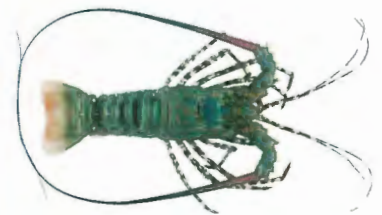


Final report for
**Handbook of Australian
seafood – a guide to
whole fish and fillets**



FRDC Project No. 1994/136

P. R. Last

G. K. Yearsley

R. D. Ward

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NON-TECHNICAL SUMMARY

1994/136

Handbook of Australian seafood—a guide to whole fish and fillets**PRINCIPAL INVESTIGATOR:** Dr P. Last**ADDRESS:**

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OBJECTIVES:

1. To produce the definitive handbook for the identification of all fresh and frozen domestic seafood species marketed in Australia.
2. To review the composition of Australia's seafood imports and produce a handbook for the identification of contemporary imported seafood species.
3. To include within both handbook volumes a means of identifying flesh and fillets of these species based on their protein fingerprints.
4. To include within both handbook volumes other information of value to marketers (including oil composition information, FRDC Project 95/122, in handbook volume 1) not covered in or by other industry references.
5. To structure the handbook volumes so they become basic references to both consumers and marketing sectors of industry.

NON TECHNICAL SUMMARY:

OUTCOMES ACHIEVED TO DATE

- the domestic and imported species volumes of the *Australian Seafood Handbook* have proven very popular with consumers, recreational anglers, and industry, demonstrating their adoption as the baseline reference for seafood in Australia. The Sydney Fish Market adopted the handbooks as their standard works of reference, and FSANZ wrote the handbooks into the draft *Food Standards Code* as the base reference for Australian seafood marketing names;
- the handbooks are widely accepted by retailers, with copies displayed and sold by numerous fish retail outlets and bookshops. Product lines in supermarkets have been reduced by the adoption of the handbooks as the identification tool for purchasing and marketing agents, and chefs and restaurateurs have similarly embraced the guides. High profile features in food-service trade magazines and lifestyle publications have both demonstrated and invigorated acceptance in the commercial and public sectors;
- reliable reports indicate that seafood sales in Sydney increased by some ten percent immediately following the launch of the domestic species handbook. Consumer awareness of the enormous range of quality seafood in Australia has significantly increased, resulting in greater willingness to sample the diversity of seafood available;
- a first-time survey of the composition of the Australian seafood market (domestic and imported species) resulted in a dramatic increase in the documented number of seafood species available in Australia;
- both handbooks provide a tool to identify fillets based on morphological characteristics. This arms consumers and industry personnel with valuable and authoritative knowledge when purchasing seafood in its common value-added form;

- tools are provided to distinguish fillets genetically, and the publication of the handbooks has sparked widespread interest in this and similar (e.g. DNA) techniques. These methods will become even more important, and increasingly applied, if marketing names are legislated;
- a tissue reference library was established, containing more than 4,800 samples from over 700 species. These samples can be used for DNA analysis as required;
- bulk copies of handbooks have been purchased by some exporters as gifts for overseas buyers, to increase awareness and familiarity with Australian products. Importers are equally assisted by now having a comprehensive reference to product that has been imported over recent decades;
- the provision of an identification tool incorporating both species and marketing names allows AQIS inspectors to reliably and consistently identify imported seafood species. This is of particular importance for trade-restricted items (e.g. CITES listed species);
- an extensive collection of high-quality transparencies of commercial species and product has been assembled. The scientific and commercial significance of this collection added weight to a proposal to value-add to the Photographic Index of Australian Fishes (PIAF). A resultant project (FRDC 2001/231) will see etched, digitised images available to specialist and general audiences via the internet;
- the inclusion in the domestic species handbook of oil composition profiles of many Australian seafood species has generated considerable interest. Such data, although of great importance, were previously available for only a few species.

Australians have always had a close association with the sea and a great appreciation of the excellent food that it provides. In this respect, we are fortunate in having possibly the greatest variety of seafood available anywhere. Australian seafood is second-to-none in quality and is enjoyed by millions of people both locally and overseas. However, to local consumers of seafood, this rich diversity of tastes and textures is a mixed blessing because fishes available in the market are often unknown to them. Some fishes available in eastern Australia are unavailable in the west and so on. Other species have been known by more than a single marketing name across the region. There has long been a need for a comprehensive, authoritative identification guide to assist those in our fishing and seafood industries, as well as Australian consumers, to identify fish. Surprisingly, it has taken until the very end of the Twentieth Century for a complete handbook to Australian seafood to become available.

This knowledge gap has been very successfully filled with the publication of two handbook volumes: the first published in 1999 covering all major domestic seafood species available in Australia; the second, a guide to seafood imported to Australia, was published in 2003. These books have received exceptionally favourable reviews from critics across Australasia. The first book, which was in bestseller lists across the nation (10,000 copies sold in about 18 months and a reprint after 2 years), also won a national print award. The handbooks, which are aligned with a Seafood Services Australia strategy to achieve best market practice, received accolades at an international symposium on seafood marketing practices in Spain. These products establish Australia as a world leader in moving to achieve authenticity of product labeling.

The handbook project was strongly supported by a joint government/industry committee chartered with standardising fish names (i.e. the 'Recommended Marketing Names of Fish Committee' now the 'Fish Names Committee') and the FRDC, who recognised the need for a national standard reference for seafood. These handbooks provide the means to identify both whole animals and other market products (e.g. fillets) using a combination of genetic and external morphological features. Work on the handbooks project began in late 1994 but it soon became clear that the scope of the study needed to be expanded to properly treat all seafood species currently marketed. The diversity of domestic seafood was much greater than previously thought and imported species were even less well identified. The original list of domestic seafood species was expanded by 90%, reflecting a shift in the market composition

due to the exploitation of new resources and changing dietary preferences through Asian influences. Also, novel methods of identifying fish from their fillets were devised using newly recognised anatomical characters.

The main results of this project have been presented in two separate handbook volumes. In addition to providing information identifying seafood species sold in Australia, these books cover in detail aims of the project, how to use the handbooks, complex issues regarding seafood names, and the size, habitat, distribution, fishery information and general remarks on each species. Important features of their fillets in the case of fish (or shelled product in the case of shellfish), as well as protein fingerprints and oil compositions are also provided for many species. These findings and the inclusion of information on the nutritional value of many species make these handbooks a world first.

Other products emanating from the project include an important digital image record of Australian seafood, both domestic and imported. This includes images of more than 500 whole animals and about 275 fillets that have been used for seafood promotion and are likely to be used soon for a variety of posters for public education. The protein fingerprint of a fillet can be matched against protein profiles of all Australian commercial species to determine its identity. This methodology is simple, and protein tests can be conducted outside the laboratory (e.g. in fish shops, fish markets or at landing sites). The study identified several common market species not noted as being commercially important, and even discovered some that are presently un-named. Even the well-known commercial and recreational species, the Moses snapper (*Lutjanus russelli*), was found to consist of two species across northern Australia that are subtly different in colour and differ genetically. This example demonstrates the value of using both molecular and classical techniques for distinguishing closely related species.

This project greatly exceeded the expected outcomes through its product quality, broad acceptance, and other ancillary information obtained. The handbooks have become a baseline reference tool for a variety of users, including the fishing industry, managers, scientists, recreational fishers, and the general public. Dissemination of this information, and use of the standardised marketing names included therein, will lead to increased consumer confidence in seafood products, with obvious benefits to industry. While prepared primarily for those who earn their living catching, buying, selling or studying seafood, these handbooks will also be of great interest to anglers. Waterproof copies will no doubt be taken on many fishing adventures.

Perhaps these handbooks have not been written before because of logistic difficulties. The number and variety of Australian seafood species eaten locally is enormous. To seek out specimens, photograph and collect detailed information on various aspects of each one has proven a daunting task.

The project also produced some valuable spin-offs that could be developed further. The value of validated images of species for promotional work is obvious. Similarly, validated tissue samples obtained from each species could be used for DNA profiling. Fillet descriptions published in the handbooks could be expanded greatly to characterise each species and to provide more basic information on fillet characteristics. The oils work complemented this project and additional domestic species, as well as imported species, remain to be analysed.

The seafood handbook project has been immensely successful in gaining widespread endorsement. However, the current versions will need periodic updating as new commercial species emerge and more information on existing species becomes available. Meanwhile, industry members and lay-people should now be able to put a consistent name to the species they catch, sell or consume.

KEYWORDS: Australian, seafood, handbook, guide, identification, domestic, imported, fish, shellfish, fillet, colour photo, protein fingerprint, oil composition.

ACKNOWLEDGEMENTS

The initiative for this project came from the Fish Names Committee (FNC), and its predecessors, with the financial backing of the FRDC. Strong support for the handbooks was received from numerous individuals representing these two organisations over many years, if not decades. More recently, additional support has come from Seafood Services Australia (SSA). We must also highlight unstinting support from Peter Dundas-Smith and Patrick Hone (FRDC), Roy Palmer (FNC) and Ted Loveday (SSA). Without their, and their colleagues, long-term enthusiasm, the handbooks simply wouldn't exist.

The preparation of comprehensive guides such as the seafood handbooks relies on the willing participation of literally hundreds of people from many sectors of the fishing industry and government. Contributors are gratefully acknowledged in each handbook (Appendix 3).

Eleven authors (six others besides the authors of this report) contributed to one or both of the handbooks, and their expert knowledge added immense value to the final products: Jane Andrew, Ross Daley, Nick Elliott, Ben Mooney, Nick Ruello and Patti Virtue.

Last, but by no means least, we thank again the curatorial staff of CSIRO's National Fish Collection in Hobart. Alastair Graham and Spikey Riddoch went well beyond the call of duty with various aspects of specimen acquisition and curation, and the reviewing of draft text.

1. BACKGROUND

The need for a comprehensive guide to Australian seafood had been widely identified by industry prior to the commencement of this project. The absence of a standard reference was formally recognised by the 'Recommended Marketing Names of Fish Committee' (now the 'Fish Names Committee') at a FRDC-sponsored meeting in May, 1993. Soon after, FRDC provided funding support to the CSIRO Division of Marine Research for a project to produce handbooks of Australian seafood covering both domestic and imported species. The first handbook, which was based on domestic species included in *Marketing Names for Fish and Seafood in Australia*, (DPIE, 1995, also known as the 'Marketing Names Guide'), aimed to identify both whole animals and other market products (e.g. fillets) using a combination of genetic and external morphological features.

Work on the handbooks project began in late 1994. However, it soon became clear that the scope of the study needed to be expanded to properly treat all current seafood species. Domestic seafood available in Australia was much more diverse than previously thought and the imported component varied greatly from the literature. For example, the original list of domestic seafood species (taken from the Marketing Names Guide) increased by 90%. These additional species, which reflected a shift in the market structure due to an increasing Asian population and the exploitation of new resources, needed to be formally named through the marketing names process. Also, novel methods of identifying fish from fillets were devised using newly discovered anatomical characters. This work, which was expanded to include all handbook fishes, significantly increased the scope of the initial study.

Imported species information included in the Marketing Names Guide was outdated and needed to be reviewed. Some species listed were no longer imported and the extent of new imports was largely unknown, and certainly undocumented. Imports of edible fisheries products from Taiwan alone had increased from 969 tonnes in 1989/90 to 3864 tonnes in 1996/97 but even centralised compositional records of fish imports were non-existent. A single marketing name was designated by the Fish Names Committee for unlisted species, and the imported species scene was reviewed to produce a separate companion volume covering those species.

The resultant handbook volumes were significantly different from, and more extensive than, the reference products proposed in the original application. A supplementary application in 1997 factored in the expanded scope and redefined timeframes. It also included printing costs for the domestic species volume that were excluded from the original proposal. It was considered more cost effective to work on both volumes concurrently despite acknowledged differences in publication schedules. A major expense of this project involved printing the final volumes so partial cost recovery was sought through income generated by book sales.

2. NEED

In the mid-1990s, Australia had a rapidly expanding fishing industry, which made use of more than 300 local and imported species of seafood. The need for a reference, providing basic marketing information on all of these species in a single location had been identified by many sectors of industry. In addition, several other needs were identified in the first application:

- no single references existed that enabled industry to define and identify all seafood species available in Australia. This need was seen as a primary objective in formulating a well-structured, long-term, marketing strategy for the fishing industry;
- a document designating single marketing names for all Australian seafood types was needed to reduce the plethora of marketing names then in use. However, to gain legal status it needed to be expanded into a more informative and user-friendly form than a simple list of species;
- there was no reference guide identifying fillets or flesh although the technology available to do so existed. A repeatable, objective method of identifying the flesh of species was required when fish substitution was suspected;
- compared with other food industries, seafood options available to us are vast. Consumers are sometimes reluctant to experiment with different seafood products because of a combination of ignorance of the product type and possibly a wariness of industry malpractice. A well-conceived guide would help promote less fashionable seafood and instill greater confidence and awareness of the range of products available;
- a single reference that standardises general information on product form, fillet type and edibility characteristics of all Australian seafood would be very useful to industry;
- a comprehensive handbook containing the above features with complete species codes would also be useful to database managers. Catch data often suffers from poor species identifications—this guide would provide a basic identification tool to fishermen and processors; and
- an important outcome would be the collation of an identification package for each species (i.e. a voucher specimen, photographed and protein fingerprinted, that can be linked to a species code and marketing name) that can be produced in general disputes or litigation over species identity.

As the project progressed additional needs for this work became obvious:

- the original handbook project application allowed for the inclusion of 60 imported and 240 domestic species. However, in researching Volume 1, 466 domestic species (an increase of over 90%) were found to be marketed regularly. The inclusion of these additional species would instill greater confidence in, and awareness of, the full range of products available and would help promote less fashionable seafood;
- while examining fillets to collect data on distinguishing features, some new characters were discovered that were not documented elsewhere for identification purposes. The inclusion of these data in the fillet identification section of the handbooks would provide a unique and valuable resource for the post-harvest sector of the industry and for consumers, and could set a standard for such work worldwide;

- preliminary research into dried and frozen seafood species imported into Australia flagged the need for a thorough investigation of its composition. The Marketing Names Guide included about 50 imported species. However, of eight importers surveyed in the early stages of this project, only 14 (28%) of these species and an additional 30 or so species were imported. A review of the composition of Australia's seafood imports, including a more comprehensive survey of importers, was needed as a precursor to a second handbook volume dedicated to imported species.

3. OBJECTIVES

1. To produce the definitive handbook for the identification of all fresh and frozen domestic seafood species marketed in Australia.
 2. To review the composition of Australia's seafood imports and produce a handbook for the identification of contemporary imported seafood species.
 3. To include within both handbook volumes a means of identifying flesh and fillets of these species based on their protein fingerprints.
 4. To include within both handbook volumes other information of value to marketers (including oil composition information, FRDC Project 95/122, in handbook volume 1) not covered in or by other industry references.
 5. To structure the handbook volumes so they become basic references to both consumers and marketing sectors of industry.
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4. METHODS

4.1 Components of the handbook project

This project incorporated aspects of a broad variety of disciplines, including fishery biology, classical taxonomy, molecular biology, biochemistry, film and digital imagery, and book production, that make use of often unrelated techniques. The relevance of many of these has already been described in the seafood handbooks (Volume 1, pp 6–14, 358–359, 395; Volume 2, pp 6–14, 176–177) but additional explanations are provided below when needed.

Selection of species profiled

The production of the Australian Seafood Handbooks was intimately linked with the activities and decisions of the Fish Names Committee (FNC) and its predecessors. Names that were approved by the committee were published in *Marketing Names for Fish and Seafood in Australia* (DPIE, 1995), which is also referred to as the 'Marketing Names Guide'. However, numerous market surveys revealed that this list was incomplete, and various submissions were made to the FNC over the course of this project to approve dozens more names.

Two confidential surveys were conducted to delineate dominant imports. The first, in 1996, surveyed eight major Victorian seafood importers with respect to the imports listed in the Marketing Names Guide. Each importer was sent a list of the imported species mentioned in the Guide and asked to indicate whether or not they imported those species. They were also asked to indicate what non-listed species they imported.

A second, more comprehensive, survey in 2000 asked importers to list the species they imported, along with additional information such as 'country of origin'. A blank survey form is included (Appendix 4). The Seafood Importers Association of Australasia willingly assisted by providing contact details of their members. Survey forms were sent to about 30 of these importers. The names of respondents are withheld for commercial confidentiality. A earlier survey of importers conducted by Food Factotum served as a useful starting point for the design of the 2000 survey.

Other imports were identified via market surveys among Asian communities in Sydney (e.g. Cabramatta), Melbourne (e.g. Springvale) and Hobart.

Some rare species (e.g. mado, *Atypichthys strigatus*), although occasionally seen in the marketplace, were not considered commercially important enough to be assigned a marketing name. However, if the volume of some previously rare market species increases, additional marketing names will be required. Also, prominent and/or common members of a group were selected to represent the group in group treatments. Some of these may eventually require an independent marketing name.

Collection and management of specimens

The task of procuring material proved more difficult than expected. Specimens were collected from a variety of sources, but retail and whole fish suppliers provided the main source. Material was mostly purchased but some more benevolent merchants either discounted specimens or donated them to the project. Specimens were selected based on need, quality, and practicalities such as size. They were stored frozen at the CSIRO Marine Laboratories until needed. Images were acquired as soon as possible to avoid problems of desiccation and loss of colour. All specimens were photographed as 35 mm transparencies using Kodachrome 64 film and selected images were later digitised for insertion into the handbook manuscripts. Special requests were made to seafood importers for imported species and some material was either

obtained directly from overseas suppliers or consultants. A variety of search methods were adopted to locate additional species (i.e. market and importer surveys, and specific requests to international colleagues for advice).

All specimens photographed were retained as vouchers and formally registered in the Australian National Fish Collection (ANFC) at the CSIRO Marine Laboratories, Hobart. Images are held in the subcollection of ANFC known as the Photographic Index of Australian Fishes (PIAF). Photographic details (i.e. registration information and specimen data) were recorded and held on a database. Digital versions of these images are presently being provided to an image library (NatureFocus, Australian Museum, Sydney) through another FRDC project (FRDC 2001/231). Vouchers provide a secure way of linking specimens, images, tissue samples, genetic data, and associated marketing names.

Content of seafood treatments

This section, which is fundamental to the project, focuses on the handbook content. Issues include species featured, unique digital codes, voucher designation, naming protocols, identifying features, comparisons, sizes, habitat details, fishery information and general remarks on species.

Various stakeholder needs (from catching, marketing and research sectors) were considered when selecting data fields for inclusion on species-profile pages. Twenty-eight potential fields were ranked for each of nine stakeholder groups to reduce the volume of fields to a realistic number, given the obvious constraints of page size. Some more technical fields, such as scientific author name and CAAB (Codes for Australian Aquatic Biota) code, were considered essential but of limited value on the species profile pages. These, and other data, were included in an Appended species list in each handbook.

All Australian seafood species with an approved marketing name were treated in this project. A few species were excluded or suppressed where the species is rarely, if ever, marketed. Other species are only now becoming important commercially and still have not been assigned a unique marketing name. Although currently caught at low levels, some of these may warrant inclusion in future upgrades of the marketing names list. These species were not covered in this project.

Unique marketing names cover only one species and were treated on one page. Group marketing names (e.g. genera or families) cover two or more species and were treated over either one or two pages. The first page (or the only page if only one is used) treated the group as a whole with a representative species figured. The scientific names of the illustrated species, and that of the fillet if it differs, were provided separately. When two pages were used, the second contained specific information on three of the component species. In most cases, the species pictured on the first page was repeated on the second with appropriate specific information. In groups such as rays, however, significant morphological variation can exist. In order to show as much of this variation as possible, the species pictured on the first page was replaced on the second page with another member of the group.

Each species (including those covered by a group marketing name) and each group marketing name have been assigned a unique digital code (CAAB). These codes are used widely to store data on Australian fisheries and on marine biota generally. The coding system was recently upgraded from six to eight digits (Yearsley, Last and Morris, 1997). Invertebrate groups were still in the transition phase at the time of printing the first volume, and were therefore prefixed with '00'. Fishes are prefixed with 37. Voucher specimens support these codes and most Australian seafood species have been assigned a voucher. Each voucher specimen was photographed fresh, sampled to obtain a protein fingerprint sample, and then preserved and catalogued in a museum collection. The catalogue or registration number of most voucher

specimens are linked to each name and species in the handbooks. Only in rare cases is the animal pictured not the voucher specimen. In such instances, vouchers may not have been assigned or the photograph of the voucher specimen may have been unsuitable for inclusion.

The main features (characters) by which a species or group of species (taxa) can be most easily identified from other taxa were presented in a subsection called 'identifying features'. These characters were sourced from a combination of published literature and original research to obtain a character suite that was generally user friendly and reliable. Each character was numbered, and corresponding numbers on a printed figure showed each feature's location on the animal. Features that distinguish closely related species were listed first. Usually, each number referred to the same character state on every species within a family or group of families but achieving consistency became impossible for larger groups. All states of a particular character were not necessarily provided for every species in the group. Morphological comparisons were made between closely related species, i.e. those in the same genus and family, and sometimes those in closely related families. Species with similar marketing names were also compared (e.g. red emperor is compared with emperor).

Fillets are more difficult to identify than whole animals because many useful features such as fin shape and mouth position are missing. However, subtleties of the tissue, bone and muscle structure proved useful, even if the differences between species were minor. These data were recorded for most species with a photograph of each fillet. Shellfish and very small species, such as whitebait, are always marketed whole or as other products so no equivalent image was included. Similarly, very large species, such as large tunas, are usually marketed as cutlets or steaks. In these cases, a cutlet photograph was provided. Additional technical information relating to fillets is presented in a section below.

Edible qualities of seafood, apart from informal comments in the 'Remarks' sections, were not generally discussed. All seafood consumed in Australia is highly esteemed by at least some segment of the population, and some species are generally highly esteemed. However, the appreciation of seafood types is highly subjective. A systematic study of seafood preferences in Australia is needed but falls outside the scope of this project. Maybe future editions of the handbooks will contain comparisons of edible qualities of seafood and information on changes that occur during cooking.

Weights were expressed for whole animals in kilograms (kg). Lengths for sharks, bony fishes and some invertebrates are based on total length, unless stated otherwise. Total widths are provided for rays and some invertebrates such as abalone and crabs. All length and width measurements are expressed in centimetres (cm). Documented maximum sizes and weights for most species were found to vary greatly or were inconsistent. Often, only the length or weight has been recorded for a single outsized specimen. Reported maxima for length and weight frequently do not correspond, leading to gross over- or understatement of size. Weights are often based on non-scientific 'guesstimates', and 'pounds' have sometimes been confused with metric units leading to species recorded to twice their likely maximum weight. Similarly, documented lengths can be based on standard, fork or total length and the type of measurement taken is rarely clarified. This has resulted in maximum lengths for some species being smaller than their true size. Also, maximum sizes of seafood species rarely reflect the normal size marketed. Sizes derived in this project were evaluated using a combination of the literature, anecdotal information, and museum specimens to provide a provisional review of maximum and common (average) sizes for each species where available. Still, for many species, these data remain inadequate and need to be 'ground truthed'.

The distribution of each species (or group of species) was plotted on a simple map. In the domestic species handbook only Australian distributions were shown. For imported species, the international distribution was given on maps that extended in coverage from Australasia to the whole world. Dark blue shading depicted the marine distribution of a species while light blue

shading showed freshwater and estuarine distributions. For marine species, shading abutting the coastline signified a continental shelf distribution. A slightly wider shading was used for taxa that occurred both on the continental shelf and continental slope. Shading separated from the coastline was used for species that occurred on the continental slope only. Information on where each species lives, such as continental shelf or continental slope, freshwater, estuarine, pelagic, bottom dwelling, etc., and in what depth, were provided in a subsection called 'Habitat'.

A 'Fishery' subsection described when, how and where commercial and recreational fisheries occur. While the value of the fishery is sometimes mentioned, information on quotas, fishing restrictions, and size and bag limits were not included because they are subject to frequent changes based on Commonwealth and local State regulations. General comments about each species were provided in a brief 'Remarks' subsection. This rather informal section included information such as old or anomalous marketing and scientific names, migrational behaviour, worldwide distribution, potential danger to humans, and flesh taste and texture.

Fillet characterisation

Fishes as a group are extremely diverse morphologically and this interspecific variability is equally well defined in the shape and structure of their fillets. Their overall shape and muscle form, extent of fat deposits, connective tissue colour, and the presence or absence of remnant structures such as scale pockets, lateral line, swim bladder, belly flap, sensory pores, and remnant bones can also be used to determine the species' identity. However, strangely enough, the fillets of many different species have never been compared to determine their uniqueness.

Whole fresh or frozen specimens were acquired specifically for this part of the project. Each fish was filleted by an experienced filleter (i.e. Nick Ruello, Geoff Champion) and skin removed from the left fillet in each case to reveal the subdermal musculature. The inner and outer fillet surfaces, as well as the outer surface with skin attached and scales removed, were photographed for all species. The outer skinned surfaces were figured in the handbooks.

A data sheet, which included a total of 75+ characters and about 175 character states, was used to record the fillet characteristics of domestic fishes. Each of these characters and their associated states are shown in a completed example of this sheet (Appendix 6). Most of these are self evident but to minimise the ambiguity of definitions, terms are defined in the handbook glossary and in Figure 3.8 A–D. Fillet shape variations (Figure 3.9 A–G), flesh colours (Figure 3.10 A–J), and features of the outer (Figure 3.11 A–F), and inner fillets (Figure 3.12 A–C), were also presented in the handbook. In addition to specific fillet data, the CAAB code of each species, date of processing, photo index number, data-sheet version, recorder(s), and handbook specimen number were recorded. All measurements were in millimetres.

This work was secondary to the objectives of this project but provide great promise as both an identification tool and a means of providing general information of the properties of fillets of commercial fishes.

Genetics

There are many methods of genetic testing that may vary in their accuracy and in the time, labour and equipment required. The technique used here was inexpensive and simple. Results were achieved in less than one hour using simple, portable equipment. Protein electrophoresis, has been used previously for fish identification (e.g. Shaklee and Keenan, 1986; Daley *et al.*, 1997). More recently, fish identification using DNA-based procedures has proven popular (see, for example, Ward, 2002), but these methods are slower than protein electrophoresis, require more equipment, and are substantially more expensive. The time may come when these disadvantages are substantially reduced or even removed as technology improves (e.g. DNA

microarray development) but currently protein electrophoresis remains the fastest and most cost-effective approach.

Proteins are large molecules and are essential components of all living cells. They regulate chemical reactions in the cell, and provide components for membranes. Some carry essential substances through an organism (e.g. haemoglobin in our blood carries oxygen to cells) and others act as hormones (chemical messengers). There are thousands of different proteins and each one is 'built' from instructions carried in the DNA. Slight differences in these instructions in a gene can lead to small changes in either the size or electric charge of a particular protein molecule, even though the protein will still carry out its usual functions. Two similar proteins, which have different sizes or a different electric charge, move at different speeds when an electric current is put through them. They can therefore be separated. This is the principle behind protein electrophoresis in which a difference in protein movement in an electric field indicates a difference in protein structure, which in turn indicates a genetic difference.

A sample of muscle tissue from a fish or invertebrate may contain thousands of proteins, but most will be present in only very small amounts. Because protein electrophoresis detects only the most abundant proteins, the protein patterns ('fingerprints') are normally quite simple. They usually differ between species, which makes identification of samples possible.

This method applies only to the identification of fresh or frozen material. Any dried, canned or cooked product requires DNA tests. Protein fingerprints are therefore not available for the dried or smoked tissues from jellyfish or *bêche-de-mer*. DNA tests may also be needed if problems arise with protein fingerprinting for species identification, or if the results need legal confirmation.

Separation of proteins by size and electric charge can be done on a variety of porous media, including starch, acrylamide and cellulose acetate plates. For this work, Titan IIITM cellulose acetate gel plates (from Helena Laboratories) were used. The equipment needs are modest: a small power pack, electrophoresis chamber, and an inexpensive microcentrifuge. The procedure could be carried out in a fish market, on a 1 m² bench-top supplied with electricity.

Testing

To test a sample, a small piece of white muscle was homogenised in a few drops of water in a 1.5 mL microcentrifuge tube. Fish tissue was taken from the 'shoulder' of the fillet. Tissues tested in invertebrates were: crustaceans—abdominal muscle; abalone and sea snails—foot muscle; bivalves—adductor muscle; squids—mantle. The mixture was centrifuged at around 10 000g at room temperature for about three minutes, and the supernatant used for electrophoresis.

Up to twelve samples can be electrophoresed simultaneously on a single 76 x 76 mm plate using the Helena Super-Z12 system. Lanes 1 and 12 were left empty (samples in outside lanes can run unevenly), the standard protein mix (see below) was placed in lanes 2 and 11, and the test samples in lanes 3 to 10. A tris glycine buffer system was used (0.02 M tris, 0.192 M glycine; Hebert and Beaton, 1989) for 25 minutes at 200 V at room temperature. The plates were then stained with a protein stain, Coomassie Blue (0.2% Coomassie Blue in a mixture of 6 parts water to 4 parts methanol to 1 part glacial acetic acid) for 5 to 15 minutes. Unbound stain was removed by washing in a destaining solution (the stain solution without Coomassie Blue). In the laboratory we used a shaker at slow speed to accelerate the de-staining. Gels were then digitally photographed and dried for future reference. Proteins present in large amounts stained blue on a white background. The figures given in the handbooks are diagrammatic representations of the photographs (see Appendix 9). A typical CAE plate and stylised figure are given in Figure 1.

