

Table 33 Annual Per Capita Consumption of Fish and Seafood By Household Composition: All Capital Cities

	Adult Male Only	*Adult Female Only*	*Adult Male and Female*	*Families with*		
				One Child	*Two Children*	*Three or More Children*
	kg	kg	kg	kg	kg	kg
Fish						
Fresh	3.09	2.33	3.66	2.95	2.33	2.35
Fish fingers	0.79	0.55	0.47	0.55	0.78	0.91
Frozen Packaged	0.49	0.31	0.39	0.29	0.28	0.16
Tinned	1.59	2.21	2.05	1.88	1.64	1.53
Smoked	0.19	0.34	0.33	0.25	0.21	0.10
Other	0.12	—	0.05	0.02	0.02	0.04
Sub Total	6.27	5.74	6.95	5.94	5.26	5.09
Cooked from takeaway outlets	2.84	0.99	1.06	0.96	1.13	1.12
Eaten outside the home	2.25	1.09	1.11	0.70	0.42	0.32
Total Fish	11.36	7.82	9.12	7.60	6.81	6.53
Seafood						
Fresh	0.55	0.28	0.86	1.00	0.86	0.57
Frozen	0.04	0.04	0.10	0.06	0.02	0.02
Tinned	0.15	0.08	0.02	0.02	0.09	0.07
Other	0.01	0.01	0.03	0.01	0.03	—
Sub Total	0.75	0.41	1.01	1.09	1.00	0.66
Cooked from takeaway outlets	1.00	0.26	0.53	0.73	0.66	0.23
Eaten outside the home	3.96	0.84	1.02	0.50	0.62	0.13
Total Seafood	5.71	1.51	2.56	2.32	2.28	1.02
Total Fish and Seafood	17.07	9.33	11.68	9.92	9.09	7.55

3.9.3 Age of Respondent

Age of respondent was closely related to household composition (Table 35). Also a high proportion (62%) of the age group 60 years and over were persons on low incomes—less than $6000 annually. Consumers from households where the respondent was in the younger age groups (15 to 39) ate 10.2 kg of fish and seafood annually per person compared with an average of 8.5 kg for older groups (Table 36). Younger consumers ate significantly more fish and seafood when dining out and from takeaway outlets. They also ate more tinned fish and seafood, fish fingers and fresh seafood.

Table 34 Average Frequency of Serving Fish and Seafood By Household Composition Times per Week

Form of Fish and Seafood	Household Composition					
				Families With		
	Adult Males Only	Adult Females Only	Adult Male and Female	One Child	Two Children	Three or More Children
Fish						
Fresh	0.24	0.21	0.39	0.36	0.32	0.43
Fish Fingers	0.11	0.11	0.10	0.14	0.23	0.29
Frozen Packaged	0.03	0.03	0.05	0.04	0.05	0.03
Tinned	0.26	0.39	0.51	0.61	0.63	0.17
Smoked	0.02	0.03	0.05	0.04	0.04	0.03
Other	0.02	—	0.02	0.01	0.01	0.02
Total prepared at home	0.68	0.77	1.12	1.20	1.28	1.47
Cooked from takeaway outlets	0.78	0.31	0.86	1.03	0.72	0.75
Eaten outside the home	0.25	0.14	0.21	0.15	0.25	0.13
Total Fish	1.71	1.22	2.19	2.38	2.25	2.35
Seafood						
Fresh	0.05	0.04	0.10	0.13	0.12	0.11
Frozen Packaged	0.01	0.01	0.02	0.03	—	0.02
Tinned	0.03	0.02	0.05	0.08	0.07	0.05
Other	—	—	0.01	—	0.01	—
Total prepared at home	0.09	0.07	0.18	0.24	0.20	0.18
Cooked from takeaway outlets	0.10	0.02	0.08	0.15	0.15	0.07
Eaten outside the home	0.24	0.09	0.14	0.25	0.24	0.13
Total Seafood	0.43	0.18	0.40	0.64	0.59	0.38
Total Fish and Seafood	2.14	1.40	2.59	3.02	2.84	2.73

Table 35 Percentage Distribution of Households by Household Composition and According to Age of Respondent

Household Composition	Age of Respondent				
	15–19 Years %	20–39 Years %	40–59 Years %	60 Years and Over %	Total %
Adult males	3.2	50.4	17.3	29.2	5.6
Adult females	0.8	23.4	21.3	54.5	12.4
Adult males and females	1.3	21.5	47.7	29.6	26.8
Adults with:					
One Child	1.6	56.5	38.7	3.3	15.6
Two Children	0.4	78.7	19.1	1.9	17.4
Three or more Children	0.8	84.5	14.7	—	11.2
Age group as Proportion of Sample	1.1	46.0	32.5	20.4	100.0

Table 36 Annual Per Capita Consumption of Fish and Seafood By Age Group: All Capital Cities

	60 Years and Over	*40 to 59 Years*	*20 to 39 Years*	*15 to 19 Years*
	kg	kg	kg	kg
Fish				
Fresh	3.34	3.36	2.46	2.73
Fish Fingers	0.56	0.55	0.73	1.23
Frozen Packaged	0.35	0.30	0.28	0.36
Tinned	1.65	0.20	1.69	2.29
Smoked	0.43	0.29	0.15	0.30
Other	0.03	0.05	0.03	—
Sub Total	6.36	4.75	5.34	6.91
Cooked from takeaway outlets	0.81	5.15	5.40	1.29
Eaten outside the home	0.68			0.90
Total Fish	6.64			7.59
Seafood				
Fresh	0.40	0.86	0.82	1.30
Frozen Packaged	0.01	0.08	0.11	0.05
Tinned	0.03	0.11	0.14	0.24
Other	0.01	0.02	0.02	0.03
Sub Total	0.45	1.07	1.09	1.62
Cooked from takeaway outlets	0.45	0.91	1.10	0.59
Eaten outside the home	0.47			0.88
Total Seafood	1.83			2.57
Total Fish and Seafood	8.47			10.16

3.9.4 Country of Origin

Table 37 sets out average consumption per person according to the country of origin of the respondent. This was not necessarily the country of origin of all members of the household. However, as the respondent was the person responsible for food purchase or preparation, meals eaten frequently reflected her or his preferences or cooking ability. In some instances, the respondent's country of origin may have had little influence on consumption by other family members. This would occur where the other family members were dieting, where persons of different ethnic backgrounds lived together and where meals were usually eaten out.

Generally, it would seem that the country of origin of the respondent had no discernible effect on the overall amount of fish and seafood consumed by the various groups. However, it had a marked influence on the form of fish and seafood eaten. Persons from households where the respondent was born in Greece (for convenience these will be referred to as 'Greek households'), ate almost twice as much fresh fish as those from predominantly 'British households', i.e. where the respondent was born in Australia, the U.K. or New Zealand. Consumption of fresh fish was also high in 'Italian households'.

On the other hand 'British households' ate more fish fingers, packaged frozen and tinned fish than other households. They also ate considerably more cooked fish and fish outside the home than their 'Mediterranean' counterparts.

Table 37 Annual Per Capita Consumption of Fish and Seafood By Country of Origin: All Capital Cities

	Aust.	*Italy*	*Greece*	*U.K./ N.Z.*	*Other*
	kg	kg	kg	kg	kg
Fish					
Fresh	2.67	3.90	5.02	2.87	3.38
Fish Fingers	0.64	0.39	0.39	0.77	0.71
Frozen Packaged	0.25	0.03	—	0.62	0.32
Tinned	1.89	1.21	1.22	1.84	1.75
Smoked	0.23	—	—	0.49	0.16
Other	0.02	—	—	0.01	0.10
Sub Total	5.70	5.53	6.63	6.60	6.42
Cooked from takeaway outlets	1.14	0.62	0.62	0.96	0.85
Eaten outside the home	0.80	0.11	0.15	0.92	0.52
Total Fish	7.64	6.26	7.40	8.48	7.79
Seafood					
Fresh	0.70	1.46	1.43	0.52	1.20
Frozen Packaged	0.11	0.03	—	0.05	0.08
Tinned	0.11	0.05	0.14	0.12	0.15
Other	0.02	—	—	0.01	0.05
Sub Total	0.94	1.54	1.57	0.70	1.48
Cooked from takeaway outlets	0.57	0.25	0.99	0.61	0.26
Eaten outside the home	0.66	0.39	0.20	0.94	0.30
Total Seafood	2.17	2.18	2.76	2.25	2.04
Total Fish and Seafood	9.81	8.44	10.16	10.73	9.83

As with fish, 'Mediterranean households' ate more fresh seafood than 'British households'—on average about twice as much. However, 'British households' ate more seafood out of home, 'Greek households' ate more cooked seafood than any other group and 'Italians' the least prepared seafood from takeaway outlets.

3.9.5 Religion

There appeared to be no relationship between religion and the amount of fish and seafood eaten. While there was some tendency for religion and consumption patterns to be related, overriding factors, especially ethnic background, were linked to religion and so no significance was attached to religion itself as an influence.

3.9.6 Recreation Fishing

Table 38 shows the proportion of households in each city where someone went fishing compared with the proportion of households where their fresh fish was either caught or received as a gift.

Generally there was a fairly close relationship between the percentage of households with leisure fishermen and the proportion of fresh fish which was caught or received as a gift. A notable exception was Canberra, the only inland city surveyed, where just over half of all households had a member who went fishing, but only a quarter of fresh fish eaten was caught or obtained as a gift.

Leisure fishing appeared to be closely associated with age. Some 53% of households where the respondent was aged 15 to 19 had a member who went fishing, the proportion was 45% in the 20 to 39 age group and fell to 14% in the 60 and over group.

