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An Inventory of the Marine Resources of the Bunbury Marine Area and Geographe Bay

BY

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AN INVENTORY OF THE MARINE RESOURCES OF THE BUNBURY MARINE AREA AND GEOGRAPHE BAY

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ABSTRACT

The marine resources of the Geographe Bay/Bunbury marine area were investigated using a variety of fishing gear i.e. set lines, set nets, trawls, ring nets, beach seines, hand lines, trolling lines, traps and light attraction at night. All the fish species caught were documented as to breeding state and food habits.

Commercial species encountered as adults during fishing operations were: bronze whaler, whiskery and gummy sharks, Westralian jewfish, Australian herring, skippy, flathead, oriental bonito, blue and sandy sprat, pilchard, mulloway, whiting, yellowtail scad, flounder, and leatherjacket and as juveniles were: skippy, yellowtail scad, tailor, southern sea garfish, pilchard, blue and sandy sprat, whiting, mullet and flathead.

Juveniles both of commercial and non commercial species were abundant in the area and many species were encountered at all sizes throughout their life cycle, suggesting the area to be important in terms of breeding. Some species were collected in breeding condition. Species assessed to be not fully exploited at present and capable of further exploitation were: oriental bonito, squid, blue mackerel and yellowtail scad.

247 fish species have now been recorded for the area (including W.A. Museum records). Some of these species were rare and the fish fauna of the area was considered to be about 211 species. All recorded species were classified according to habitat and depth preferences, social behaviour, food habits and interest to man.

I INTRODUCTION

The study described in this report was one of several undertaken by the Fisheries Research Branch of the W.A. Department of Fisheries and Wildlife as part of a programme to evaluate and predict the consequences of the ocean discharge of effluent waste from the Laporte titanium dioxide factory at Bunbury, Western Australia. The multidisciplinary programme, which was sponsored and supervised by the Laporte Effluent Committee, was designed to examine the various options for disposal of the waste. A report on the utilization of the resource by professional and amateur fishermen has already been prepared (Walker, in press). The present report provides an evaluation and inventory of the marine resources of the Bunbury/Geographe Bay marine area.

Resource information was collected during three cruises with the Department's research vessel "Flinders" using a variety of fishing gear including set lines, nets, fish traps, hand lines, trawls, trolling lines, light attraction at night etc. Some professional fishermen collected specimens and other data for the survey using gear such as ring nets and beach seines. Results of other surveys, including museum records were also incorporated into resource information results.

All species caught were categorized where possible as to their breeding state, food habits, etc. in an attempt to evaluate their status in Geographe Bay. The fishing gear used caught only fish and squid and since different gear would be required to catch shellfish no comment is made on the resource of rock lobsters, crabs, abalone or scallops. The commercial value of these species to the area was considered in a previous report on the utilization of the marine resource of the area (Walker, in press).

This report is divided into two parts. Firstly a description is given of the fish resource as captured by conventional fishing methods and secondly all species are drawn together as an inventory of the fish species of the area including information on the status and biology of individual fish species.

II THE MARINE RESOURCE AS CAPTURED BY CONVENTIONAL FISHING METHODS

1. INTRODUCTION

In the original planning of the Laporte study it was apparent to the Department of Fisheries and Wildlife

that insufficient information was available on the fish resources of the Bunbury marine area and that the Department could not comment upon such resources without undertaking an independent research assessment. This assessment took the form of three cruises to the area in which a variety of conventional fishing gear was used together with requests to some individual fishermen to collect data for the Department from certain areas using certain methods. Some of the fishing methods and gear used on research cruises, was at the time of the cruises, not used in the area by professional fishermen e.g. set/long lines, trawls, attraction by lights at night.

2. METHODS

Three research cruises were conducted in the Geographe Bay/Bunbury marine area at the following times :- 29.10.75 - 6.11.75; 1.4.76 - 10.4.76; and 14.11.76 - 21.11.76 during which a variety of fishing gear was used. In addition some professional fishermen collected species during, and provided information about, their professional fishing activities, and information collected during the course of other research programmes conducted by the Department of Fisheries and Wildlife was utilized. Details of the fishing gear used were as follows :-

A. Set lines (= long lines): One set line was used on the first cruise and two on the second and third. A set line consisted of 90 hooks of two standard sizes (8^{o} and 10^{o}) hung approximately one metre apart and over about 0.4 mile of sisal rope which was anchored at each end and supported with four, 20 cm in diameter polystyrene floats. Each hooks was attached to the 12 mm diameter sisal rope by a 15 cm trace wire of monelmetal. A one metre length of 75 mm nylon cord was tied to the trace wire at one end and to a brass swivel and shark clip at the other. The shark clip allowed the hook assembly to be clipped onto and unclipped from the rope with ease. The set line was designed and set so that it fished throughout the water column. Bait used was generally octopus, although whole fish (e.g. Perth herring and goat fish) were used completely for some sets, or dispersed throughout the line with octopus in other sets.

B. Fish traps: Fish traps consisted of conventional Shark Bay snapper traps as illustrated in Bowen (1961) which were covered for the study with 10 mm diameter wire netting. Four traps were set at a time during the first cruise and three during the second and third cruises.

