Bottom trawl surveys: catch and effort data for South East Australia between 1898 and 1997

1 Introduction

Bottom trawl surveys were carried out in South East Australia between 1898 and 1997, and sampled demersal fish communities of this region both before and at different stages since trawling begun. These surveys were performed by various research agencies, which collected and organized catch and effort data in different formats; also the detail of the information reported changed across surveys and over the years. Despite the value of these data, there has not yet been a systematic effort to collect, digitalize and standardize all of the information available. This document describes the processing carried out and the assumptions made to collect and to convert the data to a format suitable for analysis, and summarizes some important aspects of the resulting dataset.

2 Methods

2.1 Data collection and digitalization

Between 20102 and 2014, I searched public and private archives, and libraries to locate survey reports in paper format, as well as publications on survey findings and information that would help the standardization of historical data (e.g. regional fish guides that provide information on past common and scientific names). Public archives searched included the CSIRO historical archive and the Tasmanian Archives Heritage Office (TAHO), in Hobart. Private archives searched were Anthony Harrison's collection on the history of fishing in Tasmania, stored in LINC Tasmania,

Rosny Park, and Neil Klaer's collections on the history of trawling in South East Australia. Libraries searched were the CSIRO library in Hobart, the State Library of Tasmania (http://www.linc.tas.gov.au), the Biodiversity Heritage Library (http://www.biodiversitylibrary.org) and the Open Library (http://openlibrary.org). Having identified these sources, I digitalized catch and effort data from the historical surveys for which I was able to retrieve the corresponding reports (i.e. *Thetis* 1898, *Endeavour* 1909 and *Dannevig* 1948).

Next, I examined databases to collect survey data that had already been digitalized. Databases searched were the New South Wales Department of Primary Industries (NSW DPI) database; the Institute for Marine and Antarctic Studies in Tasmania (IMAS) database; and the Commonwealth Scientific and Industrial Research Organization (CSIRO) database.

I was able to assemble catch and effort data for a total of twenty bottom trawl surveys carried out between 1898 and 1997. These surveys are listed in Table 1.

Table 1. List of bottom trawl surveys carried out in South East Australia. (*) Catch and effort data collected in this study. Codes used in the table are as follows: N=New South Wales, V=Victoria, T=Tasmania, SH=shelf, SL=slope, USL=upper slope and MSL=mid-slope.

Surveys and vessels	Years	Region	Depth	Source
Private enterprises	1888	N	SH	Klaer, 2006
Lady Lock	1889	V	SH	Dannevig, 1909
Otter, Dory & Charlotte Fenwick	1891	V	SH	Dannevig, 1909
Thetis *	1898	N	SH	Farnell & Waite, 1898
Endeavour *	1909-10	T, V, N	SH	Dannevig, 1909
Liawanee	1944	T	SH	Harrison, 1994
Dannevig *	1948	T, N	SH	Mawson *et al.,* 1988
Oshuru Maru	1966	V, N	SH	Last & Harris, 1981
Umitaka Maru & Kaiyo Maru	1967	T	SH	Last & Harris, 1981
Urania	1969-70	T	SH	Webb & Wolfe, 1977
Ray Larsson & San Antone	1973-75	V	SH	Webb & Wolfe, 1977
Zeehaan *	1975-76	T	SH	Webb & Wolfe, 1977
Kapala *	1976-77	N	USL	Graham *et al.,* 1997
Zeehaan & Craigmin	1977	T, V	SH	Last & Harris, 1981
Battle Axe	1977	V	SH	Last & Harris, 1981
Kapala *	1977-78	N	USL	Gorman & Graham, 1978
Courageous *	1978	T, V	SH	Brown *et al.,* 1978
Zeehaan *	1979	T	SL	Last & Harris, 1981
Kapala *	1979-81	N	USL	Graham *et al.,* 1997
Challenger miscellaneous *	1979-87	T	SH, SL	Lyle at al., 1993
Mary Belle *	1980	T	SH	Lyle at al., 1993
Trawl fish resources phase 1 *	1981-82	T	SL	Lyle at al., 1993
Trawl fish resources phase 2-3 *	1982-82	T	SL	Lyle at al., 1993
Trawl fish resources phase 4 *	1983-83	T, V	SL	Lyle at al., 1993
Kapala *	1983-84	N	MSL	Gorman & Graham, 1983
Sarda & Soela	1984-89	V	SL	Wankowski & Moulton, 1986
Soela *	1987-89	T, N	SL	Koslow *et al.,* 1994
Kapala *	1987-89	N	MSL	Graham, 1990
Chartered commercial vessels	1987-90	V	SL	Tilzey & Rowling, 2001
Kapala *	1993-94	N	SH	Chen *et al.,* 1997
Challenger *	1993-95	T	SH	Jordan, 1997
Kapala *	1996-97	N	USL	Andrew *et al.,* 1997

2.2 Data standardization

Tow position (i.e. latitude and longitude) and net characteristics (i.e. headrope length and cod-end mesh size) were missing for some surveys, and taxonomic resolution changed over time along with the scientific names of some species. To fill these data gaps I calculated tow positions and I made educated assumptions about net characteristics. These assumptions are required because net characteristics influence net selectivity (i.e. the net's ability to catch a certain size or kind of fish) and therefore need to be considered when data collected using different sampling gears are compared (Reeves *et al.,* 1992; Maunder & Punt, 2004). Also, the headrope length is essential to calculate the area swept in each tow, which is commonly used as a measure of sampling effort and was calculated for each survey's tows. Next, to obtain species lists comparable across surveys I updated species names and adopted a common species coding system. Lastly, I converted all survey catch and effort data to a common format. Each step of the data standardisation is detailed in the following sections.

2.2.1 Tow positions

I calculated survey tow positions in latitudinal and longitudinal degrees when this information was lacking. Tow positions for the *Thetis*, *Endeavour* and *Dannevig* surveys, here defined as *historical surveys*, were reported using landmarks (e.g. Port Stephen) and depth. Using the approach detailed in Klaer (2006), I constructed a table containing landmark positions in latitudinal and longitudinal degrees, and the positions where a straight line from each landmark crosses the 200 m and 1000 m contours. For each tow I assigned a position in latitude and longitude according to

landmark position and a linear interpolation of tow depth. (See Table S1 in Appendix for Landmark positions, and positions at 200 m and 1000 m used for the conversion).

2.2.2 Net assumptions

Net mesh sizes (cod-end) were not available for the *historical surveys* and for most of the surveys collected from the IMAS database and therefore had to be assumed. Due to the commercial focus of these surveys (these were exploratory surveys designed to help develop a commercial fishery), I relied on specifications of commercial trawl nets used at the time of the survey. I assumed a net mesh size of 3 inches (76 mm) for the *historical surveys* (Fairbridge, 1948), and 90 mm for IMAS surveys (Jeremy Lyle, personal communication). For the latter, if the target species was orange roughy, I assumed a mesh size of 110 mm (Jeremy Lyle, personal communication).