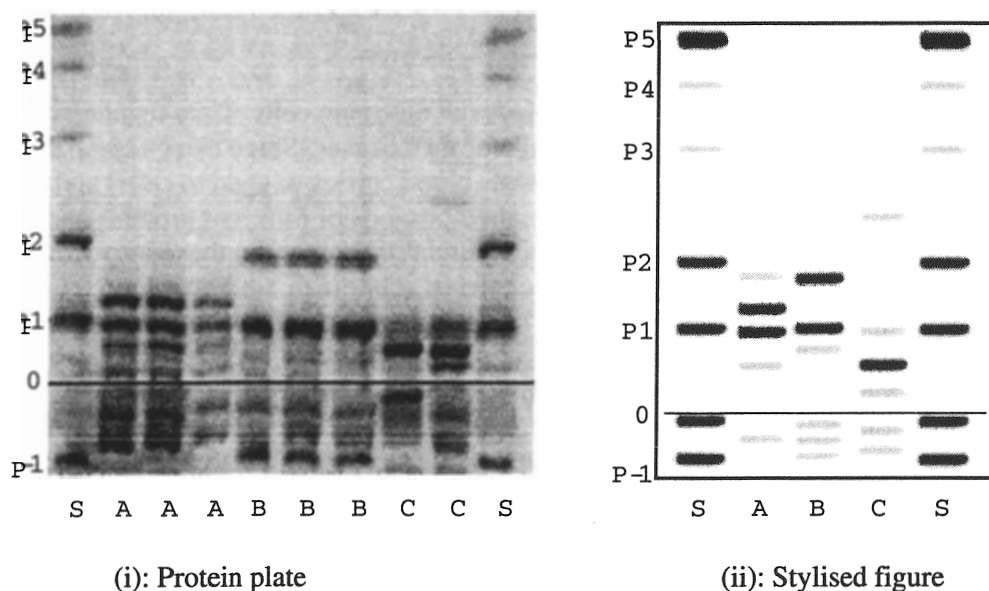


Figure 1. (i) photograph of typical CAE plate; (ii) stylised figure from the CAE plate, in a similar form to the representation in the *Australian Seafood Handbooks*. Three species are represented. S is the standard protein ladder, A is blue-spotted trevally (*Caranx bucculentus*), B is bigeye trevally (*Caranx sexfasciatus*), and C is turrum (*Carangoides fulvoguttatus*).

Reading protein fingerprint figures

The protein fingerprint of each species is compared with a 'standard' protein fingerprint—a mixture of chicken albumen (Sigma Chemical Company, A5503) and a crude protein extract from redfish (*Centroberyx affinis*) prepared in-house. It gives seven well-defined and well-separated bands: P5 is the fastest (the chicken albumen band), followed by P4, P3, P2 and P1—all located above the point of application of the protein mix at the origin (O); P0 is on or close to O; P-1 migrates below O.

Protein fingerprint descriptions given in the text of the handbooks are approximate. For example, a band stated to be 'at P1.3', is about a third of the way between P1 and P2. These relative mobilities can vary a little. Faint staining bands not recorded in the diagrams may be seen; these sometimes occur in some individuals of a species but not others. They are disregarded here. The positions of bands migrating close to or below O can vary markedly, and are not generally used for diagnostic purposes.

Sometimes one or more bands vary among individuals of the same species. This usually reflects genetic variation (also called polymorphism) for that protein, and could result in mis-identification. Where possible, at least eight individuals of each species were examined to determine the extent of such variation. Common variant patterns are included in the figures but others may occur. Such undescribed variants will be very similar to the described patterns (usually differing by only a single band) and will usually still be identifiable.

Some very closely related species have identical protein fingerprints. In such cases supplementary allozyme tests (as in Daley *et al.*, 1997) or DNA tests (as in Ward *et al.*, 1995; Elliott *et al.*, 2002) are needed for accurate identification.

In the handbook figures, groups of fish (angel sharks, dogfishes, *etc.*) are in book order and species within groups are ordered by scientific name. Figures are labelled above by marketing name. Where more than one species is covered by a marketing name, the marketing name is given a suffix ('1', '2', '3', *etc.*) and the scientific name given below. Common variants are further suffixed in the marketing name by the letters 'A', 'B' or 'C'.

Checking an identification, and establishment of reference library

If a fillet is claimed to be from species X, but the claim needs to be tested, that fillet's protein fingerprint can be determined and compared with the figure given for species X in the relevant handbook. If there are obvious major differences, it is unlikely to be species X. However, slight differences can occur between electrophoretic tests run on different days, and a better procedure is to run a sample from a known specimen of species X beside the fillet to be tested. The protein fingerprints can be compared with one another and with the figure of species X given in the handbook. If the protein fingerprint of the fillet differs from that of species X, but is similar to that of another species, Y, the fillet sample should be run beside known samples of both species X and Y.

As part of the handbook development, a frozen (-80°C) tissue reference library was established at CSIRO Marine Research, Hobart, and this now contains more than 4,800 samples from about 750 species. Subsamples of each species will eventually be transferred to ethanol for longer-term storage. These frozen or alcohol-stored reference library samples can be used for DNA analysis as required.

Oil profiling

In 1998 as part of FRDC project 1995/122, the content and composition of the oil from nearly 200 species of Australian fishes, shellfishes and crustaceans were examined (Nichols *et al.*, 1998a&b). In a follow-up study (1999/331) conducted after further consultation with industry, a further 79 species of seafood were examined.

Collectively the two oils studies determined the nutritional value of Australian species, and how oil levels may differ with taxonomic group and other factors including geographical region; transferred the knowledge to the fishing industry to better exploit the total catch, including waste products; and provided oil compositional results to nutritionists and other consumer groups for use in communicating the health benefits of Australian seafood. In the second oils study, the effects of aquaculture and processing (e.g. cooking, smoking, other forms of value-adding) on the oil content and composition of Australian seafood were also examined.

In seafood, oils are the second largest component after protein. Oils have a variety of important roles; they serve as concentrated stores of energy, as fuel molecules and as components of cell membranes. Of main importance are triglycerides, polar oils and cholesterol. Triglycerides serve as an energy store and polar oils and cholesterol are structural components of cell membranes. Cholesterol is a factor in coronary heart disease and other disorders when in dietary excess.

The main components of the oils are saturated and unsaturated fatty acids. EPA [eicosapentaenoic acid, 20:5(n-3)] and DHA [docosahexaenoic acid, 22:6(n-3)] are omega-3 polyunsaturated fatty acids (PUFA) and in the human diet are largely obtained from seafood. AA [arachidonic acid, 20:4(n-6)] is an omega-6 PUFA which is a precursor of prostaglandins (modulate hormone activity) and other eicosanoids (C_{20} physiologically active compounds). The human body manufactures only small amounts of these PUFA and we must therefore rely on dietary sources such as seafood. The marine omega-3 PUFA have a wide range of potential health benefits, particularly with respect to the prevention of coronary heart disease and rheumatoid arthritis. They also may play a role against some forms of cancer and other disorders, although further research and trials are required. Omega-3 PUFA also may be beneficial for infant brain and retina function and development.

Samples analysed for oil content and composition

A survey of State Advisory bodies and other organisations was conducted. These organisations indicated priority species or species of potential importance to the Australian seafood industry. The final list of priority species to be analysed for oil content and composition during Project 1995/122 was completed in late 1995. The majority of other muscle (flesh) samples analysed in this project were subsampled from collections made for the handbooks.

Following announcement of the commencement of project 1999/122, further requests for analyses of additional species were received from other companies and organisations. While there was some duplication between the State's priority species and these other requests, the final list of species analysed covers nearly 200 species (151 fish, 23 crustaceans, 15 shellfish). A further 79 species (58 fish, 9 crustaceans, 9 shellfish, 3 other invertebrates) were subsequently analysed as part of the follow-up Project 1999/331.

Specimens were obtained from a variety of sources including commercial fishers, aquaculture farms, seafood markets and research cruises. The sampling and preservation logistics for the handbook study provided a unique opportunity to obtain high integrity specimens with confident identification of the samples that was vitally important to the success of the oils studies.

Most muscle samples were taken immediately after capture or after purchase from the market. Some samples were taken from individual specimens that were frozen after capture and transported to Hobart. For most species 5–10 individual specimens were available, from which three were randomly selected for analysis. In a few cases, only 1 or 2 individuals were analysed as further samples were not available. All fish muscle samples were taken from the right 'shoulder' region, an area normally included in a fillet. Samples were of white meat. Skin and subcutaneous fat were excluded from muscle samples. This decision was taken as it was assumed that the majority of consumers did not eat the skin. Samples were taken from the tail of prawns and lobsters, legs of crabs and either whole body or abductor muscle of shellfish. All tissues were stored at -80°C until analysed.

Sample preparation and analysis

Analytical protocols used were as developed for marine oils research during FRDC-funded projects (1995/122 and 1999/331) performed by CSIRO Marine Research. Details of all specific procedures are available in the FRDC final reports (Nichols *et al.*, 1998a&b).

Oil was extracted from replicate specimens (up to $n=3$ for each species per sampling date) of individual species using a one-phase methanol:chloroform:water extraction (2:1:0.8 v/v/v) procedure. The total solvent extract (TSE) was concentrated and samples were stored for up to three days before oil analyses were commenced.

An aliquot of the TSE or total oil was analysed using an Iatroscan MK V TH10 TLC-FID analyser to determine the abundance of individual oil classes. The solvent system used for the oil separation was hexane-diethyl ether-acetic acid (60:17:0.2 v/v/v), a mobile phase resolving non-polar compounds such as wax esters (WE), triglycerides (TAG), free fatty acids (FFA) and sterols (ST) from polar lipid (PL). A second non-polar solvent system of hexane-diethyl ether (96:4 v/v) was also used for selected samples to resolve hydrocarbons (HC), WE and steryl esters (SE), and TAG and diacylglycerol ethers (DAGE). The flame ionization detector (FID) was calibrated for each compound class [e.g. phosphatidylcholine, cholesterol, cholesterol oleate, oleic acid, squalene, and TAG and DAGE (purified from fish and deep-sea shark liver oil respectively); 0.1–10 μg range for each oil class]. The relative level of each oil class determined by TLC-FID represents the amount of each class divided by the sum of the individual oil classes.

An aliquot of the TSE was treated with methanol-hydrochloric acid-chloroform under nitrogen to form fatty acid methyl esters (FAME). Gas chromatographic (GC) analyses of FAME and sterols were performed with a Hewlett Packard 5890A GC equipped with either an HP-1 or HP-5 cross-linked, methyl silicone, fused silica capillary column (50 m x 0.32 mm i.d.), an FID, a split/splitless injector and an HP 7673A auto sampler. Verification of the identification of individual components was performed using GC-MS data and by comparing retention time data with those obtained for authentic and laboratory standards.

Average data (n=3) for each species is presented as percentage composition (e.g. of total fatty acids) and mg/100 g (wet weight) of flesh. Results are stored using the software packages, Excel and Illustrator. CSIRO may be approached for collaborative use of the database for further manipulation and presentation purposes.

Layout of results and definitions

Entries are presented with both the scientific and marketing or common names given. Oil parameters shown are:

- oil (fat) content in percent wet weight (in parentheses at the end of each bar). Oil content definitions: low oil <2%; moderate oil (2–5%); high oil >5%;
- content of arachidonic acid (AA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in milligram per 100 gram wet weight (in histogram);
- average portions (expressed as a percentage of the total fatty acids) of saturated fatty acids (SAT), monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA) (right hand side of the page for each family).

All data presented for fish is for flesh without skin, and data are the average of three specimens. Remarks shown for families of seafood or for individual species highlight selected comparative features of the oil results. Representative results (for morwongs, mullets, ocean perches, oreos and pearl perches) are shown in Appendix 9.

Fatty acid nomenclature

Fatty acids are designated by total number of carbons: number of double bonds, followed by the position of the first double bond (unsaturated centre) from the methyl (omega or n-) end of the molecule. The two main PUFA groups are the omega-3 (the first double-bond is three carbons from the terminal methyl end of the fatty acid) and omega-6 (the first double-bond is six carbons from the terminal methyl end of the fatty acid) families. For example, the structure of docosahexaenoic acid [22:6 ω 3] has 22 carbons, with 6 double bonds, the first double bond being 3 carbons from the methyl end of the molecule.

The term omega-3 fatty acid denotes PUFA with two or more *cis*-unsaturated centres, separated from each other by one methylene group and having the first unsaturated centre three carbons from the end methyl. Similarly, omega-6 denotes PUFA with two or more *cis*-unsaturated centres, separated from each other by one methylene group and having the first unsaturated centre six carbons from the end methyl.

4.2 Production and distribution of the handbooks

Design and layout

Numerous identification guides from a dozen or so countries were surveyed to determine optimal design for books of this nature. Issues such as photo reproduction size, species distribution display, and typeface were carefully considered, with assistance from CSIRO Marine Research graphic designers. Various drafts were circulated to stakeholders for comment before the final design was selected. Minor improvements have been noted, and can be incorporated into future editions.

The layout of both volumes was performed by G. Yearsley, using fast-tracking techniques to import and format text from a word processing package (MS Word) to a desktop publishing package (QuarkXPress) on a Macintosh computer. Style sheets applied in the MS Word template were recognised by QuarkXPress via application of special formatting software. This greatly reduced the time required to format the species profile pages in the final document.

CSIRO Marine Research designer, Antonia Hodgman, expertly performed the design and layout of the domestic species handbook cover. She was provided with a brief of the project, details of the physical size of the handbook, and a selection of seven or eight high-quality images. The editors then selected one of her three designs as the draft cover, which was subsequently refined. The cover fish photograph was replaced for the imported species handbook, along with other relevant text changes.

Book production

Book production was completed in-house at CSIRO Marine Research in the preprint stages. G. Yearsley was responsible for compiling the contributions of authors, photographers, graphic designers, numerous reviewers and other participants, in addition to attending to practical considerations such as ISBN and barcode allocations. The penultimate draft of each volume was subject to extensive peer review. Although time consuming for the editors and the reviewers, this review significantly improved the final products.

Photographs were scanned using a desktop scanner, and then etched and enhanced using Adobe Photoshop software. Attention was given to detail to create the best possible images for the final publications. For example, damaged fins were carefully and accurately recreated by R. Daley and D. Gledhill in the digital files. Careful attention was also given to colour balance issues. All photographs included a colour chart and a grey-scale to facilitate accurate colour reproduction after scanning.

Distribution maps were drawn in Adobe Illustrator software after determining species distributions from the literature. Similarly, protein fingerprint figures and oil composition profiles were created using Adobe software and then all images were inserted into the document within QuarkXPress.

Three versions of the domestic species handbook were produced for the first print run. About 90% were regular hardcover items but 10% were printed on waterproof plastic, with a soft cover. Another 100 copies were printed on regular paper but were bound using snapper (*Pagrus auratus*) leather and cowhide. These collectors items were individually numbered 1–100. Production aspects that differed for the three versions included cover format, spine size, and ISBN and barcode allocations.

Printing

Courtney Colour Graphics was contracted to print the handbook volumes. During production, Courtney staff willingly provided expert technical advice regarding file types, and the intricacies of QuarkXPress and other image manipulation software.

Printing occurred at Courtney Colour's print shop in Melbourne. Handbook authors, G. Yearsley and R. Daley, conducted press checks for both handbooks. They worked very closely with prepress staff and the printers to ensure a high-quality result, particularly with respect to the colour reproduction of images. The printers were very accommodating, even to the extent of 'rubbing the plates' to reduce particular colour saturation of individual images or even part of an image (e.g. removing a pink cast from the belly of a tuna).

During the first print run of the domestic species handbook, paper was swapped between regular and waterproof part way through the printing of each flat (eight pages). This was problematic from a colour management point of view as the waterproof paper had a very different cast compared to the regular paper. Manipulation of colour input levels and additional rubbing of plates was required before the flat could be printed.

Promotion

FRDC and CSIRO Marine Research (Communications) jointly administered promotion of the handbook volumes. Most promotional efforts centered on the two high-profile book launches (Appendix 7) and associated media releases (Appendix 8). Appendix 7 includes a report on the domestic species handbook launch prepared by Hill and Knowlton, who were contracted by FRDC to assist with the food media.

Distribution and revenue

The following five project outputs were distributed for revenue (using various channels):

- domestic species handbook—first print run (1999)
 1. hardcover (9,040 copies)
 2. waterproof (1,050 copies)
 3. leather-bound (100 copies)
- domestic species handbook—second print run (2001)
 4. hardcover (7,500 copies)
- imported species handbook (2003)
 5. hardcover (3,000 copies)

Details of the distribution of the first print run of the domestic species handbook were documented in the November 2000 Milestone Report. Further to that report:

- Gary Allen has paid all outstanding monies, a total of \$82,666.96;
- CSIRO Publishing has paid all outstanding monies, a total of \$33,275.50;
- FRDC has paid all monies owing, a total of \$55,395.80;
- In addition, \$1,275 was raised through the sale of damaged handbooks to CSIRO Marine Research staff.

Total revenue received to date from the first print run of the domestic species handbook is therefore \$172,613.26. Print and distribution costs are to be deducted from revenue before any profits are shared 50:50 between FRDC and CSIRO Marine Research.

The distribution of the domestic species handbook reprint (RRP \$49.95 including GST) was handled by the FRDC, who contracted the services of CSIRO Publishing. The cost of the reprint was paid directly by the FRDC, and therefore neither costs nor revenue are detailed here.

The distribution of the imported species handbook (RRP \$49.95 including GST) was again handled by FRDC with the assistance of CSIRO Publishing. However, in this case, print costs came from this project account, and revenue received is to reimburse costs of printing and distribution. Profits are to be split 50:50 between FRDC and CSIRO Marine Research. In addition to the 3,000 copies listed above, a few dozen surplus copies were purchased independently by FRDC and CSIRO Marine Research for promotional purposes.

5. RESULTS/DISCUSSION

The main outputs of this project have already been presented in the two published products, namely the two handbook volumes. In addition to providing information identifying seafood species sold in Australia, these books cover in detail aims of the project, how to use the book, complex issues regarding seafood names, and the size, habitat, distribution, fishery information and general remarks on each species. Important features of their fillets in the case of fish (or shelled product in the case of shellfish), as well as protein fingerprints and oil compositions are also provided. Selected examples of each of these aspects are given in Appendix 9 of this report. Only specific details of the handbooks are summarised below. However, some other important unpublished aspects of this work, such as secondary products, scientific outcomes and project management issues are discussed below.

5.1 Main products (the handbooks)

Details of the handbooks are provided below. The domestic species volume was printed and bound in three versions in 1999: a wipeable, waterproof version printed on polypaper for use in the field and in fish markets; a hardcover, coffee-table version; and a leather-bound collector's version. The hardcover copy was reprinted in 2001. Only a hardcopy version of the imported species volume was produced.

Australian Seafood Handbook—an identification guide to domestic species (Volume 1)

A 469 pp identification guide to all major Australian domestic seafood species, including fish fillets, that links each species to its approved marketing name. It covers:

- 242 marketing names for fish and 59 for invertebrates;
- 294 images of whole fish, 60 images of invertebrates, and 234 images of fish fillets/product;
- 16 text figures;
- protein fingerprint and summary oil profiles for 380 and 189 species respectively;
- 2 appendices.

Printed: 1999 (reprinted with minor changes 2001)

Editors: G.K. Yearsley, P.R. Last and R.D. Ward

Contributing authors: J. Andrew, R.K. Daley, N.G. Elliott, P.R. Last, B.D. Mooney, P.D. Nichols, N.V. Ruello, P. Virtue, R.D. Ward and G.K. Yearsley.

Australian Seafood Handbook—an identification guide to imported species (Volume 2)

A 239 pp identification guide to most seafood species imported into Australia. It also includes fish fillets and links each species to an approved marketing name. It covers:

- 115 marketing names for fish, 32 for inverts;
- 112 images of whole fish, 29 images of invertebrates, and 98 images of fish fillet/product;
- 16 text figures;
- protein fingerprint profiles for 175 species;
- 2 appendices.

Printed: 2003

Editors: G.K. Yearsley, P.R. Last and R.D. Ward

Contributing authors: R.K. Daley, D.C. Gledhill, P.R. Last, R.D. Ward and G.K. Yearsley.

5.2 Secondary products

Fillet characterisation

This part of the project systematically examined more than 75 features of the fillets of single individuals of 350 species. Data were assembled in a Filemaker Pro file to provide ready access to species information when preparing these sections of the handbooks. While this work needs to be replicated and cross validated, it highlighted some important distinguishing features that were included in the handbooks and demonstrated the broader value of such data. A more robust database of fillet information could be linked to interactive identification software to enable customised identifications of species to be completed. Also, these data provide an overview of the broader characteristics of fillets that could have other applications. For example, a summary of data for six of the characters (Figure 2) shows that most of our commercial fishes have moderately deep, somewhat compressed fillets with a slight to medium taper, a single red muscle band, and usually show evidence of an air sac.

Every effort was made to reduce subjectivity of characters but this was sometimes difficult to avoid for intraspecifically variable characters such as external colour. The side of the body with skin attached was scored separately for the upper, mid- and lower sides to record the existence of a colour pattern. If present, its type, the colour tone, the level of contrast between the scale pockets and scale membranes (and their respective colours), and whether there was any dominant feature of the pattern (e.g. spots or blotches) and their number and arrangement were recorded. Still, when used in combination, these characters provide very important information about the identity of the species that is capable of distinguishing even close relatives from each other.

The present data set needs to be expanded with replicate material. Its accuracy suffers in two main areas. Flesh colour can depend on the freshness of fillets. Off white (yellowish) and pale pinkish fillets often tend to become slightly brownish (i.e. off white-brownish) with frozen storage. This category needs to capture this range of colour variation of the flesh. Also, greater emphasis needs to be placed on the characterisation of included bones. Depending on the cut, the ribs and pin bones can be removed and this can either change the shape of the fillet or alter the number of bones remaining. A more relevant definition needs to be derived to describe these variations.

Seafood images

The project provided a unique opportunity to acquire high-quality images of all Australian seafood species, as well as fillet types and other products. Many of these images were used in the handbooks and have now been digitised and made available to an image provider, Nature Focus (Australian Museum, Sydney). Images were obtained mainly using the CMR specimen photographic facility and the expertise of a qualified photographer (Mr Thor Carter) with a background in natural history photography. Supplementary images were taken by the project team, either at the Hobart laboratory or at fish shops and markets. These images will be used for a variety of purposes to promote seafood, such as on websites and in posters.

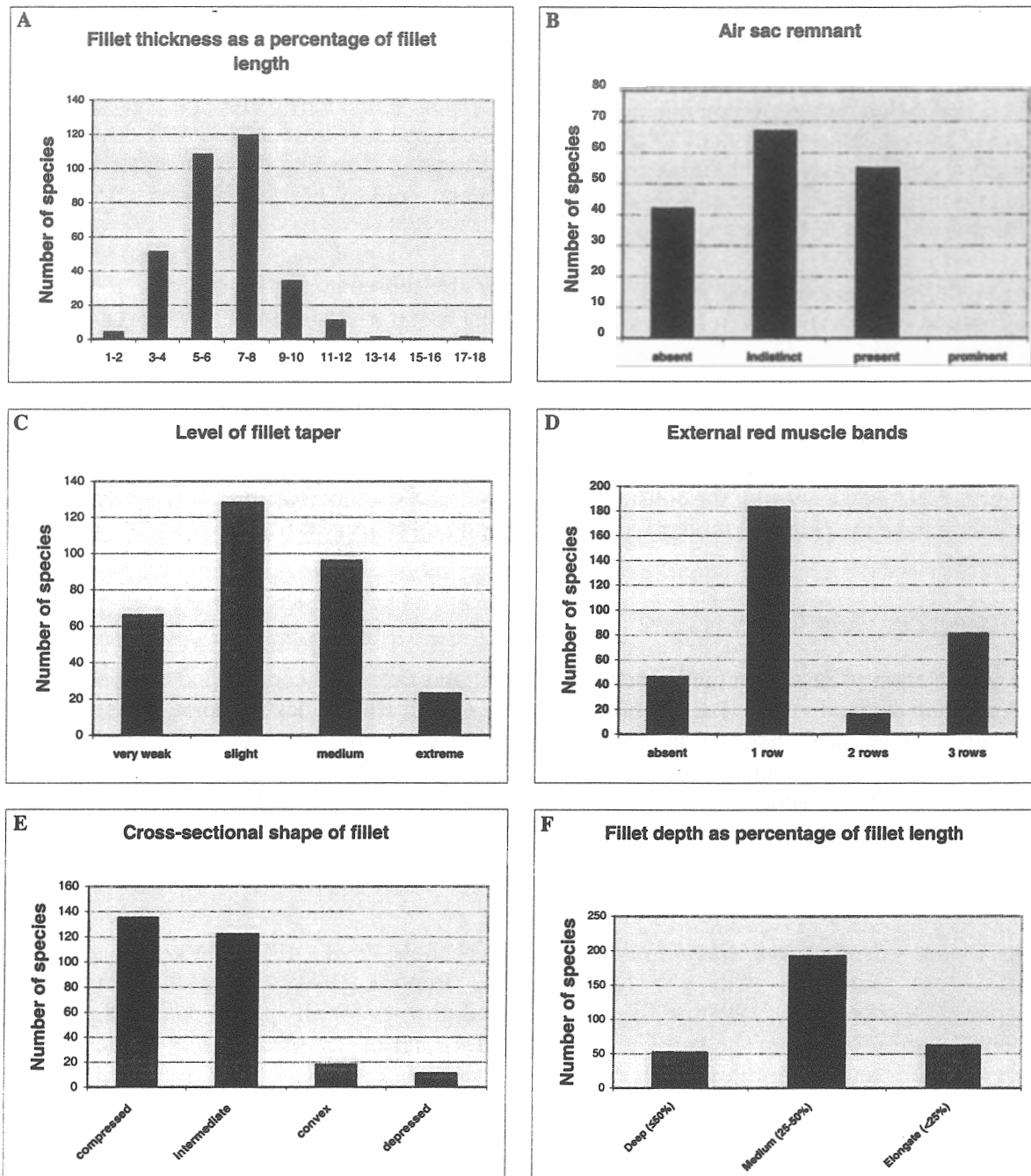


Figure 2. Summary data for six example fillet characters: (A) fillet thickness as a percentage of fillet length; (B) air sac remnant; (C) level of fillet taper; (D) external red muscle bands; (E) cross-sectional shape of fillet; (F) fillet depth as percentage of fillet length.

Protein fingerprints

The genetic identification method we adopted for the Australian Seafood Handbooks is based on the electrophoresis of crude protein extracts using cellulose acetate plates. The domestic species volume describes the protein fingerprints of about 380 species, the imported species volume about 175 species (with some overlaps).

Protein electrophoresis, and especially the cellulose acetate methodology that we espoused, is a fast, convenient (it can be carried out on a table top with minimal equipment demands), and

inexpensive means of fish identification. It can be carried out, if desired, in a market place. Results can be available within 30 minutes or thereabouts. It enables the identification of perhaps some 95% of all species, with a few sibling species being so similar that they cannot be identified by this particular approach.

DNA-based techniques are becoming increasingly popular. While they cannot (at present) rival the speed and equipment simplicity of the protein-based approach, costs are coming down and soon DNA analysis may well become competitive for routine screening. DNA analysis will permit the identification of not only fresh but also canned, cooked, or dried seafood, and will enable discrimination of sibling species.

Our project provides a vital and valuable resource for any subsequent DNA-based identification project: the frozen tissue collection. This tissue reference library was established at CSIRO Marine Research, Hobart, and now contains more than 4,800 samples from more than 700 species. Subsamples of each species will eventually be transferred to ethanol for longer-term storage. These frozen or alcohol-stored reference library samples can be used for DNA analysis as required. They will, for example, provide reference DNA sequences for a fish-egg identification project currently being developed. They could also be used to provide reference DNA sequences for the construction of DNA chips or microarrays. These, once developed, have the potential to identify unambiguously a large number of species in a very short time.

Oil composition of Australian seafood

The presentation of results in the literature on the oil and fatty acid content and composition of Australian seafood varies. For example, whilst nearly all studies have reported oil content and percent fatty acid distribution, few studies have determined the absolute amount of individual or groups of fatty acids present in Australian fish. In some studies, absolute abundance of fatty acids was determined through estimation rather than by direct measurement. The uptake of dietary oil depends on the oil class distribution; in most studies to date on Australian seafood, oil class composition including cholesterol has not been reported.

Two Guides—*Seafood the Good Food I and II* (Nichols *et al.*, 1998b; Mooney *et al.*, 2002)—were published, with two further FRDC Reports (1995/122, 1999/331) also completed (Nichols *et al.*, 1998a, 2002). Complete oil profiles for all species analysed in the handbooks are provided in the two Guides prepared as part of the separate oils studies that arose from the handbook project.

The measurement and presentation of the wider range of oil parameters for seafood is now possible due to developments in methodology and instrumental procedures. The inclusion in this study of additional parameters is also due to the recognition by nutritionists of their importance to understand better the nutritional content and value of food items.

A summary of the average content of omega-3 PUFA in various food groups is shown in Table 1. These results are for all seafood species reported in the handbook and the two volumes of *Seafood the Good Food*, and indicate that seafood has considerably higher content of the beneficial omega-3 oils than other food groups. Wild-caught seafood containing an omega-3 PUFA content of greater than 300 mg/100 g (wet mass) are shown in Table 1.

It is noted that two species of escolar that rank in the top ten seafood species in omega-3 PUFA content have been associated with recent incidences of consumer illness. The illnesses have been attributed to the high wax-ester content of escolar (Nichols *et al.*, 2002). Further research is clearly needed on these species.

Table 1. (A) wild-caught seafood containing omega-3 PUFA content of greater than 300 mg/100 g (wet mass); (B) average content of omega-3 PUFA in Australian seafood with comparison to other food groups.

A

Marketing/common name	Scientific name	Oil (%)	Total (n-3)
slender tuna	<i>Allothunnus fallai</i>	16.5	3759
swordfish	<i>Xiphias gladius</i>	7.7	1021
oilfish*	<i>Ruvettus pretiosus</i>	17.8	1019
banded morwong	<i>Cheilodactylus spectabilis</i>	3.2	820
alfonsino	<i>Beryx splendens</i>	5.2	796
whitebait	<i>Lovettia sealii</i>	2.6	734
escolar*	<i>Lepidocybium flavobrunneum</i>	19.2	717
bigeye trevally	<i>Caranx sexfasciatus</i>	4.7	709
whitebait	<i>Galaxias maculatus</i>	3.3	687
blue mackerel	<i>Scomber australasicus</i>	3.8	508
bonito	<i>Sarda australis</i>	1.5	433
gemfish	<i>Rexea solandri</i>	2.6	424
rudderfish	<i>Centrolophus niger</i>	14.4	415
Spanish mackerel	<i>Scomberomorus commerson</i>	3.0	383
sweep	<i>Scorpius lineolatus</i>	1.3	370
Australian herring	<i>Arripis georgianus</i>	1.7	359
Western blue grouper	<i>Achoerodus gouldii</i>	3.6	358
bigspine boarfish	<i>Pentaceros decacanthus</i>	1.5	354
Eastern Australian salmon	<i>Arripis trutta</i>	1.1	338
spotted mackerel	<i>Scomberomorus munroi</i>	1.2	335
school mackerel	<i>Scomberomorus queenslandicus</i>	1.1	328
grey mackerel	<i>Scomberomorus semifasciatus</i>	1.1	328
tailor	<i>Pomatomus saltatrix</i>	1.3	326
threadfin emperor	<i>Lethrinus genivittatus</i>	2.6	325
bight redfish	<i>Centroberyx gerrardi</i>	0.5	322
pilchard	<i>Sardinops neopilchardus</i>	1.2	312
blue-eye trevalla	<i>Hyperoglyphe antarctica</i>	1.3	314

B

Food group	omega-3 PUFA mg/100 g (wet weight)
Finfish	235
Oysters	150
Prawns	130
Lobster	105
Turkey	35
Beef	22
Chicken	19
Lamb	18
Pork	0
Veal	0

* consumption of escolar may cause illness (Yearsley *et al.*, 1999)

Data for non-seafood items is from references cited in Nichols *et al.*, 1998a

Summary findings for the oils study include:

- relative to other food groups, wild-caught, cultured and value-added seafood are the best and most readily available source of EPA and DHA;

- most Australian fish have high levels of omega-3 PUFA (average 235 mg/100 g, range 13 to 3760 mg/100 g) and low levels of cholesterol (average 28 mg/100 g);
- prawns have lower levels of omega-3 PUFA (average 130 mg/100 g) and higher levels of cholesterol (average 130 mg/100 g) than finfish;
- Australian fish generally have higher relative levels of DHA than fish from the Northern Hemisphere;
- fish from warmer waters generally have lower omega-3 / omega-6 ratios than fish from temperate waters, due largely to higher relative levels of AA;
- fish generally contain polar oil and/or triglyceride, although a few species contain unusually high content of wax ester, hydrocarbon or diacylglyceryl ether;
- cultured (farmed) seafood is also an excellent source of omega-3 PUFA, and the oil in the feed can be manipulated to increase oil levels in products;
- cooking and processing have no discernable effect on the content and composition of the omega-3 PUFA in seafood; and
- some variation was observed with season and location for selected fish and shellfish, but the differences generally had little effect on oil quality.