C. Set nets: Set nets used were of a variety of mesh sizes from 56 mm to 178 mm and were set either on the surface or the bottom. Nets were usually set in 3-5 metres of water and were from 1-2 m in drop and thus gave a reasonable coverage of the waters from 0-5 metres.

D. Hand lines: Hand lines of breaking strains from 5.4 kg - 54 kg with 2^{o} - 10^{o} size hooks were used with a variety of bait. They were usually rigged to fish on or slightly above the bottom.

E. Trolling lines: Trolling lines used were made of 8 mm cord. Lures were 18 cm pink or white Halco tuna lures or rigged evil eye feathered jigs as available in fishing tackle shops.

F. Beach seines: Beach seines used were conventional herring or whitebait seines along with two small experimental nets used for collecting juvenile fish.

G. Ring nets: Ring nets used were of three mesh sizes and as used by professional fishermen in Geographe Bay to catch Australian salmon, Australian herring and pilchard.

H. Trawls: The trawl net used was an 18 metre headrope flat trawl with 51 mm mesh wings and 45 mm mesh cod end. In addition a 5 metre headrope try net of the same mesh dimensions was used.

I. Light attraction at night: Fish were attracted at night with quartz iodide 2 x 1000 watt lights with the aid of a berley mix of pollard and whale oil. Fish were scooped from the surface with long handled hand nets of a variety of mesh sizes or angled with hand lines and small hooks.

Catches made were documented as to location, in most cases quarter statistical blocks (Figure 1) i.e. 5 mile squares. Species were identified and recorded as to length, weight, sex and where possible breeding state and stomach contents. Identifications in most cases were checked by the W.A. Museum. Common names used in this report were the most commonly used and accepted common names as determined by the author. Where no common name was available the scientific name was used. Common names can be reconciled with scientific names in the checklist incorporated in this report.

The survey nature of this study involved the usage of small quantities of a variety of fishing gear and constant movement from area to area. Thus results are qualitative rather than quantitative and in most cases only identify the presence of individual fish species which may or may not have a commercial value. Professional operations would involve a smaller variety of fishing gear in larger quantities e.g. 1 000 hooks a set line against 180 used in this study, the selection of the better areas in which to fish and movement from area to area only when catches declined. On some occasions catches were made which if taken by professionals may have had commercial value. Such catches were, however, occasional.

3. THE RESOURCE CAPTURED BY :-

A. Set lining

Twenty four different marine species composed of twenty two fish species, squid and starfish were caught in the Geographe Bay/Bunbury marine area with the use of one or two set lines (Table 1).

A total of 456 marine animals were caught for 6 300 hooks set, at a rate of 1 per 14 hooks. The most common fishes caught (total catch in brackets) were :- the eagle ray *Myliobatis australis* (121), at a rate of 1 per 52 hooks; the Port Jackson shark *Heterodontus portusjacksoni* (113), at a rate of 1 per 56 hooks; the southern fiddler shark *Trygonorhina fasciata* (78), at a rate of 1 per 81 hooks; the smooth stingray *Dasyatis brevicaudata* (31), at a rate of 1 per 203 hooks; the bronze whaler *Carcharhinus obscurus* (22), at a rate of 1 per 286 hooks; the gummy shark *Mustelus antarcticus* (17), at a rate of 1 per 371 hooks; the whiskery shark *Furgaleus ventralis* (13), at a rate of 1 per 485 hooks; the Westralian jewfish *Glaucosoma hebraicum* (12), at a rate of 1 per 525 hooks; and the snapper *Chrysophrys unicolor* (9), at a rate of 1 per 700 hooks. Other species caught (total catch in brackets) were:- the wobbegong sharks *Orectolobus ornatus* (2), *Orectolobus ornatus halei* (2) and *Sutorectus tentaculatus* (1); the catsharks *Parascyllium variolatum* (1) and *Halaelurus analis* (1); the hammer head shark *Sphyrna lewini* (2); the shovel nose shark *Aptychotrema vincentiana* (5); the black stingray *Dasyatis thetides* (2); the common stingaree *Urolophus testaceus* (2); the cobbler *Cnidoglanis macrocephalus* (3); the gurnard perch *Neosebastes pandus* (1); the sweep *Scorpis georgianus* (1); and the moonlighter *Vinculum sexfasciatum* (1). Also 1 squid *Sepioteuthis sp.* and 14 starfish *Pyura pachydermatina* and *Luidia australiae* were caught on the set line.

Although the catch rates e.g. of fishes such as sharks, snapper and Westralian jewfish on long lines can be used in some degree to indicate abundance in the area(s) fished, this does not apply to species such as the common stingaree, cobbler, gurnard perch, sweep, moonlighter, squid and starfish which are only rarely caught on a set line. Catches of these species are regarded as accidental and only indicate the presence of these species in the area(s).

Set line data were grouped according to cruise and quarter block (Figure 1) (Table 1). The net values of catches of commercial species were determined according to Walker, (in press) as was the return per hook set for area and cruise, and were calculated from prices paid to fishermen minus freight and selling commission. Species assigned commercial importance were:- wobbegong, whiskery, bronze whaler and hammer head sharks, cobbler, gurnard perch, Westralian jewfish, snapper, sweep, moonlighter and squid.