Table 38 Percentage of Households with Members who go Fishing and Proportion of Caught/Gift as a Source of Fresh Fish Consumption Each Capital City and Total

	Percentage of Households	
	Where a Member goes Fishing for Recreation	*Where Caught/Gift is the Source of Fresh Fish Supply*
	%	%
Sydney	33.3	22.2
Melbourne	33.1	22.8
Brisbane	38.1	33.2
Adelaide	31.0	29.6
Perth	45.6	46.7
Hobart	42.3	53.0
Canberra	51.7	24.9
Total	35.1	27.0

Country of origin of the respondent also appeared to be related to leisure fishing. Some 46% of 'Greek households' had a member who went fishing whereas the proportion for 'Italian households' was 25%. Persons from 'Greek households' were also more frequent fishermen—just over 10% fished once a week or more compared with 4% from all households.

3.9.7 Dieting

Some 2.7% of persons covered by the survey said they were eating fish and seafood primarily for dietary reasons, for example, to lose weight, or on medical advice. They ate about twice as much fish and seafood (17.2 kg) as the average for all persons (just under 8 kg). This is illustrated in Table 39, and does not include consumption by family members outside the home of which the respondent was unaware.

The top 25% of persons eating fish and seafood for dietary reasons consumed just over 29 kg each on average and all ate more than 750 grams weekly (about 25 kg per person annually)—see Table 40. About 2% of persons eating fish for dietary reasons consumed more than 50 kg per person annually and this could represent close to 5000 persons out of a survey population of 8.7 million.

Table 39 Annual Consumption per Person of Fish and Seafood[1]: By City All Persons and Those Eating Fish for Dietary Reasons

Persons	*Total kg*	*Sydney kg*	*Melbourne kg*	*Brisbane kg*	*Adelaide kg*	*Perth kg*	*Hobart kg*	*Canberra kg*
All persons	7.7	8.4	7.2	7.6	7.7	7.7	5.7	6.3
Persons eating fish for dietary reasons	17.2	16.8	15.5	16.9	22.0	21.8	15.2	12.1

[1] Does not include consumption outside the home by other family members which was not known to the respondent.

Table 40 Percentage Distribution of Fish and Seafood Consumed by Persons Eating for Dietary Reasons Grams per Person Weekly

Grams per week	*Total* %	*Sydney* %	*Melbourne* %	*Brisbane* %	*Adelaide* %	*Perth* %	*Hobart* %	*Canberra* %
None consumed in past week	15.1	17.9	10.2	10.2	8.5	31.5	29.7	25.4
1 to 100	9.4	9.5	10.1	6.1	8.2	5.7	17.5	14.9
101 to 200	16.0	12.2	26.0	8.1	11.5	5.8	17.5	12.7
201 to 300	13.9	16.7	12.0	12.2	11.9	11.4	—	10.6
301 to 400	12.1	10.0	15.0	16.3	10.0	11.3	5.9	12.7
401 to 500	8.2	7.8	9.5	10.2	9.8	—	—	11.1
501 to 750	16.7	16.8	11.0	20.4	30.5	22.8	17.5	10.7
750 to 1000	6.5	7.3	3.9	12.2	5.1	11.5	5.9	2.1
Over 1000	2.3	1.7	2.4	4.1	4.7	—	5.9	—
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

4 Discussion

This Section discusses some of the survey findings which would seem to have policy implications for those connected with the fishing industry. It covers some of the broader marketing implications which could be drawn from the survey and other information, the problems associated with the misnaming of fish and it attempts to reconcile the relatively high consumption figures found in the survey with published statistics.

4.1 Marketing Implications

4.1.1 Introduction

In the conduct of this survey some views were formed as to the long term marketing requirements of the fishing industry. Many of these will be familiar to persons connected with the industry but there could be some benefit in restating them against the background of the findings of this and other consumer surveys.

4.1.2 Is Increased Consumption Desirable?

In discussion with industry personnel on marketing issues an unstated assumption was that on the domestic market a major objective of the Australian fishing industry is (or ought to be) to increase consumption of Australian fish. It is important to observe that this need not necessarily be so. The basic objective of any business is to produce profitably and at the extremes this can be achieved by selling relatively cheap product in volume or by selling to a small and specialist market at higher prices.

To aim for increased volume at the expense of profits has been a mistake committed by many sectors of the food industry over the past 15 years. The term 'profitless prosperity' was coined in the 1960's to describe the situation in industries such as margarine and ice cream where sales increased steadily but many firms incurred substantial losses.

Very generally, the marketing of Australian fish in the past has been directed towards satisfying a small volume market. The industry has largely concentrated on supplying more expensive fresh fish and seafood with relatively little increase in the quantity sold. Canned fish has been a notable exception to this general statement. Generally over this period the industry has been relatively prosperous.

At this point it is important to make it clear that marketing strategies cannot be discussed in isolation from biological and economic considerations. If the potential catch is restricted either because the resource is insufficient or for commercial reasons, marketing strategies have to adapt accordingly.

For example, Australian seafood production is not expected to increase markedly and this sector of the industry can be expected to continue to direct its produce mainly to the more expensive markets.

This cannot be said with confidence of fish production. Although exploratory work suggests that fish resources around the Australian coast are not abundant there would

seem to be scope for increased production. Although part of the increased catch could be sold on the more expensive end of the market, a very large proportion would have to be disposed of in the cheaper fried and frozen fish segments which are currently dominated by imported fish. It cannot be asserted with confidence that this latter course would be the best for the fishing industry generally or for Australia. For example, those presently in the industry could face greater competition from newcomers (both in the catching and marketing sectors), other Australian food industries could suffer from increased fish consumption and so on. It is an area requiring detailed research on which informed decisions can be based.

However it is considered here that, on balance increased consumption of Australian fish would be desirable on broad economic grounds and for the fishing industry. The recommendations which are set out in the following section have been framed around this basic objective.

4.1.3 Marketing Recommendations

In the discussion which follows on ways to increase consumption of fish and seafood, the primary emphasis has been on fish. This was partly because many of the recommendations made for increased fish consumption apply also to seafood. A more important consideration was that factors hindering increased seafood consumption in Australia are relatively easy to define but it is difficult to justify greater domestic consumption of the principal seafoods produced—except perhaps as a strategy of market diversification. The main reason restricting the sale of more seafood domestically is its price, and to a large extent this is set by overseas markets. For those seafoods which are relatively cheap such as squid and mussels, lack of resources and low awareness by consumers are the limiting factors to greater consumption. The results of this survey and other investigations suggest that it would be relatively easy to sell more of these seafoods on the domestic market—provided the supplies were available.

Increased consumption of Australian caught fish requires the fulfilment of one or both of the following marketing objectives:

- to improve the industry's capacity to supply frozen fish to the institutional and catering markets; and
- to endeavour to establish fish as an 'everyday' food item in the home.

The objectives are relatively easy to state on the basis of research done but the means to achieve them are often complex, expensive and could involve changes which may be politically and institutionally difficult to achieve. Also it is not possible to measure with confidence the impact of alternative policies to achieve these objectives because not enough is known of the structure of the current marketing system, the interrelationship of forms and groupings within it and the demand elasticities for the different fisheries products. More research is needed in these areas.

These two broad objectives are examined in the following pages with particular emphasis on the factors hindering increased consumption of Australian-caught fish in the fresh and frozen market. Some recommendations are put forward as to how these might be overcome.

4.1.4 Improve the Industry's Capacity to Supply Frozen Fish to the Institutional and Catering Markets

4.1.4.1 Eating Out This survey has shown that about 40% of fresh and frozen fish eaten in Australia is consumed as a 'takeaway' food or when dining out. There are no estimates of the proportion of imported frozen fish sold through these outlets. However from discussions with a number of retailers in all capital cities it would seem

that the bulk of fried fish sold through 'take away' outlets is imported fish, although this was not the case in all capitals. (Melbourne and Hobart being exceptions). The more expensive restaurants appear to serve mainly fresh fish but imported fish dominate the lower end of the market (small cafes, self-service cafeterias etc.).

There has been a steady rise in the quantity and value of food eaten out and this trend appears likely to continue. Increased eating out has been associated with greater affluence, a higher proportion of older women in the workforce and changing lifestyles, especially those brought about by greater mobility. Developments in the fast food industry have also played an important part.

In 1975–76 about 20% of food expenditure in Australian capital cities was on food eaten out, ten years earlier it had been about 9%[1]. A breakdown of 1975–76 expenditure showed that it was equally divided between 'take away' foods and meals eaten out. An illustration of the growth in eating outside the home is provided in the following table.

Table 41 Food Serving Establishments: 1968–69 and 1973–74 Number and Value of Retail Sales

	1968–69		*1973–74*	
	Number	*Turnover $m*	*Number*	*Turnover $m*
Takeaway outlets	3 468	95	5 343	260
Cafes and restaurants	4 332	211	5 123	380
Total	7 800	306	10 466	640

Source: Australian Bureau of Statistics, Census of Retail Establishments and Selected Service Establishments, 1968–69 and 1973–74.

The growth in number and sales over the five years to 1973–74 was greatest among takeaway outlets. This period also coincided with the entry of fast food outlets promoting a specific image (Pizza Hut, Kentucky Fried Chicken etc.).

All available evidence suggests that the growth in eating out has continued, and perhaps accelerated, over the past few years. Certainly the number of higher priced restaurants and 'image' fast food outlets has risen sharply.

4.1.4.2 Role of Fish in Eating Out The Australian fishing industry has played little part in this growth and this has been particularly noticeable in the fast food segment. Fish as a 'takeaway' food item has found itself under increasing competition from chicken, other meats and other fast foods. To compete with these items, retailers during the 1960's and early 1970's increasingly substituted cheaper imported fish for Australian products. Imports were also less susceptible to seasonal variations in supply and were more uniform in quality. Over the past two years there have been sharp increases in the price of imported fish and Australian fish has become more competitive in cafes and cafeterias.

On the other hand, Australian fish may have increased sales through the more expensive restaurants and more specialist seafood restaurants have been opened in all capital cities.