5.3 Other scientific outcomes

Authenticity of naming and accuracy of identification are important facets of this project. Taxonomic rigour was applied to each and every species encountered, and as a consequence some surprises were unearthed. For example, the commonly caught Moses snapper (*Lutjanus russelli*) was found to consist of two closely related species that could be differentiated using both classical taxonomy and genetics. One of these is new to science and needs to be formally named. Two species currently referred to as bar rockcod (*Epinephelus ergastularius*) were detected from the genetic study. These need to be discriminated on morphology, and the nomenclature updated. The value of using a combination of molecular and classical techniques was evident in this project. In most cases, the results corroborated differences between taxa; in a few cases, the genetics highlighted species differences not observed by morphology; and in other cases, sibling species pairs could not be resolved with protein fingerprints.

The high diversity of undetected imports was a surprise to the research team. Identification of dried specimens or parts of specimens was particularly challenging. In some cases, patience was needed to obtain specimens with key characters evident so that an identification could be made accurately. The weaknesses in the literature proved a problem for some imported species. Whole Nile perch (*Lates niloticus*) were difficult to obtain and these were almost impossible to distinguish from barramundi (*Lates calcarifer*) based on published information.

5.4 Project management issues

Procuring material

One of the most difficult aspects of this project was the procurement of quality specimens for photographic purposes and for replicate material for fillet characterisation. It was hard to get good 'photo specimens' of some species because of damage, loss of colour or general unavailability (i.e. seasonal or local variability in sales). Searching for, liaising with vendors and fishermen, and the eventual shipment of material to the laboratory, was particularly labour intensive. As such, there would be obvious advantages in combining similar projects of this nature in future to obtain the best cost/benefit ratio. In this project, samples were shared effectively across research subgroups (i.e. material for oil content and fillets, tissue samples for genetics, and image work).

As expected, procuring samples of imported species was generally more difficult than procuring samples of domestic species. One import, chinook salmon, required a permit for

importation to Tasmania (Appendix 5). 'Whole frozen' examples of species that are imported dried were difficult to obtain, and had to be requested through importers. Also, protein fingerprints did not work for dried material so getting uniform data for all species was often a problem. Soft-bodied animals such as jellyfish proved difficult to photograph and keep intact.

Despite verbal interest and commitment from many importers to supply information via surveys, few responded. In fact, there were only five respondents to the 2000 survey of Seafood Importers Association of Australasia members. While this may reflect busy work schedules, it made the task of species selection for the imported species handbook more difficult than anticipated. In addition to better participation rates in importer surveys, more market surveys may have realised a greater number of imported species. For example, a significantly different mix of imported species was observed during two trips to Asian markets in the Melbourne suburb of Springvale in February and May 2001.

Overall we found that most sectors of the industry were particularly cooperative but did encounter wariness in some sectors because of sensitivities, possibly linked to substitution.

Publication and distribution

The process of publishing the handbooks was complex but did have two major advantages. Firstly, one of the editors was responsible for manuscript layout and transferring MS Word documents into desktop publishing software. This resulted in many fewer layout errors and reduced the usual, time-consuming problems associated with routine book publishing. Secondly, the editorial team established an excellent working relationship with the printer (Courtney Colour Graphics, Melbourne). Authors worked directly with the printer to ensure the greatest authenticity in colour rendition during printing. This worked well during production of the first volume and paid efficiency dividends during the reprinting of this volume and printing of the second volume.

While the project was very successful and most facets ran extremely smoothly, some problems were encountered that either affected progress or impacted on the project in some way. The distribution of the domestic species handbook (first print run) was a complex process, with both FRDC and CSIRO Marine Research staff encountering a steep learning curve. The use of three distribution points could have been simplified by the application of effective sales management procedures, including accurate tracking of sales and revenue. The distribution of the subsequent print runs (domestic and imported species volumes) was streamlined by the use of a single distributor.

The publication of the imported species handbook was later than originally planned due to two main reasons. First, in early 1999 and with the FRDC's enthusiastic support, G. Yearsley, a key member of the handbooks production team, was seconded to the Queensland Department of Primary Industries (DPI) for 12 months. His project with DPI was to assist the Principal Investigator (Tony Onley) on another FRDC-funded book project, *Development and Production of the Second Edition of the Australian Seafood Catering Manual* (FRDC Project 1998/351). Although this secondment delayed the production of the imported species handbook by 12 months, it was considered highly successful and fruitful by all those involved and concerned.

Second, the production of the imported species handbook was further delayed at the request of Australia's Fish Names Committee. Names ratification was a slow process that involved extensive liaison with seafood importers. The FNC rightly requested that marketing names issues be resolved prior to publication of the handbook. Even still, some name changes were requested in the final stages of book production, requiring changes to book layout (i.e., the order of species). In future, the list of names and species included should be agreed on well in advance of the layout stage of book production.

Unfortunately, the imported species handbook did not include species oil-composition profiles as were included in the domestic species handbook. This aspect of the work, which has proven very popular and useful to users of the domestic species handbook, was not funded for the imported species volume.

6. BENEFITS AND ADOPTION

The handbooks project has provided highly significant, positive benefits to Australia's fishing industry, and to the general community via seafood consumers. Few projects can claim such far-reaching effects on the entire industry, and few (if any) FRDC-sponsored outputs are as well known in the Australian community as the seafood handbooks.

Soon after its release in 1999, the domestic species handbook was recognised by the industry as a standard—a comprehensive and authoritative reference to Australian seafood. In particular, the marketing names listed were adopted by numerous wholesalers (e.g. the Sydney Fish Market) and retailers, bringing a previously unknown measure of clarity and uniformity to the names of Australian seafood.

Due to the domestic species handbook's high profile, it was considered the national authority on fish names, and was referred to as such in a draft of Australia's updated *Food Standards Code*. This provided the impetus for a rejuvenated 'Fish Names Committee' (formerly the 'Seafood Marketing Names Review Committee') to tighten the protocols and procedures surrounding marketing name selection. Further, the Fish Names Committee (FNC) wisely replaced the domestic species handbook as the fish names authority with a new, web-accessible species list called the 'Australian Fish Names List'. This readily updateable list, which was developed directly as a result of the success of the domestic species handbook, now also includes imported species, and has a high profile among the fishing industry.

The FNC and its predecessors have worked for decades to lift the profile of standardised fish names with a view towards names legislation. The handbooks significantly enhanced the profile of fish names to the point where the hard work of numerous individuals is now poised to pay off. Fish names will probably be legislated in Australia in 2004/05, and the handbooks have provided a framework and baseline for this very positive decision.

The domestic species handbook exceeded most peoples' sales expectations. The initial 1999 print run of 10,190 copies (9,040 hardcover, 1,050 waterproof and 100 leather-bound) sold quickly despite advice from leading booksellers that a total run of 3,000 would be 'difficult to move'. Rather, demand forced a reprint of 7,500 hardcover copies in 2001. As of 2nd March, 2004, 3,214 of these have sold and only about 4,200 remain in stock. Records show a healthy component of overseas sales, and many Australian exporters sent copies to overseas clients as a 'catalogue' of Australian seafood. The imported species handbook was not expected to achieve similarly high sales results due to a smaller market. However, sales have been strong, with 890 of an original 3,000 printed in January 2003 being sold by 2nd March, 2004. At the same date, 40 leather-bound copies of the domestic species handbook remain of an original 100.

Due to the large number of these handbooks in circulation in Australia, and due to very positive, high-profile media attention given to their launches (see Appendixes 7, 8 and 10), consumer confidence in seafood has increased. Mis-naming of species is of concern to the average seafood consumer, and product clarification achieved through the application of knowledge contained in the handbooks (by both industry and consumers) has boosted consumer confidence. Reliable reports suggest that seafood sales increased about 10% in Sydney immediately after the launch of the domestic species handbook in June, 1999.

Nearly 100 newspaper and magazine articles highlighted either or both the handbooks. And these have been published over a long time period, from the book launches to present time (e.g. very positive reviews of the imported species handbook appeared in the November, 2003 edition of *Professional Fisherman* and the March, 2004 edition of *Seafood New Zealand*, and both handbooks received excellent coverage in the March 2004 QANTAS in-flight magazine, *The Australian Way*). Newspapers include *The Weekend Australian* (26–27 June, 1999), *The*

Daily Telegraph (26 June, 1999), *The Saturday Mercury* (3 July 1999), *The Age* (20 July, 1999), *The Courier Mail* (30 October, 1999), *The Sydney Morning Herald* (12 March, 2003), *The Mercury* (19 March, 2003), and many more regional papers. Magazines include *The Queensland Fisherman* (July, 1999), *Open House* (August, 1999, April, 2003 and October, 2003), *Seafood Australia* (Winter, 1999), *Vogue Entertaining and Travel* (September, 1999), *Slimming* (October, 1999), *Elle Cuisine* (October/November, 1999), *Western Fisheries* (Spring, 1999), *Nature Australia* (Autumn, 2000), *Austasia Aquaculture* (October/November, 2000), *Club Marine* (Volume 14, 5), *Ecos* (October–December, 2000), and *Professional Fisherman* (November, 2002 and November, 2003). International magazines that reviewed the handbooks include *Seafood International* (2000) and *Seafood New Zealand* (September, 1999). Stand-out quotes from newspapers and magazines include the following:

'the best book ever written on Australian fish and seafood.'

... *The Age* (20 July, 1999)

'a sensational publication ... [that] is easy to use, logically organised and accurately written ... The authors have made a huge contribution to the knowledge and understanding of domestic seafood species. This book will become an essential reference for anyone who deals with Australian seafood.'

... *Nature Australia* (Autumn, 2000)

'Buy this book. It is not possible to compare [our] fish species book with this handsome ... reference work. The Australians must be justly proud of this achievement.'

... *Seafood New Zealand* (September, 1999)

'The definitive authority on the matter [of fish names] is the excellent CSIRO publication, Australian Seafood Handbook.'

... *Austasia Aquaculture* (October/November 2000)

'FRDC and CSIRO Marine Research publish the Australian Seafood Handbook, which proves to be one of the most popular and widely used publications funded by FRDC.'

... *FRDC R&D News* (July 2002)

A brief selection of complete articles is presented in Appendix 10A.

Both handbooks have also been given a high profile in advertising brochures produced by CSIRO Publishing. For example, both are presented in the 'Oceans and rivers' section of CSIRO Publishing's November 2003 'New and bestselling titles' brochure (Appendix 11).

In addition to written media, both handbooks received coverage on radio and television, with numerous interviews of book authors and other stakeholders. A selection of author interviews is listed in Appendix 10B and 10C.

The waterproof version of the domestic species handbook achieved a silver medal for innovation at the 17th National Print Awards in 2000 (Appendix 12). The domestic species handbook reached Top 10 Bestseller lists across the country. For example, *The Mercury* ranked it as high as three during a month in their Top 10 list in Tasmania in July and August, 1999, and one Hobart bookshop (Fullers) listed it as number two on their weekly bestseller list on 7 July, 1999.

Such extensive publicity achieved a high profile for the issue of uniform Australian fish names, causing significant, positive flow-on effects for other industry sectors and various government departments. For example, supermarkets such as Woolworths testify to very

significant, time- and money-saving reductions in product lines after adopting uniform names. This is in addition to benefits received through increased consumer education and consumer confidence. The Australian Quarantine and Inspection Service (AQIS) also simplified its procedures for monitoring seafood exports through the adoption of standard marketing names in its 'Exdoc' system.

Another positive flow-on effect has been the acquisition of, and access to, images of Australian seafood and other fishes. Previous to this project, high-quality images of most Australian seafood species were impossible to source. Predictably, the publication of images in the domestic species handbook generated increasing requests for high-quality images (both high and low resolution) of whole fish and fillets. This led to FRDC funding to digitise CSIRO Marine Research's Photographic Index of Australian Fishes (PIAF). This project is in progress, and commercial images (from the handbooks) are now available online as part of Australia's fisheries coding system, Codes for Australian Aquatic Biota (CAAB). High-resolution versions of these images are available for purchase through the Nature Focus image library. Numerous other fish images will be added to both the CAAB database and the Nature Focus library over the next few years.

Flow-on benefits have also crossed the Tasman Sea to New Zealand. The two handbooks combined cover all but a handful of New Zealand's seafood selection, and have also received good press in that country. New Zealand is strongly linked to Australia via the *Food Standards Code* (administered by Food Standards Australia New Zealand), and communication lines have been opened to discuss the expansion of the Fish Names List to include New Zealand species and names. While there are many issues to resolve, the publication of the handbooks generated liaison and cooperation between Australia and New Zealand, and many can see the benefit of future Australasian (rather than just Australian) seafood handbooks. On a related issue, requests have been received from New Zealand scientists to include New Zealand species in Australia's fisheries coding system (CAAB).

7. FURTHER DEVELOPMENT

This research has identified several areas for which there is scope for either further development, dissemination, or commercial exploitation of the products and information generated by this project.

Periodic revisions of the seafood handbooks will be necessary. These books have provided industry with a tool to appraise and refine the marketing names process, as well as to assemble more accurate data on our commercial seafood species. As a consequence, the handbooks will need to be updated as the seafood nomenclature is stabilised and better information is provided on species. Appropriate timing of possible updates will be essential. Already, parts of these books are out-of-date but an upgrade should not predate publication of the formal fish names list discussed below. It could be argued that with the current rate of increase in imported species, a revised imported species volume should precede the domestic species volume. Obviously, the answer to this question relies on need but the existence of the first edition of the imported species handbook is likely to provoke response and input from importers in the future. Imports are still not adequately delineated, and further taxonomic work is required on some threatened species (e.g. Asian whitebait). Both handbooks are highly relevant to New Zealand's seafood industry. Feedback from across the Tasman has been exceptionally positive and, given the bilateral trade agreement, the next versions should incorporate the needs of both countries (i.e. Australasian Seafood Handbooks). The volume of work to achieve this outcome is relatively minimal given the large number of shared species marketed.

Another major outcome of this project has been flagged jointly by the Fish Names Committee (FNC) and the editors of the handbooks. This includes producing a standardised list of common names of Australian fishes and commercial shellfishes. A FRDC-funded workshop (FRDC 2001/231) will formulate a list of names, eventually to be published as a recommended national standard. Genetic identification of tissue will become more valuable if and when these names are legislated. In a more serious legal environment, it may be necessary to move to DNA tests as well. Unlike protein fingerprinting, recent development in DNA analysis can be used for cooked product. This work may link in with plans to contribute to the international 'Barcode of Life' project. Oil profiles can also be used to fingerprint seafood.

Possibly the most important secondary objective of this project has been the characterisation of fillets. This work was much more successful than the research team had envisaged, and offers considerable future scope. A simple, electronic system for identifying fillets could easily be developed that is customisable by the identifier. The project could also provide detailed information on the characteristics of fillets of use to consumers and the industry alike.

Images generated by the project have been commercialised through an image distribution library (Nature Focus) with shared returns to both FRDC and CSIRO (FRDC 2001/231). This has also enabled digitisation of an image catalogue of our fishes (Photographic Index of Australian Fishes) providing an otherwise unavailable resource to multiple potential users (industry, scientists, publishers, *etc.*). Enhanced images are now available for a variety of uses including books, posters, bycatch identification, public education, *etc.* Thumbnails will be provided to the Sydney Fish Market website in a promotional trial. Quality is an issue in hard copy image reproduction; often it is poor. Posters and future versions of the handbooks should be printed on higher quality paper to ensure still more accurate colour image reproduction.

The oils component of the handbook project has generated considerable interest from various client groups. We have received numerous requests for data on species, including various bycatch species or byproducts. With the expansion of the CSIRO handbook study to over 500 species, the opportunity to examine the oil composition of further species, particularly emerging cultured species, is available and is recommended. This should include overseas species that are presently imported.

Further studies to determine both spatial and temporal variation in oil composition of commercial fish and other seafood are recommended, particularly for problematic species such as escolar (see below) and species where anecdotal evidence exists suggesting such variation affects product quality and value.

An increasing number of incidences of illness associated with consumption of 'rudderfish' has occurred recently. The high wax-ester oil composition for fillet samples have explained the reported diarrhoeal effects on consumers. The purported 'rudderfish' were in fact escolar. These results and the possible incorrect naming of the fillets suggest that consumers should be made aware of the oil type in these two groups and that strict use be made of marketing names to avoid similar health issues. Oil composition results also supported genetic and taxonomic evidence (unpublished data) that several undescribed species may exist in the rudderfish and escolar groups. Further specific taxonomic research on these groups is required, together with comparison of the oil profiles between and within (geographic and seasonal) species. In addition, insight into the physiological basis for the occurrence of these very different oils in the muscle of teleosts would be valuable.

Oil results obtained for several species (e.g. abalone) suggest that it will be possible to use fatty acid profiles as biochemical tools to ascertain the environment from which any collected specimen has been recently feeding in. Such an approach could have application in the area of fisheries compliance. Further research is required before such tools can be used quantitatively.

8. PLANNED OUTCOMES

The original applications for this project preceded special identification of 'Planned Outcomes'; however, the project generated many significant outcomes discussed below or elsewhere in this report. The handbook volumes have already exceeded the high expectation outlined in the funding application simply by virtue of their ease of use, and unprecedented acceptance by the seafood industry and general public.

A unique, first-time survey of the composition of the Australian seafood market was integral to handbook production. This review covered both domestic and imported species, and resulted in a dramatic increase in the number of documented seafood species available in Australia. For example, the publication *Marketing Names for Fish and Seafood in Australia* (DPIE, 1995) included only about 50 imported species, but project surveys revealed the true number of imports to be more than 220.

The huge sales volume of books, and their popularity with consumers and recreational anglers (not just with industry), demonstrates their adoption as the baseline reference for seafood in Australia. This is further evidenced by the Sydney Fish Market adopting the handbooks as the standard works of reference for produce traded within their facility. Additionally, FSANZ wrote the handbooks into the draft *Food Standards Code* as the base reference for Australian seafood marketing names.

The handbooks have been widely accepted by retailers, with copies displayed and sold by numerous fish retail outlets across the country. One unforeseen, but highly significant, outcome in the retail sector is the simplification of product lines in supermarkets. Inefficiencies have been reduced by standardising names following the adoption of the handbooks as the identification tool for purchasing and marketing agents. Chefs and restaurateurs have similarly embraced the handbooks, which are commonly kept as a reference in commercial kitchens across Australia. High-profile features in food-service trade magazines such as *Open House*, and more populist publications, have both demonstrated and invigorated acceptance in the commercial and public sectors.

The handbooks' high profile as stand-alone documents has created greater general awareness and increased confidence in seafood throughout Australia. For example, reliable reports indicate that seafood sales in Sydney increased by some 10% immediately following the launch of the domestic species handbook in mid-1999. Additionally, the awareness of consumers to the enormous range of quality seafood in Australia has significantly increased, resulting in a greater willingness to sample the diversity of seafood available.

A long-overlooked aspect of seafood purchasing at all levels has been the obvious need for accurate fillet identification. Both handbooks provide a tool to identify fillets based on morphological characteristics. This arms consumers and industry personnel with valuable and authoritative knowledge when purchasing seafood in its common value-added form. This helps demystify the purchasing process.

Bulk copies of handbooks have been purchased by some exporters as gifts for overseas buyers, to increase awareness and familiarity with Australian products. The domestic species handbook has reduced confusion to such an extent that some overseas clients simply quote handbook page numbers when ordering. Importers are equally assisted by now having a comprehensive reference to product that has been imported over recent decades. This provides consistency among importers regardless of a product's country of origin and any overseas names that may have been used at any prior points of sale. Names sometimes differ at each point of sale prior to retail sale in Australia.

The provision of an identification tool that incorporates both species and marketing names allows AQIS inspectors to reliably and consistently identify imported seafood species. This is of particular importance for trade-restricted items (e.g. CITES listed species). Tools are provided to distinguish fillets genetically, and the publication of the handbooks has sparked widespread interest in this and similar (e.g. DNA) techniques. These methods will become even more important, and increasingly applied, if marketing names are legislated.

An extensive collection of high-quality transparencies of commercial species and product has been assembled during the production of the handbooks. The scientific and commercial significance of this collection added weight to a proposal to value-add to the Photographic Index of Australian Fishes (PIAF). A resultant project will see etched, digitised images available to specialist and general audiences via the internet.

9. CONCLUSION

This long-running, multifaceted project was exceptionally successful, achieving all planned objectives and yielding some unplanned outcomes and benefits. It can be summarised by the following:

1. a definitive handbook for the identification of all fresh and frozen domestic seafood species marketed in Australia was published in 1999. This guide has been exceptionally well received by industry, as well as other interested parties such as recreational fishers, scientists, and the public. All numerous reviews of the book have been positive and many have been glowing. The book won a national printing award and has been in bestseller lists in some states. Sales well exceeded predictions from national book distributors, with the first print (10,000 copies) selling out in about 18 months. A reprint (7,500 copies) was commissioned in 2001 and more than 3,200 of these have been sold (March, 2004);
2. a companion volume covering more than 220 imported species was published in 2003. The format followed the earlier publication. The print run (3,000 copies) and sales were smaller than Volume 1 but the print run was well received by the target audience, the Australian importers. Like Volume 1, this book had a high profile launch, attracting considerable media attention and ministerial interest;
3. the domestic species handbook was originally based on a list of commercial seafood species. However, the scope of this project increased dramatically as the markets were examined to obtain material and images. Many unlisted species (more than 70) were being landed regularly and for the sake of completeness these were included in the project;
4. a review of the composition of Australia's seafood imports was conducted with the assistance of industry. Additional imports were flagged but many other species were being imported without the knowledge of the mainstream industry. Seafood sold by Asian vendors was significantly more diverse than anyone had anticipated. A more thorough investigation of imports is needed as other undetected species are likely to be marketed, and import composition changes with time;
5. the project aimed to use a novel combination of classical morphology, fillet anatomy, and genetics to identify species. This approach has proven particularly successful in characterising species, and has led to new discoveries about the characteristics of fillets between and within closely related species groups. Species and genera can often be identified based on fillets alone. This approach was presented at an international conference in Spain, where it and the handbook received praise. Australia is clearly a world leader in seafood identification and authenticity;
6. the inclusion of oil composition information for many species in the handbook was another novel component of this project. The assembly of oil profiles, identification information, and other information of value to marketers and fishermen, was not covered in or by any other industry reference. No other books on seafood anywhere in the world have provided this coverage;
7. the handbook volumes have become basic references to both consumers and marketing sectors of industry;
8. this project spawned numerous related publications in the scientific literature, as well as oral and poster presentations at national and international conferences (Appendix 13).

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APPENDIX 1. INTELLECTUAL PROPERTY

Copyright of the two handbook volumes is jointly owned by CSIRO Marine Research and the Fisheries Research & Development Corporation. An agreement was reached between these two parties whereby revenue from sales was shared equally, after reimbursement of print and distribution costs to FRDC.

APPENDIX 2. STAFF

All staff were CSIRO Marine Research employees, except for the consultant Nick Ruello (Ruello and Associates).

Peter Last	Principal Investigator—Project supervisor
Bob Ward	Principal Investigator—Genetics supervisor
Gordon Yearsley	Specimen acquisition, authorship, editing, graphic design and book layout, supervision of printing process
Ross Daley	Co-authorship, collection and analysis of genetic and morphological data, supervision of printing process
Nick Ruello	Editing of manuscript and description of fillets
Daniel Gledhill	Co-authorship, digital image enhancement, and map production
Jane Andrew	Protein fingerprinting
Natalie Conod	Protein fingerprinting
Spikey Riddoch	Data collation and proof reading of manuscript

The following CSIRO Marine Research staff contributed to FRDC-funded projects (1995/122 and 1999/331) on the oil composition of Australian seafoods, the results of which were included in the domestic species handbook: Peter Nichols, Nick Elliott, Ben Mooney and Patti Virtue.

APPENDIX 3. HANDBOOK ACKNOWLEDGEMENTS

Appendix 3A—Domestic species handbook acknowledgements (2001 reprint)

Appendix 3B—Imported species handbook acknowledgements

Appendix 3A—Domestic species handbook acknowledgements (2001 reprint)

While many people have helped in the preparation of this book, the editors would particularly like to thank several of our CSIRO Marine Research colleagues: Alastair Graham catalogued specimens, collected samples and gave considerable input to various other aspects of this project; Ross Daley constructed figures for the protein fingerprinting chapter and the glossary, etched and edited photographs, and helped with specimen collection and taxonomy; Nick Elliott carefully refereed the entire manuscript and assisted with specimen collection; Dave Evans (ex-CSIRO) went beyond the call of duty with specimen acquisition; Thor Carter contributed greatly by taking most of the photographs; Louise Bell gave considerable advice regarding design and layout; and Spikey Riddoch and Daniel Gledhill gave tremendous assistance and support, particularly during the final weeks of document compilation.

Fishery information was edited by the following fisheries experts who (sometimes with the assistance of their colleagues) kindly shared their knowledge: Kevin Rowling (NSW), Dave Smith (Vic.), Malcolm Dunning (Qld), Rod Lenanton (WA), Keith Jones (SA), Jeremy Lyle (Tas.) and Ric Fallu (NT). Their input greatly enhanced this finished product. Patricia Kailola gave generous assistance, particularly with researching the molluscs chapter.

The production of this handbook was dependent on the acquisition, accurate identification and cataloguing of thousands of samples. While specimen acquisition was not always easy, some industry members were exceptionally helpful and one deserves special mention. Bernie Taylor (A. Raptis and Sons, Pty. Ltd.) enthusiastically supplied literally hundreds of top-quality specimens and his contributions were essential to the completion of this handbook. We are also greatly indebted to the following industry and scientific personnel, and recreational fishers, for collecting, supplying, transporting, identifying or cataloguing samples:

Gerry Allen, Peter Arnold, Tania Bardsley, Greg Barron, Mark Benson, Donna Bradley, Alan Bradshaw, Glen Bradshaw, Francene Brown, Clay Bryce, Adam Butcher, Roger Buttermore, Graham Caracciolo, Greg Carney, Kent Carpenter, Nick Catalano, Geoff Champion, Robert Chin, Viv Clements, John Collins, Phil Critchlow, Steve Crocker, Lara Damiani, Sian Damsche, Peter Davie, John Diggle, Chris Edwards, Bob Elliot, Pam Elliott, Brendan Etches, Brad Evans, Tim Farrell, Alan Faulkner, Wayne Fulton, Caleb Gardner, Jac Gibson, Neville Gill, Martin Gomon, Geoff Gooley, Sam Gordon, Ken Graham, John Hacking, Wayne Haggdorn, David Hales, Tracy Hay, Glen Haynes, David Heaslip, Barry Hutchins, Simon Johns, Jeff Johnson, Daniel Johnstone, Clive Jones, Liesl Jonker, Alan Jordan, Pheroze Jungalwalla, Brendan Kelleher, Bill Kyle, Kevin Lamprell, Chan Lee, Peter Lee, Matthew Locket, John Lynch, Denis Macgee, John Macich, Bruce Malcolm, Bernadette Manjaji, Loisetta Marsh, Jamie Mason, Andrew Massey, Chris Massey, Brett Mawbey, Stan McDonald, Craig McDowall, Mark McGrouther, Robert McKenzie, Dave McKeown, Vicki Midgley, Kerry Miles, Glenn Murphy, David Needham, Stephen Newman, Terry Nichols, Mark Norman, Colin Ostle, Roy Palmer, John Paxton, Rod Pearn, Gretta Pecl, Kylie Pitt, Brett Poulson, Russell Reece, Tim Rieniets, Ian Riggs, John Roach, Arthur Rodas, Kevin Rowling, Andrew Sanger, Mandy Sansom, Richard Saul, Joel Scott, Glen Searle, Chris Shearer, Troy Sinclair, Steve Sly, Andrew Smith, Brad Smith, Errol Smith, Ken Smith, Paul Southgate, Peter Stephenson, Murray Stevenson, Neville Stewart, Tim Stranks, Denis Suckling, Wayne Sumpton,

Calvin Terry, Lisa Terry, Albert Thorley, Andrew Tierney, Liz Turner, Goldie Tybell, Sven Uthicke, Terry Walker, Betty Warner, Lee Warner, Caren Willcox, Don Workman, and De-arne Yearsley.

Employees or representatives of the following companies or groups also assisted greatly:

Angelakis Brothers, Ansett Air Freight, Australian Express, Australian Fisheries Management Authority, Christies Seafoods, Claudio's Quality Seafood, De-Costi Brothers Seafoods, Footscray wholesale fish market sellers, FRV Southern Surveyor, Marine Discovery Centre, Peter's Fish Market, Sydney Fish Market buyers and retailers, and numerous work experience students.