All other species caught (Table 1) were assessed as having no commercial value. Over all areas and cruises a total value of $699 of commercial species were caught on the set lines at a value of $0.11 a hook. Catch values per hook varied according to area and cruise from zero to $0.59 a hook (Table 1).

Catch rates for all areas for the three cruises were :- 1 fish per 10 hooks in Nov/Dec 1975, 1 fish per 11 hooks in April 1976 and 1 fish per 25 hooks in November 1976 (Table 1). Catches of individual species varied according to cruise (Table 1). Variations when tested with a chi square test were of statistical significance for Port Jackson shark, whiskery shark, gummy shark, bronze whaler, southern fiddler shark, black stingray, and eagle ray. Such variations for these species do not appear to be attributable to time of year i.e. Oct/Nov or April. The third cruise i.e. November 1976 was conducted in poorer weather conditions which affected the catch rate than the other cruises, and the number of hooks set was doubled between the first and the second cruise giving a better coverage of the area.

These factors are suggested as influencing the catches of the above species rather than seasonal variations in their abundance.

The best catches according to area and cruise (Table 1) were for :- block 2820/3 (Figure 1) in April 1976 - the area 5 to 10 mile out to sea from Bunbury,where a catch of $0.59 a hook was made; block 2720/2 in April 1976 - the Binningup area - $0.40 a hook; 2720/4 the Binningup area in Oct/Nov 1975 - $0.26 a hook; 2920/1 in Nov 1976 - southwest of Bunbury - $0.18 a hook and in Oct/Nov 1975 - $0.17 a hook; 2820/1 in Oct/Nov 1975 - $0.12 a hook; 2820/4 in Oct/Nov 1975 - $0.11 a hook; 3019/3 in April 1976 - $0.11 a hook; and 2820/1 in April 1976 - $0.09 a hook (Figure 1).

Bait costs per hook were $0.02, the hook rig excluding the rope, floats and anchors cost approximately $0.50 a hook and the rope, anchors and floats added another $0.50 a hook approximately. Thus considering bait costs alone $0.02 a hook many sets were not economic propositions especially as each set usually involved the loss of one or two hook rigs and damage of some hooks so that they had to be replaced. This added usually another $0.03 to the cost of setting the line making it about $0.05 a hook in terms of outlay excluding cost fuel and labour. Some sets, however, were better than $0.09 a hook and as good as $0.59 a hook and thus had some commercial interest. A commercial operation today would involve setting about 1 000 hooks and would be likely to have greater success

because of the area covered, better selection of the area of the set-which was not possible in this investigation, and greater efficiency of operation compared to a research exercise as conducted in this study.

Whitley (1943) reported on the long line fishery at Bunbury and provided some results (Table 2) which can be compared with those obtained in this study (Table 3). The long lines (set lines) used were 1.6 km in length and contained 180-200 hooks about 2 metres apart. Hooks were attached to 1.9 cm diameter sisal rope via a 30 cm snood and 46 cm wire trace. A drum buoy was attached to each end of the line and iron bar weights and wooden floats attached to keep it fishing mid water and allowing it to reach the bottom in places. Hooks were baited with whole yelloweye mullet or Perth herring. Overall the set lines described by Whitley (1943) were similar in construction to the ones used in this study. If the assumption can be made that the bait used, i.e. whole fish or octopus/whole fish, did not influence the catch rate or species composition then catches made in 1943 can be compared with those made during this study in the same area i.e. block 2820/2 and 2820/4 (Table 3).

Octopus today is generally accepted as the best bait for set lines because of its acceptability to prey species and its capacity to remain on the hook. However, during the present study, when octopus bait was running low and for two sets for comparative purposes, whole fish were used as bait with no apparent effect on catch rate or species composition.

An overall better catch rate of 1 fish per 17 hooks was obtained during this study than obtained in 1943 i.e. 1 per 52 hooks (Table 3). More Port Jackson sharks, southern fiddler sharks, and eagle rays were obtained than in 1943, catch rates for these species being under 1 fish per hundred hooks (Table 3). In 1943 more gummy sharks were caught (1 fish per 92 hooks) than in this study (1 fish per 990 hooks). These differences were of statistical significance at the 5% level when tested with a chi square test. This result suggests that since 1943 there has been a change in the fish species which occupy the bottom feeding niche in the Bunbury marine area from gummy sharks to Port Jackson sharks, southern fiddler sharks and eagle rays. All these fishes have teeth well adapted for crushing molluscs and crustaceans on which they feed. It is likely that past commercial fishing activities in the Bunbury area directed at gummy sharks, which are of good commercial value, severely reduced the numbers of this species so allowing the non commercial Port Jackson sharks, southern fiddler

sharks and eagle rays to build up in numbers so that they are today the dominant bottom feeding carnivorous animals of the area. As these species have no commercial value there has been no reduction in their numbers by fishing activities to date.

The failure to catch grey nurse and tiger sharks during this study was probably also due to past fishing activities reducing the numbers of these species which were probably never very abundant.

B. TRAPPING

48 different marine species composed of 44 fish species, squid, octopus, cuttle fish and starfish, were caught in the Geographe Bay/Bunbury marine area with fish traps (Table 4).