Likewise, net headrope lengths were not reported for the *Thetis*, the *Mary Belle* and for tows undertaken by the vessel *Bluefin* during the *Trawl fish resource survey*. For the *Thetis* I assumed a headrope length of 21 m, as reported for the *Dannevig*, which surveyed similar grounds. I concluded that *Thetis* and *Endeavour* nets did not have the same headrope length despite these surveys being undertaken in closer years. This was because the larger *Endeavour* net (with a headrope length of 29 m) was adopted in Australia for the first time in 1909, after the *Thetis* survey (Dannevig, 1909). The *Mary Belle* was an inshore survey and its net was most likely relatively small. Hence, I assumed the same headrope value as reported for the *Challenger* 1993-95 (26 m), which also explored inshore Tasmanian waters (Lyle, 1993; Jordan, 1997). Lastly, I assumed headrope lengths of 40 m for the *Bluefin* tows because this is the length of a standard multispecies commercial net operating on the outer continental shelf, where these tows where carried out (Lyle, 1993).

2.2.3 Sampling effort

Depending on the survey, sampling effort for each tow was given either as time trawled, distance covered or swept area. I calculated trawling effort in terms of area swept in km^2 per tow. I estimated swept area following Sparre & Venema (1989):

$$A = D * hr * X2 \quad (2\text{-}1)$$

Where *D* is the distance covered (also given as *D=V*t*, where *V* is the trawling speed and *t* is the time trawled); *hr* is the headrope length; *X2* is that fraction of the headrope length, *hr*, which is equal to the width of the path swept by the trawl, the 'wing spread', and its suggested value is 0.5. When the trawling speed was not reported I assumed it to be 5.6 km/h (~3 knots) because this is the standard trawling speed reported for the majority of tows in both the *historical* and more recent surveys (Dannevig, 1909; Jordan, 1997).

2.2.4 Species names

I crosschecked for species names no longer in use. For the *historical surveys* species names were given as species common names used at the time the survey was carried out. To obtain a species list comparable across surveys, I interpreted and translated species common names into scientific names using a combination of lists of biological records collected during some of these surveys and provided by the Australian Museum, in Sydney, survey reports (e.g. Farnell & Waite, 1898), and available literature on past species taxonomic classification (e.g. Tenison-Woods, 1882; Ogilby, 1886; Stead, 1906; Roughley *et al.,* 1916; Roughley, 1953).

For many records, the species common name referred to a family or a group of species (e.g. flatheads, sharks). In most of these cases scientific names are at family or higher taxonomic levels. However, in some instances I was able to confidently assume the species belonging to the family reported. For example, I assumed that 'Tasmanian silver belly' referred to *Parequula melbournensis* because this is the only species belonging to the *Gerreidae* (silver belly) family known to inhabit Tasmanian waters (Atlas et al., 2015). Further, I assumed that 'Tasmanian flounder' referred to *Rhombosolea tapirina* because this is the most common flounder found in Tasmania and was caught in large quantities during the survey in which it was reported (John Pogonoski, personal communication).

Moreover, some old common names may have been linked to a range of current scientific names. For example, among the most uncertain common names were cods and perches. According to the old literature, cods could have referred to either the family *Moridae* or the family *Scorpaenidae*, whereas perches could have referred to any one of the families *Serranidae*, *Sebastidae*, *Neosebastidae* and *Callanthiidae*. When records were uncertain or details from a survey biological record were missing I consulted fish taxonomists at CSIRO, who advised on the most likely species/family. This advice took into consideration the size of the catch, and the depth and specific locality (i.e. latitude and longitude) of capture. Depth and latitude of capture also allowed correcting for some misreported names. For example, the *Endeavour* registered sawfish (*Pristidae*) catches at latitude of about 40° S, but this family is found almost exclusively in tropical waters (Atlas et al., 2015). Instead, saw sharks (*Pristophoridae*) inhabit temperature waters and are commonly found around Tasmania (Atlas et al., 2015), so I changed sawfish records (at latitude of 40° S) into

saw sharks. (See Table S2 in Appendix for species names used in *historical survey* reports and corresponding old and current scientific names).

Also, for all surveys, I updated species names following classifications reported in the Codes for Australian Aquatic Biota (CAAB) (Yearsley *et al.,* 1997), and for each species/family I assigned the relevant CAAB code. As most of the survey catch data consisted of demersal bony fishes and elasmobranchs, I considered only these taxa.

Finally, I cleaned the dataset by removing tows reported inland and tows missing latitude, longitude or depth, as well as tows with no catch information (e.g. the *Thetis* survey reported a few tows with null catches). Also, for all surveys I converted tow latitude and longitude to decimal degrees and depth to meters, if given otherwise, and I calculated tows' mean latitude, longitude and depth, when starting and ending values were provided. I adopted a common format for all surveys, detailed in Table 2.

Data manipulation carried out in this study was implemented in R 3.1.0 (R Development Core Team, 2014)

Table 2. Dataset format and fields explanation.

Field name	Specification	Type
database	databse of origin	character
survey	survey name	character
tow_ID	tow-unique ID	character
day	day the tow was carried out	numeric
month	month the tow was carried out	numeric
year	year the tow was carried out	numeric
season	season the tow was carried out	character
lat	tow mean latitude in decimal degrees	numeric
long	tow mean longitude in decimal degrees	numeric
depth	tow mean depth in m	numeric
net_ID	net-unique ID	character
net_design	net characteristics	character
headrope_m	length of the net's headrope in mm	numeric
codend_mm	size of the net's mesh at the cod-end	numeric
mouth_mm	size of the net mesh at the mouth	numeric
trawling_speed_km	towing speed during the tow in km	numeric
time_trawled_h	time trawled during the tow in hours	numeric
distance_trawled_km	distance trawled during the tow in km	numeric
swept_area_kmq	area swept during the tow in km squared	numeric
vessel_ID	vessel-unique ID	character
vessel_t	vessel tonnage	character
vessel_m	vessel length in m	character
vessel_type	vessel characteristics	character
echosounder	echosounder type	character
radar	radar type	character
other_equipment	other equipment for navigation	character
kapala_report	Kapala cruise report number	character
CAAB	species CAAB code	numeric
species	species scientific name	character
family	species family name	character
class	species class name	character
counts	species counts per tow	numeric
Weight	species weight per tow	numeric

3 Results

The result of applying the rules and standards outlined above is a dataset containing a total of 3,083 tows taken at depths between 9 m and 1280 m. These tows sampled a total of 574 species belonging to 194 families among chondrichthyes and osteichthyes. The position of survey tows and their temporal distribution are shown in Fig. 1 and the survey characteristics and outcomes are summarised in the next paragraphs.