The following CSIRO Marine Research staff assisted with specimen collection and/or other aspects of the project:

Denis Abbott, Franzis Althaus, Bruce Barker, Nic Bax, Paul Boulton, Simon Braine, Nan Bray, Dave Brewer, Cathy Bulman, Peter Campbell, Robert Campbell, Naomi Clear, Ian Cook, Darren Dennis, Geoff Dews, Graeme Dunstan, Kevin Eatt, Michael Gardner, Karen Gowllett-Holmes, Mark Green, Peter Grewe, John Gunn, Antonia Hodgman, Rob Kenyon, Mark Lewis, Clive Liron, Greg Lyden, Craig Mackinnon, Catriona Macleod, Janet Madsen, Tim Mangan, Vivienne Mawson, Don Michel, Paulette Midgley, Michael Moore, Meredith Newman, Anne Pirrone, Craig Proctor, Tony Rees, Tristan Richards, Keith Sainsbury, John Salini, Tim Skewes, John Stevens, Charles Sutherland, Brian Taylor, David Vance, Vicki Wadley, Ted Wassenberg, Angela Webb, Grant West, Wade Whitelaw, Alan Williams, and Owain Williams.

Photographs by Thor Carter, Gordon Yearsley, Alastair Graham, Ross Daley, Nick Elliott, Charles Sutherland, Peter Last and Graeme Johnson. The striped marlin photograph was kindly supplied by Julian Pepperell (Pepperell Research).

We also acknowledge colleagues (mostly museum taxonomists) involved in a recent Marine Bioregionalisation of Australia project. Their data provided the foundation for the distributional maps.

Comments on the text or other general assistance was provided by: Heather Coulston, Sheila and the late Jack Coulston, Nick and Ruth Freeman, Jeff and Karen Hogg, Bruce and Janet Hummerston, Jo Innes, Danny and Maria Milosavljevic, Michael Podagiel, Francis Ryan, Brian and Jennifer Yates, and Honor Yearsley.

Members of the various seafood marketing names committees were exceptionally helpful; Roy Palmer, in particular, provided valuable advice.

Funded by the Fisheries Research and Development Corporation and we thank all its staff, particularly Peter Dundas-Smith and Patrick Hone, for their continuous support, input and advice.

Appendix 3B—Imported species handbook acknowledgements

While many people assisted in the preparation of this book, the editors would first like to thank several of our CSIRO Marine Research colleagues: Alastair Graham catalogued specimens, collected samples and gave considerable input to various other aspects of this project; Daniel Gledhill co-authored the bony fishes chapter, etched and edited photographs, constructed the maps, and helped with data collection and proofing; Ross Daley constructed figures for the protein fingerprinting chapter and the glossary, etched and edited photographs, and helped with specimen collection, taxonomy and proofing; Thor Carter contributed greatly by taking most of the photographs; Karen Gowlett-Holmes identified imported invertebrates and reviewed the invertebrate-related sections; Natalie Conod and Jane Andrew each contributed greatly to the protein fingerprinting work; Spikey Riddoch gave tremendous assistance and support in various aspects of document compilation; Nick Elliott carefully refereed the entire manuscript and assisted with specimen collection; Louise Bell gave advice regarding design and layout; and Jawahar Patil collected samples overseas.

The members of the Fish Names Committee and its previous versions provided the impetus and foundation for the domestic and imported species handbooks. Numerous industry and government personnel have served well on these committees and working groups over more than 20 years. The production of this imported species volume was made possible by tremendous input from all current committee members. Long-standing member and current chairman, Roy Palmer, demonstrated passionate leadership and has given great support to the seafood handbook projects over many years. The secretary, Alan Snow, superbly administered the approval of various marketing names that are included herein. Noel Gallagher also deserves special mention for contributing valuable comments from his vast knowledge of imported seafood species.

In addition to those mentioned above, species identification pages and other sections of the text were edited by the following experts who kindly shared their extensive knowledge: Peter Dundas-Smith (Fisheries Research and Development Corporation), Doug Hoese (Australian Museum), Patrick Hone (Fisheries Research and Development Corporation), Les Johns (Australian Quarantine and Inspection Service), Michael Parolin (Fisheries Research and Development Corporation), Larry Paul (National Institute of Water and Atmospheric Research, New Zealand), Kylie Paulsen (Fisheries Research and Development Corporation), Harry Peters (Marine Product Marketing), Nick Ruello (Ruello and Associates), and Richard Stevens (Western Australian Fishing Industry Council).

The production of this handbook was dependent on the acquisition, accurate identification and cataloguing of thousands of samples. We are greatly indebted to the following industry and scientific personnel, for collecting, supplying, transporting, identifying, cataloguing or filleting samples, and/or for commenting on the text or providing other general assistance:

Gerry Allen, Claudio Bittencourt, Mark Boulter, Ellen Bromley, Patrick Campbell, Kent Carpenter, Geoff Champion, Patrick Clementson, Jeremy Cliff, Flo Cohen, Phil Cooper, Heather Coulston, Maria Cousseau, Rebecca Daniels, Peter Davie, Ted Doran, Malcolm Dunning, David Eccles, John Field, Spiros Foscolos, Malcolm Francis, Frederick Fry, Lisa-ann Gershwin, Steven Gill, Tony Gill, Martin Gomon, Mark Gooley, Sam Gordon, Ken Graham, Vicente Hdez, Phil Heemstra, José Hernández, Jeff and Karen Hogg, Kristy Howes, Barry Hutchins, Hajime Ishihara, Tomio Iwamoto, Gavin James, Jeff Johnson, Pheroze Jungalwalla, Clive Keenan, Barbara Kriketos, Helen Larson, Annie P. K. Lim, Richard Lord, Jamie Lowe, John Lynch, Bernadette Manjaji, Hiro Matsumoto, Bob McDowall, Mark McGrouther, Peter McMillan, Alec Moore, Garry Moxom, Kir Nesis, Stephen Newman, Kyosuke Niwa, Mark Norman, Tony Onley, Ciro Oyarzun, Bill Pate, Ian Peebles, Peter Poulos, Jack Randall, Tim Rieniets, John Roach, Clive Roberts, Paul Rodhouse, Kevin Rowling, Mike Ruccio, Nick Ruello, Craig Sanderson, Kunio Sasaki, Mary Schwenzfeier, Bernard Séret, David Skibinski, Dennis Spooner, Tim Stranks, Liz Turner, Geoffrey Waller, Reg Warren, Simon Wills, Carmen Yamashiro, and De-arne Yearsley.

Employees or representatives of the following companies or groups also assisted greatly:

A. Raptis & Sons Pty Ltd, Australian Quarantine and Inspection Service, Australian Seafood Producers Pty Ltd, E. J. Doran Pty Ltd, Emma's Seafood Yong Tofu, Footscray wholesale fish market sellers, H & N Fish Company, Hai Long Seafood, Hai Phu, Hai Quang Seafood, Kailis Bros. Pty Ltd, Marine Product Marketing Pty Ltd, Meng Heng Asian Groceries, Pacific West Foods Australia Pty Ltd, Prestige Fisheries Pty Ltd, Seafood Importers Association of Australasia, Seafood Traders of Australasia Pty Ltd, Stingray Seafoods Pty Ltd, Sydney Fish Market buyers and retailers, and Zanwick Pty Ltd.

The following CSIRO Marine Research staff assisted with specimen collection and/or other aspects of the project:

Denis Abbott, Sharon Appleyard, Nan Bray, Alan Butler, Peter Campbell, Jerry Copleman, Lea Crosswell, Meredith Hepburn, Antonia Hodgman, Greg Lyden, Craig Macaulay, Janet Madsen, Tim Mangan, Peter McDonough, Sean McInnes, Don Michel, Michael Moore, Peter Nichols, Tim O'Sullivan, Anne Pirrone, Craig Proctor, Diana Reale, Tony Rees, Leigh Roberts, Catherine Ryan, Keith Sainsbury, Cath Sliwa, John Stevens, Peter Thompson, Debbie Vince, Angela Webb, Alan Williams, and Jeffery Young.

Most of the photographs contained herein were taken by the following CSIRO Marine Research staff: Thor Carter, Gordon Yearsley, Alastair Graham, Ross Daley, Nick Elliott, Charles Sutherland and Peter Last. Additional photographs were supplied by:

Alan Blacklock—paua; Norma Brunetti—illex squid; Paula Cullenberg—snow crab; Fred Fry—Alaskan pollock (whole and fillet), Atlantic cod (whole); Eric Hochberg—giant squid (photo by S. Berry) and octopus; Takeo Horiguchi—nori; Maurice Kottelat—gourami (whole); Peter McMillan—southern rock cod (whole), New Zealand arrow squid; Stephen Newman—oblique-band snapper (whole); Harry Peters—Nile perch (whole, photo by N. Gallagher); Jack Randall—flyingfish (whole), humphead snapper (whole); Clive Roberts—morwong (whole); and Andrew Stewart—New Zealand turbot (whole).

The Fisheries Research and Development Corporation (FRDC) funded the research on which this handbook is based to help eliminate the confusion over fish names in Australia. We thank the FRDC staff for their ongoing support, input and advice.

APPENDIX 4. IMPORTER SURVEY FORM

The following form was sent to members of the Seafood Importers Association of Australasia to delineate the major seafood items imported to Australia.

CSIRO Imported Seafood Handbook — Products Survey

Please use one form (one side of a page) per species and provide the following information:

Scientific name and common/marketing name	The scientific name and Australian marketing (or common) name of the product to help identify it.
Main country(ies) of origin and overseas names	The country or countries in whose territorial waters the product was caught or farmed. If the exporting country is different please indicate. Please include overseas common names if known.
Intended use in Australia	Human consumption, bait, petfood, etc.
Product form	The imported species handbook will include information on all processed seafood products, including fish meals, oils, marinades, and canned products.
Years imported or years since last imported	Product history is required for both recent and established products.
Average imported weight	To estimate the importance of each species.
Optional comments/suggestions	Please include any comments on future developments, unusual imports or issues you would like covered in the imported species Handbook.

Acknowledgement

All contributors will be duly acknowledged in the final publication. Please stipulate if you want to be acknowledged personally, as a company or not at all.

Specimen acquisition

As you are aware, most imported products are not whole (e.g. Nile perch fillets are imported rather than whole Nile perch). However, to complete the imported species handbook, we will need to obtain whole animals (for photography, fillet descriptions and genetic studies). We would greatly appreciate your help in sourcing specimens from overseas suppliers. **Please indicate if you are willing to help.**

Return of survey forms

We would greatly appreciate receiving your completed survey forms (in the enclosed envelope, no stamp required) by May 5, 2000. Please note that Gordon Yearsley is currently on secondment in Queensland and best contacted on 0417 383 086 or gordon.yearsley@marine.csiro.au.

CSIRO IMPORTED SEAFOOD HANDBOOK — PRODUCTS SURVEY

Contact name: _____ Company: _____

Phone number: (____) _____ Fax number: (____) _____

Email address: _____ Date: ____/____/____

Acknowledgement in the Handbook (please circle preferred option): personal / company / none

Scientific name (genus and species)									
Common/marketing name in Australia									
Main country(ies) of origin	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%; text-align: center; border-bottom: 1px solid black;">Country</th> <th style="text-align: center; border-bottom: 1px solid black;">Local overseas name</th> </tr> </thead> <tbody> <tr> <td style="border-bottom: 1px solid black;">1.</td> <td style="border-bottom: 1px solid black;"> </td> </tr> <tr> <td style="border-bottom: 1px solid black;">2.</td> <td style="border-bottom: 1px solid black;"> </td> </tr> <tr> <td style="border-bottom: 1px solid black;">3.</td> <td style="border-bottom: 1px solid black;"> </td> </tr> </tbody> </table>	Country	Local overseas name	1.		2.		3.	
Country	Local overseas name								
1.									
2.									
3.									

Intended use in Australia (please tick)	Human consumption <input type="checkbox"/>	Petfood <input type="checkbox"/>
	Commercial bait <input type="checkbox"/>	Aquaculture feed <input type="checkbox"/>
	Recreational bait <input type="checkbox"/>	Farm animal feed <input type="checkbox"/>
	Other <input type="checkbox"/> _____	

General product form	Frozen <input type="checkbox"/>	Marinated/pickled <input type="checkbox"/>
	Chilled <input type="checkbox"/>	Canned <input type="checkbox"/>
	Smoked <input type="checkbox"/>	Dried <input type="checkbox"/>
	Other <input type="checkbox"/> _____	

Finfish form	Whole <input type="checkbox"/>	Fillet or similar, skin on <input type="checkbox"/>
	Gilled and gutted <input type="checkbox"/>	Fillet or similar, skin off <input type="checkbox"/>
	Headed and gutted <input type="checkbox"/>	Fillet, crumbed/battered <input type="checkbox"/>
	Other <input type="checkbox"/> _____	

OR

Shellfish form	Whole <input type="checkbox"/>	Half shell <input type="checkbox"/>
	Tail <input type="checkbox"/>	Shelled <input type="checkbox"/>
	Tube <input type="checkbox"/>	Diced <input type="checkbox"/>
	Other <input type="checkbox"/> _____	

Years imported	Less than 1 year <input type="checkbox"/>	4–10 years <input type="checkbox"/>
	1–3 years <input type="checkbox"/>	More than 10 years <input type="checkbox"/>

OR

Years since last imported	Less than 1 year <input type="checkbox"/>	4–10 years <input type="checkbox"/>
	1–3 years <input type="checkbox"/>	More than 10 years <input type="checkbox"/>

Average imported weight (per year for recent years)	Less than 1 tonne <input type="checkbox"/>	100–1000 <input type="checkbox"/>
	1–9 tonnes <input type="checkbox"/>	More than 1000 tonnes <input type="checkbox"/>
	10–99 tonnes <input type="checkbox"/>	

Specimen acquisition	Yes, I am willing to help <input type="checkbox"/>
----------------------	--

Optional comments and suggestions:

APPENDIX 5: IMPORT PERMIT FOR CHINOOK SALMON

ANIMAL HEALTH ACT 1995

SECTION 19

**SPECIAL AUTHORITY FOR THE IMPORTATION OF
CHINOOK SALMON (*ONCORHYNCHUS
TSCHAWYTSCHA*)**



Tasmania
DEPARTMENT of
PRIMARY INDUSTRIES,
WATER and ENVIRONMENT

**Gordon Yearsley
CSIRO Marine Research
GPO Box 1538
HOBART 7001**

According to Section 19 of the Animal Health Act 1995, I authorize you to import 3 eviscerated Chinook Salmon and up to 12 muscle samples from fish of this species. All this material will be obtained from the Sydney or Melbourne Fish Markets.

The following conditions will apply:

1. Each shipment and a copy of this Authority must be presented to an inspector from the Quarantine Branch of the Department of Primary Industries, Water and Environment on arrival.
2. Standard Quarantine Branch fees may be charged for this clearance.
3. Post-Entry Isolation
 - a) After the shipment is cleared by a Quarantine Branch inspector, the imported material must be taken directly to the Fish Taxonomy Section on the ground floor in Block 1 of the CSIRO Marine Research Laboratory, Castray Esplanade, Battery Point.
 - b) All containers and packaging material must be autoclaved or disinfected with an iodophor solution containing 50-100 mg/L free iodine, or an equivalent solution..
 - c) No imported material may be removed from the Fish Taxonomy Section unless it has been treated in a manner which the Chief Veterinary Officer has approved in writing.
 - d) The procedures outlined by you (preservation in 10% formalin followed by storage in 70% ethanol and the CTAB miniprep for isolating DNA from tissues) will be sufficient to allow removal of material subjected to either procedure.
 - e) Frozen material must be noted in standard laboratory records, clearly labelled and stored in a way that will prevent its accidental removal.
 - f) An authorised officer must be able to inspect the laboratory for compliance to these requirements at any time.

A handwritten signature in black ink, appearing to read 'John Elliott', with a long horizontal flourish extending to the right.

John Elliott for
R Andrewartha
CHIEF VETERINARY OFFICER

Issue Date	12 April, 2002
Expiry Date	12 April, 2003

APPENDIX 6. FILLET-DATA SHEET

The following data sheet was used to record fillet characteristics of each species collected. The example included here is for estuary rockcod (*Epinephelus coioides*).

CAAB: 37311007

Species: Epinephelus coioides

Date: 23/06/98

HB No.: 3

Photo data: 22/6/98 R5

Version: 5/1/98

Recorders: PL

TO DO: FILLETS - ALL PARTS; HEADED AND GUTTED - PARTS 1, 2 & 4.

Part 1: Fillets — Basic Form

<p>1A. Length 435 mm vs Depth 243 mm</p> <p>1. deep (≥50%) 2. medium (25–50%) 1 depth/length 55.86 % 3. elongate (<25%)</p> <p>Obliqueness (angle) 90</p> <p>1. not oblique (flathead, 135°) 2. intermediate (whiting, 120°) 3. oblique (emperor, 105°) 4 4. very oblique (spiky oreo, 90°) 5. rounded 6. angular</p>	<p>1B. Thickness 40 mm</p> <p>Thickness/length 9.20 %</p> <p>1. compressed 2. intermediate 3. convex 2 4. depressed</p> <p>1C. Taper</p> <p>1. very weak (pike) 2. slight (mullet) 4 3. medium (snapper) 4. extreme (dory)</p>	<p>1D. Air sack remnant</p> <p>0. absent 1. indistinct 3 2. present 3. prominent</p> <p>1E. Belly flap</p> <p>0. absent 1. present 1 2. variable</p> <p>1F. Caudal peduncle</p> <p>0. absent 2 1. present 2. variable</p> <p>CP cross-sectional shape (before filleting)</p> <p>1. Round 2. moderately compressed 3. compressed 4. moderately depressed 2 5. depressed</p>
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This species completed (Y/N)

Part 2: Fillets — External Surface

This species added to MAC (date) 08/07/98

If skun (i.e. no skin info available), tick here , and go to 2H

<p>2A. Scale pockets</p> <p>0. absent 1. embedded or reduced 2. barely detectable 3. irregular 4. defined 4 5. well defined 6. defined but hard to see 7. vary greatly over surface</p>	<p>2B. Scale/pocket max depth 5.8 mm</p> <p>Scale/depth 2.39 %</p> <p>1. <2.5 mm 2. 2.5–5 mm 3. 5–10 mm 4. >10 mm 5. scutes 3 6. denticles</p>	<p>2C. Lateral line</p> <p>0. non-existent 1. inobvious 2. distinct 1 3. very distinct</p> <p>0. no special features 1. scutes 2. denticles 0 3. caudal keel</p>	<p>2D. Skin pores</p> <p>0. non-existent 1. inobvious (in part) 2. pronounced (in part) 3. inobvious (all over) 4. pronounced (all over) 0</p>
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<p>2E. Skin thickness</p> <p>1. thin 2. medium 3. thick 4 4. verythick</p>	<p>2F. Scale deciduosity</p> <p>1. extremely adherent 2. very adherent 3. adherent 2 4. deciduous 5. very deciduous</p>	<p>Colour options:</p> <p>0. N/A 1. white 2. black 3. grey 4. silver 5. red 6. yellow</p> <p>7. blue 8. green 9. brown 10. pink 11. orange 12. translucent 13. 14.</p>	<p>00. tone follows scale pocket & membrane colours directly</p>	<p>Pattern type options:</p> <p>1. plain 2. stripes 3. spots/blotches 4. bands 5. combination 6. reticulations 7. marbled</p>
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2G. Skin Colour 1. plain; 2. bifurcated; 3. complex 3

	Pattern type	Tone	Scale pocket/membrane contrast	Pocket colour	Membrane colour	Dominant special feature colour	Secondary special feature colour	Number/arrangement (dominant feature)		
Upper (covers all for "plain")	3	39	2	1	38	68		2		
Middle	3	39	2	1	3	68		2		
Lower	1	31	2	1	3					

Contrast options:

0. none
 5. poor
 1. irregular
 2. defined
 3. well defined
 4. defined but hard to see

Spots/blotches, no./arrangement options:

1. fine
 2. medium
 3. heavy

Stripes, no./arrangement options:

0. oblique (no 0 = horiz)

1. one
 2. two
 3. three
 4. four
 5. five
 6. more than 5

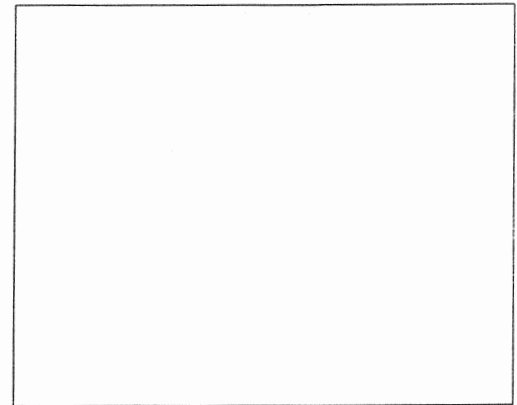
Add colour notes:

2H. Integument colour (when skun) Use colour options overleaf	Dorsal Ventral	<input type="text" value="1"/> <input type="text" value="1"/>	2I. Slime 0. absent 1. slightly <input type="text" value="2"/> 2. moderately 3. very <hr/> 2J. Fatty layer 0. absent 1. trace 2. obvious <input type="text" value="2"/> 3. well developed	2K. Red muscle 0. absent 1. 1 row 2. 2 rows 3. 3 rows etc. <input type="text" value="3"/>	<table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%;"></td> <td style="width:10%;">1. continuous</td> <td style="width:10%;">Upper</td> <td style="width:10%;">Middle</td> <td style="width:10%;">Lower</td> </tr> <tr> <td></td> <td>2. discontinuous</td> <td style="text-align: center;"><input type="text" value="1"/></td> <td style="text-align: center;"><input type="text" value="1"/></td> <td style="text-align: center;"><input type="text" value="2"/></td> </tr> <tr> <td></td> <td>3. diffuse</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>1. very feeble</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>2. feeble</td> <td style="text-align: center;"><input type="text" value="2"/></td> <td style="text-align: center;"><input type="text" value="3"/></td> <td style="text-align: center;"><input type="text" value="2"/></td> </tr> <tr> <td></td> <td>3. intermediate</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>4. pronounced</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>5. very pronounced</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Main band width (mm):</td> <td style="text-align: center;"><input type="text" value="26"/></td> <td style="text-align: center;"><input type="text" value="38"/></td> <td style="text-align: center;"><input type="text" value="20"/></td> </tr> <tr> <td></td> <td>Band width % of F depth:</td> <td style="text-align: center;"><input type="text" value="10.70"/></td> <td style="text-align: center;"><input type="text" value="15.6"/></td> <td style="text-align: center;"><input type="text" value="8.2"/></td> </tr> </table>		1. continuous	Upper	Middle	Lower		2. discontinuous	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="2"/>		3. diffuse					1. very feeble					2. feeble	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="2"/>		3. intermediate					4. pronounced					5. very pronounced					Main band width (mm):	<input type="text" value="26"/>	<input type="text" value="38"/>	<input type="text" value="20"/>		Band width % of F depth:	<input type="text" value="10.70"/>	<input type="text" value="15.6"/>	<input type="text" value="8.2"/>
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Part 3: Fillets — Internal Surface

3A. Flesh colour 1. milky (roughy) 2. white (coral trout) 3. off white (yellowish) 4. off white (brownish) 5. pinkish (pale) 6. reddish brown 7. brown 8. red <input type="text" value="4"/> 9. greyish 10. blue 11. orange (Salmo) 12. bluish white (Haletta) 13. off white (greyish—garfish)	3B. Peritoneum colour 1. transparent 2. translucent <input type="text" value="4"/> 3. silvery/translucent 4. silv./white translucent 5. silvery 6. white 7. white with black flecks 8. black 9. brown 10. pink 11. grey with black streaks 12. black with translucent	3C. Midline (connective tissue) colour 1. as for flesh 2. white 3. white with black flecks 4. translucent 5. translucent with black spots 6. grey <input type="text" value="4"/>	3D. Muscle flakiness 1. fine 2. medium <input type="text" value="3"/> 3. gaping 3E. No. pin bones <input type="text" value="7"/> No. pin spines (ext.) <input type="text" value="4"/> Descript. <input type="text" value="anterior ones long,"/> 3F. No. rib bones <input type="text" value="6"/>
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ILLUSTRATION:



3G. Muscle bands (outer) Number of rows <input type="text" value="1"/> <input type="text" value="1"/> Converging (1), <i>weakly converging</i> (3), parallel (2) or follow dorsal contour and convex (4) <input type="text" value="2"/> <input type="text" value="3"/> Myomeres indistinct (1), <i>intermdiate</i> (3) or distinct (2) <input type="text" value="2"/> <input type="text" value="2"/> No. myomeres adj. to dorsal midline <input type="text" value="20"/>	3H. Fatty layer 0. absent <input type="text" value="0"/> 1. trace 3. obvious 4. well developed <hr/> 3I. Pockets in flesh 0. absent <input type="text" value="0"/> 1. present <hr/> 3J. Parasites in flesh 0. absent <input type="text" value="0"/> 1. present
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Part 4: Fins

4A. Dorsal Fin Spines min max Rays min max <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> Shape 0. N/A 1. even <input type="text"/> 2. slight notch 3. deep notch 4. broken continuous 5. continuous 3 portions 6. separate/1st single 7. separate 8. separate/2nd adipose 9. separate 3 portions	4B. Anal Fin Spines min max Rays min max <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> Shape?? 0. N/A 1. even 2. slight notch <input type="text"/> 3. ? 4. ? 5. ?	4C. Caudal Fin Rays min max <input type="text"/> <input type="text"/> Shape 0. N/A 1. isocercal 2. diphyccercal 3. heterocercal 4. hypocercal <input type="text"/> 5. truncate 6. emargin 7. forked 8. lunate 9. rounded 10. cent ray p. 11. pointed 12. lanceolate	4D. Pectoral Fin Rays min max <input type="text"/> <input type="text"/> Shape 0. N/A 1. falcate <input type="text"/> 2. trapezoid 3. rounded
4E. Pelvic Fin Spines min max Rays min max <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> Position 0. N/A 1. jugular <input type="text"/> 2. thoracic 3. abdomin. 4. variable			

NOTES:

Red muscle, 1 @ full width?

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APPENDIX 7. SUMMARY OF LAUNCH DETAILS

Appendix 7A—Summary of domestic species handbook launch

Appendix 7B—Summary of imported species handbook launch

Appendix 7A—Summary of domestic species handbook launch

Date: 25 June 1999

Venue: Doyle's, Watsons Bay, Sydney

Coordination: FRDC, CSIRO Marine Research, Hill and Knowlton

Launcher: Federal Agriculture, Fisheries and Forestry Minister, Mark Vaile

Invitees: Numerous industry representatives and media

Function: Two separate functions. First, a sit-down lunch for lifestyle (food) media writers, complete with a 'guess the seafood' competition led by Nick Ruello. Second, the official launch, an hors d'oeuvres/drinks function with industry representatives and invited guests.

Speakers: Minister Vaile, Peter Doyle Snr, Peter Dundas-Smith, Nick Ruello, Gordon Yearsley

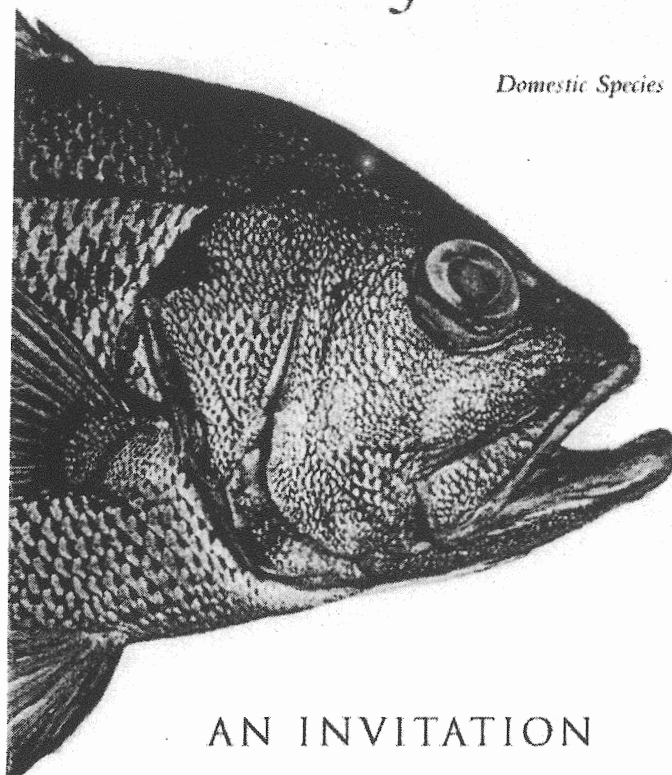
Funding: FRDC, with some contribution from project funds

Feedback: Hill and Knowlton provided the following report on the launch:

Final report for the launch of the
Australian Seafood Handbook – an
identification guide to domestic species

AUSTRALIAN
Seafood

Domestic Species



AN INVITATION

Prepared by,

Hill and Knowlton
Level 7
15 Blue St
North Sydney

Telephone: (02) 9966 1255
Facsimile: (02) 9966 1244

Date: July 1999

Compiled by Simone Pregellio

CONTENTS

1. Introduction	3
2. Project Aim	4
3. Project Elements	4
4. Results	5
Appendices	

1. Introduction

Hill and Knowlton were asked by the Fisheries Research and Development Corporation to offer media relations support to the launch of *The Australian Seafood Handbook – an identification guide to domestic species*.

Working with the FRDC communications team, Hill and Knowlton offered support in the area of media release writing and media liaison - specifically with the food media.

This report outlines the activities Hill and Knowlton undertook for this role and the results that have been received to date.

2. Project Aim

The aim of the project was to successfully launch the Australian Seafood Handbook to the Australian media – concentrating on fishing journalists, the food media and selected lifestyle consumer journalists.

3. Project Elements

1. Media materials

A media release was written announcing the introduction of the handbook. This core release was adapted to accommodate food writers and lifestyle writers.

See Appendix A for a copy of the media release.

All other media materials were prepared by the FRDC Communications team.

2. Food media launch

With specific experience in food media, Hill and Knowlton were asked to invite food and lifestyle media to the launch of the handbook by the Federal Agriculture, Fisheries and Forestry Minister, Mark Vaile. With the Ministerial launch scheduled for 4.30 pm on a Friday afternoon - the week commencing Feast of Sydney, Hill and Knowlton suggested a separate lunch time launch specifically for the food and lifestyle media.

This time was suggested not only for its suitability for media generally but because this time had not been scheduled for a Feast of Sydney event (three events had been scheduled for the evening).

Invitation text for the food media was written, invitations distributed and follow up phone calls made to all invitees. Invitees included food writers on major Sydney newspapers, food writers in women's magazines, food writers on specific food and dining magazines and key nutritionists.

3. Radio activity

The core media release was sent to select radio producers who work on fishing programs. Phone calls were made to each of the producers offering a spokesperson.

In some cases, the stations had already received the information courtesy of a media alert sent out by the FRDC two days earlier.