A total of 1157 marine animals were caught for 147 trap hauls at a rate of 7.9 fish per trap. The most common fishes caught were (total number in brackets):- slender bullseye *Parapriacanthus elongatus* (337); roach *Parequula melbournensis* (188); rough leatherjacket *Scobinichthys granulatus* (174); common bullseye *Pempheris multiradiata* (144); toothbrush leatherjacket *Penicipelta vittiger* (72); skippy *Caranx georgianus* (45); moonlighter *Vinculum sexfasciatum* (21); silver whiting *Sillago bassensis* (20); and six spined leatherjacket *Meuschenia freycineti* (18). Of these fish species only adult leatherjacket, skippy*, silver whiting and moonlighter are of commercial value. Adults of these species were only trapped occasionally. No trap haul yielded a catch of commercial value. However, traps demonstrated the presence of fish in the area, particularly juveniles, the adults of some of which are of commercial value.

C. SET NETTING

37 fish species were caught in the Geographe Bay/Bunbury marine area with set nets of mesh size 54 cm - 178 cm set at depths of 0 - 5 metres (Table 5).

The total of 371 fish were caught in 19 settings. The most common fish caught by this method were (total number in brackets):- Australian herring *Arripis georgianus* (140); sea trumpeter *Pelsartia humeralus* (62); rough leatherjacket *Scobinichthys granulatus* (29); tailor *Pomatomus saltator* (20); toothbrush leatherjacket *Penicipelta vittiger* (15); Port Jackson shark *Heterodontus portusjacksoni* (12); slender flying fish *Cypselurus exsiliens* (11);

* Skippy = skipjack = trevally.

and skippy *Caranx georgianus* (10). Of these species only Australian herring, tailor, skippy (all pelagic fishes) and adult leatherjackets are of commercial value.

As the nets set in this study were of a variety of mesh sizes, the catches made (Table 5) can only indicate the presence of species in the area, for adults of some species will only mesh in nets of a certain mesh size. A commercial operation would involve the setting of nets of suitable mesh size for adults of the intended species and thus would have a much greater success than in this study. However, catches made of Australian herring may represent a presence of this species in commercial quantities at the time. The same may possibly also be said for catches of skippy and tailor.

D. HAND LINING

The following species were caught on hand lines of a variety of breaking strains and with a variety of hook sizes on or slightly above the bottom in the Geographe Bay/Bunbury marine area :- southern sea garfish *Hyporhampus melanochir;* blue devil *Paraplesiops meleagris;* skippy *Caranx georgianus;* yellowtail scad *Trachurus mccullochi;* Australian herring *Arripis georgianus;* roach *Parequula melbournensis;* red mullet *Upeneichthys lineatus;* pike *Australuzza novaehollandiae;* striped sea pike *Sphyraena obtusata;* parrot fish *Pseudolabrus parilus;* Maori *Ophthalmolepsis lineolatus;* oriental bonito *Sarda orientalis;* blue mackerel *Scomber australasicus* and squid *Sepioteuthis sp.*

All species except for red mullet and blue devil have a market acceptance. Catches indicated presence of these species in the area not commercial abundance. During this survey, on the three occasions when blue mackerel and on one occasion when yellowtail scad were caught, large quantities of these species were observed on the surface in the area. Quantities of blue mackerel were estimated to be in excess of half a tonne and yellowtail scad in excess of many tonnes and of commercial potential.

E. TROLLING

Oriental bonito *Sarda orientalis* were caught on trolling lines throughout the area during the three cruises of this study. On several occasions schools were observed on the surface in block 2820 (Figure 1) up to 10 miles out to sea from Bunbury. In November 1975 in this area in excess of 40 bonito were trolled in 45 minutes. This was a catch of good commercial value (about $100). This species was assessed as having good commercial importance in the area and hardly being exploited at present.

Two juvenile southern blue fin tuna *Thunnus maccoyii* (1+ fish) were caught on troll lines in block 2820/4 (Figure 1) out from Bunbury in November 1977.

F. BEACH SEINING

Table 6 shows beach seine catches made for three locations within Geographe Bay on six different occasions during the survey. Catches were taken with small mesh beach seines with and without berley to attract fish species as part of a research investigation into juvenile fish species present in the area. The most abundant fish species caught were (total number in brackets):- elongate hardyhead (12 645); marine hardyhead (4 347); yelloweye mullet (825); yellow-finned whiting (548); blue sprat (464); King George V whiting (367); Australian herring (167); northern gobbleguts (150); and prickly toad fish (135). Of these species mullet, whiting, sprat and herring have commercial value.

In addition a professional fisherman who beach seined in the marine area out from Bunbury in block 2820/2 and 2820/4 retained one fish of each species caught in his nets for this study. These species were:- rusky catshark *Parascyllium ferrugineum;* Woodward's reef eel *Gymnothorax woodwardi;* large scaled grinner *Saurida undosquamis;* beaked salmon *Gonorhynchus greyi;* marine hardyhead *Pranesus ogilbyi;* sand flathead *Platycephalus longispinis;* rock flathead *Platycephalus laevigatus;* striped trumpeter *Helotes sexlineatus;* sea trumpeter *Pelsartia humeralis;* silver whiting *Sillago bassensis;* trumpeter whiting *Sillago maculata;* King George V whiting *Sillago punctata;* yellow finned whiting *Sillago schomburgkii;* skippy *Caranx georgianus;* Australian herring *Arripis georgianus;* roach *Parequula melbournensis;* tarwhine *Rhabdosargus sarba;* mulloway *Argyrosomus hololepidotus;* small toothed flounder *Pseudorhombus jenynsii;* and elongate flounder *Ammotretis elongatus.* Of these species only the flathead, whiting, skippy, Australian herring, tarwhine, mulloway and flounder have a commercial importance.