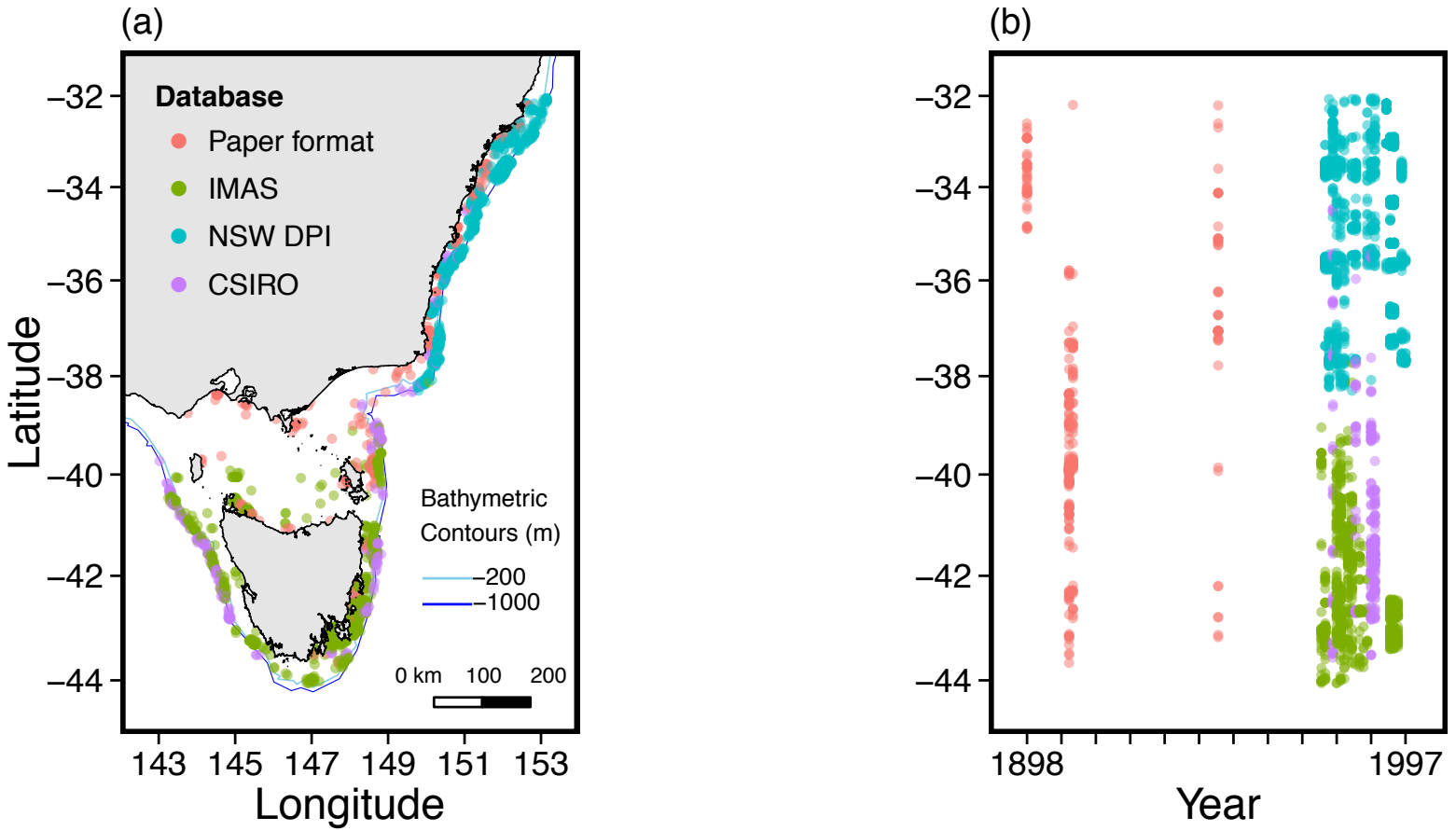

Figure 1. Geographic and temporal distribution of survey data. (a) Map showing the tow locations of the collection of all surveys. (b) Latitudinal (in bins of 0.1 DD) and temporal coverage of the sampling operations.

3.1 Early surveys

I retrieved data from the *historical surveys* from archives and personal collections. In particular, Neil Klaer kindly provided *Thetis* and *Endeavour* reports, while I found the *Dannevig* survey report (Fig. 2) in the CSIRO historical archives, in Hobart. Although the *Endeavour* operated for 5 years (1909-1914), reports of its surveys that I was able to locate only referred to the years 1909 and 1910. It is most likely that the data collected in later years went missing when the vessel and all the crew were lost at sea in 1914. Details on vessel tonnage and length, as well as measures of the trawl net used to sample, were available for the *Endeavour* and the *Dannevig* surveys, but not for the *Thetis* survey (Table 3).

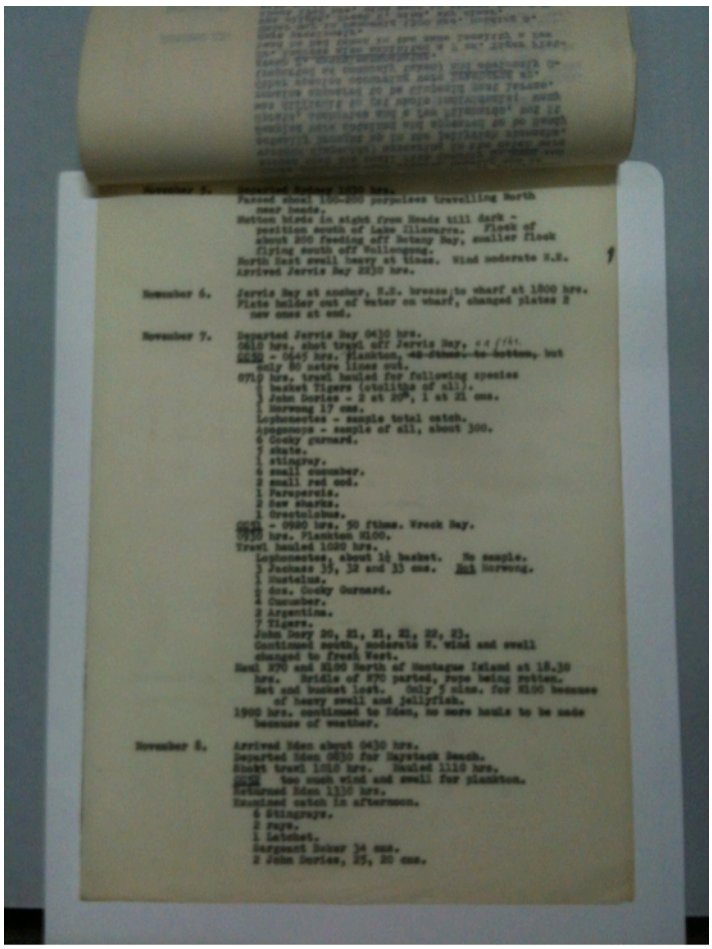

Figure 3. *Dannevig* survey report.

Table 3. Nets and vessels used in *historical surveys* and their specifications. (*) Assumed values.

Survey	Vessel (t)	Vessel (m)	Vessel type	Net ID	Headrope (m)	Cod-end (mm)
Thetis			New South Wales Government's research vessel	THE	*21	*76
Endeavour	335	41	Australian Federal Government's research vessel	END	29	*76
Dannevig	92	22.6	CSIRO research vessel	DA2	21	*76
				DA1	24	*76

Summaries of the total catch per survey show that the *Thetis* recorded the highest number of species and families, despite having the lowest number of tows (Table 4). However, the reported number of species and families depends on the accuracy of taxonomic classification, and, for these surveys, high percentages of the catch records were reported at higher taxonomic level than species (e.g. *Pristiophorus spp*.; "*Seriolella brama & Seriolella punctata"*) or even family (e.g. "*Platycephalidae* – undifferentiated"; sharks). As this percentage was consistent for the *Endeavour* (64% for species and 8% for families), I would expect that the number of species and families sampled during this survey was much higher than reported. This is particularly the case for sharks and rays, which had no distinction of species or family. Information on species abundance was also often lacking. Whereas the *Endeavour* surveys report numbers of individuals sampled for all catch records, this information is available for only 27% of the *Dannevig* catch records and for none of the *Thetis* records.