Despite increasing sales to the lucrative restaurant trade, the failure of the industry to share in the growth of 'fast food' sales must be viewed with concern. This is particularly

[1] See Australian Bureau of Statistics, Household Expenditure Survey, 1975–76 (various bulletins) and *Australian Retailing*, May 1971, 'Consumer Survey Reveals Household Spending Patterns'. For Australia as a whole, expenditure on food eaten out in 1975–76 was 18% of total food expenditure.

so given the likelihood of continued growth in this sector of the food market at the expense of home prepared foods.

Developments in the Australian catering industry have mirrored those in the United States with a lag of some years. Currently about one third of food expenditure in the United States is spent on products prepared outside the home compared with about 18% in Australia. It is notable that in the United States, over the past few years, 'fast food' outlets selling mainly fish increased their value of sales significantly more than other outlets. This has been attributed to sophisticated marketing coupled with consumer concern about nutrition and desire for a change in diet. These consumer attitudes have also been reflected in the report on attitudes towards fish in Melbourne[2]. However, as noted, the performance of the fishing industry in both countries has been quite different in meeting the needs of this market.

4.1.4.3 Needs of the Catering Trade Any examination of the failure of the Australian industry to meet the needs of the catering trade has to start by looking at the requirements of caterers generally and especially 'fast food' operators who are supplying an important segment of the population. These requirements can be identified as:

- relatively cheap product. Fast food outlets work to fine margins both in the image sector and among the more traditional outlets. However cheapness of product is not an overriding factor and can be offset by other considerations such as:
- continuity of supply. Unless a product is in regular supply it will be supplanted by some other food product;
- suitable for 'fast food' operations. Product has to be in a form suitable for handling in bulk and subdivided into smaller units, be easily stored and capable of being cooked and reheated rapidly;
- acceptable to the consumer. In the case of fish this implies that the product meet certain minimum specifications. For example, it should contain very little bone, and preferably none at all—the Melbourne survey findings showed 70% of respondents agreed that bones concerned them when eating fish.

Imported fish have generally fulfilled those requirements better than Australian fish. They have been in fairly continuous supply throughout the year and acceptable to both fast food operators and their customers. They have also been cheaper although as noted earlier their cost has risen rapidly over the past couple of years.

The rising cost of imports has encouraged the belief that the Australian industry will, because of its improved competitiveness, be able to increasingly substitute for them. However, cost is only one element in the requirements of 'fast food' operators and the other factors listed above could be equally important. Unless the Australian fishing industry can satisfactorily meet these non-price requirements, 'fast food' outlets will increasingly turn from fish to other products.

Meeting these requirements could involve improvements in both fish catching and their sale to 'fast food' outlets.

First, Australian fishermen need to catch more of the fish preferred by fast food operators. Shark is an example of a species suited to the fast food trade, but supplies are limited because of controls on catching due to its mercury content. Other fish suitable, but not in sufficient supply, include gemfish, snapper, morwong and bream.

[2] See 'Some Aspects of Consumer Attitudes and Opinions Towards Fish and Other Seafoods in Metropolitan Melbourne' especially tables 17 and 18.

Much more research is needed by Government and industry to establish the stocks of these and other fish.

Second, fish distribution and selling need to be co-ordinated to ensure that the product sold is of acceptable quality and not subject to marked variations in supply or price owing to seasonal and other factors. The present industry structure is not geared to do this effectively and alternative marketing policies which will stabilise prices and ensure uniformity of product quality may need to be adopted. For example, this could involve:

- the selling by fishermen to processing firms or co-operatives at a fixed price to be negotiated. These firms or co-operatives would process the catch, store it and sell to wholesalers or direct to 'fast food' operators at a predetermined price. This form of marketing has been the basis for the success of the Australian canned tuna industry;
- fostering the development of large integrated enterprises owning their own processing facilities, storage plants and boats or which have boats supplying them on contract. Such enterprises need not necessarily be in conflict with the traditional smaller scale fishing industry which could continue to supply the more expensive fresh fish market.

These examples indicate the kinds of marketing developments which will need to precede any successful attempt by the Australian fishing industry to share in the growth being experienced by catering outlets generally, and not just the more expensive restaurant.

Finally, an important factor in consumer lack of confidence in fish products, particularly those bought from takeaway outlets is the practice of misnaming fish. This is discussed in greater detail in section 4.3.

4.1.5 To Endeavour to establish Fish as an 'Everyday' Food Item in the Home

4.1.5.1 Fish Eaten At Home On average, Australians eat fish at home about once a week and only 5% of the capital city population never or rarely eat fish. Thus, Australians are familiar with fish as a food item in the home but there would seem to be considerable scope for increasing consumption.

In discussing ways to increase fish consumption it is necessary to treat tinned fish separately from other forms. This is largely because tinned fish are directed towards a different market (lunchtime sandwiches, snacks etc.) and have different competing foods (other sandwich spreads, other tinned foods). More importantly, the fish used for canning in Australia up to now—tuna and Australian salmon—are not generally suited to consumption as fresh, frozen, smoked or other forms. Generally these forms of fish other than tinned compete with one another for the same market and for supplies of fish.

Also, smoked and dried fish are not discussed separately because the suggestions made for increasing fresh and frozen fish consumption apply with equal force for these forms.

4.1.5.2 Tinned Fish Consumption of Australian tinned fish has grown markedly over the past decade and canned tuna consumption has more than doubled. Much of this performance can be attributed to good marketing although the marketing environment (rising incomes, increasing price of overseas products) has been favourable.

Nevertheless there would seem to be scope for further consumption increases should supplies be available. For example, there is no inherent reason why consumption in Adelaide is so high (see Table 5 of this report) other than consistent availability and

promotion of tuna (the principal canning fish) in the past. If consumption in other capital cities could be raised to the Adelaide level total consumption of tinned fish would rise by over 20%.

One of the most important contributors to the relatively high Adelaide consumption has been the greater promotion of canned fish (especially tuna). This promotion has been primarily in the form of point of sale demonstrations and the distribution of recipes. A result is that Adelaide consumers are more adventurous in their use and cooking of canned fish. They are also more familiar with tinned fish—fewer Adelaide respondents never or rarely served tinned fish and significantly more served it once a week.

There would therefore seem to be little doubt that consumption in other capital cities could be increased by the adoption of long term promotional measures—and some canners are promoting in selected cities. Generally consumers are likely to be receptive to such promotion as the purchase of canned fish is fairly evenly spread through all age groups and is served more in higher income households. Rising incomes and a continued increase in the number of households with more than one income earner are likely to establish a favourable environment for greater canned fish consumption.

Offsetting these factors is a potential shortage of supplies of Australian caught canned fish either because of a diversion of tuna to overseas markets or insufficient resources to keep pace with current demand—as is occurring with Australian salmon and could occur with tuna.

Thus it is likely that the species which have provided the impetus for greater consumption of Australian canned fish will become scarcer, more expensive and cater increasingly for the more expensive end of the market.

Accordingly, there could be an expansion in the cheaper segment of the tinned fish market, currently supplied mainly by imported sardines, herrings etc. As these are also becoming more expensive there would seem to be some scope for the development of an Australian based industry. Such an industry could be based on the canning of pilchards, anchovies or other fish. Studies need to be undertaken into the feasibility of canning these and other fish taking into consideration the availability of the resource, the eating qualities of the canned product and the likely cost of production. In this latter context the most important consideration would seem to be the price which it would be necessary to pay to make fishing these species economic at assured levels of catch rate and boat operations.

4.1.5.3 Fresh and Frozen Fish The great bulk of fresh and frozen fish eaten in the home is believed to be of Australian origin, and imported frozen fish is becoming relatively more expensive.

There are a number of reasons which would suggest that fresh and frozen fish offer the greatest potential for increased consumption of Australian fish. There appear to be unexploited fish resources available for further development and as noted earlier most consumers are familiar with fresh and frozen fish, serving it at some time during the year. For example, 82% of survey respondents claimed to serve fresh and frozen fish reasonably frequently compared with 50% for fish fingers and 26% for frozen packaged fish.

Additionally, consumers appear to be favourably disposed towards fresh fish. The Melbourne attitudinal survey revealed that some 72% of respondents 'liked' fish in varying degrees, 11% 'disliked' it and 17% neither 'liked' nor 'disliked' it.

Thus there would seem to be a favourable climate for the expansion of consumption and for Australian fish to form an increasing part of this consumption.

However, the fishing industry is part of a highly competitive food market. Also results of consumer surveys over the past few years together with discussions with retailers and other fish marketers indicate a number of specific concerns which have held back consumption of fresh and frozen fish and are likely to continue to do so unless corrected. Some of these are discussed below and, where appropriate, suggestions are advanced to overcome them.

Availability In the Melbourne survey of consumer attitudes, declining availability was the single most important reason cited by respondents whose consumption of fresh and frozen fish had declined compared with the previous year. That survey also disclosed that consumers rated fresh and frozen fish significantly lower than fish fingers and frozen packaged fish in availability. There is no reason to expect that these results would be greatly different in other cities.

About half of all fresh and frozen fish purchased comes from retail fish shops and almost a quarter from a fish market. Just under 10% of purchases are made from supermarkets. By contrast almost all fish fingers and packaged frozen fish are sold through supermarkets.

The low rating of availability of fresh and frozen fish appears to be associated with the trend towards one stop shopping and the relative decline in the number of fish shops.

According to trade sources there has been a net decline in the number of fresh fish shops over recent years. Much of the fall represented a shift by retailers from fresh fish sales to cooked takeaway sales of fish and other foods. This fall has not been uniform in all capitals, being less in Sydney than elsewhere.

The decline in fresh fish outlets does not appear to have been caused solely by economic factors. Those outlets which have continued to specialise in fresh fish generally appear to be prosperous. However, selling fresh fish is a highly skilled business requiring expertise in fish purchasing, processing, storage and selling. The number of people with this expertise is limited and there is no provision for formally training people to take over existing outlets or open new ones. The adoption of some form of apprenticeship training would seem to be one of the more important requirements of the industry. Emphasis in such training would be not only on selling good quality fish but also on the quality of the surroundings in which they are sold.