G. RING NETTING

The following species were collected by professional fishermen during routine fishing operations in Geographe Bay:- Woodward's reef eel *Gymnothorax woodwardi;* serpent eel *Ophisurus serpens;* pilchard *Sardinops neopilchardus;* blue sprat *Spratelloides robustus;* beaked salmon *Gonorhynchus greyi;* southern sea garfish *Hyporthamphus melanochir;* marine hardyhead *Pranesus ogilbyi;* Swan River hardyhead *Atherinosoma presbyteroides;* elongate hardyhead *Atherinosoma elongatus;* short snouted seahorse *Hippocampus breviceps;* spotted pipefish

Stigmatophora argus; Port Phillip pipefish *Syngathus phillipi;* little scorpion fish *Gymnapistes marmoratus;* red gurnard *Chelidonichthys kumu;* tassel snouted flathead *Thysanophrys cirronasus;* black-banded sea perch *Hypoplectrodes nigrorbrum;* spotted sea perch *Ellerkeldia sp.;* blue devil *Paraplesiops meleagris;* striped trumpeter *Helotes sexlineatus;* northern gobbleguts *Apogon rueppelli;* an undescribed whiting species *Sillago sp.;* skippy *Caranx georgianus;* yellowtail scad *Trachurus mccullochi;* Australian herring *Arripis georgianus;* silver belly *Gerres subfasciatus;* roach *Parequula melbournensis;* Woodward's pemfret *Schuettea woodwardi;* rough bullseye *Pempheris klunzingeri;* common bullseye *Pempheris multiradiata;* buffalo bream *Kyphosus sydneyanus;* footballer *Neatypus obliquus;* banded sweep *Scorpis georgianus;* yelloweye mullet *Aldrichetta forsteri;* sea mullet *Mugil cephalus;* black-spotted parrot fish *Austrolabrus maculatus;* King wrasse *Coris auricularis;* a wrasse species *Halichoeres brownfieldi;* rainbow fish *Heteroscarus acroptilus;* stargazer *Kathetostoma laeve;* elongate flounder *Ammotretis elongatus;* southern tongue sole *Cynoglossus broadhursti;* bridled leatherjacket *Acanthaluteres spilomelanurus;* pigmy leatherjacket *Brachaluteres jacksonianus;* six-spined leatherjacket *Meuschenia freycineti;* toothbrush leatherjacket *Penicipelta vittiger;* rough leatherjacket *Scobinichthys granulatus;* ringed toadfish *Arothron armilla.*

Of the 47 species caught by this method only pilchard, blue sprat, southern sea garfish, tassel snouted flathead, skippy, yellowtail scad, Australian herring, yelloweye and sea mullet, elongate flounder and the larger leatherjacket species have a commercial value.

H. TRAWLING

The following species were caught during this study in the Bunbury marine area (6 miles from Bunbury groyne, 5.2 miles from shore) and Geographe Bay (1 mile N.E. of Gannet rock, 25 metres) using flat trawls and try nets :- Port Jackson shark *Heterodontus portusjacksoni;* common stingaree *Urolophus testaceus;* sandy sprat *Hyperlophus vittatus;* blue sprat *Spratelloides robustus;* beaked salmon *Gonorhynchus greyi;* cobbler *Cnidoglanis macrocephalus;* southern rock cod *Physiculus barbatus;* marine hardyhead *Pranesus ogilbyi;* roughy *Trachichthys australis;* knight fish *Cleidopus gloriamus;* veilfin *Metavelifer multiradiatus;* spotted pipefish *Stigmatophora argus;* Port Phillip pipefish *Syngathus phillipi;* ocean perch *Helicolenus papillosus;* gurnard perch *Neosebastes pandus;* little scorpion fish *Neosebastes scabriceps;* red rock cod *Scorpaena sumptuosa;* butterfly gurnard *Paratrigla vanessa;* sea moth *Acanthopegasus lancifer;*