4. Results

The following food and lifestyle media attended the lunch time launch of the Australian Seafood Handbook.

Name	Title	Publication
Darlene Allston	Editor – Home Maker	That's Life
Melanie Lord	Deputy Practicals Editor	For Me
Alexandra McCowan	Food Editor	Australian Women's Weekly
Kirsty Cassidy	Food Editor	Elle
Consuelo Guinness	Food Editor	Belle
Jo Rodgers	Food Editor	Daily Telegraph
Kylie Isherwood	Food Writer	Australian Slimming Magazine
Lydney Milan	Food Writer	Australian Table
Elise Pascoe	Food Writer	Burke's Backyard
Sally Hammond	Food Writer	Freelance
Linda Venturoni Wilson	Food Editor	Australian House and Garden
Maureen Simpson	Food Writer	Australian House and Garden
Jennene Plummer	Food Editor	Super Food Ideas
Joan Campbell	Food Editor	Vogue Australia
Rosemary Stanton	Nutritionist	Burke's Backyard

These writers who attended the lunch expressed interest in featuring the book in a future media activity. Given this response, it can be expected that coverage will be ongoing over the next few months.

The following publications are coordinating photo shoots involving the waterproof versions of the handbook

Publication	Timing	Issue
Vogue Entertaining and Travel	Photo-shoot late July	October
Elle	Photo-shoot on 3 rd August	October/November

The following are publications that could not attend the launch but specifically requested the book for their review.

Name	Title	Publication
Catherine Saxelby	Nutritionist	The Sun-Herald – other various <i>(see Appendix B for letter of thanks)</i>
Anneka Manning	Food Editor	Australian Good Taste
Lucy Kelly	Food Editor	Good Medicine
Maeve O'Meara	Food Editor	New Woman
Kathy Snowball	Food Editor	Australian Gourmet Traveller
Belinda Jeffery	Food Editor	Better Homes and Gardens
Margaret Fulton	Food Editor	New Idea
Jill Dupleix	Food Editor	Daily Telegraph
Sheridan Rogers	Food Editor	The Sun Herald
Donna Hay	Food Editor	marie claire

The following radio stations were contacted;

Station	Program	Comments
2BL	Weekend Program	Information faxed through to producer and message left.
2CR	Evening Show	Information e-mailed to program – attention to the fishing reporter – Rod Harrison
2GB	Weekend Morning	Information faxed to weekend producer/presenter. Message left.
2KY	Hightide	Information spoke to producer. Producer interested and said he would call to pursue.
2UE	Gary O'Callaghan's Sydney	Producer had received information two days previously via newsnet and had passed on information to fishing reporter – Bob Staines

3LO	Breakfast Saturday	Producer interested to speak to someone when in Melbourne. Information faxed through in the interim
4BC	Fishing Show	Information faxed through to producer. Producer unavailable until Saturday.

Appendix A – Media Release



MEDIA RELEASE



June 24 1999

THE BOOK, THE FISH, THE CHEF AND THE MINISTER

The fish trade, recreational fishers and consumers now have the definitive guide to seafood with the publication of the **Australian Seafood Handbook – an identification guide to domestic species**. The Handbook is the first comprehensive and fully illustrated guide to Australia's major seafood species – in whole and filleted form.

With a foreword by Peter Doyle, doyen of the seafood industry, the book will be launched in Sydney tomorrow by Federal Agriculture, Fisheries and Forestry Minister, Mark Vaile.

'Doyles on the Beach' at Watson's Bay will be the setting for a gathering of seafood luminaries, from fishing interests, to fish wholesalers and retailers, restaurateurs and consumer representatives.

Written by Peter Last, Gordon Yearsley and Bob Ward from the CSIRO, the guide took five years to research and prepare. Many hours were spent gleaning information from most of the country's major fishing ports, national and overseas fish markets, research voyages from the tropics to the sub-Antarctic, fellow scientists, and fishing industry representatives.

"The guide is sure to grace the boats and bookshelves of commercial, recreational and trade interests and feature in the kitchens of many professional chefs and consumers," said Peter Dundas-Smith, Executive Director of the Fisheries Research and Development Corporation which sponsored the Handbook project.

"As well as being the definitive guide for commercial fishing, the guide also meets the interest of Australia's five million recreational fishers.

"Recreational fishing is a substantial industry in its own right and the guide brings a new level of information to the sporting enthusiast who also has an interest the health of this industry

"The guide also really helps the consumer choose the right seafood for a particular recipe or menu. Unlike the red meat and poultry industries, when it comes to seafood

variety, the Australian consumer has 20 times the choice for tonight's dinner," said Mr Dundas-Smith.

The Handbook is user-friendly. It carries colour photographs of all our 600-odd major commercial seafood species, how to identify them, their protein 'fingerprints', descriptions of their fishery and habitat, and remarks about the species - which includes flesh type, taste and flavour in some cases. Descriptions and photos of the fillets of each fish are also provided.

A huge advantage for consumers is the book's ruling on uniform marketing names for seafood right across the country – whether they are buying fresh at a market or eating in a restaurant.

The Handbook retails for \$39.95 and special waterproof paper editions are available at \$75 a copy.

The Australian Seafood Handbook is available from the Australian Seafood Extension and Advisory Service (AUSEAS) phone - 07-3406 8617, fax - 07-3406 8677, CSIRO Publishing and most larger bookstores.

ENDS

FURTHER INFORMATION:

Simone Pregellio Hill and Knowlton (02) 9966 1255
Craig Macaulay CSIRO 0419 314 434

Appendix B – Letter of thanks

Appendix 7B—Summary of imported species handbook launch

Date: 11 March 2003

Venue: Nick's Bar and Grill, King Street Wharf, Sydney

Coordination: FRDC and CSIRO Marine Research

Launcher: Barry Ross, Business Manager Seafood, Woolworths Ltd

Invitees: Numerous industry representatives and media

Function: Pre-lunch, with refreshments

Speakers: Barry Ross, Senator Ian MacDonald (Minister for Fisheries, Forestry and Conservation), Noel Gallagher, Peter Dundas-Smith, Gordon Yearsley

Funding: FRDC, with some contribution from project funds

APPENDIX 8. HANDBOOK MEDIA RELEASES

Appendix 8A—Media Releases and associated Facts Sheets for the domestic species handbook launch

Appendix 8B—Media Release for the domestic species handbook reprint launch

Appendix 8C—Media Releases and associated Facts Sheets for the imported species handbook launch

Appendix 8A—Media Releases and associated Facts Sheets for the domestic species handbook launch



Media Release

THE HON MARK VAILE MP

MINISTER FOR AGRICULTURE, FISHERIES AND FORESTRY

Friday, June 25, 1999

MV95/99

New guide to Australia's seafood

Australia's international reputation as a leader in fisheries management has been enhanced with the release of a new national seafood guide.

Launching the "Australian Seafood Handbook" in Sydney today, Agriculture, Fisheries and Forestry Minister, Mark Vaile, said the identification guide to domestic species was a major initiative for the nation's seafood industry – an industry now worth \$1.9 billion/yr.

The guide profiles 600 species of seafood, and includes seawater and freshwater finfish and shellfish, together with wholefish and fillet identification. It details a full national marketing names guide, nutritional values, and a world-first protein-fingerprinting guide.

"The Handbook is a long-awaited industry resource that adds new dimensions for the people involved in the harvest, farming, and distribution and preparation of seafood," Mr Vaile said.

"Importantly, for the consumer, and recreational fishers, it provides a guide to one of the richest seafood selections in the world.

"All Australians will gain from the world-leading marine research contained in the handbook, just as they will from the Federal Government's new Oceans Policy which promotes increased research and wider understanding of our marine biological diversity," Mr Vaile said.

Scientists at CSIRO Marine Research teamed with seafood consultants and the Fisheries Research and Development Corporation to write and edit the guide in a five-year research project. Co-editors were Dr Peter Last, and Mr Gordon Yearsley, from the Biodiversity group at CSIRO Marine Research, and CSIRO geneticist, Dr Bob Ward.

"They have gleaned information from most of the country's major fishing ports, Australian and overseas fish markets, during research voyages from the tropics to the sub-Antarctic, from fellow scientists, and fishing industry representatives," Mr Vaile said.

Published by the CSIRO, the "Australian Seafood Handbook" is available from the Australian Seafood Advisory Service, Brisbane, (ph 07 3406 8617); CSIRO Publishing, Melbourne (ph 03 9662 7500); and bookstores.

Contact: Bruce Mills 02 6277 7520



FISHERIES
RESEARCH &
DEVELOPMENT
CORPORATION

MEDIA RELEASE



CSIRO
MARINE RESEARCH

June 25

THE BOOK, THE FISH, THE CHEF AND THE MINISTER

The fish trade, recreational fishers and consumers now have the definitive guide to seafood with the publication of the **Australian Seafood Handbook – an identification guide to domestic species**. The Handbook is the first comprehensive and fully illustrated guide to Australia's major seafood species – in whole and filleted form.

With a foreword by Peter Doyle, doyen of the seafood industry, the book was launched in Sydney today by Federal Agriculture, Fisheries and Forestry Minister, Mark Vaile.

'Doyles on the Beach' at Watson's Bay was the setting for a gathering of seafood luminaries, from fishing interests, to fish wholesalers and retailers, restaurateurs and consumer representatives.

Written by Peter Last, Gordon Yearsley and Bob Ward from the CSIRO, the guide took five years to research and prepare. Many hours were spent gleaning information from most of the country's major fishing ports, national and overseas fish markets, research voyages from the tropics to the sub-Antarctic, fellow scientists, and fishing industry representatives.

"The guide is sure to grace the boats and bookshelves of commercial, recreational and trade interests and feature in the kitchens of many professional chefs and consumers," said Peter Dundas-Smith, Executive Director of the Fisheries Research and Development Corporation which sponsored the Handbook project.

"As well as being the definitive guide for commercial fishing, the guide also meets the interest of Australia's five million recreational fishers.

"Recreational fishing is a substantial industry in its own right and the guide brings a new level of information to the sporting enthusiast who also has an interest in the health of this industry

"The guide also really helps the consumer choose the right seafood for a particular recipe or menu. Unlike the red meat and poultry industries, when it comes to seafood variety, the Australian consumer has 20 times the choice for tonight's dinner," said Mr Dundas-Smith.

The Handbook is user-friendly. It carries colour photographs of all our 600-odd major commercial seafood species, how to identify them, their protein 'fingerprints', descriptions of their fishery and habitat, and remarks about the species - which includes flesh type, taste and flavour in some cases. Descriptions and photos of the fillets of each fish are also provided.

A huge advantage for consumers is the book's ruling on uniform marketing names for seafood right across the country - whether they are buying fresh at a market or eating in a restaurant.

The Handbook retails for \$39.95 and special waterproof paper editions are available at \$75 a copy.

The Australian Seafood Handbook is available from the Australian Seafood Extension and Advisory Service (AUSEAS) phone - 07-3406 8617, fax - 07-3406 8677, CSIRO Publishing and most larger bookstores.

ENDS

FURTHER INFORMATION:

Craig Macaulay	CSIRO	0419 314 434
Kylie Paulsen	FRDC	0413 630 491
Gordon Yearsley	CSIRO	0417 383 086
Peter Last	CSIRO	019 970 142



FISHERIES
RESEARCH &
DEVELOPMENT
CORPORATION

MEDIA RELEASE



CSIRO
MARINE RESEARCH

June 25

THE FISHY STORY SOLVED AT LAST

Tall tales of 'the one that got away' or plaintive pleadings of 'what's this, mum?' will soon be a thing of the past with the publication of the **Australian Seafood Handbook – an identification guide to domestic species.**

A first, the Handbook is a completely illustrated guide to all major Australian seafood species - in whole and filleted form.

Targeted at the retail and restaurant trades and the consumer as well as commercial and recreational fishers, the guide was launched in Sydney today by Mark Vaile, Federal Minister for Agriculture, Fisheries and Forestry.

And where else to launch the ultimate fishy tome but at Doyles on the Beach, Watson's Bay. Mr Seafood himself, Peter Doyle Snr, who wrote the Foreword, was present to solve any arguments on the best fish for a menu – with the aid of the Handbook, of course.

"The publication is the definitive guide to common seafood species around Australia," said co-author Dr Peter Last of the CSIRO.

"It will help the fishing industry better understand the key resource of our \$1.9 million seafood trade. It will help the retail and restaurant trades in their selection of produce. It will help consumer choice.

"I am confident that the Handbook will soon be accepted as the ready reference to Australian seafood," Dr Last said.

The Australian Seafood Handbook was co-authored by Peter Last, Gordon Yearsley and Bob Ward of CSIRO with funding from the Fisheries Research and Development Corporation (FRDC). The FRDC represents all harvesting, distribution and quality control sectors of Australia's \$1.9 billion fishing industry.

As well as being the definitive guide for commercial fishing the Handbook also meets the interest of the estimated five million recreational fishers, according to FRDC Executive-Director, Peter Dundas-Smith.

"The publication offers a new depth of knowledge and understanding for the sporting enthusiast who also has an interest in the health of our industry," Mr Dundas-Smith said.

The *Australian Seafood Handbook - An Identification Guide to Domestic Species* took five years to prepare. Co-editors Peter Last and Gordon Yearsley, from the Biodiversity group at CSIRO Marine Research, and CSIRO geneticist Dr Bob Ward, worked with leading seafood consultants.

To prepare for the writing of the guide, they mounted an exhaustive national sea hunt, gleaning information from most of the country's major fishing ports, national and overseas fish markets, research voyages from the tropics to the sub-Antarctic, fellow scientists, and fishing industry representatives.

Their quest was to create the most comprehensive profile of the 600 finfish and shellfish species caught or farmed in Australian waters, and sold on either the domestic or export markets.

The Handbook is very user-friendly. It carries colour photographs of all our major commercial seafood species, how to identify them, their protein fingerprints, descriptions of their fishery and habitat, and remarks about the species - which includes flesh type, taste and flavour in some cases. Descriptions and photos of the fillets of each fish are also provided.

A huge advantage for consumers is the book's use of uniform marketing names right across the country - whether they are buying fresh at a market or eating in a restaurant.

The Handbook retails for \$39.95 and special waterproof paper editions are available at \$75 a copy plus post and handling where applicable.

The Australian Seafood Handbook is available from the Australian Seafood Extension and Advisory Service (AUSEAS) phone - 07-3406 8617, CSIRO Publishing and most larger bookstores.

Additional information:

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Kylie Paulsen	FRDC	0413 630 491
Gordon Yearsley	CSIRO	0417 383 086
Peter Last	CSIRO	019 970 142



MEDIA RELEASE



June 25

SCIENTISTS SEEK MORE RESEARCH ON MARINE BIOLOGICAL DIVERSITY

Australia's need to maintain research of the marine biota is essential in fully understanding the diversity of its marine environment, according to the editors of a new CSIRO identification guide to Australian seafood species, the *Australian Seafood Handbook*.

"The need to complete the profile of Australia's seafood species in the context of fisheries management and feeding the nation is obvious," Dr Peter Last.

"But it is equally desirable to know the extent of marine riches within Australia's Exclusive Economic Zone supporting the production of such seafood variety so that management of the marine environment can be achieved in balance with all other needs," Dr Last said.

Scientists have identified some 4,500 fish species living in Australian waters. In the past 30 years Australian marine scientists have identified 2,000 fish species recorded for the first time in the region.

A taxonomist who oversees one of Australia's most important biological collections, the CSIRO-ISR Munro Fish Collection, Dr Last was joint leader of a team of taxonomists, geneticists and seafood consultants who prepared the *Australian Seafood Handbook - an identification guide to domestic species*.

His co-editors on the guide were Mr Gordon Yearsley and Dr Bob Ward, both of CSIRO Marine Research.

Species include: cartilaginous fishes such as sharks, rays and skates; bony fishes; crustaceans including bugs, crabs and prawns; molluscs such as abalone, mussels, squids and octopuses; and other invertebrates like jellyfishes and sea urchins.

Funded by the Fisheries Research and Development Corporation (FRDC) and prepared over four years, the guide profiles 600 species of seafood - bony fishes, cartilaginous fishes, crustaceans, molluscs and other invertebrates - caught in Australian fresh and marine environments.

As well as photographic identification of species and their fillets, it includes a revised list of national marketing names for species, genetic fingerprinting of species and details of nutritional value based on previous CSIRO research on omega-3 and omega-6 fatty acids.

The guide is a major reference for the Australian fishing and seafood industry, and is considered to be the first of its type for a national seafood trade in the world.

However, its benefits as a reference also extend to marine science and biology, the recreational fishing industry and consumers wishing to learn more about the expanding seafood selection available to them.

Dr Last acknowledged the support of the FRDC, and that of the fishing industry, including processors, distributors and the catering sector. The industry turns over around \$1.9 billion each year in national and international trade.

Dr Last said Australia maintained a considerable marine research effort centred on CSIRO, State research institutes and universities.

He said scientists - working closely with commercial fishermen - were strategically sampling the deep oceans and coasts to build the profile of Australia's marine biodiversity.

"Our Exclusive Economic Zone houses one of the most diverse biotas on earth.

"With assistance from the fishing industry, researchers are finding species which are new to science but which have a part to play in our complex marine environment.

"We need to enhance that support with more research that will help science better understand all the layers of life in Australia's marine environment and in turn aid authorities in their role of protection and sustainable management," Dr Last said.

The *Handbook* retails for \$39.95 and special waterproof paper editions are available at \$75 a copy. Postage is not included.

The Australian Seafood Handbook is available from the Australian Seafood Extension and Advisory Service (AUSEAS) phone - 07-3406 8617, fax 07-3406 8677, CSIRO Publishing, most bookstores, fishing and tackle shops and leading seafood outlets.

ENDS

FURTHER INFORMATION:

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Peter Last	CSIRO	019 970 142



MEDIA RELEASE



June 25

SEAFOOD GUIDE MEETS CONSUMER EDUCATION NEEDS

A new guide to Australian seafood fills a gap in educating consumers about the wealth of their seafood selection, according to Sydney restaurateur, Mr Peter Doyle, snr.

Mr Doyle acclaimed the CSIRO book - *Australian Seafood Handbook - an identification guide to domestic species* – as meeting a long-standing industry need.

Mr Doyle, in his foreword to the book launched today by the Minister for Agriculture, Fisheries and Forestry, Mr Mark Vaile, said Australia has seafood second to none in quality and variety.

"In my 50 years as a fisherman and restaurateur, my biggest disappointment has been to see how many people miss out on tasting the full range of Australia's wonderful seafood.

"Most Australians aren't familiar with fish species or how to handle and cook them.

"The fishing industry needs to do more to educate and help our consumers – and even people within the industry itself.

"One of the things we've needed for years has been a reliable guide on how to identify seafood. This book fits the bill very well," Mr Doyle said.

He paid tribute to the dedication of the writing and editing team in what he described as a 'gigantic' task.

Dr Peter Last and Mr Gordon Yearsley, taxonomists at CSIRO Marine Research, Dr Bob Ward, a geneticist at CSIRO Marine Research, and seafood consultants from around the country spent five years researching the book. The guide profiles 600 species of seafood, among them seawater and freshwater finfish and shellfish, together with wholefish and fillet identification, as well as listings of nutritional values and a guide to marketing names.

Species include: cartilaginous fishes such as sharks, rays and skates; bony fishes; crustaceans including bugs, crabs and prawns; molluscs such as abalone, mussels, squids and octopuses; and other invertebrates like jellyfishes and sea urchins.

Mr Doyle said he was proud that three features of the book combined to make it a world first:

- describing and illustrating fillets
- including error-free genetic testing to identify species
- providing information on nutritional value.

"Once this book becomes well-known and well-used in the commercial and recreational sectors of the industry, many more people will be confident about seafood varieties.

"Consumer demand for seafood will increase – and will open the way for greater enjoyment of our healthy product," Mr Doyle said.

The Handbook retails for \$39.95 and special waterproof paper editions are available at \$75 a copy. Postage is not included.

The Australian Seafood Handbook is available from the Australian Seafood Extension and Advisory Service (AUSEAS) phone - 07-3406 8617, fax 07-3406 8677, CSIRO Publishing, most bookstores, fishing and tackle shops and soon from leading seafood outlets.

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MEDIA RELEASE



June 25

CSIRO SERVES UP WORLD'S BEST SEAFOOD GUIDE

Australia's \$1.9 billion seafood trade and the country's four million recreational anglers are about to get a world first - the most comprehensive guide for a national seafood industry.

As the initial part of a major five year project for the Fisheries Research and Development Corporation, scientists at CSIRO Marine Research have produced the *Australian Seafood Handbook* - the definitive identification guide to 600 commercial finfish and shellfish species.

"This is a significant initiative that will elevate consumer confidence and contribute to establishing new quality standards to the processing, distribution and sales of finfish and shellfish," says Dr Peter Last.

"When it comes to seafood variety the Australian consumer has significantly more in choice for the dinner table.

"Seafood lovers will continue to have that choice but will be able to select and identify the other species and so increase their options," says Dr Last.

Preparation of the *Australian Seafood Handbook* has been funded by CSIRO and the Fisheries Research and Development Corporation (FRDC), which represents all harvesting, distribution and quality control sectors of Australia's fishing industry.

Part of the FRDC's charter is to also represent the interest of the four million recreational fishers and, according to FRDC Executive Director, Peter Dundas-Smith, the Handbook also meets that objective.

"Recreational fishing is a substantial industry in its own right and the Handbook generates a new tier of knowledge and understanding for the fishing enthusiast who also has an interest the health of this industry," Mr Dundas-Smith said.

Species include: cartilaginous fishes such as sharks, rays and skates; bony fishes; crustaceans including bugs, crabs and prawns; molluscs such as abalone, mussels, squids and octopuses; and other invertebrates like jellyfishes and sea urchins.

Working with seafood consultants, co-editors Dr Last, and Mr Gordon Yearsley, from the Biodiversity group at CSIRO Marine Research, and CSIRO geneticist Dr Bob Ward, spent four years preparing the *Australian Seafood Handbook - an identification guide to domestic species*.

They have gleaned information from most of the country's major fishing ports, national and overseas fish markets, research voyages from the tropics to the sub-Antarctic, fellow scientists, and fishing industry representatives.

Their quest was to create the most comprehensive profile of the 600 finfish and shellfish species caught or farmed in Australian waters, and sold on either the domestic or export markets.

Dr Last said the Handbook is user-friendly. It carries colour photographs of all our major commercial seafood species, how to identify them, their protein fingerprints, descriptions of their fishery and habitat, and remarks about the species - which includes flesh type, taste and flavour in some cases. Descriptions and photos of the fillets of each fish are also provided.

"Australia has one of the richest seafood selections in the world and as local tastes shift for reasons such as nutrition and health, the industry should be able provide 'the seafood of choice' for all Australians.

"However, having such a large choice can be confusing for the consumer. This book aims to introduce and educate consumers to all of these options."

"For a start, it is an advantage to consumers to have uniformity of marketing names right across the country whether they are buying fresh at a market or eating in a restaurant."

"Of equal importance, is the broader knowledge now available to the catering sector with the Handbook providing an aid to fish selection to give its customers the widest choice of seafood flavours," Dr Last said.

Dr Last estimated there are 4,500 fish species in Australian waters, although many are not commercially available.

The Australian Seafood Handbook is the latest initiative in bringing the catching and processing sectors of the industry closer to the consumer. In 1998, scientists at CSIRO completed the first significant study of the nutritionally valuable omega-3 oils in 200 different fish species. The results of that study are included in the Handbook.

Future projects also funded by FRDC include -

- An Identification Guide to imported fish species. More than 60 per cent of seafood consumed in Australia is imported. Imported species are also sold under a variety of names, and there is no indication of what is imported nor its country of origin.
- Australian Seafood - a Catering manual, providing information on seafood products available (available June 2000)
- Broadening the nutritional value of Australian fish species

The Handbook retails for \$39.95 and special waterproof paper editions are available at \$75 a copy. Postage is not included.

The Australian Seafood Handbook is available from the Australian Seafood Extension and Advisory Service (AUSEAS) phone - 07-3406 8617, fax 07-3406 8677, CSIRO Publishing, most bookstores, fishing and tackle shops and soon from leading seafood outlets.

ENDS

FURTHER INFORMATION:

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Peter Last CSIRO 019 970 142



FACTS SHEET



THE AUSTRALIAN SEAFOOD HANDBOOK — an identification guide to domestic species

Four years in the making, the 470-page *Australian Seafood Handbook* is a milestone publication for the fishing industry, including the national seafood trade, and the recreational fishing industry.

Key features are –

- **Domestic species covered:** cartilaginous fishes such as sharks, rays and skates; bony fishes; crustaceans including lobsters, crabs and prawns; molluscs such as abalone, mussels, squids and octopuses; and other invertebrates like jellyfishes and sea urchins.
- **Species identification:** A high-quality photographic record of more than 350 species, in addition to listings of identifying structural features for each entry.
- **Distribution:** The Australian distribution of each species (or group of species) is shown on a map, with an indicator of whether it is restricted to Australian waters or can be found elsewhere, and therefore possibly imported.
- **Fillet identification:** The edible qualities of different types of seafood can be assessed in a number of ways. Features of the flesh, such as general appearance, moisture level, flavour, texture, colour and shelf life, have all been used as measures of quality. Similarly, these features, along with many others, can be used to identify the fillets of fish groups and, in some cases, species.
- **Comparisons:** There are numerous 'look-alikes' when it comes to species identification, some confounding even the experts. Distinguishing features are listed to assist in comparison with related or similar species. Size and weight details are included, as well as maximum and commonly-marketed details.
- **Habitat:** Outlines environmental location as being marine or freshwater, coastal, continental shelf or deep ocean, and likely depth range.
- **Fishery:** Summarises how and where commercial and recreational fisheries for the species occur.
- **Remarks:** Information which contributes to knowledge of the species, such as how it is caught and sold, tastability and flavour, flesh description, migration patterns, anecdotal information, and important scientific name information.
- **Glossary of terms:** Comprehensive definitions of technical terms, identifying features and characteristics including fillet shapes, fillet colour, structural features of generalised species.

- **Protein fingerprinting:** Sets this identification guide apart from all other guides with a critical chart of the genetic features of 380 species. Protein fingerprinting is a rapid and simple method for identifying most fish and shellfish, and as such it is a particularly useful tool for the seafood industry as well as for marine science.
- **Nutritional value:** Seafood is healthy and important for our diet but how healthy? The oil content of fish and shellfish varies from species to species, depending on factors such as feed source and environment. The composition of saturated, monounsaturated and polyunsaturated fatty acids are given, as well as the levels of nutritionally-important omega-3 and omega-6 fatty acids. CSIRO Marine Research is a leader in this research field and is soon to begin another Fisheries Research and Development Corporation-funded project on nutritional value of individual species.
- **Seafood names:** Although improving, marketing names still vary from state to state and even within regions and cities, and are often based on names applied by early European immigrants and settlers. Standardising names of species has been a major seafood industry objective to eliminate confusion among consumers and in the industry. The *Australian Seafood Handbook* reviews and updates the marketing names for seafood, providing a single name for species previously known by up to 10 other common names. Their other common names are also listed and indexed.
- **Scientific names:** Scientific names are linked to each marketing name and an index of scientific names is included. The use of scientific names is explained thoroughly in the 'How to use this Handbook' chapter.

The *Handbook* retails for \$39.95 and special waterproof paper editions are available at \$75 a copy. Postage is not included.

The *Australian Seafood Handbook* is available from the Australian Seafood Extension and Advisory Service (AUSEAS) phone - 07-3406 8617, fax 07-3406 8677, CSIRO Publishing, most bookstores, fishing and tackle shops and leading seafood outlets.



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FACTS SHEET



CSIRO
MARINE RESEARCH

June 25

THE AUSTRALIA SEAFOOD HANDBOOK

CO-EDITORS

MR GORDON YEARSLEY

The senior editor of the *Australian Seafood Handbook* is **Mr Gordon Yearsley**, a fish taxonomist who has worked in classification and identification since graduating with honours in marine biology from the University of Tasmania in 1988. As a co-author of nine of ten chapters in the book, even bottle-washing was among tasks performed – other tasks ranged from chief sample collector, book planner (layout and design), laboratory time, photographer (about 20% of images), scribe and editor. Sea time used to prepare for the publication includes research voyages aboard the *Southern Surveyor* to Bass Strait, the North-West Shelf and the Gulf of Carpentaria.

Previous work includes substantial contributions to "Marketing Names for Fish and Seafood in Australia" and "Sharks and Rays of Australia" and author on "South East Fishery Quota Species - an Identification Guide", as well as authoring a number of scientific papers. Taxonomy and book production requires a methodical and systematic approach, being pedantic and staying on track and on time.

A committed taxonomist, he rarely fishes but as a seafood connoisseur would like to see names standardised across the country in the interests of consumers and the industry. Favourite seafood is the moonfish.

DR PETER LAST

Dr Peter Last is a co-principal investigator with Dr Bob Ward for the *Australian Seafood Handbook* project. A long-standing advocate for uniformity in names applied to fish species around Australia, he has worked closely with joint Governmental/Industry committees to stabilise seafood marketing name nomenclature in Australia, leading to publication of the *Australian Seafood Handbook*. "There's a clear objective to see consumers recognise the name of a fish, no matter where they are or where in Australia they come from," Peter says. He has an extensive background in multiple marine research areas, focusing on fisheries biology, taxonomy and biogeography, spanning 25 years.

After working at the former Tasmanian Department of Sea Fisheries and obtaining a PhD from the University of Tasmania, he has been employed as the curator of CSIRO's ISR Munro fish collection and the Marine Division's fish taxonomist since 1984. During this period, Dr Last has co-authored or contributed chapters more than a dozen books on fish identification and has produced many more published papers on other aspects of fish biology. These include guides to Australian sharks and rays, Tasmanian fishes, south-east Australian trawl species, and

major contributions to the Food and Agricultural Organisation identification sheets to fishes of the Indo-Pacific region. He has also served on a variety of seafood, fisheries and marine conservation working groups and committees, both locally and internationally, and when on time out from work relaxes with underwater hockey, coastal diving and recreational fishing.

DR BOB WARD

Dr Bob Ward's contribution to the *Australian Seafood Handbook* has been in the protein fingerprinting of 380 species, a technique first used in a comprehensive industry context in the publication 'South East Fishery Quota Species - an Identification Guide', published by CSIRO in 1997 and for which was also co-author. "Protein fingerprinting is a rapid and simple method for identifying most fish and shellfish, and as such it is a particularly useful tool for the seafood industry as well as for marine science," he says. "However, for very closely-related species, such as the various tunas and billfish, more expensive DNA testing may be required". Bob gained his PhD from Cambridge, UK, and then held various university posts in England and Wales before moving to Tasmania to work with CSIRO in Hobart in 1990, establishing a special-purpose genetics laboratory. Initial work focused on stock structure issues of various commercial fisheries including blue-eye trevalla, orange roughy, morwong, sharks and tunas. More recently the genetics lab has moved into aquaculture genetics with work on salmon, oysters and abalone.