Together with the decline in fresh fish shop numbers there has been an increasing trend towards one-stop shopping at a shopping complex or large supermarket. Relatively few shopping complexes have specialist fish shops for reasons indicated above, and to date supermarkets have concentrated largely on frozen packaged fish rather than fresh and frozen fish. The fish which has been displayed has usually been restricted to a few species, often imported frozen fish and with poor visual appeal.

Given the current level of demand for fish, especially fresh fish, it would seem almost inevitable that supermarkets will increasingly carry Australian fish over the next few years. The requirements of supermarkets have been discussed elsewhere[3] but they can be summarised as:

- ☐ guaranteed continuity of supply;
- ☐ predictable shopping for customers. Not only must product be regularly available, but there should be no sharp fluctuations in price; and
- ☐ guaranteed and consistently high quality. This implies quality control from time of catching to delivery into retail outlets.

[3] See L. R. Watson and M. W. Rowe, 'Australian Fish for Local Supermarkets', Fish Expo '76 Seminar, *Report of Proceedings*, Australian Government Publishing Service, Canberra 1977.

To date the Australian industry has been unable to fulfil these requirements, and has lost a potentially important outlet for its product. It should be observed that supermarkets would offer an additional outlet for fish, especially frozen fish which may need to be stored on board larger freezer boats or at times of market over-supply. Persons requiring a large range of fish especially fresh fish might be expected to continue to patronise existing fish shops (the desire for freshness is discussed below).

The requirements of supermarkets are not easy to meet and essentially involve the same considerations discussed earlier in relation to the 'fast food' industry. In very general terms selling to supermarkets will require centralised marketing either:

- through a large co-operative organisation such as SAFCOL, which is able to buy product from its members and distribute it to supermarket chains, or
- by marketing organisations entering into contracts with fishermen for the supply of product at specified prices and reselling to supermarkets;
- through supermarkets themselves setting up organisations to buy from fishermen;
- by the establishment of large integrated companies owning their own boats.

Finally, to reiterate, unless fresh and frozen fish is made more readily available latent consumer demand will remain unfulfilled. Availability can be increased by the establishment of additional specialist fish shops, selling more fish through supermarkets or, ideally, a combination of both.

Price Even when fish is physically available the ability of individual consumers to purchase fresh and frozen fish also depends on its cost. Although fresh fish has become more expensive in recent years relative to other foods there is no evidence yet of consumer resistance to those prices. To a large extent these increases appear to have been offset by other perceived benefits to consumers such as the fulfilment of concerns about nutrition and dietary habits generally.

There is, however, much the industry can do to attract consumers by local advertising of cheaper varieties of fish and 'specialling' varieties in temporary oversupply. Such promotion needs to be accompanied by appropriate point of sale recipes (discussed below under promotion).

Freshness Desire for fresh fish and doubts as to whether fish purchased was really fresh dominated many aspects of consumer attitudes towards fish in the Melbourne survey.

Freshness was considered by respondents to be the most important characteristic when buying fresh fish. Also the freshness of fish offered was given as the dominant reason why consumers preferred a particular retail fish shop.

Although consumers considered freshness to be important 76% agreed with the statement that it was difficult to know if the fish offered to them was really fresh. Freshness was judged mainly by smell or the brightness of the eyes but it was significant that 20% of consumers were unable to nominate any way to assess freshness.

The importance of freshness and the difficulty consumers have in assessing it underline the importance of ensuring that fresh fish sold should not only be fresh but be seen to be so.

At present, keeping the fish fresh from the catching vessel to retail outlet is largely the responsibility of the industry itself. From observation, standards differ widely from State to State. However, judging from the response of Melbourne consumers allied to comments received in other capitals there is general unease among fish eaters at the freshness of the fish they receive. A number of suggestions could be made to raise the standard of fresh fish such as date marking fish landings, grading at wholesale markets,

wider controls by Health inspectors but all are either impractical or too expensive. It has been concluded that relative freshness must remain a part of the competitive process and the fisherman or retailer consistently selling fresher product should, other things being equal, receive a higher price.

However, to give consumers confidence that fish sold is fresh as distinct from frozen, it could be suggested that fish be so described in retail outlets, and that such descriptions be mandatory. For example, bream should be described as 'fresh bream' or 'frozen bream'. A definition of frozen fish could be any fish which has been frozen at a temperature below 30°F, even if then rethawed, or frozen overnight by a retailer.

Much more research would need to be undertaken into the implications of any such requirements. Also, it will be argued with justice that some frozen fish is of higher quality than fresh fish. On balance however it is considered that a mandatory description along the lines outlined above could eliminate many of the difficulties reportedly experienced by consumers with 'fresh' fish. Also supermarkets could overcome any problems about frozen fish sold being 'non-fresh' by promotion of quality control and in particular through being more consistent in quality. Also, well presented frozen fish fillets could appeal to that segment of the market which eats fresh fish infrequently because of its negative qualities such as messiness, smell and presence of bones.

Promotion As observed earlier the great majority of consumers eat fresh and frozen fish fairly frequently and have very positive feelings towards it. There would therefore seem to be little advantage to be gained by promotion aimed to encourage consumers to eat more fish. If the product available is of high quality and competitively priced consumers could be expected to buy it.

It is suggested that promotion would be advantageous in three areas.

The first is in informing consumers about new or unfamiliar fish species coming on to the market. In this respect more point of sale display such as that used for gemfish and mullet by the N.S.W. Seafoods Promotion Committee will be needed.

Second, consumers need to be better informed about products which are cheap and in oversupply. This would assist in moving seasonal stocks.

Third, and most important, the survey has shown that consumers have a limited knowledge of cooking fresh and frozen fish. About 60% of such fish was fried and almost 15% grilled. A high percentage of respondents had little confidence in their ability as fish cooks. The most important promotional objective of the industry should be to raise this confidence by providing small point of sale recipes, recipe booklets and cookery demonstrations to groups and in larger retail centres.

Promotion along these lines (other than cookery demonstrations) is undertaken in New South Wales and Queensland but on an inadequate scale because of lack of funds. It would seem extremely desirable that such effort be intensified and that it be extended to all States and Territories.

Accordingly, it is suggested that more funds be made available through an Australia wide levy on all sectors of the fresh and frozen fish industry and be administered by an independent committee of Government and industry personnel along similar lines to the fishing industry research committee. The committee would set priorities and disburse funds. Funds could be used for point of sale display posters, recipes etc., and much of this promotion would be conducted by State authorities doing this work at present. Additionally, the committee could oversee the work of a small group of home economists who would be primarily engaged in demonstration work.

4.1.6 *Summary*

It has been assumed that a basic objective of the Australian fishing industry on the domestic market should be increased consumption of Australian fish.

No specific marketing recommendations have been advanced for seafoods. It is considered that seafood consumption could be increased fairly readily in the absence of two major restraints. These are price, which is largely set overseas and resource availability.

Increased consumption of Australian fish requires the fulfilment of one or both of the following objectives:

- to improve the industry's capacity to supply frozen fish to the institutional and catering markets; and
- to endeavour to establish fish as an 'everyday' food item in the home.

The following recommendations have been advanced to overcome some of the factors hindering the attainment of these objectives.

- Increased research by Government and industry to establish the extent of stocks available, especially for 'takeaway' outlets and tinned fish. Such research should also include investigations into ways of catching fish which at present cannot be caught because of technical or economic factors.
- Improved co-ordination between the catching and distribution sectors in order to improve continuity of supply and achieve some predictability in price to meet the needs of fast food outlets and supermarkets. Such co-ordination could be accomplished by the growth of large co-operative marketing organisations or some form of integrated enterprise supplied either by its own boat or by contract.
- Studies aimed at identifying new fish species suitable for canning be conducted.
- Research be conducted into the implications of a mandatory requirement that fish sold through retail outlets be described as 'fresh' or 'frozen'.
- Fish species be identified in a way acceptable to both trade and consumers.
- Retailers give more emphasis to local advertising of 'specials' i.e., cheaper fish in temporary oversupply.
- An industry levy be adopted to,
  promote underused or new species;
  produce point of sale recipes and pamphlets;
  enable a small group of home economists to give cooking demonstrations at meetings of shoppers and at shopping centres.

4.2 Level of Consumption

The latest official statistics estimate the apparent consumption of edible fish products at 6.7 kg per person in 1975–76[4]. In nearly all the previous ten years consumption per person was in the 6 to 7 kg range.

These estimates contrast markedly with the survey findings of an average 10 kg consumed per person over 1976–77 in the capital cities. Although neither of these two estimates of consumption is strictly accurate it will be argued here that Australian fish consumption is higher than hitherto believed. However, it is important first to note the major differences between the estimates in their basis and scope of calculation.

Official statistics of consumption in any one year represent a balancing figure taking into account commercial production, exports, imports and stock changes. An

[4] *Fisheries 1975–76*, Australian Bureau of Statistics, Canberra (reference number 10.8)

allowance of 10% is added to commercial fresh fish production to account for fish caught by leisure fishermen. Waste and deterioration between production or import and final consumption are not calculated. Consumption per person is derived by dividing these statistics by the estimated mean population of Australia in the relevant year.

By contrast, the survey figures represent estimates by consumers of the fish and seafood they had eaten in a particular week. It was assumed that in aggregate the consumption of all individuals in a week could be translated into a yearly rate, particularly as interviewing was spread over four quarters and covered different time periods in each quarter.

The second difference between the two estimates of consumption relates to their scope and coverage.

The survey results cover only the 65% of the Australian population living in the capital cities surveyed. No comparable surveys have been undertaken in other cities and areas, and their fish consumption is a matter for conjecture. However, it is unlikely that their overall consumption would exceed that found in the survey. Although some coastal cities and towns could have consumption levels equal to or greater than the survey average, inland centres might be expected to consume less fish per person, especially fresh fish and seafood. It will be recalled that Canberra, the only inland city surveyed, had a total fish and seafood consumption of only 8 kg per person and there were factors at work in that city resulting in above average eating out, especially of seafood, which are not likely to be present in most other inland centres.