sand flathead *Platycephalus longispinis;* rock flathead *Platycephalus laevigatus;* northern gobbleguts *Apogon rueppellii;* silver whiting *Sillago bassensis;* skippy *Caranx georgianus;* yellowtail scad *Trachurus mccullochi;* roach *Parequula melbournensis;* red mullet *Upeneichthys lineatus;* common bullseye *Pempheris multiradiata;* slender bullseye *Parapriacanthus elongatus;* rough bullseye *Pempheris klunzingeri;* dusky morwong *Dactylophora nigricans;* wrasse *Eupetrichthys angustipes;* wrasse *Halichoeres brownfieldi;* parrot fish *Pseudolabrus bostockii;* brown-spotted parrot fish *Pseudolabrus parilus;* blue rock whiting *Neoodax semifasciatus;* tubemouth *Siphonognathus argyrophanes;* rainbow fish *Heteroscarus acroptilus;* black-throated threefin *Helcogramma decurrens;* spotted stinkfish *Callionymus calcaratus;* stinkfish *Callionymus grossi;* elongate flounder *Ammotretis elongatus;* southern tongue sole *Cynoglossus broadhursti;* pigmy leatherjacket *Brachaluteres jacksonianus;* deep bodied leatherjacket *Eubalichthys mosaicus;* toothbrush leatherjacket *Penicipelta vittiger;* rough leatherjacket *Scobinichthys granulatus;* smooth boxfish *Anoplocapros lenticularis;* robust boxfish *Strophiurichthys robustus;* boxfish *Strophiurichthys inermis;* Shaw's cowfish *Aracana aurita;* globefish *Diodon nicthemerus;* ringed toadfish *Arothron armilla.*

Of the 53 species collected in trawl nets only the following 16 species have commercial value:- blue sprat, sandy sprat, cobbler, southern rock cod, ocean perch, gurnard perch, butterfly gurnard, sand and rock flathead, silver whiting, skippy, yellowtail scad, brown-spotted parrot fish, elongate flounder, toothbrush and rough leatherjacket. During the course of this study no shots were made which were judged as having commercial value. In general the roughness of the bottom influenced trawling operations and caused considerable net damage. To date bottom roughness has acted as a deterrent to commercial trawling operations in the Bunbury/ Geographe Bay area.

I. LIGHT ATTRACTION AT NIGHT

Light attraction at night with the aid of a whale oil and pollard berley, hand lines and long handled scoop nets yielded the following marine species:- red mullet (juveniles) *Upeneichthys lineatus;* veilfin (juveniles) *Metavelifer multiradiatus;* butterfly gurnard (juvenile) *Paratrigla vanessa;* marine hardyhead (juveniles) *Pranesus ogilbyi;* elongate hardyhead (juveniles) *Atherinosoma elongatus;* beaked salmon (juveniles) *Gonorhynchus greyi;* sandy sprat (juveniles and larvae) *Hyperlophus vittatus;* blue sprat (juveniles and larvae) *Spratelloides robustus;* Australian herring (juveniles) *Arripis georgianus;* yellowtail scad (juveniles) *Trachurus mccullochi;* skippy (adults and juveniles) *Caranx georgianus;* blue mackerel (juveniles) *Scomber australasicus;* southern sea garfish *Hyporhamphus melanochir;* and squid *Sepioteuthis sp.*

Sandy sprat, blue sprat, yellowtail scad, blue mackerel, Australian herring, southern sea garfish, skippy and squid have commercial value. Larval blue and sandy sprat were abundant in April 1976 and juvenile skippy, and southern sea garfish were present in November. Juvenile Australian herring were light attracted to the surface in September and November. An extremely large school of yellowtail scad, estimated to be in the order of many tonnes, and of commercial value was attracted to the surface in April 1976. This school appeared to be composed of half grown adults. Three schools of small blue mackerel were attracted to the surface during the surveys of April and November 1976. Schools were estimated to be in the order of 1 tonne and of commercial value.

Squid were attracted to the surface whenever lights were turned on at night and berley used. As soon as a quantity of small fish began to feed on the berley squid appeared. They could be caught on squid lures baited with whole fish and occasionally on jigs. On one occasion, in a two hour fishing session, 56 squid weighing up to 1 kg were caught. Squid have an increasing market value and there would appear to be a good potential for a commercial operation fishing for them throughout the entire area, especially over weed beds. The species of squid encountered did not appear to take a squid jig as readily as other squid species and it would seem that an alternative method of catching them to jigging may be necessary e.g. mid water trawling.

III AN INVENTORY OF THE FISH RESOURCE

1. INTRODUCTION

During the investigation it became evident that a check-list of the fishes collected from Geographe Bay and the Bunbury marine area, in the course of this study, would be of value in assessment and documentation of the resource. It was decided that such a checklist would have added value to other workers if it included museum records of fish collected from the area in the past, and if some comment was made on each species as to its distribution, preferred habitat, social behaviour, food habits and status in terms of importance to man. This added information changed the checklist into an inventory of the fishes of the area especially when coupled with biological information concerning species, collected in fishing operations connected with this study.

2. SUMMARY OF SOME ASPECTS OF THE BIOLOGY OF GEOGRAPHE BAY/BUNBURY MARINE FISHES

All fishes caught during the three survey cruises of October/November 1975 and April and November 1976, were biologically sampled to determine length, weight, sex and breeding state, and food habits. This information according to species is summarized in Table 7.