Contributing CSIRO authors were Jane Andrew, Ross Daley, Dr Nick Elliott, Ben Mooney, Dr Peter Nichols and Dr Patti Virtue.

Seafood consultant and contributing author, Mr Nick Ruello, of Ruello and Associates provided invaluable advice to the co-editors.

Photographic support was provided by Mr Thor Carter, of CSIRO Marine Research.

ENDS

FURTHER INFORMATION:

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Gordon Yearsley CSIRO 0417 383 086
Peter Last CSIRO 019 970 142

Appendix 8B—Media Release for the domestic species handbook reprint launch



Media Release

AUSTRALIAN SEAFOOD HANDBOOK – BACK BY PUBLIC DEMAND!

14th December 2001

Australians have confirmed their love of seafood – and seafood books! According to the Fisheries Research and Development Corporation (FRDC), seafood consumption is up, and the country's first comprehensive guide to commercially-available seafood species is being re-printed after a first-run sell-out.

The CSIRO-prepared Australian Seafood Handbook has been re-printed and updated to meet consumer and industry demand for an identification guide to 800 seafood species.



After more than four years of research, the Australian Seafood Handbook is the most comprehensive identification guide to freshwater, coastal, continental shelf and deep ocean commercial species.

A further 7,500 hit the streets this week after the last of 10,000 copies of the 470-page Handbook sold earlier this year.

"It's also confirmation that there is strong interest in fish generally and for reasons that may include their biology and the sustainability of their ecosystems," says FRDC Executive Director, Peter Dundas-Smith.

"To meet that product quality CSIRO marine biologists have written a guide that provides enthusiasts with almost all the information they need to know about their favoured species," Mr Dundas-Smith said.

More than 90 per cent of Australians eat seafood. Consumption is indicated by a recent Sydney survey, which showed total consumption of 15.3 kilograms per person per year.

He said demand was also high from seafood processors and wholesalers who use the book to promote Australian seafood to domestic and international clients.

Funded by FRDC, the Australian Seafood Handbook was co-edited by Mr Gordon Yearsley, and CSIRO colleagues taxonomist Dr Peter Last and geneticist, Dr Bob Ward, with assistance from seafood

consultants.

Features of the Australian Seafood Handbook include:

- A full national marketing names guide
- Nutritional values of individual species
- A world-first protein fingerprinting guide
- Fillet identification

Species include: cartilaginous fishes such as sharks, rays and skates; bony fishes; crustaceans including bugs, crabs and prawns; molluscs such as abalone, mussels, squids and octopuses; and other invertebrates like jellyfishes and sea urchins.

The scientists gleaned much of their information from most of the country's major fishing ports, national and overseas fish markets, research voyages from the tropics to the sub-Antarctic, fellow scientists, and fishing industry representatives.

Mr Yearsley said the Handbook is easily understood. It carries colour photographs of all our major commercial seafood species, how to identify them, their protein fingerprints, descriptions of their fishery and habitat, and remarks about the species – which includes flesh type, taste and flavour in some cases. Descriptions and photos of the fillets of each fish is also provided.

According to Mr Yearsley, Australian Seafood Handbook – an identification guide to domestic species is a world first in the seafood industry.

A companion volume focussing on imported species will be published in mid-2002.

"Australia has one of the richest seafood selections in the world and as local tastes shift for reasons such as nutrition and health, the industry should be able provide 'the seafood of choice' for all Australians.

"However, having such a large choice can be confusing for the consumer. This book aims to introduce and educate consumers to all of these options."

"For a start, it is an advantage to consumers to have uniformity of marketing names right across the country whether they are buying fresh at a market or eating in a restaurant."

"Of equal importance, is the broader knowledge now available to the catering sector with the Handbook providing an aid to fish selection to give its customers the widest choice of seafood flavours," Mr Yearsley said.

"Australia has tremendous wealth in its seafood selection and identification can be daunting even for experts," said Mr Yearsley.

The book is 470 pages, hardback, full colour throughout, and is available from CSIRO Publishing (1800 645 051, www.publish.csiro.au), all bookstores and fishing tackle shops. Recommended retail price is \$49.95, including GST.

[CLICK HERE FOR MORE INFORMATION ABOUT THE AUTHORS](#)

For more information contact:

Appendix 8C—Media Releases and associated Facts Sheets for the imported species handbook launch



Media Release

Australia's seafood diversity climbs, says new CSIRO guide

11 March 2003

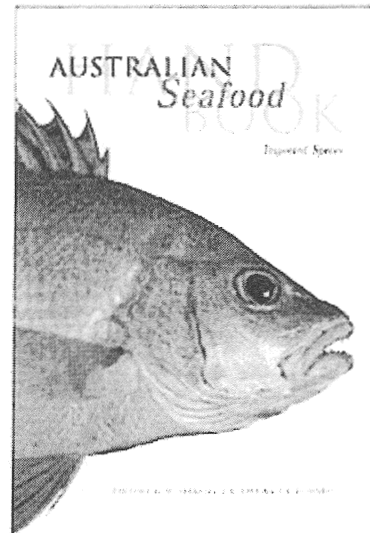
Imported products now provide more than 60 per cent of seafood sold in Australia, according to a new CSIRO species identification guide to imported seafood.

"We've gone from basic British cod and haddock consumers in the 1950's to today importing around 225 species from 50 countries," said Mr Gordon Yearsley, a co-author of a new book, the *Australian Seafood Handbook — an identification guide to imported species*.

"Consumption of imported seafood has reached 140,000 tonnes a year or 50 per cent more than levels of 10 years ago, with an industry value today of about \$1 billion.

"Together with the tremendous variety of more than 800 species commercially harvested or farmed in our own waters that's a very healthy appetite," says Mr Yearsley.

Funded by the Fisheries Research and Development Corporation (FRDC) and supported by the fishing industry, the imported species identification guide was launched in Sydney today.



The *Australian Seafood Handbook — an identification guide to imported species*.

The guide is a companion volume to the *Australian Seafood Handbook — an identification guide to domestic species* launched in 1999, and which was reprinted in 2001.

Mr Noel Gallagher, Chairman of Seafood Traders of Australasia Ltd and a 55-year veteran of global marketing of seafoods, said today the industry provided Australians with an adequate supply of seafood year round.

"Used in tandem with the updated Australian Fish Names List, importers now have a powerful, world-class reference tool for seafood species identification which will trigger reforms in the seafood industry primarily benefiting the consuming public", Mr Gallagher said.

The 240-page guide profiles 130 species or species groups and is an important educational facility for the seafood processing and food service trade. Edited by Mr Yearsley and Drs Peter Last and Bob Ward, from CSIRO Marine Research, the guide is intended to assist importers, buyers and processors in identifying imported species. Additional features of the guide are genetic protein

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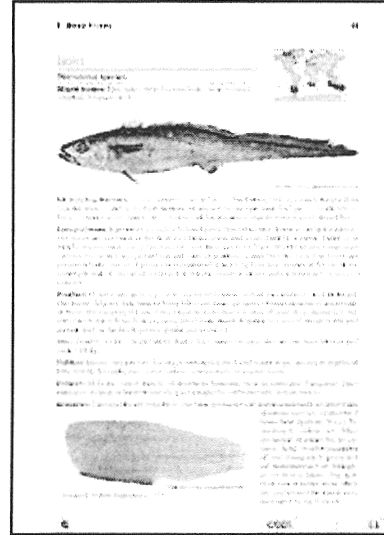
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fingerprinting to distinguish species and standardisation of marketing names to minimise confusion in the market.

Speaking at the launch, Mr Yearsley said half the quantities of imported seafood come from just two countries — New Zealand and Thailand. With efficient international chilled and frozen freight capacities, and diversified markets the number of seafood imports has expanded enormously. For example the quantity of chilled fish imported has grown 30 per cent in just four years.

However, he attributed growth in the number of species to —

- The inability of Australian fisheries to meet demand for some products
- Sourcing of specialised products by migrants from their home country, and a subsequent uptake of these products by Australian consumers
- Direct competition from neighbouring countries such as New Zealand and the Solomon Islands, where imported chilled products arrive daily to be sold alongside local products of the same species.



"One of the reasons Australia is unable to meet local demand for some products is that Australian fisheries are just too small.

"Although Australia's ocean territory is the third largest Exclusive Economic Zone (EEZ) in the world it is relatively poor in terms of seafood production compared with other areas and instead produces low quantity, high value products.



Co-author, Gordon Yearsley.

"This is because the world's high volume fisheries are located in nutrient-rich waters.

"For example, the food service trade, and fish burger and fish finger manufacturers, require large volumes of white, boned-out filets but Australian fisheries cannot supply the required quantities," Mr Yearsley said.

He said south-east Asian migrants in particular had sought and sourced familiar products from their native countries and have introduced special and more diverse flavours to local markets.

Australians, more generally, have responded to the new products on offer, thereby increasing demand and fuelling the product's importation.

"Australians are increasingly willing to experiment with various food types and preparations, creating a market for species and products that are unavailable locally.

"If recent trends continue, Australia's seafood selection will further increase and diversify in future decades," Mr Yearsley said.

Mr Harry Peters, Chairman of the Seafood Importers Association of Australasia Limited, supported this saying seafood imports have provided a unique balance which kept seafood on every household menu and generated a considerable rise in per capita consumption.



Packaged imported seafood.

"Importers of seafoods have operated in harmony with the domestic fishing industry to level out supply with demand. This provides Australians with a variety

of products from all over the world at prices affordable to the average consumer," Mr Peters said.

In the past ten years, scientists at CSIRO have been funded by FRDC to produce:

1. *Field Guide to Australian Sharks and Rays*
2. *South East Quota Species Guide*
3. *Australian Seafood Handbook – an identification guide to domestic species*
4. *Australian Seafood Handbook – an identification guide to imported species*
5. *Seafood the Good Food I and II*

Copies of the *Field Guide to Australian Sharks and Rays*, *Australian Seafood Handbook* guides and *Seafood the Good Food I and II* are available from CSIRO Publishing (1800 - 645 - 051 www.publish.csiro.au) or book stores. The new Guide is available in hardback and sells for \$49.95 (price accurate as at 7/3/03).

Additional information:

- Craig Macaulay ph 03-62325219, e-mail
- CSIRO Marine Research publications (includes above mentioned publications)
- A growing market - imported seafood (background information on the project)
- Key features of the book
- Background on the authors

Updated: 11/03/03

[Media Releases]

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Media Release

A growing market - imported seafood

Australian Seafood Handbook — an identification guide to imported species

Project Background

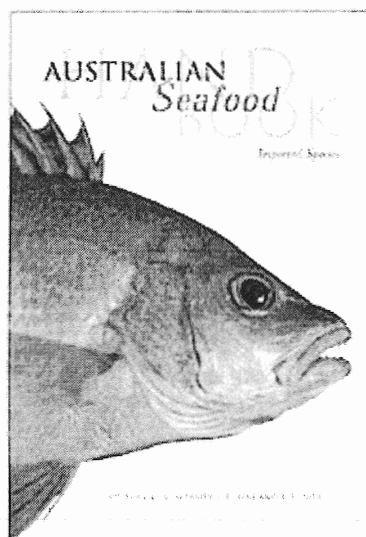
Australia’s seafood selection is second to none. A variety of more than 800 domestic species is supplemented by an enormous and fascinating offering of imported species and products.

The quantity, diversity and origins of seafood in Australia has increased dramatically in recent decades. Imported seafood now provides more than 60% of seafood sold in Australia.

Until the mid-1950s, only a handful of species, such as North Atlantic cod, salmon and herring, were regularly imported. Less than 20,000 tonnes were imported a year from only a few countries (mainly Norway, Canada, South Africa, New Zealand and the United Kingdom).

Aim of this handbook

The aim of this imported species volume (*Australian Seafood Handbook — an identification guide to imported species*) is to provide an affordable, easy-to-use guide to all major seafood species imported to Australia, including their many product forms, and to link each species to its approved, national marketing name. In the course of this research, many previously unrecorded imports were discovered in markets, and it is likely that the contents included are incomplete. Therefore, this first edition will need to be expanded and refined significantly in the future.



Australian Seafood Handbook — an identification guide to imported species

Although much of the handbook’s content is original, published literature and anecdotal information from specialists and importers were often relied on for product type, country of origin, size, depth range and distributional data. Contradictions and omissions were noted in the literature and better data are needed for many species.

Consequently, the authors encourage comments and new information from industry representatives, and readers who have a good knowledge of particular imported species.

Importing facts

Today, with efficient international chilled and frozen freight capacities, and diversified Australian markets, the volume of imports has swollen enormously.



Ross Daiey, a contributing author of the handbook.

- In 2001, about 140,000 tonnes of more than 225 species were imported

from 50 countries.

- Thailand and New Zealand supplied 50 per cent in quantity and value of seafood imports in 1999, compared with 33 per cent a decade earlier. European imports diminished by more than half during the same period.
- Of the species imported, about 12 were cartilaginous fishes (sharks and rays), 165 bony fishes, 18 crustaceans, 25 molluscs and five were other varieties of seafoods.
- In the last decade alone, the total volume of seafood imported has risen by 50%.
- The quantity of whole (chilled) imported finfish has grown more than 30% in just the last four years.
- The total reported value of edible seafood imports exceeded \$870 million in the 2000–2001 financial year (Australian Fisheries Statistics, 2002).

In addition, but not included in this handbook, is a variety of other imported aquatic species (e.g. bait products, fish feed, petfood, and aquarium fishes).

Reasons for increase

There are three main reasons for the recent increase in diversity of seafood imported for human consumption:

- Australian fisheries cannot meet local demand for some products. In many such cases, Australian fisheries are just too small. Although Australia's ocean territory is the third largest Exclusive Economic Zone (EEZ) in the world, it is relatively poor in terms of seafood biomass compared with many other regions (e.g. New Zealand), ranking only fifty-second in terms of production. The food service trade, and fish burger and fish finger manufacturers, require large volumes of white, boned-out fillets, which Australian fisheries cannot supply. Hence, such products are largely imported with New Zealand being a key supplier to this market.
- Migrants have begun to source culturally familiar products from their native lands. These largely differ from domestic species and products (e.g. various dried and salted fishes, sauces and pastes, fish balls, and roe) and have introduced more diverse flavours to local markets. This is particularly true of products from South-East Asia. Australians have demonstrated increasing acceptance of the new products on offer, thereby increasing demand.
- Growth in the number of seafood species imported is related to competition with domestic products from neighbouring countries. Many local species are also caught in fishing grounds adjacent to the Australian EEZ (e.g. the Solomon Islands) and foreign products are imported and sold alongside domestic products. Shipments arrive regularly by air from New Zealand to be sold at many capital city wholesale markets.

Import sources

An increase in the number of species has been accompanied by a significant diversification in the source of imports. Asia and the South Pacific, rather than Europe and North America, are now the dominant sources.

South Africa and South America also now supply a significant proportion of seafood imports. However, a complicating factor in source country statistics is that products may travel to Australia via two or three other countries. For example, most flyingfish roe imported from Japan is originally sourced from Malaysia or the Philippines.

Over recent decades, the 'commodity type' (e.g. fillets or whole fish) and condition (e.g. frozen, chilled or dried) of imported seafood products have also diversified greatly.

Historically, imports were mostly restricted to salted or otherwise preserved products (particularly canned) due to the relatively slow and cumbersome freight services then existing. However, modern freight services now allow efficient international transportation of all manner of products.

Commodity types imported include whole fish, trimmed finfishes, headed and gutted finfishes, gilled and gutted finfishes, fillets, mollusc (e.g. bivalve) meat, crustacean tails, crab claws, minced seafood meat, portion-controlled crumbed

finfish, sauces, pastes, fish balls, surimi, and roe.

Some commodity types that contain seafood are not classified as 'seafood' on import statistics (e.g. Worcestershire sauce contains anchovy but is not considered a seafood import). Products can be chilled, frozen, dried, salted, smoked, pickled, or canned (heated).

Imports comprise —

- Chilled and frozen products about 56%
- Canned items about 29%
- Smoked, dried or salted about 2%
- Other preparations such as sauces about 13%. Canned products have a longer shelf life than chilled or frozen products and are therefore popular in international trade.

Many seafood products are imported to cater for specific needs (e.g. important ingredients in unique Asian dishes) while others enter in higher volume for the food service industry.

About 65% of the imported species are also available in Australian waters and the bulk of these are targeted by domestic fishers. Some other imports have closely related forms in Australian seas. For example, hakes (*Merluccius* species) imported from South Africa and South America are closely related to southern hake (*M. australis*), which is caught occasionally off southern Australia.

Future Trends

If recent trends continue, Australia's seafood selection will further increase and diversify.

Two worldwide trends will affect future imports:

- increased retention and sale of domestic bycatch species,
- and a trend away from wild caught stocks to aquaculture products.

Asian imports already have a strong link to freshwater aquaculture products (e.g. freshwater prawn, barramundi, and basa) and the volume of farmed fish on offer will increase.

Seafood Names

The naming procedure that applies to domestic seafood species applies equally to imports.

A plethora of domestic common names, which has caused confusion for both industry and consumers, is being simplified through the adoption of a unique, national marketing name for each species or group of species. Likewise, seafood imports have attracted a variety of common names, and many species are sold under two or more names in different regions and/or at different times.

Obtaining uniformity of seafood names is perhaps more difficult for imported than domestic species. Different foreign names remain attached to various species from capture or harvest to the final consumer, and identical imports are sometimes sold side-by-side under different names. Increasing diversity of imports has compounded confusion over names, as has inaccurate species identification.

By law, imported product—except that from New Zealand—must be displayed with the country of origin or the word 'imported' displayed on the packaging and/or labelling when traded or sold at retail level.

Beyond that, however, there is an urgent need for authenticity of labelling, and the adoption of standard marketing names for all species sold in Australia, whether domestic or imported. This will ultimately provide direct and indirect advantages to the entire seafood industry and give confidence to consumers. The entire chain will be protected because trade and retail customers are assured of receiving the authentic product.

To advance this process, domestic and imported seafood marketing names were standardised nationally through a joint industry and government review group, the

Fish Names Committee.

For more than 20 years this Committee has reviewed all available names of Australia's seafood species. Approved domestic and imported names form the authoritative 'Australian Fish Names List'. Details of the role of the Fish Names Committee, the latest fish names list, and the process by which a marketing name can be approved or changed, are available from Seafood Services Australia Ltd (<http://www.seafoodservices.com.au/>)

The problem of identifying finfish fillets or other processed seafood has been largely overcome by forensic techniques. For seafood imports this is very important as whole fish are imported only in relatively small volumes. Regulatory and policing authorities can use these methods to detect substitution or misrepresentation, which will increase consumer confidence in names used by vendors.

Forensics depend on genetic variation between species, and only a small piece of fillet or invertebrate muscle is needed for identification. Protein fingerprinting was chosen to identify species here because it is simple to use and can be employed outside the laboratory. More refined DNA analysis will be required to identify many value-added products, sauces and pastes, particularly where more than one seafood species is included.

Further Information:

- Australia's seafood diversity climbs, says new CSIRO guide (media release)
- Key features of the book
- Background on the authors

Updated: 11/03/03

[Media Releases]

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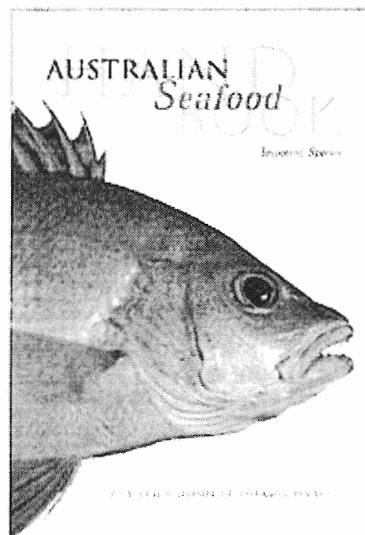
Media Release

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Key features are —

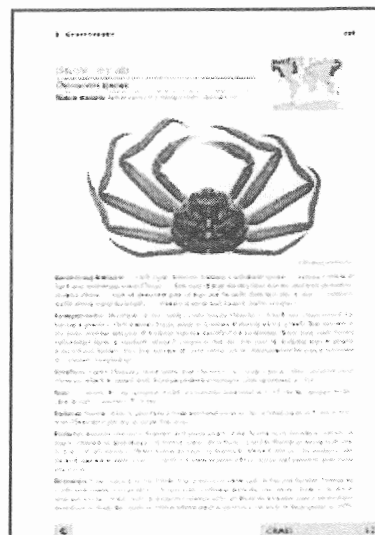
- **Imported species covered:** cartilaginous fishes such as sharks, rays and skates; bony fishes; crustaceans including lobsters, crabs and prawns; molluscs such as abalone, mussels, squids and octopuses; and other invertebrates like jellyfishes and sea urchins.
 - **Species identification:** A high-quality photographic record of about 140 species, in addition to listings of identifying structural features for each entry.
 - **Distribution:** The worldwide distribution of each species (or group of species) is shown on a map on each page.
 - **Fillet identification:** The edible qualities of different types of seafood can be assessed in a number of ways. Features of the flesh, such as general appearance, moisture level, flavour, texture, colour and shelf life, have all been used as measures of quality. Similarly, these features, along with many others, can be used to identify the fillets of fish groups and, in some cases, species.
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- Remarks:** Information which contributes to knowledge of the species, such as how it is caught and sold, tastability and flavour, flesh description, migration patterns,



Australian Seafood Handbook — an identification guide to imported species

anecdotal information, and important scientific name information.

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- Scientific names:** Scientific names are linked to each marketing name and an index of scientific names is included. The use of scientific names is explained thoroughly in the 'How to use this Handbook' chapter.



The *Handbook* retails for *\$49.95 including GST. Postage is not included.

The *Australian Seafood Handbook* is available from CSIRO Publishing at <http://www.publish.csiro.au/>, by email to publishing.sales@csiro.au or call 1800 645 051 for orders within Australia or 61 3 9662 7500 for international calls.

The set of two volumes — "*Australian Seafood Handbook — a guide to domestic species*" and the "*Australian Seafood Handbook — a guide to imported species*" is available for *\$89.95 (*price accurate as at 7/3/03 and subject to price increases).

Further Information:

- Australia's seafood diversity climbs, says new CSIRO guide (media release)
- A growing market - imported seafood (background information on the project)
- Background on the authors



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Media Release

THE AUSTRALIAN SEAFOOD HANDBOOK — an identification guide to imported species

AUTHOR BACKGROUNDS

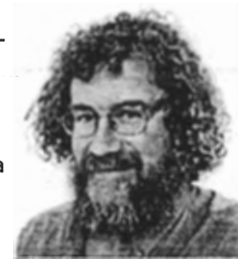
The senior editor of the *Australian Seafood Handbook* is **Mr Gordon Yearsley**, a fish taxonomist who has worked in classification and identification since graduating with honours in marine biology from the University of Tasmania in 1988. As a co-author of nine of ten chapters in the book, even bottle-washing was among tasks performed — other tasks ranged from chief sample collector, book planner (layout and design), laboratory time, photographer (about 20% of images), scribe and editor. Previous work includes substantial



Gordon Yearsley

contributions to "*Marketing Names for Fish and Seafood in Australia*", "*Australian Seafood Handbook — a guide to domestic species*" and "*Sharks and Rays of Australia*", "*Field Guide to Australian Sharks and Rays*" author on "*South East Fishery Quota Species - an Identification Guide*", as well as authoring a number of scientific papers. Taxonomy and book production requires a methodical and systematic approach, being pedantic and staying on track and on time. A committed taxonomist, he rarely fishes but as a seafood connoisseur would like to see names standardised across the country in the interests of consumers and the industry. Favourite seafood is the moonfish.

Dr Peter Last is a co-principal investigator with Dr Bob Ward for the *Australian Seafood Handbook* project. A long-standing advocate for uniformity in names applied to fish species around Australia, he has worked closely with joint Governmental/Industry committees to stabilise seafood marketing name nomenclature in Australia, leading to publication of the *Australian Seafood Handbook*. "There's a clear objective to see consumers recognise the name of a fish, no matter where they are or where they come from," Peter says. He has an extensive background in multiple marine research areas, focusing on fisheries biology, taxonomy and biogeography, spanning nearly 30 years.



Peter Last

After working at the former Tasmanian Department of Sea Fisheries and obtaining a PhD from the University of Tasmania, he has been employed as the curator of CSIRO's National Fish Collection and the Marine Division's fish taxonomist since 1984. During this period, Dr Last has co-authored or contributed chapters to more than a dozen books on fish identification and has produced many more published papers on other aspects of fish biology. These include guides to Australian sharks and rays, Tasmanian fishes, south-east Australian trawl species, and major contributions to the Food and Agricultural Organisation identification sheets to fishes of the Indo-Pacific region. He has also served on a variety of seafood, fisheries and marine conservation working groups and committees, both locally and internationally, and when on time out from work relaxes with underwater hockey, coastal diving and recreational fishing.

Dr Bob Ward's contribution to the *Australian Seafood Handbook* has been in the protein fingerprinting of 175 species, a technique first used in a comprehensive industry context in the publication '*South East Fishery Quota Species - an Identification Guide*', published by CSIRO in 1997 and for which he was also co-author. "Protein fingerprinting is a rapid and simple method for identifying most fish and shellfish, and as such it is a particularly useful tool for the seafood industry as well as for marine

science," he says. "However, for very closely-related species, such as the various tunas and billfish, more expensive DNA testing may be required". Bob gained his PhD from Cambridge, UK, and then held various university posts in England and Wales before moving to Tasmania to work with CSIRO in Hobart in 1990, establishing a special-purpose genetics laboratory. Initial work focused on stock structure issues of various commercial fisheries including blue-eye trevalla, orange roughy, morwong, sharks and tunas. More recently the genetics lab has moved into aquaculture genetics with work on salmon, oysters and abalone.



Contributing CSIRO authors were Ross Daley and Daniel Gledhill.

Numerous seafood importers, members of the Fish Names Committee and FRDC staff provided invaluable advice to the authors.

Photographic support was provided by Mr Thor Carter, of CSIRO Marine Research.

Further Information:

- Australia's seafood diversity climbs, says new CSIRO guide (media release)
- A growing market - imported seafood (background information on the project)
- Key features of the book

Updated: 11/03/03

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APPENDIX 9. EXAMPLE HANDBOOK PAGES

Appendix 9A—Example of species profile page (single marketing name); p. 169, imported species handbook

Appendix 9B—Example of species profile pages (group marketing name); pp 224–225, domestic species handbook

Appendix 9C—Example of protein fingerprint figure page; p. 378, domestic species handbook

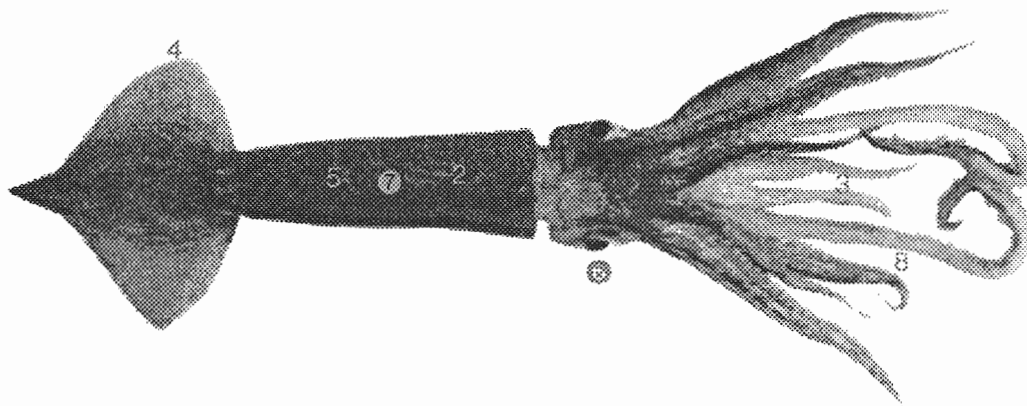
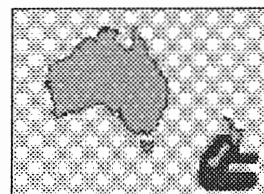
Appendix 9D—Example of oil composition figure page; p. 402, domestic species handbook

Appendix 9A—Example of species profile page (single marketing name); p. 169, imported species handbook

New Zealand arrow squid

Nototodarus sloanii

Minor names: calamari (AU), arrow squid (NZ)



Identifying features: ① more than 60 pairs of suckers on the first (outer) right arm; ② dorsal surface of mantle smooth, light brownish-pink with a blue or purple stripe; ③ large arm suckers with 11–13 similar-sized, flattened conical teeth; ④ fins short, rhomboidal; ⑤ torpedo-shaped body; ⑥ no transparent membrane over eyes; ⑦ a translucent, feather-like ‘pen’ running underneath the back; ⑧ 8 arms and 2 long tentacles.

Comparisons: A member of the family Ommastrephidae, and characterised by having short, rhomboidal fins, a torpedo-shaped body and no transparent membrane over the eyes. Very similar to Australia’s prized Gould’s squid (*N. gouldi*) but with more than 60 pairs of suckers on the first (outer) right arm compared with fewer than 51 suckers in Gould’s squid. Many other commercial squids have much longer fins.

Product: Usually processed and often crumbed as ‘squid rings’ or, incorrectly, ‘calamari rings’ (frozen). Also whole, tubes and arms (frozen).

Size: To 42 cm in mantle length and 1.4 kg (commonly imported at 20–25 cm in mantle length).

Habitat: Marine; pelagic in continental shelf and slope waters, usually in depths of less than 200 m but sometimes taken to about 500 m.

Fishery: Mostly trawled off New Zealand’s South Island, but sometimes jigged. Since the late 1960s, New Zealand’s lucrative squid stocks have been targeted by foreign vessels, including Japanese, Taiwanese and Korean.