Data provided on household expenditure would seem to strongly substantiate this. The following table sets out expenditure on fish by households in urban and rural areas.

Table 42 Average Weekly Household Expenditure Fish and Seafood 1975–76

Fish and seafood	*All Australia* $	*Capital cities* $	*Other urban areas* $	*Rural areas* $
Fresh	0.20	0.23	0.14	0.15
Frozen	0.37	0.41	0.30	0.26
Total	0.57	0.64	0.44	0.41

Source: Australian Bureau of Statistics, Household Expenditure Survey, 1975–76 (Various Bulletins)

Persons living in capital cities spent about 50% more than those in other urban and rural areas. More importantly, in the context of this discussion, capital city expenditure was some 12% greater than the average for Australia as a whole.

Also, the survey results related to consumption by persons living in dwellings. It did not cover fish and seafood consumed in institutions or other centres. However, it is considered that this would have minimal influence on the difference between the survey results and official statistics.

These variations between the two estimates of consumption are not likely to account for the 3 to 4 kg per person difference between them. A further reason for the variation would seem to stem from errors in one or both sets of estimates.

There are two likely sources of error in the official estimates.

The first concerns the proportion of fish eaten which are caught by recreational fishermen. The official statistics allow 10% for this—a percentage which has been

unchanged for over 30 years. Survey findings indicate a figure of some 27% of fresh and frozen fish consumed are caught by leisure fishermen. Applying this proportion to the official statistics would have produced an estimate of consumption per person in 1975–76 of 7.4 kg—compared with 6.7 kg.

The second source of error is probably more important and concerns the estimated production of fresh and frozen fish and crustaceans and molluscs of Australian origin. These production figures are based on returns supplied by fishermen which are believed to be understated. Spot checks and comparisons with sales through metropolitan markets and co-operatives suggest this understatement could be as high as 30%.

The survey estimate also contains possible sources of error.

Because it is based on a sample of the population there is the probability of sampling error. As noted in Appendix III, of the 7 kg of fish and seafood eaten at home per person there is one chance in 20 that the average is 0.3 kg greater or less than this. Because of the large and representative number of persons sampled the sampling error is relatively slight.

Error could also have occurred because of overstatement by respondents of amounts consumed during the survey week. This could have arisen through the inclusion of fish or seafood eaten in the week prior to the survey week. Such 'telescoping' of consumption is widely recognised in consumer surveys based on recall of consumption and every effort was made in this survey to prevent it (See Section 2.3).

One method of calculating whether such overstatement did occur is to estimate the Australian market for individual forms of fish and seafoods, based on the survey and compare these with those forms for which reliable official statistics are available. In the table which follows, the estimated market size based on the survey was calculated by multiplying the average consumption per person in the capital cities by the estimated population at September 1976 (the mid point of the survey) of 13.9 m. An important assumption in this calculation is that all Australians ate these products in the same quantity as the capital city householders; as noted earlier this may not be so.

Table 43 Market Size: Selected Fish Products: Tonnes, edible weight

	Survey Estimate	*DPI Estimate*
Canned fish	25 000	20 400
Frozen packaged fish	4 200	3 800
Fish fingers	9 200	6 900
Smoked fish	3 300	4 400
Canned seafood	1 700	2 100
Total selected products	43 400	37 600

Although this table needs to be interpreted with caution, there would seem to be a general tendency for the survey results to be higher than the estimated quantity available for consumption based on official figures. The overestimate could result from lower consumption by persons not covered in the survey (especially in country areas) or because of overstatement by consumers.

Two general conclusions may be drawn from this discussion. First, official statistics of Australian fish consumption appear to be understated because of underreporting of fresh and frozen fish, crustaceans and mollusc production and also because the allowance for fish caught by fishermen is probably too low.

Second, the survey results showing average consumption at 10 kg per person are probably an overstatement of consumption in Australia as a whole. This is mainly

because the survey did not cover rural areas and cities, and respondents may have overstated their consumption.

If the percentage overstatement of the survey results indicated in Table 1 were applied to all products, consumption per person for Australia as a whole in 1976–77 was in the vicinity of 8 to 9 kg per person. This level would be consistent with estimates made of the extent to which official consumption figures underestimate the 'true' consumption.

4.3 Misnaming of Fish and Seafood

One of the difficulties encountered in this survey was to obtain from consumers a description of the fish species they had eaten. Some 2% of respondents did not know the species of fish served at home, 16% did not know the species bought from a 'take away' shop and 20% did not know the kind of fish eaten at a meal–serving establishment.

Even more important than this was the widespread misnaming of fish, especially when bought at 'take away' outlets and restaurants. For example, the two main species of cooked fish which respondents claimed to have bought in Adelaide and Perth were butterfish and snapper respectively; most of this fish appears to have been imported hake. Some fresh and frozen fish fillets also appear to have been misnamed.

Basically misnaming of fish occurs because merchants and retailers attempt to respond to consumer demand for traditional species which are unavailable or expensive by supplying species of similar or even superior taste. Also many Australian species have the same name as imported species but are different fish. Examples are given in Appendix IV of this report.

Although misnaming of fish would appear to involve an element of consumer deception it raises quite complex issues which require a more detailed study and analysis than is possible here. However it is important to recognise that misnaming of fish occurs in many other countries and that it can offer benefit to both fishermen and consumers.

In the United States and Europe a number of fish are sold under different names to satisfy the traditional preferences of local communities. Examples at random include hake sold as whiting, ocean perch as redfish, pollock as saithe and so on. It is pertinent to note that the United States Department of Commerce has commissioned a study into the appropriate market names for fishery products. The study is examining the feasibility of introducing a new framework of names based on edibility. For example fish with no bones, low fat content etc would be in one common group, those with firmer texture, higher fat content etc., would be in another and so on.

There are obvious benefits in misnaming fish. The consumer can be introduced to new and unfamiliar species. Also seasonal shortages in supply of particular species can be alleviated by substituting comparable fish, often at lower prices. In this context it should also be noted that in a large number of cases misnaming has benefited the consumer because the substituted product is either cheaper or of superior or equal quality.

There are also clear disadvantages of such practices. The most important of these is their long term effect on consumer confidence in the product of the fishing industry. This occurs most frequently when frozen imported fish is substituted for fresh local fish; for example frozen hake fillets for bream, imported whiting for fresh Australian whiting etc. These practices may have contributed to the generally low regard consumers hold for fish shops because their fish is frequently 'not fresh'[5]. The practice

[5] See 'Some Aspects of Consumer Attitudes and Opinions Towards Fish and Other Seafood in Metropolitan Melbourne'.

could also have affected sales of domestically caught fish by enabling cheaper imported fish to be sold under the names of traditionally popular Australian species.

There would seem to be a need for a more detailed study into the extent to which misnaming of fish occurs, the reasons for it and its effect on the consumer and on sales of Australian fish. Such a study could also indicate whether a more rational classification of fish could be adopted instead of species names.

Glossary of Terms Used

Respondent Person responsible for the preparation of food in the household, aged 15 years and over.

Household One or more persons who normally share common food supplies.

Head of Household In husband-wife families the husband was taken as the head of household. In other cases the chief income earner was normally regarded as the head.

Household Members Includes all permanent residents, including boarders. Does not include guests or family members who do not normally live in the household.

Dwelling Any private house, flat, room etc. used for dwelling purposes with the exception of hotels, motels, clubs, hostels, boarding houses, educational, religious or charitable institutions, hospitals, police or fire stations, defence or penal institutions.

'Takeaway' Shops Snack bars, hamburger shops, takeaway Chinese food shops and any other 'fast-food' establishments.

Cooked Fish/Seafood Refers to fish which is cooked or prepared on the shop premises.

Caught or Gift Refers to fish and seafood which is caught by members of the household or given gratis to the household.

APPENDIX II

Sample Methodology

1. Sample Design

The sample design chosen for this study was a multistage stratified scheme. Survey procedures were established in co-operation with the Australian Bureau of Statistics (ABS). The survey was designed to draw a representative sample of households on a probability-proportional-to-size (p.p.s.) basis from regions within each of the seven capital cities.

The sampling frame consisted of the total number of private dwelling units in each capital city. Each state office of the ABS provided figures on dwelling units in all census collectors' districts (CDs). The number of dwelling units derive from the 1971 census and are adjusted for additions to the housing stock. This is, of course, important in areas of new suburban development.

Each city surveyed was stratified into at most five regions which comprised neighbouring Local Government Areas (LGAs). The boundaries of the regions were drawn so as to represent a combination of geographical and social differentiation in the population.

The sampling units are the 1971 CDs. A sample of CDs was selected in each region on a fixed interval sampling basis with a random start for each region. The selected CDs were then allocated to appropriate quarter periods of the survey e.g. first and fifth CD to the first quarter, second and sixth CD to the second quarter etc. A cluster of 10 households was interviewed within each CD.

The proportionate stratification, i.e. 'regionalising' of each city, should lead to reduced overall variance compared with a simple random sample design, although clustering will increase variance.

2. Survey Procedures

Within each census district, a random starting point for each cluster of interviews was chosen with the aid of a superimposed grid. Grid co-ordinates were chosen at random and the starting point was designated to be the street corner nearest to these co-ordinates.

Interviewers were instructed to obtain an interview at every third house from the starting point. When an interviewer failed to make contact with a potential respondent, after four calls at varying times of the day and evening, a dwelling on either side of the original one selected was substituted. This substitution also occurred if a household refused to supply information. The State Field Supervisor in each city validated at least 10% of all interviews by phone or personally.

The supervisors in each state were involved in the study from the initial piloting stage. The teams of trained interviewers in each state were briefed before each round of

interviews by the National Field Supervisor and debriefed after the first round of interviews.

All questionnaires were edited and then coded before being punched onto computer-cards and validated.