Table 4. *Historical surveys* data summary and quality.

Survey	Tows	Species	Families	Individuals	Taxon > species (%)	Taxon > family (%)	Records reporting individuals (%)
Thetis	43	46	62		54	2	0
Endeavour	218	34	43	244275	64	8	100
Dannevig	47	26	42	755	52	7	27

3.2 NSW DPI surveys

The NSW DPI database includes a collection of bottom trawl surveys carried out between 1976 and 1997, with the New South Wales Division of Fisheries research vessel *Kapala* (e.g. Gorman & Graham, 1978, 1983; Graham *et al.,* 1997). All surveys were performed with the same vessel, but nets used changed across surveys (Table 5).

Table 5. Nets used in NSW DPI survey and their specifications.

Survey	Net ID	Net design	Headrope (m)	Cod-end (mm)
Kapala 1976-77	F6	Boris box, 30 m bridles & 45 m sweeps	21	90
Kapala 1977-78	F6	Boris box, 30 m bridles & 45 m sweeps	21	90
Kapala 1979-81	F3	Engel balloon, 54 m bridles & 45 m sweeps	56	90
	F6	Boris box, 30 m bridles & 45 m sweeps	21	90
Kapala 1983-84	F3	Engel balloon, 54 m bridles & 45 m sweeps	56	42
	F6	Boris box, 30 m bridles & 45 m sweeps	21	90
Kapala 1987-89	F5	Boris box, 30 m bridles & 50 m sweeps	30	90
				42
Kapala 1992-94	F1	Engel balloon, 53 m bridles & 180 m sweeps	56	42
Kapala 1996-97	F6	Boris box, 30 m bridles & 45 m sweeps	21	90

Summaries of the total catch per survey in number of species, families and individuals sampled are given in Table 6. Overall, low percentages of catch records were reported at higher taxonomic level than species and no catch record was reported at higher taxonomic level than family. Species abundance is consistently reported as number of individuals sampled per species across all surveys, and no information on species

weight is given. For some of these surveys (i.e. *Kapala 1976-77, Kapala 1996-97 and Kapala 1993-94*) length frequency data are also available, although not collected as part of this study.

Table 6. NSW DPI survey data summary and quality.

Survey	Tows	Species	Families	Individuals	Taxon > species (%)	Taxon > family (%)	Records reporting individuals (%)
Kapala 1976-77	233	143	85	145583	8	0	100
Kapala 1977-78	58	168	93	31023	2	0	100
Kapala 1979-81	197	134	76	180302	8	0	99
Kapala 1983-84	94	143	53	34156	3	0	100
Kapala 1987-89	165	178	62	68500	3	0	100
Kapala 1992-94	620	256	104	3189381	1	0	95
Kapala 1996-97	165	145	74	130547	4	0	100

3.3 IMAS surveys

The IMAS database includes a collection of bottom trawl surveys carried out by the Division of Sea Fisheries (formerly Tasmanian Fisheries Development Authority and later Department of Sea Fisheries) between 1975 and 1995. A combination of research and fishing vessels and nets were used (Table 7).

Table 7. Nets and vessels used in the Division of Sea Fisheries surveys and their specifications. (*) Assumed values.

Survey	Years	Vessel ID	Vessel (t)	Vessel (m)	Vessel type	Net ID	Net design	Headrope (m)	Cod-end (mm)
Zeehaan	1975-1976	*Zeehaan*	92	22.3	Fisheries vessel	F&B	Frank and Bryce, 45 m bridles & 270 m sweeps	36.3	*90
Zeehaan	1979	*Zeehaan*				URI		38	*90
						CAQ	Coastal Aquarius	47	*90
						C3B	Coastal 3 bridled	36.6	*90
						CBO	Coastal box trawl	17.3	*90
						G3B	Grundy 480 3 bridled	22	*90
Challenger miscellaneous	1979-1987	*Challenger*	87	21	Tasmania Fisheries Department research vessel	F&B	Frank and Bryce, 45 m bridles & 270 m sweeps	29	*90
						URI		38	*90
						GRU	Bridport Grundy 3 bridled	24	*90
						URI2		41	*90
						COMM	Standard commercial	40	*90
						RWA	Roughy net	34	*110
						SAM	Sammy's net	29	*90
						CAQ	Coastal Aquarius	47	*90

Table 7. Continued.

Survey	Years	Vessel ID	Vessel (t)	Vessel (m)	Vessel type	Net ID	Net design	Headrope (m)	Cod-end (mm)
Mary Belle	1980-1980	*Mary Belle*	29	14.6	Fisheries vessel	WTR	Frank and Bryce wing trawl	*26	*90
						NZF	New Zealand flounder net	*26	*90
						OTH	Other small trawl nets	*26	*90
Trawl fish resources phase 1	1981-1982	*Challenger*				URI		38	*90
		Bluefin	387	34	Maritime College research vessel	ENG	Engel balloon trawl	*40	*90
Trawl fish resources phase 2-3	1982-1982	*Bluefin*				ENG	Engel balloon trawl	*40	*90
		Challenger				RWA	Roughy net	34	*110
		Petuna Endeavour	200	24	Fisheries vessel	ITL	Italian	60	*90
Trawl fish resources phase 4	1983-1983	*Petuna Endeavour*				ITL	Italian	60	*90
		Challenger				URI		38	*90
		Margaret Philippa	200	26	Fisheries vessel	EBT	Engel high lift balloon trawl	53	*90
						BTA	Baltar trawl with bobbin gear	56	*90
Challenger	1993-1995	*Challenger*				AJ	Otter trawl net, 25 m bridles & 38 m sweeps	26	20 liner

Summaries of the total catch per survey in number of species, families and individuals sampled or species weights are given in Table 8. The number of species and families sampled are particularly low for the *Zeehaan 1975-76* and the *Mary Belle 1980* (both coastal), despite the high number of tows. The percentage of catch records reported at higher taxonomic level than species is as high as 10-15% for some surveys, although in none of the surveys were catch records reported at higher taxonomic level than family. Information on species abundance was given as either species weight (i.e. *Zeehaan 1975-76* and the *Mary Belle 1980*), or a combination of species weight and number of individuals sampled (e.g. *Trawl fish resources surveys*). The *Challenger 1993-94* is the only survey in the whole dataset consistently reporting both species weight and number of individual samples for each tow.

Table 8. IMAS survey data summary and quality.