In terms of length and weight, individuals representative of all size classes from juveniles to adults were encountered of the following species (Table 7):- Port Jackson shark; southern fiddler shark; common stingaree; sandy sprat; blue sprat; beaked salmon; southern sea garfish; marine hardyhead; spotted pipefish; little scorpion fish; butterfly gurnard; sand flathead; long-headed flathead; rock flathead; blue devil; striped trumpeter; silver whiting; skippy; yellowtail scad; Australian herring; roach; red mullet; slender bullseye; rough bullseye; buffalo bream; yelloweye mullet; wrasse *(Halichoeres brownfieldi)*; brown-spotted parrot fish; long-rayed rock whiting; rainbow fish; spotted stinkfish; oriental bonito; blue mackerel; small toothed flounder; mosaic leatherjacket; deep bodied leatherjacket; gales leatherjacket; toothbrush leatherjacket; rough leather-jacket; Shaw's cowfish;boxfish *(Strophiurichthys inermis)*; and ringed toadfish. This would appear to indicate that these fish species spend their entire life cycle in the area. Some of these species which are migratory e.g. Australian herring, yelloweye mullet, oriental bonito, etc. may migrate out of or into the area from other areas. However, the presence of individuals of these species of all sizes indicates that all life cycle stages are present in the area at some stage and hence the area studied is equally as important to them as it is to a demersal (resident, non migratory) species.

Juvenile specimens were collected of the following species:- angel shark; southern rock cod; King George V whiting; tailor; yellowtail kingfish; tarwhine; mulloway; star-gazer *(Kathetostoma laeve)*; three fin; southern blue fin tuna; elongate flounder; and globe fish. Adults of these species, except for angel shark and southern blue fin tuna do occur in the area and thus potentially could spend their entire life cycle within the Geographe Bay/ Bunbury marine area. Adults of southern bluefin tuna and angel shark are to be found offshore and the area could be said to act as a nursery for these species. Indeed considering all the species mentioned above, the importance of the entire area as a nursery for most of these species cannot be overlooked. Species given in Table 7 and not mentioned above were only encountered as adults. In most cases collection methods, time of year,

etc. precluded the catching of juveniles of these species. However, it is possible with some of these species e.g. giant herring, large scaled grinner (both of which are usually tropical in distribution) and sea mullet that their juveniles are located in other areas and other habitats not offered in this area e.g. estuaries, tropical waters etc.

The presence of the juveniles mentioned usually indicated that a species was using the area in which to breed. It is not possible to be certain of this, as juveniles or larvae may migrate into the area from another area, in which they were spawned. However, where fish in advanced breeding condition i.e. gravid or almost gravid with eggs or newly hatched larvae were found, it is possible to be more certain that the species concerned uses the Geographe Bay/Bunbury marine area in which to breed. Species encountered in a near gravid condition were (date sampled in brackets):- cobbler carpet shark (16.11.75); gummy shark (8.4.76); southern fiddler shark (1.11.75); common stingaree (3.11.75); slender long tom (16.11.76); skippy (29.10.75); snapper (15.11.76); and oriental bonito (6.11.75) and in a gravid condition (with very ripe eggs) were slender long tom (16.11.76) and slender flying fish (19.11.76).

3. CHECKLIST OF FISHES OF THE GEOGRAPHE BAY/BUNBURY MARINE AREA WITH COMMENTS ON THEIR ECOLOGICAL STATUS

All species collected by the various fishing methods employed during this study, plus records of species not encountered but recorded in the fish register of the Western Australian Museum were arranged into a checklist (Table 8). Fishes were grouped into their appropriate families on the basis of the classification of Scott, Glover and Southcott (1974) for elasmobranchs and Greenwood, Rosen, Weitzman and Meyers (1966) for teleosts. Fishes were classified according to distribution, preferred habitat, schooling behaviour, food habits and use to man (Table 8).

247 fish species were collected by the various fishing methods or recorded in museum records for Geographe Bay/ Bunbury marine area. 237 species were considered as being usually temperate in distribution, 27 tropical (thus rare occurrences in the area) and 17 species both temperate and tropical.

52 species were considered to be pelagic, with 26 of these being migratory and 24 occurring within surface

waters. Of the demersal species:- 101 were considered to occur over sand and mud; 202 over weed and 125 over rock and reef. Within this category some fishes were assigned to two or even three habitats if they were considered to utilize more than one such habitat. This was likewise the case with depth preferences:- 220 fishes were considered to occur inshore i.e. less than 15m depth; 195 offshore i.e. 15-100m; and 46 in deeper waters greater than 100m. 9 of these deeper water species only occur generally over or in water greater than 100 metres and, as this depth does not occur within the Bunbury/Geographe Bay marine area studied, were regarded as rare occurrences in the area.

In terms of social behaviour 188 fish species were considered to be usually solitary in the marine habitat, although they may school in estuaries e.g. tarwhine, and for spawning and 59 species were considered to be schooling fishes.

Fishes were assigned to one of 6 feeding categories on the basis of what their most common food preference might be. In some cases food habits of a particular species may also include other categories e.g. parrot fish may feed on crustaceans, molluscs and small fishes and thus could be considered to be omnivorous and a lower carnivore. It was considered that it was better to assign a fish to one category only, in this case omnivorous.

8 fishes were considered to be herbivorous (plant eaters) in food habits; 20 species planktivorous (eating plankton); 1 species illophagic (eating detritus); 93 species omnivorous (eating molluscs and crustaceans); 101 species to be lower carnivores (eating smaller fishes); and 24 species to be higher carnivores (eating larger fishes).

98 fish species were considered usually to have interest to the angler and 87 species to the professional. 70 species were considered to have commercial interest in other States as well as in W.A.