Basis for Per Capita Consumption Figures

Base Date	*City*	*Base No. of Dwellings*	*Sample Population*	*Actual No. of Respondents*	*Household Grossing Up Factor*
June 1974	Sydney[1]	937 017	3 106 000	400	2 343
June 1975	Melbourne[2]	863 559	2 760 000	360	2 399
June 1974	Adelaide[3]	282 581	884 000	180	1 570
June 1975	Brisbane[4]	261 623	862 000	180	1 453
June 1975	Perth[5]	250 315	832 000	160	1 564
June 1974	Hobart[6]	41 421	135 000	120	345
Sept. 1975	Canberra[7]	55 916	202 000	100	559
Total		2 692 432	8 779 000	1 500	1 795

Sample Population = No. of Dwellings × Actual Occupancy Rate

[1] Sydney Statistical Division (S.D.)
[2] Melbourne S.D.
[3] Adelaide S.D. excluding Gawler, Mudla Wirra, Stirling, Willunga.
[4] Brisbane S.D. excluding Albert (Pt), Beaudesert (Pt), Caboolture (Pt), Moreton (Pt), Pine Rivers (Pt), Redland.
[5] Perth S.D. excluding Serpentine—Jarrahdale.
[6] Hobart (Urban parts of Hobart, Clarence and Glenorchy Councils).
[7] Canberra City District.

The base number of dwellings for a city is taken for the latest year for which information was available at the time of sample selection (noted in above table).

The Brisbane and Perth Sample areas were less than the total City population as they excluded remote LGAs.

Population data for surveyed areas of Brisbane, Adelaide, Perth and Hobart was not available for the base year, so was calculated by applying the average occupancy rate to the base number of dwellings. The average occupancy rate was calculated by using the population figures for SDs and Hobart LGAs as given below:

	Base No. of Dwellings	*Population*	*Occupancy Rate*
Adelaide SD'74	289 953	885 400	3.054
Brisbane SD'75	302 204	958 800	3.173
Perth SD'75	250 908	787 300	3.138
Hobart/Clarence/Glenorchy	45 418	135 019	2.973

APPENDIX III

Estimation of Survey Sampling Errors

This Appendix considers the scale and estimation of certain sampling errors that relate to the household sample survey of fish and seafood consumption conducted in Australian capital cities and Canberra over four quarters ending February 1977.

The need to estimate sampling errors arises from the fact that different samples drawn from the same population will yield different estimates of variables holding a particular attribute. Sampling errors are estimated in order to give a degree of confidence in a value or in the difference between two values.

The statistical design of sample surveys is directed to obtaining information representative of a population at economical cost. There is a trade-off between using a 'simple random sampling' (s.r.s.) design that affords relatively simple formulae for estimation of survey errors, and a 'stratified and clustered' design for which the error estimation is mathematically complex. Variance estimates for clustered designs are usually higher than for simple random samples. The trade-off arises in the high cost of interviewing 'simple random samples' of households in our sprawling suburbs compared to the more economical interviewing of clusters of households in representative Census Districts of regions (strata) of our capital cities.

To facilitate estimation of sampling errors, Sydney and Melbourne were each divided into five strata, Brisbane and Adelaide into three strata each, Perth and Canberra into two strata each. Hobart was considered as a single stratum. The 21 strata were made up of contiguous Local Government Areas (LGAs) in each city, the groupings of LGAs having been made on the basis of natural boundaries, and social/geographic development.

To each stratum a sample of households n_h (rounded to the nearest ten) was allocated in proportion to the number of households in the stratum. Within each stratum $\frac{n_h}{10}$ Census Districts were systematically selected with probability proportional to the number of households in each Census District in the stratum. Within each selected Census District a cluster of households were selected using a quasi-random procedure to yield ten effective household interviews. This procedure for selecting starting points for each cluster is explained in survey methodology.

Details of sample allocation and strata weights are given in Table A1. For example, in Sydney Central $\frac{320}{10} = 32$ Census Districts were selected and in each quarter $\frac{32}{4} = 8$ clusters of 10 households each were interviewed. The split-half technique[1] was used to estimate the sampling errors of means. To permit use of this technique, each stratum was subdivided into two halves with an allocation of alternate clusters (of ten) into each half stratum.

[1] The 'split-halves' technique was developed by J. C. Koop (*Ann. Math. Statist*, 42, (3), 1971).

Potentially, sampling errors can be calculated for all the values realised in the survey. The calculation of each error estimate would be an enormous task and their interpretation would be tedious. We therefore give estimates for selected variables, and on the basis of estimating the design effect give a table for estimating errors of proportions. Estimates of errors have only been made for data aggregated over the four quarters of the survey.

Variance Estimates for Mean Fish and Seafood Consumption Levels

The mean consumption of fish served at home and seafood served at home was computed for each sub-strata of the 21 strata in terms of grams per household per week. The weighted mean annual consumption was estimated for each city ($\bar{x}_{city}$) and for all capital cities taken together ($\bar{x}$) by multiplying weekly consumption by fifty-two.

The variance of the sample means was estimated for each city and all cities using the split-halves formulae e.g.

$$\text{var}(\bar{x}) = \tfrac{1}{4}\Sigma_{h=1}^{21} W_h^2 (\bar{x}_{1h} - \bar{x}_{2h})^2$$

where $\bar{x}$ = all capital cities sample mean

$\bar{x}_{1h}$ = 1st split-half sample mean in stratum h

x_{2h} = 2nd split-half sample mean in stratum h

W_h = stratum weight for stratum h, i.e. proportion of households in the sampling frame falling into stratum h, or in other words households in stratum h as a proportion of all households in that city.

Table A1 Details of Stratified Sample

Stratum Name		*Stratum Weights Within City* W_h	*Stratum Weights Between Cities*	*No. of Sample Households* n_h
Sydney	Central	.202	.0702	320
	East South	.242	.0842	400
	West South West	.167	.0582	240
	West North West	.195	.0678	320
	North	.194	.0676	320
	Total	1.000		1 600
Melbourne	South	.286	.0918	400
	Central	.127	.0418	200
	West	.129	.0413	200
	North	.172	.0553	200
	East	.286	.0915	400
	Total	1.000		1 400
Brisbane	North	.347	.0338	240
	South	.329	.0319	240
	Central West	.324	.0315	240
	Total	1.000		720
Adelaide	Coast	.357	.0374	240
	North	.334	.0350	240
	City	.309	.0325	240
	Total	1.000		720

Table A1 Details of Stratified Sample

Stratum Name		*Stratum Weights Within City* W_h	*Stratum Weights Between Cities*	*No. of Sample Households* n_h
Perth	North	.487	.0453	320
	South	.513	.0476	320
	Total	1.000		640
Hobart		1.000	.0154	400
Canberra	North	.481	.0098	240
	South	.519	.0106	240
	Total	1.000		480
Total			1.0000	6 000

When multiplied by a factor of two (an approximation to 1.96), the standard deviation (which is the square root of the variance) of the mean yields a confidence interval. There are 19 chances in 20 that the true value lies within two standard deviations of the estimate.

$$\bar{x} - 2 \text{ std. dev } (\bar{x}) < \mu < \bar{x} + 2 \text{ std. dev. } (\bar{x})$$

where std. dev. is the standard deviation.

Table A2 Variation of Mean Annual Consumption of Fish served at Home Kilograms

	Per Household			*Per Person (approximation)*		
	Mean	*2 Standard Deviations Of Mean*	*95% Confidence Interval on Mean*	*Mean*	*2 Standard Deviations of Mean*	*95% Confidence Interval on Mean*
All Cities	19.1	0.7	18.4 to 19.8	5.9	0.2	5.7 to 6.1
Sydney	21.6	1.6	20.0 to 23.2	6.5	0.5	6.0 to 7.0
Melbourne	18.1	1.2	16.9 to 19.3	5.7	0.4	5.3 to 6.1
Brisbane	19.4	1.7	17.7 to 21.1	5.9	0.5	5.4 to 6.4
Adelaide	18.6	0.5	18.1 to 19.1	6.0	0.2	5.8 to 6.2
Perth	18.6	1.9	16.7 to 20.5	5.6	0.6	5.0 to 6.2
Hobart	13.3	2.9	10.4 to 16.2	4.2	0.9	3.3 to 5.1
Canberra	17.0	0.8	16.2 to 17.8	4.7	0.2	4.5 to 4.9

Table A2 suggests highest mean fish consumption (served at home) occurred amongst Sydney households followed by Brisbane. The cities of Melbourne, Adelaide and Perth have similar 'close to average' consumption patterns. Less fish is served at home in Canberra than the above cities and Hobart households have the lowest consumption of fish at home.

Table A3 Variation of Mean Annual Consumption of Seafood Served at Home

Kilograms

	Per Household			*Per Person (approximation)*		
	Mean	*2 Standard Deviations of Mean*	*95% Confidence Interval on Mean*	*Mean*	*2 Standard Deviations of Mean*	*95% Confidence Interval on Mean*
All Cities	3.4	0.4	3.0 to 3.8	1.1	.1	1.0 to 1.2
Sydney	3.7	1.8	1.9 to 5.5	1.1	0.5	0.6 to 1.6
Melbourne	2.3	0.3	2.0 to 2.6	0.7	0.1	0.6 to 0.8
Brisbane	3.8	1.6	2.2 to 5.4	1.2	0.5	0.7 to 1.7
Adelaide	3.1	1.5	1.6 to 4.6	1.0	0.5	0.5 to 1.5
Perth	5.1	.1	5.0 to 5.2	1.5	...	1.5 to 1.5
Hobart	2.7	2.2	0.5 to 4.9	0.8	0.7	0.1 to 1.5
Canberra	8.5	4.5	4.0 to 13.0	2.4	1.2	1.2 to 3.6

Table A3 shows that mean consumption of seafood served at home is far lower than that of fish. Canberra has highest range of consumption (but very variable) followed by Perth (with almost no variation). Sydney and Brisbane were above the all-capitals average and quite variable. Melbourne households had lowest range of home consumption of seafood. Adelaide and Hobart had below average consumption of seafood at home, both cities showing high variability.