Survey	Tows	Species	Families	Individuals	Weight (kg)	Taxon > species (%)	Taxon > family (%)	Records reporting individuals (%)	Records reporting weights (%)	Records with no biomass information (%)
Zeehaan 1975-76	154	14	11	2925	50823	0	0	0	100	0
Zeehaan 1979	43	105	68	351	39535	10	0	37	64	0
Challenger miscellaneous	214	147	78	35173	38138	6	0	81	23	1
Mary Belle	152	18	18	0	3409	0	0	0	100	0
Trawl fish resources phase 1	25	90	54	1342	11393	10	0	27	73	0
Trawl fish resources survey 2-3	65	89	50	8943	70788	13	0	40	60	0
Trawl fish resources phase 4	57	101	58	10576	113553	15	0	74	26	1
Challenger	240	114	68	124945	29429	2	0	97	99	0

3.4 CSIRO surveys

The CSIRO database includes a collection of surveys carried out with the *F.R.V. Soela* and *Courageous,* during the 1970s and the 1980s. Both vessels used similar nets (Table 9).

Summaries of the total catch per survey in number of species, families and individuals sampled or species weights are given in Table 10. Data quality for the *Soela* survey is lower than for the other surveys carried out at similar times. For instance, 19% of the catch records are reported at higher taxonomic level than species, 7% are reported at higher taxonomic level than family, and 38% lack information on species abundance. Species abundance was given as a combination of number of individuals sampled or species weight in both *Soela* and *Courageous* surveys.

Table 9. Nets and vessels used in CSIRO survey and their specifications.

Survey	Vessel type	Net ID	Net design	Headrope (m)	Cod-end (mm)
Courageous	CSIRO research vessel	CS3	Frank & Bryce, 228 mm mesh size at wings, 40 mm cod-end liner, Karmoy doors	25.6	40
		CS2	Frank & Bryce, 228 mm mesh size at wings, Fearnought doors	25.6	40
Soela	CSIRO research vessel	CS1	Engel demersal high lift	35.3	37 liner
		CS4	Frank & Bryce, 228 mm mesh size at wings, 40 mm cod-end liner, Polyvalent doors	25.6	40

Table 10. CSIRO survey data summary and quality.

Survey	Tows	Species	Families	Individuals	Weight (kg)	Taxon > species (%)	Taxon > family (%)	Records reporting individuals (%)	Records reporting weights (%)	Records with no biomass information (%)
Courageous	50	91	58	2217	10744	3	2	63	53	6
Soela	240	132	81	56409	72212	19	7	34	59	38

4 Discussion

I compiled catch and effort data from twenty bottom trawl surveys sampling demersal fish communities of South East Australia between 1898 and 1997 into a single dataset ready for analysis. These data were collected, and some were analyzed, as part of Novaglio (2016) PhD thesis, which is in preparation for publication. Nevertheless, the 'cleaned' data that are now available may be further interrogated, thus benefit other researches.

Catch and effort data from *Endeavour* and *Thetis* is of particular value because these were the only data collected before the development of a trawl fishery in Australia. Whereas the strength of the *Endeavour* is that it reports abundances for all catch records, thus providing information on community structure (i.e. species/families relative abundances) before exploitation, the strength of the *Thetis* is that it provides a more detailed list of species sampled, thus delivering information on community composition (i.e. species presence).

NSW DPI provided the set of surveys with the greatest sampling resolution. These surveys sampled the demersal communities of the continental shelf and slope of New South Wales between 1976 and 1997. Almost all catch records were reported at species level and the number of individuals sampled per species was given for all survey tows. Because the NSW DPI dataset includes surveys carried out at different stages of commercial exploitation and in some cases prior to fishing (i.e. the *Kapala 1976-77*, which surveyed the continental slope) these data have been used in several previous studies aiming at a better understanding of the effect of trawling on demersal

communities and fish stocks (Andrew *et al.,* 1997; Graham *et al.,* 2001; Tuck, 2011; Foster *et al.,* 2015).

All steps of the data standardization process highlighted the marked gaps in data quality between *historical* and the more recent surveys. For instance, for *historical surveys* I had to assume a number of pieces of essential information, such as tow position, net characteristics and species names. In some cases, the information I relied on was imprecise, and may have biased my assumptions. For examples, tow landmarks used to calculate tow positions were sometimes vague (e.g. landmark positions reported as 'Between Haystack Bay and North end of Twofold Bay'), as were some of the species common names reported in survey logbooks (e.g. perch). However, when considering historical data there is almost always a tradeoff between accuracy and having any data to consider at all. Instead, the focus should be on extracting the best information available and accounting for data gaps and limits when interpreting outcomes. Because the challenges I faced are likely common to the standardization of other historical datasets, I hope that my approach can be used in similar contexts.

Data gathering and standardization is an important step in all studies involving data analysis, but this step requires additional effort and time when dealing with historical data. First, available data have to be identified through an extensive literature review. Next, it is necessary to determine where the data may be stored. This can be straightforward if the data are already in digital format (as were data from the 1970s onwards) and more complicated if the data are still in paper format (and buried in archives). In such cases, once records are retrieved they need to be digitalized. Next, data gaps and incongruences have to be assessed and assumptions need to be made so

that the information is comparable across different sources of data (e.g. all records needed tow position and area swept). For some data (i.e. that from *historical surveys*) consequential assumptions need to be made, thus deserving thoughtful consideration. This involves further search across the literature for details that cannot be found in particular survey reports (e.g. fish common and scientific names and details on the fishing nets used at the time surveys were carried out). However, all efforts are worthwhile if the outcome is a long-term dataset that, despite limitations (e.g. coarse taxonomy or basic recording), may be informative about the historical impact of fishing on marine communities, and the meticulous approach detailed here will most likely lead to the finding of such valuable data, perhaps available in many regions around the world.

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Appendix

Table S1. Tows landmark positions in latitudinal and longitudinal decimal degrees (DD), positions at 200 m and 1000 m.

Landmark	Lat landmark	Long landmark	Lat 200m	Long 200m	Lat 1000m	Long 1000m
Babel Island	-39.95	148.33	-39.95	148.86	-39.95	148.96
Barrenjoey Point	-33.58	151.33	-33.58	151.9	-33.58	152.13
Bass Point	-34.6	150.08	-34.6	151.18	-34.6	151.33
Batemans Bay	-35.73	150.25	-35.73	150.83	-35.73	150.93
Bermagui	-36.43	150.06	-36.43	150.26	-36.43	150.33
Between Haystack Bay and North end of Twofold Bay	-39.93	148.01	-39.93	148.75	-39.93	148.95
Bird Island	-33.23	151.6	-33.23	152.23	-33.23	152.4
Botany Bay	-34	151.23	-34	151.55	-34	151.85
Broken Bay	-33.6	151.31	-33.6	151.86	-33.6	152.13
Broughton Island	-32.61	152.31	-32.61	152.66	-32.61	152.85
Broulee	-35.85	150.18	-35.85	150.51	-35.85	150.56
Brush Island	-35.53	150.41	-35.53	150.71	-35.53	150.78
Bulgo	-34.2	151	-34.2	151.4	-34.2	151.58
Cape Everard	-37.8	149.26	-38.11	149.36	-38.33	149.43
Cape Forster	-32.18	152.51	-32.18	152.9	-32.18	153.08
Cape Grenfell	-34.9	150.6	-34.9	151.05	-34.9	151.18
Cape Hawke	-32.21	152.56	-32.21	152.93	-32.21	153.08
Cape Howe	-37.5	149.98	-37.5	150.23	-37.5	150.3
Cape Three Points	-33.5	151.41	-33.5	151.93	-33.5	152.13
Catherine Hill Bay	-33.15	151.63	-33.15	152.28	-33.15	152.48
Charlott Head	-32.33	152.55	-32.33	152.9	-32.33	153.01
Coalcliff	-34.25	150.98	-34.25	151.4	-34.25	151.58
Coogee	-33.91	151.25	-33.91	151.56	-33.91	151.85
Cronulla	-34.03	151.18	-34.03	151.58	-34.03	151.86
Crookhaven River	-34.9	150.75	-34.9	151.08	-34.9	151.23