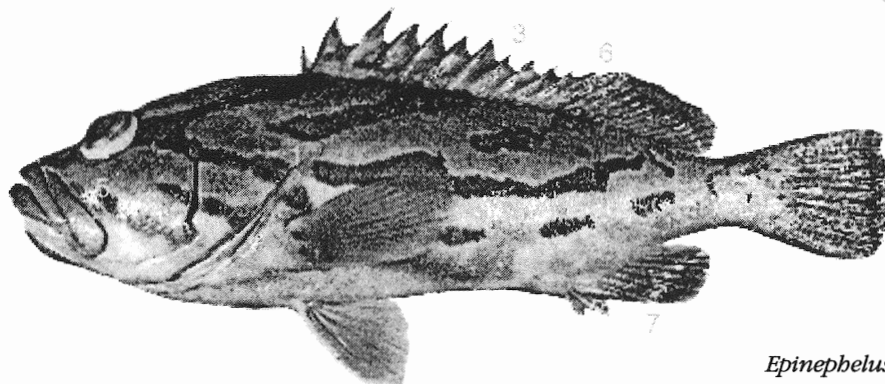
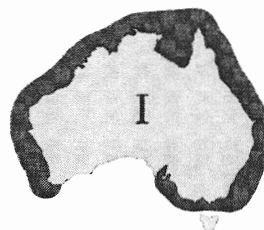
Remarks: New Zealand arrow squid and Gould’s squid both occur in New Zealand waters but the former dominates the fishery and imports to Australia. Although the two species are very similar, imported product is usually trawl caught and therefore of lower quality than jigged product.

Appendix 9B—Example of species profile pages (group marketing name); pp 224–225, domestic species handbook

Rockcod (page 1 of 2)

Aethaloperca, Anyperodon & Epinephelus species

Previous names: chinaman cod, flowery cod, greasy cod, groper, grouper, potato cod, redflush rockcod, reef cod, slimy cod, spotted cod, threeline rockcod, whiteline rockcod



Epinephelus morrbua

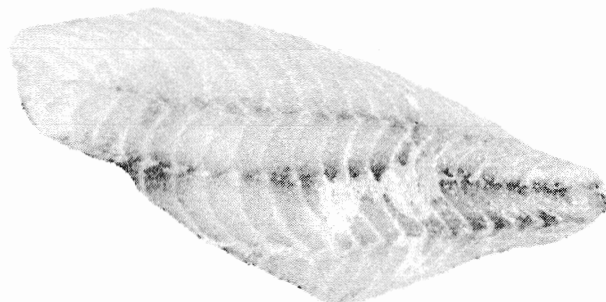
Identifying features: ① operculum angular posteriorly, with 3 spines; ② no large, forward-pointing spines on lower margin of preoperculum; ③ dorsal fin continuous with spinous part distinct; ④ caudal fin lunate to rounded (not forked); ⑤ mouth and head large; ⑥ dorsal fin with 9–11 strong spines, 13–18 soft rays; ⑦ anal fin with 3 strong spines, 7–10 soft rays.

Comparisons: The 35 or so species sold as 'rockcod' are also confusingly referred to as 'cod' but are unrelated to the true cods (Gadiformes). Rockcods are essentially similar to each other in shape but usually differ subtly in colour. Nevertheless, identification can be difficult even for a specialist. They differ from related fishes marketed as 'coral trout' (p. 217) in having 9–11 dorsal-fin spines (versus 7–8 in the *Plectropomus* species), and a less convex caudal-fin margin without the hind soft rays of the dorsal and anal fins greatly elongated (as in *Variola* species).

Fillet: *E. morrbua* moderately deep, rather elongate, tapering prominently, distinctly convex above, yellowish-white to pinkish. Outside with intermediate, continuous, central red muscle band; parallel EL, weakly converging HL; HS along middle of fillet; integument white to translucent. Inside flesh coarse; belly flap sometimes present; peritoneum silvery white to translucent. Usually skinned, skin thick, scale pockets small and defined.

Size: To about 300 cm and 400 kg (adults usually 30–120 cm and 0.5–25 kg).

Habitat: Marine; demersal in coralline and rocky reef habitats over the continental shelf and upper slope to depths of about 400 m.



Trimmed. Protein fingerprint p. 369; oil composition p. 403.

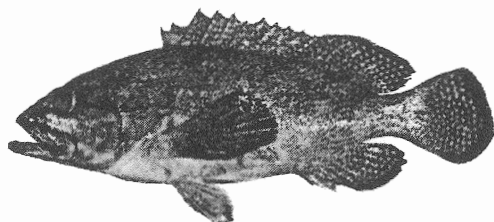
Fishery: Caught mainly using lines, nets and traps although considerable catches of some tropical species are taken by trawlers.

Remarks: Highly regarded table-fishes with white flesh and excellent flavour and texture. Several species are large and eight of the most valuable of these have separate marketing names.

Rockcod (page 2 of 2)

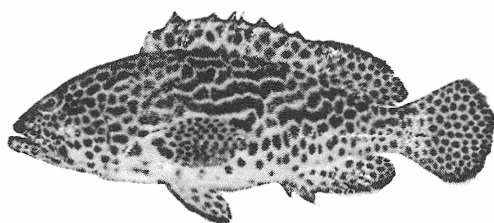
Aethaloperca, Anyperodon & Epinephelus species

Epinephelus ongus



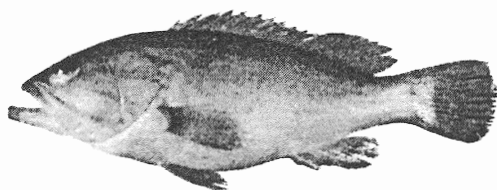
Remarks: Commonly called 'specklefin rockcod', this cryptic species is distributed off shallow reefs of northern Australia between Mooloolaba (Qld) and the Rowley Shoals (WA) in depths to at least 25 m. Best distinguished in having wavy lines and pale blotches along the sides with a dark edge above the upper lip resembling a moustache but no yellow fin tips. Reaches about 35 cm and about 0.9 kg.

Epinephelus merra



Remarks: Commonly called 'birdwire rockcod', this species is distributed in very shallow, sheltered water on reefs of northern Australia between Lord Howe Island (NSW) and the Dampier Archipelago (WA) rarely exceeding depths of 20 m. Best distinguished in having a distinctive honeycomb pattern of brownish spots and lines separated by narrower pale lines, distinctly darker and smaller spots on the head than the body, and lacking prominent bars on the breast just forward of the pectoral fin (with a few large spots instead). Reaches about 35 cm and about 0.9 kg.

Epinephelus heniochus



Remarks: Commonly called 'threeline rockcod', this species is distributed over soft bottoms of the mid-continental shelf of northern Australia between southern Queensland and the North West Shelf (WA) in depths of 40–230 m. Best distinguished from other rockcods in having a uniform brownish-pink body with a few faint lines radiating from the back of the eye. Reaches at least 43 cm and about 1.3 kg.

Appendix 9C—Example of protein fingerprint figure page; p. 378, domestic species handbook

Bony fishes

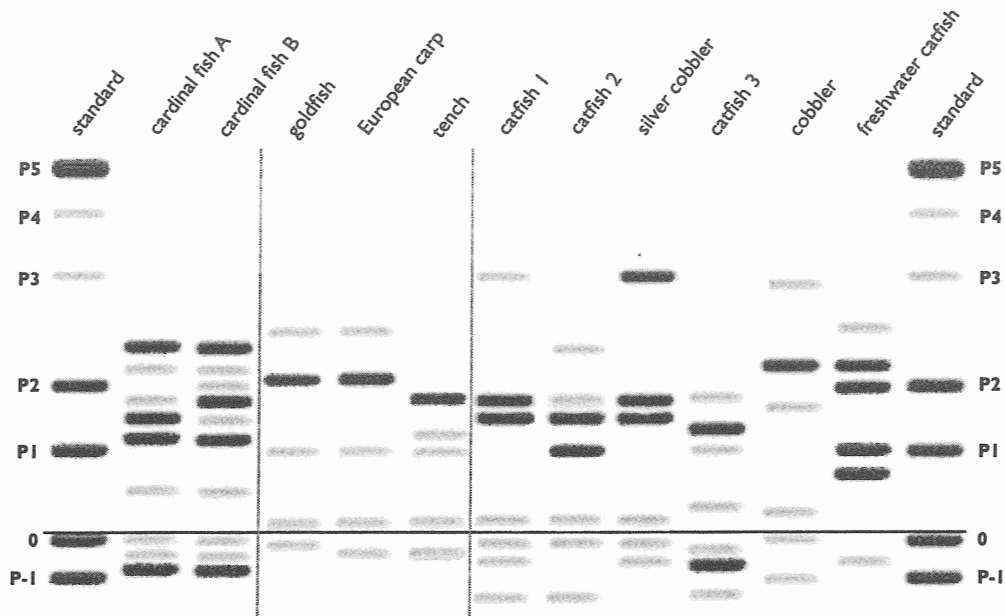


Figure 9.7—Protein fingerprints of cardinal fishes, carps and catfishes. Cardinal fish (*Epigonus telescopus*), goldfish (*Carassius auratus*), European carp (*Cyprinus carpio*), tench (*Tinca tinca*), catfish 1 (*Arius bilineatus*), catfish 2 (*A. mastersi*), silver cobbler (*A. midgleyi*), catfish 3 (*A. thalassinus*), cobbler (*Cnidogobius macrocephalus*), freshwater catfish (*Tandanus tandanus*).

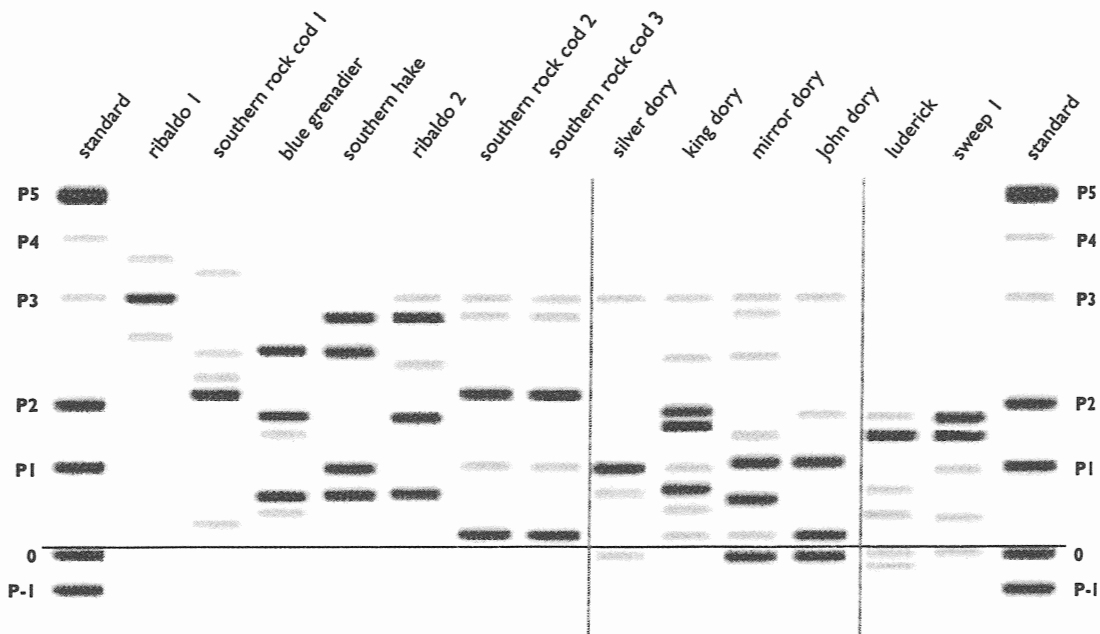


Figure 9.8—Protein fingerprints of cods, dories and drummers. Ribaldo 1 (*Lepidion schmidti*), southern rock cod 1 (*Lotella rhacina*), blue grenadier (*Macruronus novaezelandiae*), southern hake (*Merluccius australis*), ribaldo 2 (*Mora moro*), southern rock cod 2 (*Pseudophycis bachus*), southern rock cod 3 (*P. barbata*), silver dory (*Cyttus australis*), king dory (*C. traversi*), mirror dory (*Zenopsis nebulosus*), John dory (*Zeus faber*), luderick (*Girella tricuspidata*), sweep 1 (*Scorpius lineolatus*).

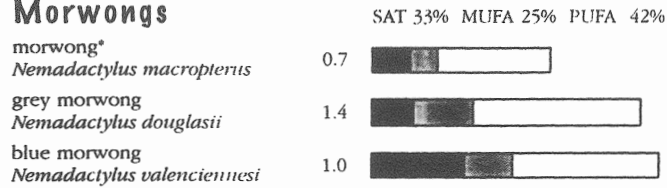
Appendix 9D—Example of oil composition figure page; p. 402, domestic species handbook

Bony fishes

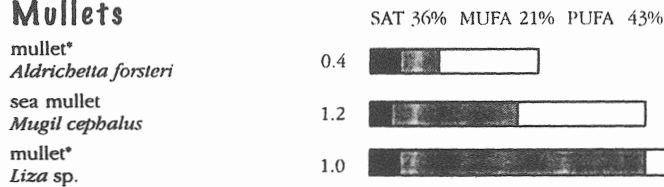
20:4ω6 AA

20:5ω3 EPA

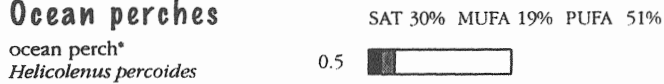
Morwongs



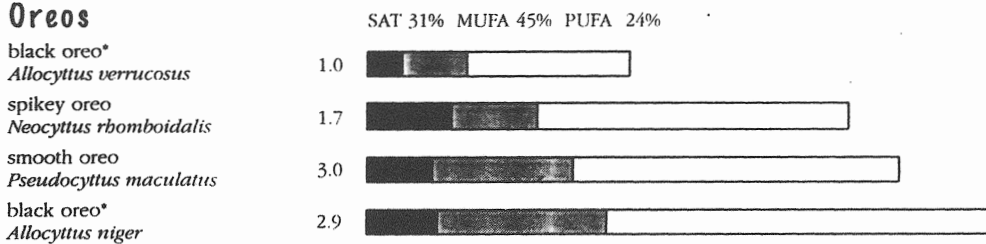
Mulletts



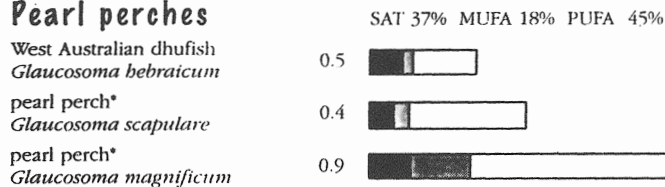
Ocean perches



Oreos



Pearl perches



% OIL 0 300 600
mg PUFA/100 g flesh

Remarks: The deepwater oreos generally had moderate oil content (up to 3.0%); most other species had low oil content. The deepwater oreos also had the lowest relative PUFA levels (24%) and the highest MUFA levels. Sea mullet and mullet (*Liza sp.*) had more EPA than DHA, and the oreos also had a higher proportion of EPA than other families. Blue morwong had the highest relative levels of the omega-6 fatty acid AA. Data for oreos from Bakes *et al.* (1995).

APPENDIX 10. MEDIA COVERAGE

Appendix 10A—A brief selection of newspaper and magazine articles relating to the domestic or imported species handbooks

Appendix 10B—List of radio and television interviews of authors, relating to domestic species handbook

Appendix 10C—List of radio and television interviews of authors, relating to imported species handbook

Appendix 10A—A brief selection of newspaper and magazine articles relating to the domestic or imported species handbooks

The following articles are included:

The Age (20 July, 1999)
Seafood New Zealand (September, 1999)
Nature Australia (Autumn, 2000)
Open House (August, 1999)
Club Marine (Volume 14, 5)
The Sydney Morning Herald (12 March, 2003)
The Mercury (March 19, 2003)

under the covers

AUSTRALIAN
Seafood



The Australian Seafood Handbook (published by CSIRO Marine Research, \$39.95 hardcover, \$75 waterproof edition)

My Penguin edition of *Mediterranean*

Seafood, by Alan Davidson, carries an excerpt from a review of it by Auberon Waugh. It says, "The best book ever written on this, or possibly any other, subject."

I'd like to amend that for the first edition of the *Australian Seafood Handbook*. It is the best book ever written on Australian fish and seafood: the one we've all been waiting for. Don't get me wrong. This is not a work of gastronomy. It doesn't have Davidson's poetry, anecdotes, amateur enthusiasms or his recipes. It's not that kind of book.

It is a work of science, the result of five years' painstaking and exhaustive research and cataloguing of around 600 species of domestic seafood, a team effort by scientists at CSIRO Marine Research, seafood consultants, and the Fisheries Research and Development Corporation. Its co-editors are CSIRO scientists Dr Peter Last, Gordon Yearsley and Dr Bob Ward.

But all these boffins have bent over backwards to ensure that this book will be as useful to marine biologists as it will be to commercial and recreational fishers, to chefs, and to those simple souls, like you and me, who just love to eat fish.

That means you can look up a fish by its common name or scientific name, and you'll find a color photograph of the entire fish, and its fillet. And if you find yourself with a dodgy fillet ("sure it's barramundi mate, caught it meself off the Cape yesterday morning") not only can you tell just by looking ("possibly the most obvious feature of a fillet is its basic appearance"), but if you're really serious, there's a whole chapter giving the protein fingerprints of every piece of seafood in the book – and how you can go about checking them.

Each entry gives you not only the marketing name, the genus and, wherever possible, the species, but identifying features, comparisons (with other fish), fillet description, size, habitat, fishery and a remarks section that addresses cooking and eating qualities.

There's a chapter giving oil contents: you might like to know that the swordfish has the highest oil content of all the fish in the book; that Australian fishes generally have high levels of omega-3 (good fat); generally lower levels of oil than northern hemisphere

In cauliflower, we trust

What has Brecht got to do with Epicure? Brechtian scholars will have picked it already. The playwright's modern classic, *The Resistible Rise of Arturo Ui*, is set in the Chicago of the 1930s, a time of mob rule and general lawlessness and corruption. Greengrocers (now we get to the food angle), desperate to survive the Depression, form a Cauliflower Tru. Into this scene steps Arturo, a protection racketeer and small-time thug. Want to know more? Buy a ticket. The play is satirical, funny and accessible, according to the Melbourne Theatre Company (who have to say that), and it opened last week at the Victorian Arts Centre's Playhouse. It closes on 21 August. Tickets are \$28.95-\$46.95. Phone 13 6166.

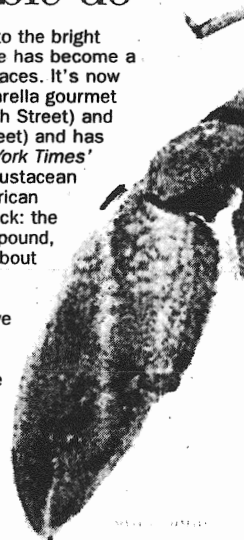
— John Lethlean



Yabbie yabbie do

From muddy Australian dam to the bright lights of Broadway: the yabbie has become a world traveller that's going places. It's now appearing in New York at Citarella gourmet grocery (2135 Broadway, 75th Street) and 1313 Third Avenue (75th Street) and has been described by *The New York Times'* Dining Out section as "the crustacean of the moment". But for American gourmards there is a drawback: the yabbies sell for \$US19.99 a pound, which roughly translates as about \$A60 a kilogram. We can get them for between \$20 and \$25 a kilogram; or, if you have a dam, for nothing. The crayfish with an Australian accent are being flown – alive and well – to New York in a first-class polystyrene box by the Western Australian company Cambinata, which is based in the Great Southern Region town Kukerin (two churches, a hall and a yabby farm). According to Mary Nenke, who farms the yabbies with her husband Michael, Cambinata is established in the Hong Kong and Singapore markets but has only just started to claw its way into New York. The stockists tracked the company down via Austrade's internet site. And Nenke's tip for cooking yabbies: always steam – never boil.

— Stephanie Wood





DOMESTIC FISH RETAILING

Buy this Book

I could go on at length about an ideologically driven government introducing electricity reforms that almost immediately resulted in higher electricity prices.

By Toby Warren, Southfresh Ltd

How about a government so driven by "user pays" that for a while it looked like the fishing industry was in severe strife not from natural disaster but from bureaucratic blundering and a myopia matched only by Magoo.

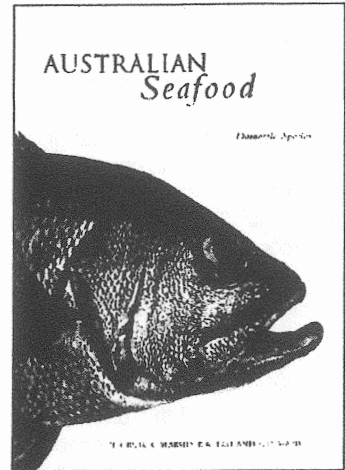
In Australia, the Fisheries Research and Development Corporation along with CSIRO Marine Research have produced a reference book called "Australian Seafood Handbook".

It is not possible to compare the New Zealand Commercial Fish Species book with this handsome 450 page reference work. The Australians must be justly proud of this achievement. Page after page describes the many and varied fish found in Australia's waters from the subtropical to the subantarctic. Every species is pictured both in the round and, where appropriate,

in fillet form. A map shows simply where the fish is found and other names it might commonly (or erroneously) be called. For each fish there is a paragraph on identifying features, comparisons with other species, a description of the fillet, the size range, its habitat, the fishery and some general remarks.

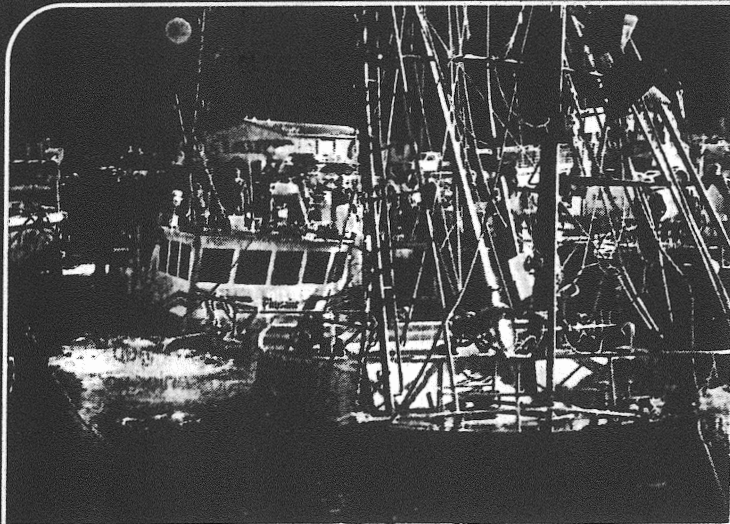
Perhaps of more interest to the scientist is a section on protein fingerprinting of each fish as a definitive way of identifying the fillet. This follows with a section on oil compositions of the species. For example, I can report that lings and leatherjackets have an oil content of about 0.5% compared with broadbill swordfish at 7.7% and orange roughy at 4.9%. The book also details the nature of the oils and remarks on peculiarities, differences and similarities. It finally offers an appendix on names.

While there is plenty here for the scientist, and many scientists have helped to compile and edit this volume, there is lots for the



seafood retailer. I checked to compare the species detailed on our own ageing species book and found only a handful not also described in the Australian Seafood Handbook. Some flatfish such as brill and turbot fail to get a mention and neither does my favourite blue cod, but by reference to the index you will learn all you wanted to know (and some you didn't) about blue warehou, red cod and silver dory.

The book is not expensive at a list price of A\$39.95 plus freight for the regular version and A\$75.00 plus freight for the waterproof version. As a reference to be read alongside the New Zealand species book it offers valuable information about species caught both in Australia and New Zealand. When customers come at you with difficult



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questions, this book allows you to answer them with confidence. Not only do I think that every retailer should buy this reference book, but I believe that everyone who sells seafood to Australia should rush out and buy a copy. What a fabulous opportunity to better understand New Zealand fish sold to Australians from an Australian point of view. Marketing is about discovering what the market wants and supplying it. The "Australian Seafood Handbook" delivers half the answer to that problem.

It came as no surprise to me that the Australian government assisted in the funding and publication of this book. The Australian government seems to have grasped what has completely avoided the lot we have elected (and pay) to govern and guide us, that domestic industry is important and sometimes requires support. While good sense seemed to have escaped Bill Clinton when Monica showed him her thongs, it didn't pass him by when it came to protecting Montana sheep farmers. We blithely admit almost anything into New Zealand, including fruit fly, and then complain that we're paying too much unemployment benefit. The ideologically new right are determined to undermine the efforts of the Apple & Pear Board while forgetting that whatever mistakes they might or might not be making they are competing with multinationals whose turnover damn near matches our gross domestic product.

Will New Zealand and Canadian salmon

get smooth entry into Australia? Even after losing the WTO case we should imagine they will give up. The Australian government is hell-bent on protecting the domestic industry. And what is our government doing to protect and nurture the fishing industry? Sweet nothing is the answer. Ask any small independent fisherman and he'll tell you the government is going to great lengths to put him out of business. Last month Alistair Macfarlane described the obvious idiocy of a government seeking to put the kybosh on the odd bit of "outside the zone" opportunity, let alone serious attempts to involve Island nations in joint ventures. Cost recovery is taken to absurdity and compliance is only affordable by the big companies. The small ones spend more time filling in forms and shagging about answering questions from people who should know better than is good for their businesses.

Maybe it's because Australia, the "lucky country" has much more resource and a bigger revenue base than New Zealand. Maybe it's because their politicians didn't buy the ludicrous notion that "the market" could look after everything from education to health to prisons. Whatever the reason, their support in publishing the "Australian Seafood Handbook" delivered excellent results.

Buy it if you want to know the difference between John dory, lockdown dory, silver dory and mirror dory. How about black dory,

smooth dory and spikey dory? Buy this book if you want to understand the difference between blue warehou, white warehou and silver warehou. Buy it because it's easy to read and if you're involved in the fishing industry it's really interesting to read more about fish species. Buy it because while the New Zealand government continues its efforts to decimate the fishing industry, industry players have neither the funds nor the focus to produce a volume so good. Buy it because it may be the best value for money you can find in a 450 page colour illustrated well-researched hard-back. Buy it because it'll smarten up your office. Buy it for any number of reasons, but buy it you should. The "Australian Seafood Handbook" is a good buy and a great read.

The "Australian Seafood Handbook" can be purchased from two places:

CSIRO Publishing

www.publish.csiro.au/books/
150 Oxford Street, PO Box 1139
Collingwood 3066, Victoria, Australia
Telephone: +61 3 9662 7500
Fax: +61 3 9662 7555

Email: info@publish.csiro.au

Australian Seafood Extension and Advisory Service

19 Hercules Street, Hamilton,
Qld 4007, Australia
Telephone: +61 7 3406 8617
Fax: +61 7 3406 8677

Email: austin@dpi.qld.gov.au



and ignore the text. I started doing this but was soon hooked by Elizabeth's written prose, which provides the right level of scientific information to satisfy people with some knowledge in the field and interested readers with no prior knowledge. This information is interspersed with wonderful stories about lucky finds, some that have got away and a range of the colourful characters at the Ridge. Once I started reading, I found it hard to stop. As well as a fluid writing style, Elizabeth is also a skilled illustrator. Her reconstructions, drawings and even pages from her field notes are first class.

The quality of Robert's photography was brought home to me when I saw some of the specimens recently. While the specimens certainly had some colour, they did not shine nearly as brightly as they do in the book. Robert has really brought out the colours in the specimens in ways that only a highly skilled photographer can do.

I can thoroughly recommend this book to anyone with an interest in natural history, fossils, opals or Australia's past. It would make a highly desirable birthday or Christmas present. It would also be a nice way of recognising all that Elizabeth and Robert have done over the years to educate opal miners into keeping these bits of our heritage from being lost forever and to ensure more specimens are kept for the future. The Smiths themselves have made a wonderful gesture and donated their collection to the Australian Museum. May they continue their good work so that in the near future we will be able to admire a larger second edition of this excellent book.

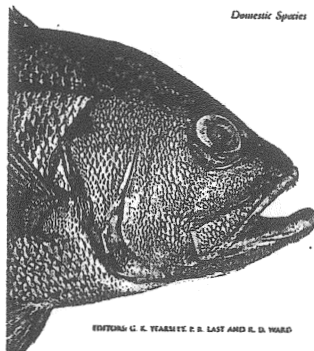
—Phil Creaser
Australian Museum

Australian Seafood Handbook: Domestic Species

Ed. by G.K. Yearsley, P.R. Last and R.D. Ward. CSIRO Marine Research, Tas., 1999, 461pp. \$39.95rrp (standard edition), \$75.00rrp (waterproof edition).

Over 600 species of Australian seafood are sold in

AUSTRALIAN Seafood



Australia for human consumption. In the past there has been considerable confusion over the marketing names of these species. Not only has the same species been marketed under different names from State to State, but in many cases, different names have been used between shops in the same town.

The Australian seafood handbook is a sensational publication that attempts to solve this dilemma. It is the culmination of five years of work by CSIRO scientists who are all experts in their fields.

The authors state that "the main aim of this handbook is to provide an affordable, easy-to-use identification guide to all major Australian domestic seafood species, including fish fillets, and to link each species with an approved marketing name". They have achieved these aims. Funding from the Fisheries Research and Development Corporation (FRDC) ensured affordability. The handbook comes in standard and waterproof editions, and both sell for very reasonable prices.

The book is easy to use, logically organised and accurately written. The bulk of the book deals with Australian domestic seafood species including fishes, crustaceans, molluscs and other invertebrates. Each account includes a colour photograph of the species, its fillet (for fishes), and a distribution map. Details are given on identification, size, comparisons with similar species, and information on the habitat and fishery. Importantly each

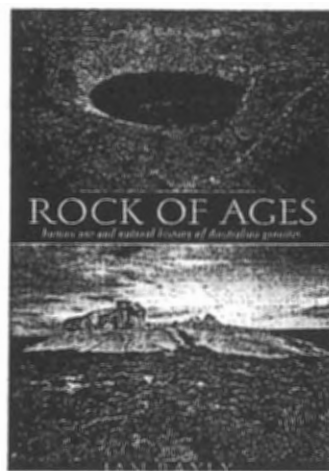
species is listed under its approved marketing name.

The book also contains two other important pieces of research. The first is a description of the protein fingerprint for each species. This relatively simple technique can be used in most cases to identify seafood from a tissue sample. The second is an analysis of the oil content of the seafood. Research has shown that the oils in seafoods, such as the polyunsaturated fatty acids, are beneficial to human health.

My only concern is that some of the yellow numbers that are used to label the photographs are very hard to read. In the light of what has been achieved by the authors however, this is a tiny problem. In fact it is refreshing to review a book and have little but praise to offer.

The authors have made a huge contribution to the knowledge and understanding of domestic seafood species. This book will become an essential reference for anyone who deals with Australian seafood.

—Mark McGrouther
Australian Museum



Rock of Ages: Human Use and Natural History of Australian Granites

By Ian Bayly. University of Western Australia Press, WA, 1999, 132pp. \$34.95rrp.