Estimates of 'per person' consumption are strictly speaking estimates of a ratio of two variables, namely average household consumption and average household size i.e., persons per household. Data on average household size within sub-strata are not available. As average household size is known to be far less variable than consumption, the 'per person' estimates given in Tables A2 and A3 are reasonable as they are the result of dividing the weighted mean of consumption per household in strata by a mean city household size for each city and all cities taken together.

The discussion above relates to estimates of variance of means. The scale of variances of means is generally smaller than the underlying variance of the individual observations to the order of n, the sample size. Table A4 gives the means and standard deviations of weekly household fish and seafood consumption in each sub-strata. The very wide variability within sub-strata indicates the differing patterns of consumption in all parts of the community.

Estimation of Design Effect

In view of the need to make estimates of errors that apply to a broad range of variables we have examined the relationship between the variance for the stratified/cluster design and the variance that would have applied had a simple random sample been employed. The method involves estimating 'design effects' (deff (x)), where the estimated design effect for sample estimation x is defined as:

$$\text{deff}(x) = \frac{\text{estimated variance of x for the complex design}}{\text{estimated variance of x for s.r.s. of the same size}}$$

For forming confidence intervals $\sqrt{\text{deff}(x)}$ represents the multiplier that may be applied to the s.r.s. standard deviation to give the estimate of standard deviation for the complex design.

Using the large-sample standard normal distribution approximation for the sampling distribution of

$$\frac{p - P}{\text{Std dev}(p)},$$

Table A4 Mean and Standard Deviations of Fish and Seafood Consumption at Home by Sub-Strata, Four-Quarter Aggregate, Grams Per Household Per Week

Stratum	*Sub-Stratum*	*Fish*		*Seafood*	
		Mean	*Standard Deviation*	*Mean*	*Standard Deviation*
Sydney					
Central	1	354	466	64	222
	2	372	552	67	236
East South	1	352	468	42	188
	2	370	525	46	152
West South West	1	514	1 090	155	863
	2	430	679	75	239
West North West	1	391	532	56	184
North	1	383	520	74	299
	2	515	852	39	143
Melbourne					
South	1	324	453	41	149
	2	387	595	37	189
Central	1	273	367	33	85
	2	245	357	40	164
West	1	398	616	37	130
	2	311	435	57	244
North	1	435	515	68	233
	2	423	540	63	220
East	1	344	445	33	109
	2	317	419	48	152
Hobart					
	1	227	412	31	224
	2	285	519	73	260
Brisbane					
North	1	341	489	65	264
	2	390	555	48	206
South	1	377	510	30	124
	2	345	605	124	64
Central West	1	352	473	95	441
	2	438	624	81	271
Adelaide					
Coast	1	421	704	58	204
	2	407	705	141	534
North	1	363	457	41	254
	2	341	478	34	149
City	1	309	340	47	225
	2	290	394	33	131
Perth					
North	1	317	485	103	518
	2	332	515	108	369
South	1	353	509	91	335
	2	424	562	93	314
Canberra					
North	1	341	458	25	90
	2	349	542	72	271
South	1	327	420	36	139
	2	297	417	40	160

a 95% confidence interval for the population value of the proportion P is

$$p - 2\sqrt{\text{deff}(p)}\sqrt{\frac{p(1-p)}{n}} \leqslant P \leqslant p + 2\sqrt{\text{deff}(p)}\sqrt{\frac{p(1-p)}{n}}$$

where p is the sample estimate of the proportion and n is the sample size.

As deff is usually greater than 'one' the confidence interval is wider than that for an equivalent simple random sample design.

Table A5 gives estimates of $\sqrt{\text{deff}}$ for each city and all cities together that result from computing split-halves estimates of proportions for five selected variables. The selected variables broadly cover the range of the distribution of a proportion i.e., ranging from 10.3% to 49.4%.

The deff estimates for Sydney and Melbourne lie above the below the mean of 1.98 for all cities. Although the Table shows deff varies considerably both within cities and between cities we propose a value of 2 as a reasonable estimate of deff for most purposes for which the fish and seafood consumption survey may be used.

Table A5 Estimates of the Square Root of the Design Effect for Selected Variables

	Households Which					
	Served Fish Fingers Once in Past Week	*Served Fish Fingers but not in Past Week*	*Never Serve Fish Fingers*	*Fresh Fish Served*	*Never Serve Fresh Fish*	*Average $\sqrt{deff}$*
Mean Proportion for All Cities %	10.3	37.5	49.5	25.7	18.1	
All Cities	2.74	2.86	1.29	1.82	1.20	1.98
Sydney	2.81	3.75	2.45	1.83	.79	2.33
Melbourne	2.46	1.71	2.58	1.14	1.50	1.88
Brisbane	2.67	2.66	3.63	1.28	.93	2.23
Adelaide	2.62	1.01	3.60	2.28	.90	2.08
Perth	1.00	.37	3.93	1.62	.91	1.57
Hobart	2.80	.36	4.90	.35	.86	1.85
Canberra	3.11	2.77	4.47	1.01	.51	2.37

Table A6 gives estimates of the standard deviations for a percentage variable p calculated as

$$\text{std dev. (p)} = \sqrt{\text{deff}} \times \text{std dev of a s.r.s.}$$

$$= 2 \times \sqrt{\frac{p(1-p)}{n}}$$

$$= 2\sqrt{\frac{p(1-p)}{n}}$$

Thus a 95% confidence interval for a proportion of 80% occurring in Melbourne would be 80% ± 2 (2.1%) i.e., 75.8% to 84.2%.

Table A6 Estimates of Standard Deviations of Percentages

Sample Size n	*Percentage P* %	5 95	10 90	15 85	20 80	25 75	30 70	35 65	40 60	45 55	50
6000 (All Cities)		.6	.8	.9	1.0	1.1	1.2	1.2	1.3	1.3	1.3
2500		.9	1.2	1.4	1.6	1.7	1.8	1.9	2.0	2.0	2.0
2000		1.0	1.3	1.6	1.8	1.9	2.0	2.1	2.2	2.2	2.2
1600 (Sydney)		1.1	1.5	1.8	2.0	2.2	2.3	2.4	2.4	2.5	2.5
1400 (Melbourne)		1.2	1.6	1.9	2.1	2.3	2.4	2.5	2.6	2.6	2.6
1000 (Brisbane)		1.4	1.9	2.3	2.5	2.7	2.9	3.0	3.1	3.1	3.1
720 (Adelaide)		1.6	2.2	2.7	3.0	3.2	3.4	3.6	3.6	3.7	3.7
640 (Perth)		2.0	2.7	3.2	3.6	3.9	4.1	4.3	4.4	4.5	4.5
480 (Canberra)		2.0	2.7	3.3	3.6	4.0	4.2	4.4	4.5	4.5	4.6
400 (Hobart)		2.2	3.0	3.6	4.0	4.3	4.6	4.8	4.9	5.0	5.0
300		2.5	3.5	4.1	4.6	5.0	5.3	5.5	5.7	5.7	5.8
200		3.1	4.2	5.0	5.7	6.1	6.5	6.7	6.9	7.0	7.1
100		4.4	6.0	7.1	8.0	8.6	9.2	9.6	9.8	10.0	10.0
50		6.2	8.5	10.1	11.3	12.2	13.0	13.5	13.9	14.1	14.1

Table A7 is an extension of Table A6 and gives error estimates for weighted up samples of variables given in terms of thousand of households for each city and all cities. Table A6 may be used as follows. If in Melbourne 413 000 households never serve fish fingers the appropriate 95% confidence interval is obtained by referring to the upper row for Melbourne in Table A7 and finding the closest value to 413 000 i.e., in this case 390 000 for which the error estimate is given as 22 000 in the row below.

The confidence interval is then computed as

$$413\,000 \pm 2\,(22\,000)$$

i.e., between 369 000 and 477 000 Melbourne households never serve fish fingers.

Table A7 Estimates of Standard Deviations for Variables Showing Thousands of Households in Capital Cities Holding Attributes

ALL CITIES																				
Variable Estimates	000s	140	270	400	540	670	810	940	1080	1210	1350	1480	1620	1750	1890	2020	2150	2290	2420	2560
Standard Deviation	000s	16	22	24	27	30	32	32	35	35	35	35	35	32	32	30	27	24	22	16
SYDNEY																				
Variable Estimate	000s	50	90	140	190	230	280	330	380	420	470	520	560	610	660	700	750	800	840	890
Standard Deviation	000s	10	14	17	19	21	22	22	22	23	23	23	22	22	22	21	19	17	14	10
MELBOURNE																				
Variable Estimate	000s	40	90	130	170	222	260	300	350	390	430	480	520	560	600	650	690	730	780	820
Standard Deviation	000s	10	14	16	18	20	21	22	22	22	22	22	22	22	25	20	18	16	14	10
BRISBANE AND ADELAIDE																				
Variable Estimate	000s	15	25	40	55	70	80	95	110	120	135	150	165	175	190	205	220	230	245	260
Standard Deviation	000s	4	6	7	8	9	9	10	10	10	10	10	10	10	9	9	8	7	6	4
PERTH																				
Variable Estimate	000s	12	25	38	50	62	75	88	100	112	125	138	150	162	175	188	200	212	225	238
Standard Deviation	000s	5	7	8	9	10	10	11	11	11	11	11	11	11	10	10	9	8	7	5
HOBART																				
Variable Estimate	000s	2.0	4.1	6.2	8.2	10.2	12.3	14.4	16.4	18.4	20.5	22.6	24.6	26.6	28.7	30.8	32.8	34.8	36.9	39.0
Standard Deviation	000s	0.9	1.3	1.5	1.7	1.8	1.9	2.0	2.0	2.1	2.1	2.1	2.0	2.0	1.9	1.8	1.7	1.5	1.3	0.9
CANBERRA																				
Variable Estimate	000s	2.8	5.6	8.4	11.2	14.0	16.8	19.6	22.4	25.2	28.0	30.8	33.6	36.4	39.2	42.0	44.8	46.7	50.4	53.2
Standard Deviation	000s	1.1	1.5	1.8	2.0	2.2	2.4	2.5	2.5	2.5	2.6	2.5	2.5	2.5	2.4	2.2	2.0	1.8	1.5	1.1

Relationship Between Trade Names and Other Names for Fish

The names used in the report to describe fish and seafood purchased and consumed are the names which respondents used in describing their purchases or catch. These were the common or trade names of the fish. The main objectives of this Appendix are:

- to denote the range of species which may be covered by such common names;
- to indicate where fish and seafood may have been named incorrectly by consumers or retailers and to suggest what the correct species may have been; and
- to provide the proper and scientific name for the fish and seafood where a common name may refer to a number of species.