Crowdy Head	-31.85	152.75	-31.85	153.05	-31.85	153.31
Disaster Bay	-37.26	149.96	-37.26	150.28	-37.26	150.35
Eden	-37.06	149.91	-37.06	150.28	-37.06	150.35
Everard Light North East	-37.78	149.28	-37.78	150.11	-37.78	150.2
Flinders Island	-39.93	148.01	-39.93	148.75	-39.93	148.95
Gabo Island	-37.56	149.91	-37.56	150.21	-37.56	150.3
Goalen	-36.51	150.05	-36.51	150.33	-36.51	150.41
Green Cape	-37.21	150.03	-37.21	150.33	-37.21	150.38
Haystack Rock	-42.2	148.06	-42.2	148.53	-42.2	148.61
Jervis Bay	-35.11	150.76	-35.11	150.96	-35.11	151.1
Jervis Bay (within)	-35.03	150.44	-35.03	150.44	-35.03	150.44
Jibbon	-34.06	151.15	-34.06	151.48	-34.06	151.68
Kiama	-34.66	150.85	-34.66	151.16	-34.66	151.33
Korogoro Island	-31.05	153.03	-31.05	153.2	-31.05	153.31
Lakes Entrance	-37.86	148	-38.33	148.51	-38.48	148.73
Lily Vale	-34.2	151	-34.2	151.4	-34.2	151.61
Long Point	-33.75	151.25	-33.75	151.75	-33.75	152.08
Manning River	-31.86	152.7	-31.86	153.08	-31.86	153.25
Maria Island	-42.66	148.13	-42.66	148.4	-42.66	148.51
Marion Bay	-42.8	148	-42.8	148.35	-42.8	148.45
Marley Beach	-34.11	151.13	-34.11	151.45	-34.11	151.7
Merimbula	-36.9	149.93	-36.9	150.26	-36.9	150.33
Montague Island	-36.25	150.23	-36.25	150.3	-36.25	150.38
Montague Island North	-36.23	150.21	-36.23	150.35	-36.23	150.4
Montague Island South	-36.25	150.21	-36.25	150.33	-36.25	150.4
Moon Bay	-36.7	149.98	-36.7	150.26	-36.7	150.35
Moon Island	-33.08	151.66	-33.08	152.38	-33.08	152.56
Morna Point	-32.78	152.08	-32.78	152.65	-32.78	152.78
Moruya	-35.91	150.13	-35.91	150.46	-35.91	150.51
Mowarry Point	-37.15	150	-37.15	150.28	-37.15	150.35
N.E. flinders Island	-39.86	148.08	-39.86	148.71	-39.86	148.9
N.E. Broughton Island	-32.6	152.31	-32.6	152.8	-32.6	152.9
Narrabeen	-33.7	151.01	-33.7	151.76	-33.7	152.05
New Zealand Ground	-33.71	151.43	-33.63	151.86	-33.56	152.13

Newcastle	-32.93	151.76	-32.93	152.55	-32.93	152.65
Norah Head	-33.28	151.58	-33.28	152.18	-33.28	152.31
O'Hara Head	-35.56	150.38	-35.56	150.68	-35.56	150.75
Port Hacking	-34.06	151.1	-34.06	151.51	-34.06	151.81
Port Jackson	-33.81	151.28	-33.81	151.65	-33.81	151.93
Port Kembla	-34.48	150.91	-34.48	151.26	-34.48	151.43
Port Macquarie	-31.45	152.91	-31.45	153.13	-31.45	153.25
Port Stephens	-32.7	152.16	-32.7	152.68	-32.7	152.83
Red Head	-35.25	150.55	-35.25	150.9	-35.25	151
Seal Rock	-32.43	152.53	-32.43	152.81	-32.43	152.95
Shoalhaven Head	-34.85	150.75	-34.85	151.1	-34.85	151.21
Sisters	-39.5	147.73	-39.2	148.61	-39.13	148.73
Smoky Cape	-30.91	153.08	-30.91	153.2	-30.91	153.31
St Helens	-41.33	148.25	-41.33	148.61	-41.33	148.8
Storm Bay	-43.1	147.5	-43.5	147.81	-43.73	147.95
Sugar Rock	-33.11	151.55	-33.11	152.33	-33.11	152.55
Sydney Head	-33.85	151.3	-33.85	151.7	-33.85	152.08
Tathra Head	-36.73	149.98	-36.73	150.26	-36.73	150.33
The Pines	-36.01	150.15	-36.01	150.4	-36.01	150.46
Tollgate Island	-35.75	150.26	-35.75	150.56	-35.75	150.63
Tuggerah Lakes	-33.33	151.5	-33.33	151.11	-33.33	152.28
Tuncurry	-32.18	152.5	-32.18	152.93	-32.18	153.08
Twofold bay	-37.08	149.91	-37.08	150.28	-37.08	150.35
Ulladulla	-35.35	150.46	-35.35	150.81	-35.35	150.98
Wallis Lake	-32.26	152.51	-32.26	152.93	-32.26	153.06
Warden	-35.38	150.5	-35.38	150.78	-35.38	150.88
Wattamolla	-34.13	151.13	-34.13	151.46	-34.13	151.71
Wollongong	-34.41	150.9	-34.41	151.26	-34.41	151.46
Wreck Bay	-35.18	150.63	-35.18	150.91	-35.18	151.05
Wybung Head	-33.2	151.66	-33.2	152.23	-33.2	152.4

Table S2. Species names used in *historical survey*'s logs and corresponding old and current scientific names. Conversion from survey log name to old scientific names following *(a) Endeavour* biological records; *(b)* Stead, 1906; *(c)* Roughley *et al.,* 1916 and Roughley, 1953; *(d)* Farnell & Waite, 1898; and *(e)* Ogilby 1886.