The title of the book excited me. The information on the back cover referred to "... the natural history of Australian granites" and I was certainly left with the impression that this was a comprehensive account of "... the

history, biology, beauty and recreational potential of Australian granite landscapes".

Regrettably, this is one book that should not be judged by its cover. Much of the book is devoted to 'water-related' aspects of granite landscapes in south-western Western Australia. While this is examined in detail with interesting information and excellent photographs, most

Over 600 species of Australian seafood are sold in Australia for human consumption.

of the other aspects of Australian granite landscapes are barely represented. The introductory section on the geology of granites is very brief, and at the risk of being pedantic, it is annoying when maps don't match the text and when some basic things like the shape of the ACT are wrong.

With the focus being on south-western Western Australia, the eastern seaboard and indeed the rest of Australia get some photographs but not much else. I may have been expecting too much given my love of granite landscapes, both from a geological and recreational perspective. Australian granite terrain is considered to provide some of the best orienteering in the world.

Even the final chapter on conservation is very brief and superficial, considering the importance the author places on these landscapes. I had expected that mention may have been made of 'geodiversity' and 'geoconservation', especially as one of the references is a definitive work on geoconservation.

Granite landscapes do have a special place in our hearts, and the author clearly has a special affiliation with these areas in the south-west of Western Australia. It may have been better if the title of the book reflected this.

—Phil Creaser
Australian Museum



New CSIRO seafood guide n service education

Australian Seafood Handbook
 Edited by Dr Peter Last, Gordon
 Yearsley and Dr Bob Ward

"Once this book becomes well-known and well-used in the commercial and recreational sectors of the industry, many more people will be confident about seafood varieties," he says. "Consumer demand for seafood will increase - and will open the way for greater enjoyment of our healthy product."

THE CSIRO has released a new guide, the *Australian Seafood Handbook - an identification guide to domestic species*, designed to educate customers about the wealth of seafood selection in Australia.

Funded by the Fisheries Research and Development Corporation on behalf of Australia's \$1.9 billion seafood industry, the 470-page guide to domestic species has been developed for all sectors of the seafood trade from harvesting to processing, distribution, preparation and catering.

Sydney restaurateur Peter Doyle, who wrote the book's foreward, the handbook, claims a reliable guide to seafood has been needed for years.

"This book fits the bill very well," Mr Doyle said.

He believes Australian seafood is second to none in quality and variety, but most Australians are not familiar with fish species and how to handle and cook them.

"In my 50 years as a fisherman and restaurateur, my biggest disappointment has been to see how many people miss out on tasting the full range of Australia's wonderful seafood," Mr Doyle says.

"The fishing industry needs to do more to educate and help our consumers - and even people within the industry itself."

Hobart restaurateur George Mure, whose vertically integrated fishing operation is synonymous with Tasmanian seafood, is equally enthusiastic.

"The whole spectrum of our industry has been waiting for this for a long time," George said. "From the fisherman out at sea, to the fishmonger and right down to the restaurateur, identification is a critical issue well met by this guide."

The compilation of the handbook was a gigantic task for the editorial team, including Dr Peter Last and Gordon Yearsley, taxonomists at CSIRO Marine Research, Dr Bob Ward, a geneticist at CSIRO Marine Research, and seafood consultants from around the country.

They spent five years researching

the book, profiling 600 species of seafood, among them seawater and freshwater finfish and shellfish, wholefish and fillet identification, listings of nutritional values and a guide to marketing names.

According to Mr Doyle, the book's three main features are describing and illustrating fillets, including error-free genetic testing to identify species and providing information on nutritional value.

Co-editor Dr Last said the handbook is designed to be user friendly. It carries 350 colour photographs of all our major commercial seafood species, how to identify them, their protein fingerprints, descriptions of their



Our industry has been waiting for this for a long time!



Equal on your
table...

EQUAL®

Circle 22 on Reader Enquiry Card

guide meets food

...well-
...commercial
...industry,
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fishery and habitat, and remarks about the species - which includes flesh type, taste and flavour in some cases.

Descriptions and photos of the fillets of each fish is also provided.

"In recent years, the Australian industry has acknowledged that to go forward and build a stronger relationship with consumers, it required a tool to be better equipped with new and more product information," said Dr Last.

"Our initial feedback is that this guide will lead to a new tier of trade and consumer confidence by expanding seafood's marketing edge over its rivals at the dinner table."

The scientists gleaned their information from most of the country's

major fishing ports, national and overseas fish markets, research voyages from the tropics to the sub-Antarctic, fellow scientists, and fishing industry representatives and recreational fishers.

Their quest was to create the most comprehensive profile of the 600 finfish and shellfish species caught or farmed in Australian waters, and sold on either the domestic or export markets.

"Australia has one of the richest seafood selections in the world," Dr Last said, "and as local tastes shift for reasons such as nutrition and health, the industry should be able provide 'the seafood of choice' for all Australians.

"However, having such a large choice can be confusing for the consumer. This book aims to introduce and educate consumers to all of these options," Dr Last said.

Domestic species covered in the

Australian Seafood Handbook include: cartilaginous fishes such as sharks, rays and skates; bony fishes; crustaceans including bugs, crabs and prawns; molluscs such as abalone, mussels, squids and octopuses; and other invertebrates like jellyfishes and sea urchins.

Most of the information in the handbook is of particular use to the food service industry.

The Australian distribution of each species (or group of species) is shown on a map, with an indicator of whether it is restricted to Australian waters or can be found elsewhere, and therefore possibly imported.

The book allows for the edible qualities of seafood to be assessed in a number of ways. Features of the flesh, such as general appearance, moisture level, flavour, texture, colour and shelf life, have all been used as measures of quality.

Similarly, these features, along with many others, can be used to identify the fillets of fish groups and, in some cases, species.

Species identification is discussed in detail.

There are numerous 'look-alikes' when it comes to species identification, some confounding even the experts. Distinguishing features are listed to assist in comparison with related or similar species.

Size and weight details are included, as well as maximum and commonly-marketed details.

Information which contributes to knowledge of the species, such as how it is caught and sold, testability and flavour, flesh description, migration patterns, anecdotal information, and important scientific name information are remarked on.

Although improving, marketing names still vary from state to state and even within regions and cities, and are often based on names applied by early European immigrants and settlers.

Standardising names of species has been a major seafood industry objective to eliminate confusion among consumers and in the industry.

The *Australian Seafood Handbook* reviews and updates the marketing names for seafood, providing a single name for species previously known by up to 10 other common names.

Other common names are also listed and indexed.

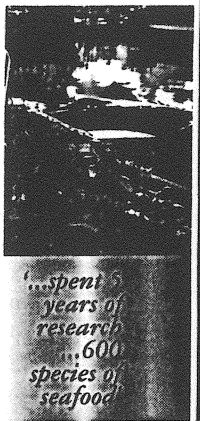
Scientific names are linked to each marketing name and an index of scientific names is included.

The handbook also includes a comprehensive definitions of technical terms, identifying features and characteristics including fillet shapes, fillet colour, structural features of generalised species.

CSIRO authors Jane Andrew, Ross Daley, Dr Nick Elliott, Ben Mooney, Dr Peter Nichols and Dr Patti Virtue contributed to the handbook, and seafood consultant and contributing author, Mr Nick Ruello, of Ruello and Associates provided advice to the co-editors.

Photographic support was provided by Mr Thor Carter, of CSIRO Marine Research.

Australian Seafood Handbook published by the CSIRO and is available from the *Australian Seafood Extension and Advisory Service (AUSEAS)*, most bookstores, fishing and tackle shops and leading seafood outlets. It retails for \$39.95. Special waterproof paper editions are available for \$75.



...shows customers
you care

available from

Goodman Food Services
Heider 1800 025 066

MARKET PLACE

The Nautilus Collection for Men



A brand new collection of after shave, deodorant, shampoo and eau de toilette for men was launched on the Australian market in September.

Called Nautilus Aqua, the collection comes from Italy and according to the press release it is the "latest fragrance for men to get wildly invigorated by" and "sets free the adventurous spirit within".

"The essence comes from wood and water – think driftwood on a beach, soaking up aquatic aromas of the ocean and sun. Fresh, clean, intoxicating. With notes of tangerine, pink pepper, cedarwood and tonka bean, Nautilus is a complex blend representing an exotic and long voyage across open water".

The Nautilus project is named after the Nautilus shell that lives in colonies in the depths of the Pacific and Indian oceans and rises to the surface at night to feed on plankton. It was also the name of the submarine in Jules Verne's *Twenty Thousand Leagues Under The Sea*.

A series of products are being created to complement the toiletries including high-tech sunglasses, ties,

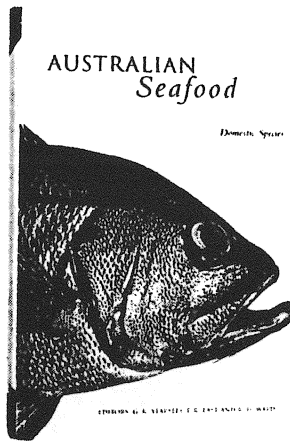
shaving sets, pocket knives, windproof lighters and key rings.

Nautilus Aqua is available at leading department stores and selected pharmacies nationally and could make a good upmarket gift "for the man who has everything".

Enquiries: Juvena Australia.
Tel: 1800 251 010.
In NSW tel: 9888 6333.

Books

Australian Seafood



By G.K. Yearsley, P.R. Last and R.D. Ward.

For an island nation, most Australians know very little about the rich bounty of diverse seafood that abounds in the waters that surround us. Our seafood is unmatched in quality and variety.

Did you know that Australian seafood is marketed under 300 names and the total number of domestic seafood species marketed in Australia is about 600?

In *Australian Seafood* the authors, a team from the CSIRO, have made a huge effort to put together detailed and accurate information on the 600-odd species of fish and shellfish, both salt and freshwater, that are caught locally in Australian waters.

Unlike other seafood books, *Australian Seafood* shows how to identify species by their specific characteristics and how to recognise

their fillets. The book also has information on nutritional value and links each species to its market name.

Each species is identified by its market name and other names, its distinguishing features, size, habitat, where to catch it and whether it is a good table fish or not.

Australian Seafood is a unique book and contains a wealth of information, much of which has not been previously available in other publications. Consumers and recreational fishers will gain a lot from it. The book is also a must for the commercial fishing industry.

Australian Seafood is published by CSIRO Marine Research, GPO Box 1538 Hobart, Tasmania 7001.
E-mail: seafood@marine.csiro.au

Fatal Storm

By Rob Mundle

"... this huge wave arrived. I was looking a long way up at its crest, like I had to stretch my neck. There was a lot of white water, a real lot of white water coming at me, and the wave just kept getting steeper and steeper. I braced myself by grabbing the wheel and leaning over it. There was nothing I could do to try and beat it. The moment it hit the yacht was knocked over to 90 degrees with the mast in the water. I couldn't see for quite a few seconds. I was under green water. It wasn't just spray or splash, it was hugely green. The water filled the mainsail and held the yacht down; it could have been 40-feet deep for all I know."

Hugh Treharne,
Bright Morning Star.

Six sailors lost their lives, 55 sailors were winched to safety by rescue helicopters, many yachts were overturned and five sank in the horrendous conditions of the 54th Sydney to Hobart Yacht race. *Fatal Storm* is the story of that race.

Working from home to

Sherrill Nixon
Workplace Reporter

The long-touted benefits of working from home may be illusory with new research showing teleworkers often put in longer hours than their colleagues in the office.

A University of Queensland study also warned that any productivity gains might be difficult to sustain, and cost-cutting benefits were generally offset by the need to set up home offices prop-

erly. However, it did show some found it easier to juggle work and family responsibilities by working from home while others were able to continue working during extended illness.

The researchers, led by Associate Professor Gillian Whitehouse, surveyed more than 2500 Australian organisations and conducted detailed studies of telework in eight companies.

Nearly two-thirds of the organisations said they achieved productivity gains and more flexible

use of staff through their work-from-home programs.

The deeper analysis, which included interviews with managers and workers, found productivity improved because teleworkers used their time better and were free of office interruptions.

But it found employees at home often worked longer hours - usually unpaid - in return for the "privilege" of teleworking.

In one organisation the workers said the company "gets its five days' value out of four days" be-

cause the staff wanted to "give something back". In another, teleworkers said they were more likely to check their computers on days off because their office was so close to hand.

"Generally telework did appear to allow greater worker autonomy and flexibility, but there was also the potential for employees and their families to be disadvantaged," the report said.

"Many of the teleworkers were working longer hours, some out of gratitude to their employer,

Cutting the red tape that turns emperors into bream

Richard Macey

Gordon Yearsley can't help himself. When out shopping with his wife De-arne, he is inclined to suddenly dash into the nearest fish shop and begin inspecting the labels.

For the CSIRO marine biologist, checking to see if the blue-

man Sea to be sold in Sydney as the New Zealand hoki was branded as the blue grenadier if caught in local waters.

"If you buy smoked cod in the supermarket, it's probably hake from South Africa . . . 95 per cent sure."

Mr Yearsley said most customers had no idea that fish im-

Australian Seafood Handbook - Imported Species, co-authored by Mr Yearsley, a companion guide book to a work published in 1991 detailing Australian fish. Both use standardised names approved by the Australian Fish Names Committee, and other common names

The red emperor, for example masquerades as the government bream - named for the red bar on the juvenile that "give the impression that the fish is entangled in red tape".

Jewfish can be sold as croaker and drum, while king dory is sometimes horsehead.

Mr Yearsley said even he was surprised to find that more than 250 different fish were imported.

Half came from Thailand or New Zealand, with Vietnam, Indonesia and Burma among growing sources.

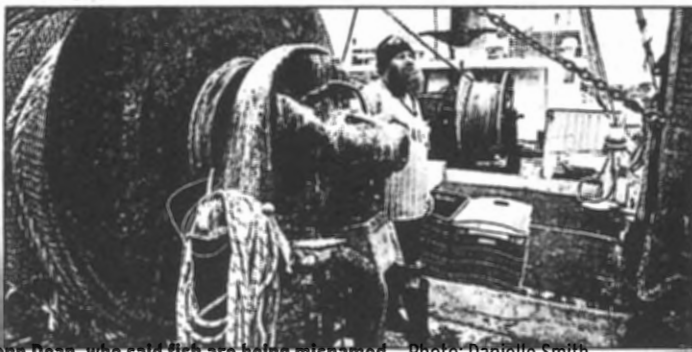
After 22 years at sea, Glenn Dean is used to mislabelled fish in suburban shops.

"You see it everywhere you go," the professional fisherman said. "I look at the fish on sale and say 'that's not right'. I see hairtail sold as blue grenadier and tarwhine sold as bream."

At the fish markets yesterday Mike Nicholas, of Mosman, confessed he enjoyed the confusion.

"It makes me look at the product. It adds linguistic spice," he said, recalling how after one Melbourne Cup he was advised to try a fish branded "New Zealand galloper".

It turned out to be red emperor.



Glenn Dean, who said fish are being misnamed. Photo: Danielle Smith

eyed cod is really a New Zealand blue-cod - totally different fish with unfortunately similar names - is an occupational hazard that irritates De-arne.

Mr Yearsley suspects a lot of what is sold in suburban fish shops is wrongly labelled. The problem, he says, is not so much deception by retailers, but the baffling plethora of names used to market fish.

Cod, bass and sea perch have become blanket tags for a wide range of different fish.

Fish shipped across the Tas-

ports had soared 50 per cent in the past decade and that 60 per cent of fish was now from overseas.

"By law, imported fish must be displayed with a notice saying its an imported product, but you hardly ever see it."

The confusion was compounded by employees who knew as little as their customers. "To be a butcher you have to have done an apprenticeship but the person selling you your fish may be on their first day in the job."

To help customers and retailers, the CSIRO yesterday launched



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IN THE SWIM: Scientist Gordon Yearsley with his guide to imported fish species.

Flounder no more over fish

By KANE YOUNG

WHEN you go to the fishmonger and buy some fish, do you really know what you're getting?

Gordon Yearsley does. You may not realise it, but some fish — especially imported species — are given different names for different markets, which can lead to confusion among consumers.

The smoked cod you buy at the supermarket is actually hake. Blue grenadier is also known as New Zealand hoki and red emperor is also called government bream, while the terms cod, bass and sea perch are used to describe a range of different fish.

"It can be incredibly confusing for the average con-

sumer," said Mr Yearsley, a Tasmanian CSIRO marine biologist.

Sixty per cent of fish eaten in Australia is now imported, with more than 800 domestic species joined by about 250 from overseas.

Mr Yearsley has spent years identifying and classifying fish species, and has now written a book aimed at helping consumers and retailers avoid the confusion over imported species.

Australian Seafood Handbook: An identification guide to imported species has been launched by the CSIRO in Sydney.

Four years in the making, the 240-page book profiles 130 species of fish including

sharks, crustaceans, molluscs and other invertebrates like jellyfish and sea urchins.

Edited by Mr Yearsley, Peter Last and Bob Ward, the guide is a handy educational book for fish buyers, processors and importers.

Mr Yearsley had two pieces of advice for consumers.

"Consumers should ask questions of their fishmonger," he said. "They may not know the answers, but the questions may spur them into finding out.

"And secondly, anyone who is serious about knowing what they are buying should buy the book."

QUICK NEWS

Truck rolls

THE Midland Highway was closed for nearly five hours yesterday after a truck rolled near the Cressy turn-off.

No one was injured and traffic was diverted through Ross from noon until 5pm.

The drivers of two cars involved in an accident at Beach Rd, Kingston Beach, about 6pm yesterday also escaped injury.

Injury charge

A HARDWARE company and company director were yesterday fined \$7500 for a workplace injury in which an employee had his leg damaged by a forklift.

Alexander David Bayne, and Geeveston Mitre 10 yesterday pleaded guilty to the charges.

Magistrate Peter Dixon fined the company \$5000 and Bayne \$2500.

Rail opening

THE West Coast Wilderness Railway will be officially opened on April 3.

The ceremony will also mark the 106th anniversary of the first trip along the 34km track from Queenstown to Strahan.

17 APRIL 2003

Central Office Professionals Day

Thank your secretary or administrator with a personalised message in The Mercury's "Tasmanian Office Professionals' Day" Classifieds listing, and they could win three nights twin-share accommodation of their choice, to be selected from amongst the 30 quality properties which make up The Innkeepers Collection in Tasmania. As the state's leading accommodation group, Innkeepers offers the largest range of quality hotels, apartments, wilderness lodges, motor inns and intimate retreats, in key locations all around the island. For more details, visit their website at www.innkeeper.com.au or contact their friendly staff at the Innkeepers Central Reservations Office on 1300 130 269.

To place your message, call The Mercury Classifieds on 62 300 400.

The winner of this fantastic package will be drawn at the Office Professionals Breakfast on Thursday 17 April.

The Australian Institute of Office Professionals (AIOPO) invites all secretaries, administrators, executives and friends to the 2003 Tasmanian Office Professionals Breakfast on Thursday, 17 April 2003 at Wrest Point Tasman Room, 6.45am for 7.00am.

Guest Speaker:

Ms Colleen McGann - 2002 Telstra Tasmanian Business Woman of the Year.

Entertainment by National Entertainer.



Appendix 10B—List of radio and television interviews of authors, relating to domestic species handbook

Radio

- May/June 1999—CSIRO Sci Files
25 June, 1999—Radio National Breakfast. Interview with Peter Last
25 June, 1999—ABC Radio Northern Territory (National). Interview with Peter Last
25 June, 1999—Canberra 2CN. Interview with Gordon Yearsley
25 June, 1999—Three other ABC interviews with Gordon Yearsley, two live-to-air, mostly eastern NSW
28 June 1999—ABC Radio West Australia Statewide. Interview with Peter Last
June 1999—ABC Gold Coast (Qld). Interview with Gordon Yearsley
June, 1999—ABC Bundaberg (Qld). Interview with Gordon Yearsley
29 June, 1999—ABC 5AN Adelaide (SA). Interview with Gordon Yearsley
30 June, 1999—2NC ABC, Newcastle (NSW). Interview with Gordon Yearsley
6 July, 1999—3AK Melbourne (Vic). Interview with Gordon Yearsley
7 July, 1999—ABC Kimberleys (WA). Interview with Gordon Yearsley
19 July, 1999—Radio 97 Tweed Heads (NSW). Interview with Gordon Yearsley
13 December, 2001—ABC Tasmania (statewide). Interview with Gordon Yearsley
14 December, 2001—ABC Rural (national). Interview with Gordon Yearsley

Television

- 29 June, 1999—Today (National Nine Network)
3 July, 1999—Cross Country (Seven Network), prerecorded on Launch day
20 November, 1999—Hooked on Water (National Nine Network)
10 March, 2000—Burke's Backyard (National Nine Network)
19 March, 2000—Landline (ABC)
14 December, 2001—Southern Cross TV.
14 December, 2001—WIN TV.

Appendix 10C—List of radio and television interviews of authors, relating to imported species handbook

Radio

- 11 March, 2003—ABC 936 Rural (Tas). Interview with Gordon Yearsley
- 11 March, 2003—ABC News (Tas). Interview with Gordon Yearsley
- 12 March, 2003—ABC 891 Adelaide (SA). Interview with Gordon Yearsley
- 12 March, 2003—ABC 702 NSW. Interview with Gordon Yearsley
- 17 March, 2003—ABC NSW. Interview with Gordon Yearsley
- 18 March, 2003—ABC Canberra (ACT). Interview with Gordon Yearsley

Television

- 13 March, 2003—Cannel 7 News, Bundaberg (Qld). Interview with Gordon Yearsley

APPENDIX 11. CSIRO PUBLISHING BROCHURE, NOVEMBER, 2003

'New and bestselling titles' brochure released by CSIRO Publishing in November 2003, which includes both domestic and imported species handbooks in the 'Oceans and rivers' section.

Fungi AUSTRALIA BURNING SUSTAINABLE

new & bestselling titles

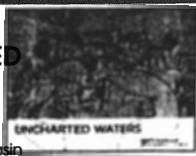
from CSIRO PUBLISHING

GIFT IDEAS

oceans & rivers

UNCHARTED WATERS

Daniel Connell
Murray-Darling Basin
Commission



The social, economic and environmental impacts of natural resource use and management have enormous effect on our future sustainability. The situation faced by the Murray-Darling Basin in south-eastern Australia provides a powerful example of these issues.

The aim of *Uncharted Waters* is to stimulate public discussion on the long-term future of natural resource management in the Basin. It presents a wide range of views and solutions from leaders in many fields and expresses the interests of the people in the Basin. The lavish design and illustrations provide a stunning backdrop for the stories that the contributors have to tell.

2003 • CSIRO PUBLISHING • 1876830433
• 138 pp • colour illustrations
• paperback

\$49.95

FIELD GUIDE TO FRESHWATER FISHES OF AUSTRALIA

GR Allen, SH Midgley
& M Allen
Western Australian
Museum



This comprehensive volume provides in-depth coverage of nearly 300 species – every fish known to inhabit freshwater on the Australian continent. Stunning illustrations in full colour, with additional hints for rapid identification, complement the concise summary of biological knowledge.

This spectacular guide is an essential reference for scientists, aquarists, fishers and every person who appreciates Australia's extraordinary natural heritage.

2002 • Western Australian Museum
• 0730754863 • 410 pp • colour
illustrations • paperback

\$45.00

THE WORLD'S FIRST SHELL COLLECTING GUIDE FROM 1821

John Mawe's
'The Voyager's
Companion or Shell Collector's Pilot'

Jeffrey D Stilwell
Western Australian Museum



This book reproduces in facsimile, John Mawe's first shell collecting guide of 1804, together with his complete edition of 1821, *The Voyager's Companion, or Shell Collector's Pilot*. The modern reader can now follow this intrepid author along the coasts of North Africa and South America, sharing the pleasures of handling beautiful and rare shells gathered from shores lapped by the waters of the South Seas, learning how and where to collect shells and how best to preserve them. Readers will discover that even unprepossessing shells are worth picking up, that the inhabitants of faraway places were often puzzled why anyone should want to collect such seemingly common objects.

August 2003 • Western Australian Museum
• 1920843043 • 96 pp • colour illustrations
• paperback

\$39.95

FIELD GUIDE TO AUSTRALIAN SHARKS & RAYS

RK Daley, JD Stevens, PR Last
& GK Yearsley



Australia has an extremely diverse shark and ray fauna. There are more than 300 different species and at least half of these are thought to only occur in our waters.

This user-friendly guide was developed so that fishers, observers, and scientists can identify the main Australian target and bycatch species of sharks, rays and chimaerids. It includes full colour illustrations, distribution maps and descriptions, which will be of interest to divers, naturalists and students in aquatic science.

2002 • CSIRO PUBLISHING • 1876996102 • 88 pp
• colour illustrations • paperback

\$24.95

AUSTRALIAN SEAFOOD HANDBOOK

An Identification Guide to
Domestic Species

GK Yearsley, PR Last & RD Ward

AUSTRALIAN
Seafood



Superb colour photographs of about 350 species of finfishes and shellfishes including crustaceans, jellyfishes, molluscs, sea cucumbers and sea urchins are included in this comprehensive user-friendly identification guide. Oil composition profiles, protein fingerprints and fish fillet features are also provided.

This is an essential reference for all professional and recreational fishers, fishmongers, processors, biologists and seafood consumers. It contains everything you need to know about recognising and identifying the rich variety of seafood species found in Australian waters.

2001 • FRDC/CSIRO PUBLISHING • 0643061940
• 469 pp • colour illustrations • hardback

\$49.95

AUSTRALIAN SEAFOOD HANDBOOK

An Identification Guide to
Imported Species

GK Yearsley, PR Last & RD Ward



The quantity, diversity and origins of seafood imports to Australia have increased dramatically in recent decades, and importers now supply more than 60% of the commercial market in Australia.

Australia's 225 imported seafood species are superbly documented in this user-friendly and comprehensive identification guide. Colour photographs, protein fingerprints, and fish fillet features are provided for an amazing variety of seafoods: finfishes, crustaceans, molluscs, jellyfishes, sea cucumbers and seaweeds. It is an easy-to-use guide to all major seafood species imported, including fish fillets, which link each species to its approved, national marketing name.

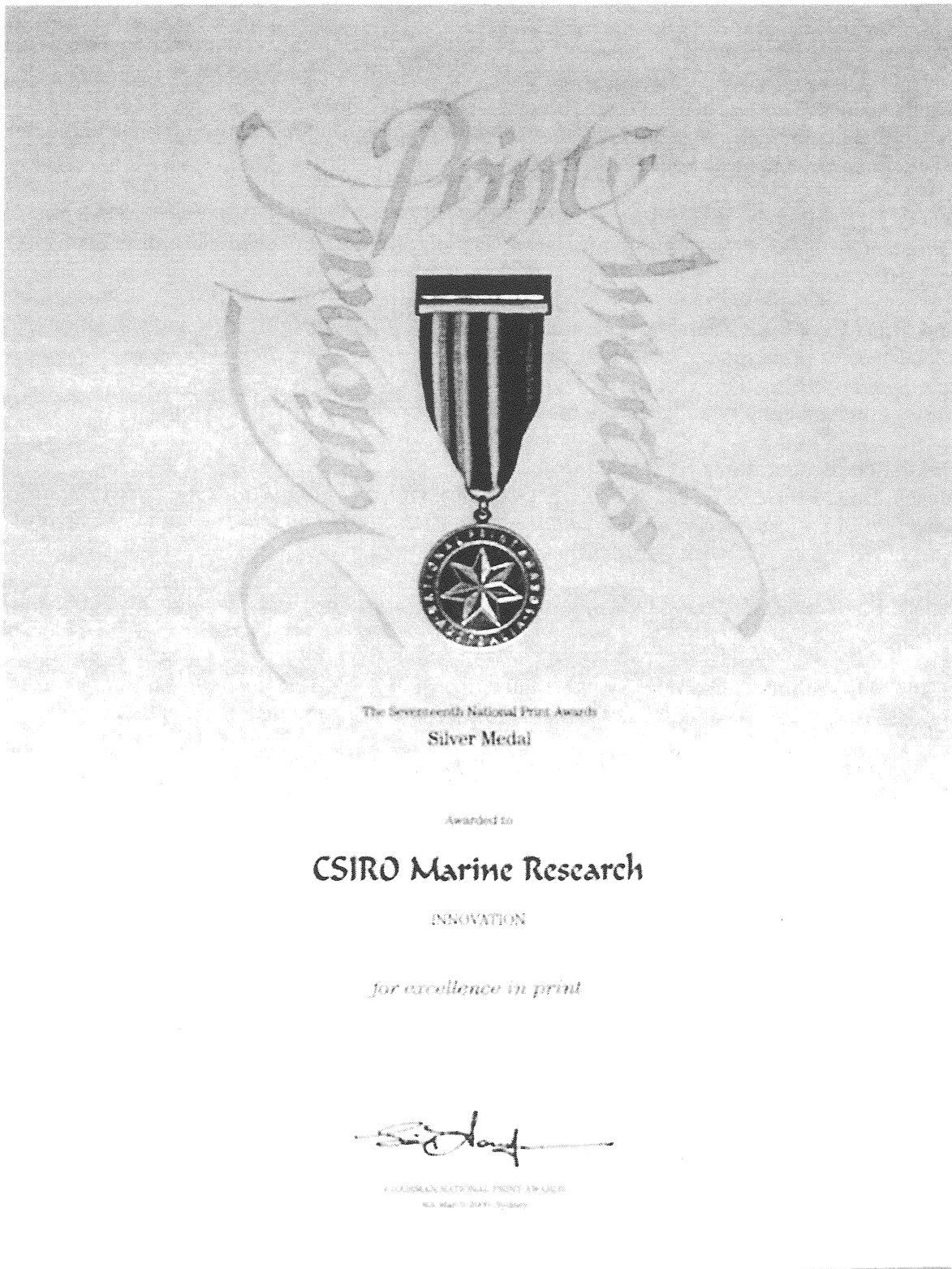
2003 • FRDC/CSIRO PUBLISHING • 1876996315
• 224 pp • colour illustrations • hardback

\$49.95



APPENDIX 12. NATIONAL PRINT AWARD

Reproduction of the National Print Award (Silver Medal) for Innovation in 2000, granted to CSIRO Marine Research and Courtney Colour Graphics for the *Australian Seafood Handbook* (waterproof edition).



APPENDIX 13. RELATED PUBLICATIONS AND PRESENTATIONS

Papers

Nichols, P.D., Mooney, B.D. and Elliott, N.G. (2001). Unusually high levels of non-saponifiable lipids in the fish, escolar and rudderfish: a tool for identification. *Journal of Chromatography* **936**:183–191.

Conference proceedings

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