Table 1 sets out the common name, the proper name and the scientific name of all Australian caught fish discussed in this Appendix.

Table 1 Common, Proper and Scientific Names of Some Australian Fish

Common Name	*Proper Name*	*Scientific Name*
Whiting	Goldenlined	*Sillago analis*
	Sand (Eastern)	*S. ciliata*
	Trumpeter	*S. maculata*
	Western sand	*S. schomburgki*
	King George or spotted	*Sillaginodes punctatus*
Snapper	Snapper	*Chrysophrys auratus*
	Queen snapper	*Nemadactylus valenciennesi*
Bream	Yellowfin	*Acanthopagrus australis*
	Pikey	*A. berda*
	Black	*A. butcheri*
	Western yellowfin	*A. latus*
	Buffalo	*Segutilum corneli*
	Bony bream	*Fluviolosa richardsoni*
Flathead	Bartailed	*Platycephalus indicus*
	Dusky	*Neoplatycephalus fuscus*
	Northern sand	*Trudis arenarius*
	Tiger	*Neoplatycephalus richardsoni*
	Sand	*Trudis bassensis*
Flounder	Flounder	*Rhombosolea spp.*
Tuna	Southern bluefin	*Thunnus maccoyii*
	Northern bluefin	*T. tonggol*
	Yellowfin	*T. albacres*
	Skipjack or striped	*Katsuwonus pelamis*
	Dogtooth	*Gymnosarda nuda*
Salmon	Australian salmon	*Arripis trutta*
Sardines	Pilchards	*Sardinops neopilchardus*
	Perth herring	*Fluvialosa vlaminghi*
	Anchovy	*Engraulis australis*
	Sandy spratt	*Hyperlophus vittatus*
	Spratt	*Clupea bassensis*
	Scaly mackerel	*Amblygaster postera*

Flake	Gummy shark	*Mustelus antarcticus*
	School shark	*Galeorhinus australis*
Cod	Cod	*Epinephelus* and *cephalopholis* spp.
	Cod	*Plectropoma maculatum*
	Southern rock cod	*Physiculus barbatus*
	Murray cods	*Maccullochella* spp.
Butterfish	Butterfish	*Selenotoca multifasciata*
Prawns	Brown tiger prawn	*Penaeus esculentus*
	Banana prawn	*P. merguiensis*
	Eastern king prawn	*P. plebejus*
	Western king prawn	*P. latisulcatus*
	Endeavour prawn	*Metapenaeus endeavouri*
	School prawn	*M. macleayi*
	Green-tail prawn	*M. bennettae*
	Rainbow prawn	*Parapanaeopsis sculptilis*

1. Whiting

Six species of whiting are caught locally and these are predominantly sold as fresh fish for serving at home or eating out at restaurants.

King George or spotted whiting is the major species landed, with South Australia being the chief producer (some 1000 tonnes annually) and smaller quantities being caught in Victoria and Western Australia. School whiting is also important with a catch of close to 1000 tonnes and nearly all landed in Victoria. Less than half of the school whiting catch is eaten in Australia. About 300 to 400 tonnes of sand whiting is caught annually and 100 to 200 tonnes of trumpeter whiting. These species are found mainly off Queensland and New South Wales.

Whiting *(Gadus merlangus)* is also imported, with Scotland and Ireland being the principal source of supply. These imports differ significantly from the local species having a softer texture flesh and generally an inferior taste.

2. Snapper

Snapper and queen snapper are the two species of this fish landed locally. These are high quality eating fish and are predominantly sold fresh for serving at home or for eating out in restaurants. Only a small proportion, if any, is believed to be actually sold as cooked fish from 'take aways'. This conflicts with information supplied by many survey respondents, mainly in Perth, concerning the purchase of snapper as cooked fish from 'take aways'. It is thought that the fish sold as 'snapper' was chiefly imported hake with possibly a smaller proportion being shark.

New South Wales is the main producer of snapper and accounts for about half of the annual catch of some 1500 to 2000 tonnes. It is also caught in significant quantities in all other States, excepting Tasmania. Queen snapper represents only a very small proportion of the catch and is mainly caught in Western Australia.

About 1000 tonnes of snapper is imported mainly from New Zealand. This fish is similar to that taken locally and is sold as fresh fish for serving at home or eating out at restaurants.

3. Bream

Most bream caught locally is either black or pikey bream and is landed along the East Coast. Victoria and New South Wales are the major producing States.

Bream is a high quality eating fish mainly sold fresh for serving at home or eating out at restaurants. Little is actually believed to be sold as cooked fish from 'take aways' which conflicts with details supplied by respondents about this species particularly in Sydney and Canberra.

It is thought that the species sold as bream cooked from 'take aways' was predominantly either Japanese or South African hake.

Bream *(Abramis brama)* is also imported principally from Denmark and other Western European countries. It is considered that this fish does not differ significantly from the local species. Some quantities may be sold through 'take-aways' as cooked fish but most is sold as frozen packaged fish through supermarkets for eating at home.

4. Flathead

Tiger, sand, dusky and bartailed are the major species of this fish caught domestically. New South Wales and Victoria are the dominant producing States, with much smaller quantities being landed in all the other States. Most of this fish is sold in Sydney.

Although respondents stated that they purchased significant quantities from 'take aways' as cooked fish, it is believed that what may have been purchased on many or most occasions was an imported species such as hake.

No flathead is believed to be imported.

5. Flounder

Relatively small quantities of flounder are caught locally and catches are believed to be less than 100 tonnes. Victoria, Tasmania and South Australia are the main producing States. This is a high quality eating fish mainly sold fresh for serving at home or for eating out at restaurants.

Flounder is also imported, some in frozen packaged form from Europe and the other as fresh or chilled whole fish from New Zealand. About 300 tonnes liveweight is imported from New Zealand annually.

6. Tuna

Southern bluefin and skipjack or striped tuna are the principal local species landed. Some yellowfin and northern bluefin are also taken, but in very small quantities.

This fish is predominantly used for canning, although a small proportion is sold fresh. Nearly all tuna is served at home as canned, although some quantities may be eaten out in the form of sandwiches and salad, etc. purchased from 'take aways' and restaurants.

Frozen tuna is imported on occasions, depending chiefly on the shortfall in local landings, for use by domestic canners. Some is also imported already canned.

These imports are generally of skipjack tuna and believed to be similar to the skipjack caught locally. However, for canning purposes they are considered inferior to southern bluefin tuna—the main species used in Australia.

7. Salmon

Australian 'Salmon' is the only species of this type of fish caught locally. It is a canning variety and is served mainly at home.

Western Australia, South Australia and New South Wales are the major producing States, although significant quantities are also landed in Victoria and Tasmania. The annual catch is around 3000 to 5000 tonnes liveweight.

About 8000 tonnes of canned salmon is imported annually, chiefly from Japan, Canada and the United States. The bulk of these consist of pink with a smaller amount of red salmon being imported.

The imported salmon differs in species and quality from the local fish. The Australian 'salmon' in fact is not a true salmon but a perch and generally is regarded as not being as high a grade as the imported product.

8. Fish fingers

Currently fish fingers are not produced locally on a commercial scale using Australian fish, although research is being conducted in this field to find suitable species for this purpose. The fish fingers which are imported are based on cod species from the Northern Hemisphere and South African hake.

9. Sardines

Although there are domestic landings of small species of fish like pilchards, herrings, anchovy, sprat and scaly mackerel, little is used for human food consumption. Most are used as raw material for fish meal production for stock feed supplements and bait for fishing. Some is also used in making fish pastes and for specialty pickled food items.

Most of the local small fish is landed in Victoria and Western Australia with smaller quantities in New South Wales.

Sardines are imported from several European countries. These are chiefly in canned form although a significant amount comes in cured as either salted, dried or smoked fish. These are predominantly for serving at home.

10. Flake

Flake is the trade name given to shark. The species involved are mainly gummy and school shark, although other smaller quantities of shark are also caught and marketed. The bulk is sold through fish and chip shops either as cooked or fresh filleted fish.

School and gummy shark are caught off most States, but mainly Victoria with New South Wales being a major producer.

Small quantities of shark are imported from New Zealand and these are similar to the domestically caught fish.

11. Cod

Cod is landed locally in very small quantities with Queensland being the main producer followed by Western Australia.

Most cod (*Gadus morrhua*) is imported and sold through supermarkets as fish fingers for serving at home.

Cod was also stated by Brisbane respondents to be the principal fish purchased cooked from 'take aways'. However, it appears that this was not cod but was mainly imported hake, either Japanese or South African.

12. Butterfish

A very small quantity of butterfish is landed locally mainly in Queensland, but some also in the Northern Territory.

Butterfish was given as the principal fish purchased cooked from 'take aways' in Adelaide. This was found also to be imported hake.

13. Prawns and Shrimps

Many species of prawns are caught domestically. These range in size from the large type to the small variety.

The term shrimp is widely used overseas to describe what in Australia are called prawns. Quite often however local consumers and distributors may call very small prawns shrimp.

Australia imports significant quantities of very small prawns from Asia.

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