Survey report name	Old scientific name	Scientific name
Amblyrhynchotus oblongus	*(a)Amblyrhynchotus oblongus*	*Tetraodontidae - undifferentiated*
Angel fish	*(d)Rhina squatina/squatina squatina*	*Squatina spp.*
Antennarius nummifer	*(a)Antennarius nummifer*	*Antennarius nummifer*
Anthias pulchellus	*(a)Anthias pulchellus*	*Lepidoperca pulchella*
Apogonops		*Apogonops spp.*
Apogonops anomalus	*(a)Apogonops anomalus*	*Apogonops anomalus*
Argentina	*(c)Monodactylus argenteus*	*Monodactylidae - undifferentiated*
Australian cod		*Moridae - undifferentiated*
Banded stingaree		*Urolophus cruciatus*
Barracouta	*(a)Thyrsites atun*	*Thyrsites atun*
Bass flathead	*(b)Platycephalus bassensis*	*Platycephalus bassensis*
Bastard trumpeter	*(b)Latris ciliaris*	*Latridopsis forsteri*
Beardie	*(b)Lotella callarias/rhacina*	*Lotella rhacina*
Bellow fish macrorhamphosus	*(a)Macrorhamphosus*	*Macroramphosus scolopax*
Bellows fish	*(a)Macrorhamphosus scolopax/gallinago*	*Macroramphosus scolopax*
Black sole	*(c)Synaptura nigra*	*Brachirus nigra*
Black stin ray	*(d)Trygon pastinaca*	*Dasyatidae - undifferentiated*
Boar fish	*(a)Zanclistius elevatus*	*Zanclistius elevatus*
Box fish	*(b)Ostraciontidae*	*Ostraciidae - undifferentiated*
Brachionichthys hirsutus	*(a)Brachionichthys hirsutus*	*Brachionichthys hirsutus*
Brown puller		*Chromis hypsilepis*
Bull's eye	*(b)Pempheridae spp..*	*Pempheridae - undifferentiated*
Bullrout	*(d)Centropogon robustus*	*Notesthes robusta*
C. ayraudi	*(b)Monacanthus ayraudi/chinaman*	*Nelusetta ayraud*
C. morwong	*(c)Cheliodactylidae*	*Cheilodactylidae - undifferentiated*
Callianthias platei	*(a)Callanthias platei*	*Callanthias spp.*
Carpet shark		*Order orectolobiformes - undifferentiated*

Centropercis nudivittis	*(a)Centropercis nudivittis*	*Champsodon spp.*
Cephaloscyllium		*Cephaloscyllium spp.*
Chimera		*Chimaeridae - undifferentiated*
Chinaman leatherjacket	*(b)Monacanthus ayraudi*	*Nelusetta ayraud*
Cod gurnard	*(c)Triglidae*	*Triglidae - undifferentiated*
Cod		*Moridae - undifferentiated*
Cod physiculus	*(a)Physiculus*	*Pseudophycis barbata*
Collared cat shark		*Scyliorhinidae - undifferentiated*
Common stingray		*Dasyatidae - undifferentiated*
Conger eel	*(a)Congrus habenatus*	*Congridae - undifferentiated*
Congermurena	*(a)Congermurena habenata*	*Congridae - undifferentiated*
Crested flounder	*(b)Lophonectes gallus*	*Lophonectes gallus*
Cristiceps argyropleura	*(a)Cristiceps argyropleura*	*Cristiceps argyropleura*
Cucumber fish	*(a)Chloropthalmus nigripinnis*	*Paraulopus nigripinnis*
Deepsea flathead	*(c)Neoplatycephalus macrodon*	*Platycephalus richardsoni*
Deepsea flute mouth	*(b)Fistularidae*	*Fistulariidae - undifferentiated*
Devil fish	*(e)Mobula mobular*	*Myliobatidae - undifferentiated*
Dog fish	*(a)Squalus megalops*	*Squalus spp.*
Dogfish squalus megalops	*(a)Squalus megalops*	*Squalus spp.*
Dragonet	*(b)Callionymidae*	*Draconettidae & callionymidae - undifferentiated*
Eagle ray	*(b)Myliobatis australis*	*Myliobatidae - undifferentiated*
Elephant fish		*Callorhinchus milii*
Emissola	*(e)Emissola ganearum/e.maugeana*	*Mustelus antarcticus*
Farnell's boar fish	*(a)Histiopterus farnelli*	*Paristiopterus labiosus*
Fiddler	*(b)Trygonorrhina fasciata*	*Trygonorrhina spp.*
Flathead	*(c)Platycephalidae*	*Platycephalidae - undifferentiated*
Flounder		*Pleuronectidae & others- undifferentiated*
Flounder multimaculatus	*(a)Pseunderhomhus multimaculatus*	*Pseudorhombus jenynsii*
Flounder pseunderhomhus multimaculatus	*(a)Pseunderhomhus multimaculatus*	*Pseudorhombus jenynsii*
Flying gurnard	*(d)Trigla polyommata*	*Pterygotrigla polyommata*
Fortescue	*(d)Pentaroge marmorata*	*Gymnapistes marmoratus*
Ghost fish		*Hydrolagus ogilbyi*
Grey banded perch	*(b)Serranidae family*	*Serranidae - undifferentiated*

Grey nurse shark	*(d)Odontaspp.s americanus*	*Odontaspididae - undifferentiated*
Gummy		*Mustelus spp.*
Gurnard kumu	*(a)Kumu- chelidonichthys kumu*	*Chelidonichthys kumu*
Gurnard polyommata	*(a)Polyommata- pterygotrigla polyommata*	*Pterygotrigla polyommata*
Hake		*Merlucciidae & macruronidae - undifferentiated*
Hake jordanidia		*Merlucciidae & macruronidae - undifferentiated*
Hammerheaded shark	*(d)Zygaena malleus*	*Sphyrna zygaena*
Horse mackerel	*(a)Trachurus declivis*	*Trachurus declivis*
Jackass fish	*(c)Dactylospp.rus macropterus*	*Nemadactylus macropterus*
Javelin fish	*(a)Chilomycterus jaculiferus*	*Diodontidae*
John silver dory		*Zeidae & cyttidae - undifferentiated*
John dory	*(a)Zeus faber*	*Zeus faber*
Keel headed parrot fish	*(b)Labridae & scaridae*	*Labridae - undifferentiated*
Knight fish	*(b)Monocentris gloria-maris*	*Monocentrididae - undifferentiated*
Kumu	*(c)Chelidonichthys kumu*	*Chelidonichthys kumu*
Lagocephalus lunaris	*(a)Lagocephalus lunaris*	*Lagocephalus lunaris*
Large toothed flounder	*(b)Paralichthys arsius*	*Pseudorhombus arsius*
Latchet		*Pterygotrigla polyommata*
Lead coloured dory		*Zeidae & cyttidae - undifferentiated*
Leather jackets	*(b)Monacanthus ayraudi*	*Nelusetta ayraud*
Ling	*(b)Lotella callarias/rhacina*	*Lotella rhacina*
Lizard fish		*Bathysauridae & synodontidae - undifferentiated*
Long nosed flounder	*(c)Ammotretis rostratus*	*Ammotretis rostratus*
Lophonectes	*(a)Lophonectes*	*Lophonectes gallus*
Mackerel	*(d)Scomber antarcticus*	*Scomber australasicus*
Monochanthu mosaicus	*(a)Monochanthu mosaicus*	*Eubalichthys mosaicus*
Monochanthu setosus	*(a)Monochanthu setosus*	*Meuschenia scaber*
Morwong	*(a)Dactylospp.rus carponemus*	*Nemadactylus douglasi*
Mustelus		*Mustelus spp.*
Nannygai	*(d)Beryx affinis*	*Centroberyx affinis*
Nany banded sole		*Soleidae - undifferentiated*
Narrow banded sole	*(b)Solea macleayana*	*Synclidopus macleayanus*
Nemadactylus morwong	*(a)Nemadactylus morwong*	*Nemadactylus macropterus & nemadactylus spp.*
Numb fish		*Narcinidae - undifferentiated*

Old wife	*(d)Enoplosus armatus*	*Enoplosus armatus*
Orange perch	*(e) Anthias pulchellus*	*Lepidoperca pulchella*
Orectolobus	*(a)Orectolobus*	*Orectolobidae - undifferentiated*
Other gurnard	*(c)Triglidae*	*Triglidae - undifferentiated*
Paralichthys tenuirastrum	*(a)Paralichthys tenuirastrum*	*Pseudorhombus tenuirastrum*
Parapercis	*(a)Parapercis*	*Parapercis spp.*
Parapercis allporti	*(a)Callanthias allporti*	*Callanthias spp.*
Parapercis ocularis	*(a)Parapercis ocularis*	*Parapercis spp.*
Paratrachichthys trailli	*(a)Paratrachichthys trailli*	*Paratrachichthys macleayi*
Parrot fish	*(a)Pseudolabrus spp.*	*Labridae - undifferentiated*
Perch		*Serranidae - undifferentiated*
Pike	*(b)Sphyraena novaehollandiae*	*Sphyraena novaehollandiae & dinolestes lewini*
Pilchard		*Sardinops sagax*
Polyoammata	*(c)Pterygotrigla polyoammata*	*Pterygotrigla polyommata*
Porcupine	*(b)Dicotylichthys punctulatus*	*Diodontidae - undifferentiated*
Port jackson shark	*(b)Heteroontus philippi*	*Heterodontus spp.*
Rays		*Dasyatidae - undifferentiated*
Red bull s eye	*(b)Pempheris spp..*	*Pempheris spp.*
Red cod		*Scorpaena papillosa*
Red gurnard	*(c)Triglidae*	*Triglidae - undifferentiated*
Red gurnard perch	*(c)Triglidae*	*Triglidae - undifferentiated*
Red gurnet perch	*(c)Helicolenus percoides*	*Helicolenus percoides*
Red morwong	*(b)Cheilodactylus fuscus*	*Cheilodactylus fuscus*
Red mullet	*(b)Upeneus porosus*	*Upenichthyes spp.*
Red perch	*(a)Caesioperca rasor*	*Caesioperca rasor*
Red rock cod	*(d)Scorpaena cruenta*	*Scorpaena spp.*
Rock cod	*(a)Pseudophycis barbata/physiculus barbatus*	*Pseudophycis barbata*
Rock cod tasmanian		*Scorpaenidae - undifferentiated*
Rock perch and allports perch	*(a)Callanthias allporti*	*Callanthias spp.*
Rough billied pipe fish		*Syngnathidae - undifferentiated*
Sand flathead	*(c)Platycephalidae*	*Platycephalidae - undifferentiated*
Sand whiting	*(c)Sillago ciliata*	*Sillago ciliata*
Sargeant baker	*(a)Aulopus purpurissatus*	*Aulopus purpurissatus*

Saury		*Saurida spp.*
Saw shark		*Pristiophoridae - undifferentiated*
Sawfish	*(b)Pristis zysron*	*Pristiophorus spp.*
Schnapper	*(b)Pagrosomus auratus*	*Pagrus auratus*
School shark	*(d)Galeus australis*	*Galeorhinus galeus*
Sea perch	*(a)Helicolenus percoides*	*Helicolenus percoides*
Sea pike	*(a)Sphyraena*	*Sphyraena spp.*
Sergeant baker	*(a)Aulopus purpurissatus*	*Aulopus purpurissatus*
Shark		*Class chondrichthyes*
Shovel nose ray	*(d)Rhinobatus granulatus*	*Rhinobatidae - undifferentiated*
Silver belly	*(b)Gerridae*	*Gerreidae - undifferentiated*
Silver belly victoria	*(b)Gerridae*	*Parequula melbournensis*
Silver bream	*(e)Gerres ovatus*	*Gerres subfasciatus*
Silver dory	*(a)Cyttus australis*	*Cyttus australis*
Silversides	*(c)Gerridae*	*Atherinidae - undifferentiated*
Skate		*Rajidae - undifferentiated*
Skipjack	*(c)Pomatomus saltatrix*	*Pseudocaranx spp.*
Small shark		*Class chondrichthyes*
Small toothed flounder	*(a)Pseudorhombus multimaculatus*	*Pseudorhombus jenynsii*
Snapper	*(c)Pagrosomus auratus*	*Pagrus auratus*
Sole		*Soleidae - undifferentiated*
Spikies		*Squalus spp.*
Spiny sea horse		*Solegnathus spp.*
Spotted cat shark		*Scyliorhinidae - undifferentiated*
Spotted flounder	*(a)Paralichthys novaecambriae*	*Pleuronectidae - undifferentiated*
Spriny dog		*Squalus spp.*
Star grazer	*(b)Anema inerme*	*Uranoscopidae - undifferentiated*
Stingrays	*(d)Trygon pastinaca*	*Dasyatidae - undifferentiated*
Stonelifter	*(b)Kathetostoma laeve*	*Uranoscopidae - undifferentiated*
Synodus tumbil	*(a)Synodus tumbil*	*Synodontidae - undifferentiated*
Tailor	*(d)Temnodon saltator*	*Pomatomus saltatrix*
Tasmanian black perch jackass	*(a)Chilodactylus macropterus*	*Nemadactylus macropterus*
Tasmanian flounder		*Rhombosolea tapirina*
Tasmanian numb fish		*Narcine tasmaniensis*

Tasmanian red perch		*Neosebastes spp.*
Tasmanian silver belly	*(b)Gerridae*	*Parequula melbournensis*
Teraglin	*(d)Otolithus atelodus*	*Atractoscion aequidens*
Thetis fish	*(a)Sebastes thetidis*	*Neosebastes thetidis*
Tigers	*(c)Neoplatycephalus macrodon*	*Platycephalus richardsoni*
Tigers flatehead	*(c)Neoplatycephalus macrodon*	*Platycephalus richardsoni*
Trachinocephalus myops	*(a)Trachinocephalus myops*	*Trachinocephalus myops*
Trevalla	*(a)Seriolella brama/punctata*	*Seriolella brama & seriolella punctata*
Trevally	*(a)Caranx spp.*	*Caranx georgianus*
Trumpeter	*(a)Latris spp.*	*Latridae - undifferentiated*
Trumpeter tasmania	*(b)Latris hecateia*	*Latris lineata*
Trumpeter bastard	*(b)Latris ciliaris*	*Latridopsis forsteri*
Trumpeter perch	*(c)Pelates sexlineatus*	*Pelates sexlineatus*
Trumpeter whiting	*(d)Sillago bassensis*	*Sillago bassensis*
Whiptail	*(b)Macruridae*	*Coelorinchus spp.*
Whiting	*(a)Sillago bassensis*	*Sillago bassensis*
Whiting grass	*(e) sillago ciliata*	*Sillago spp.*
Whiting sea	*(a)Sillago bassensis*	*Sillago bassensis*
Wirrah	*(c)Acanthistius serratus*	*Acanthistius serratus*
Wobbegong	*(d)Crossorhinus barbatus*	*Orectolobidae - undifferentiated*
Yellowtail	*(d)Trachurus declivis*	*Trachurus spp.*
Zanclutius		*Zanclistius spp.*