The fish fauna of Geographe Bay/Bunbury marine area was regarded to be composed of around 211 fish species. The 27 tropical and 9 oceanic species were deducted from the 247 recorded species for the area, as they were regarded as rare occurrences and not regular components of the fauna of the area.

Three first recordings of fishes for W.A. waters were obtained during this study:- a spotted stingaree *Urolophus*

gigas Scott, 1954. (Bunbury area, trawl, Nov. 1975); a butterfly gurnard *Paratrigla vanessa* (Richardson) 1839. (Eagle Bay, trawl, Feb. 1976); and a sea moth *Acanthopegasus lancifer* (Kaup) 1861. (Castle Rock, trawl, Feb. 1975). Prior to the capture of these three species the farthest west in Australian waters they had been recorded was South Australia.

IV SUMMARY AND CONCLUSIONS

Fishing techniques used during this study revealed the importance of the Geographe Bay/Bunbury marine area as a habitat for juvenile commercial and non commercial fishes and the presence of commercial species such as:- bronze whaler, whiskery and gummy sharks, Westralian jewfish, Australian herring, skippy, flathead, oriental bonito, blue and sandy sprat, pilchard, mulloway, whiting, flounder, yellowtail scad, leatherjacket and squid. On the basis of quantities seen squid, oriental bonito, blue mackerel and yellowtail scad were assessed as having potential for further exploitation in the area, other species were considered to be almost or fully exploited at present.

Commercial species commonly encountered as juveniles were:- skippy, yellowtail scad, tailor, southern sea garfish, pilchard, blue and sandy sprat, whiting, mullet and flathead. Representative size classes from juveniles to adults were encountered for numerous species indicating that these species spend their entire life cycle in the Geographe Bay/Bunbury marine area. This and the presence of juveniles as discussed suggest that these species spawn in the area. In addition some species were encountered in breeding condition :- cobbler carpet shark, gummy shark, southern fiddler shark, common stingaree, slender long tom, skippy, snapper, oriental bonito and slender flying fish.

Set lines yielded 456 marine animals for 6 300 hooks set, a rate of one animal per 14 hooks. The most common fishes caught were the non commercial eagle ray, Port Jackson shark and southern fiddler shark. Commercial species encountered were :- bronze whaler, gummy shark, whiskery shark, Westralian jewfish, snapper and others. Catch values per hook set varied from zero to $0.59, the higher catch values of which may have been of commercial interest. Catch rates were better than similar operations for the same area conducted in the past, as reported by Whitley (1943). The species composition of such catches were, however, different. Possible reasons for this have been previously discussed.

Fish traps caught small numbers of mainly juvenile fishes including some species which were of commercial interest in the area (commercial species) e.g. skippy, whiting and larger leatherjacket species.

Fish nets indicated the presence of commercial species of Australian herring, skippy and tailor and hand lining of skippy, pike, parrot fish, oriental bonito, and squid. Hand lining also showed on occasions the presence of large quantities of blue mackerel and yellowtail scad in the area. Trolling showed oriental bonito to be present throughout the area in reasonable numbers at all times and that juvenile southern bluefin tuna (1+ fish) were present in the area in November.

Beach seining, ring netting and trawling operations yielded juveniles of many species including the commercial species:- pilchard, blue and sandy sprat, flathead, whiting, Australian herring, mulloway, flounder, southern sea garfish, yellowtail scad, tailor, mullet and leatherjacket.

Light attraction at night yielded many larval and juvenile fishes, in particular the commercial species:- skippy, yellowtail scad, blue and sandy sprat, and southern sea garfish. Good catches, which on occasions may have been of commercial value,of squid, blue mackerel and yellowtail scad were made by this technique.

247 fish species were recorded for Geographe Bay and the Bunbury marine area including three new records for W.A. 237 species were considered as being temperate in distribution, 26 tropical (and thus rare in temperate waters) and 17 species both temperate and tropical. 51 species were considered to be pelagic with 26 of these being migratory and 23 occurring within surface waters. The remaining 196 species were regarded as demersal and occurring over sand and mud (101), weed (202) or rock and reef (125). 220 fishes were considered to occur within inshore waters 0-15m, 195 in waters 15-100m, and 46 in waters deeper than 100 metres. 9 of these deeper water species were regarded as oceanic and very rare occurrences within the area.

If tropical and oceanic species are considered to be rarities and not regular occurrences within the area, the fish fauna of Geographe Bay/Bunbury marine area can be regarded as composed of around 211 fish species.

98 of these species were considered to be of angler interest, and 87 to be of professional interest within Western Australia.

In terms of food habits 8 fish were considered to be herbivorous, 20 species planktivorous, 1 species iliophagic, 93 species omnivorous, 101 species lower carnivores and 24 species higher carnivores. Fishes were assigned to one category only on the basis of what was thought to be their most common food source.

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TABLE 1: SET LINE CATCH RESULTS IN TERMS OF LOCATION AND CRUISE DATE

BLOCK		2720/2	2720/4			2820/1			2820/2		
DATE		April 1976	Oct/Nov 1975	April 1976	Nov 1976	Oct/Nov 1975	April 1976	Nov 1976	Oct/Nov 1975	April 1976	Nov 1976
Number of hooks set		180	90	540	360	180	540	360	360	180	540
Scientific name	Family										
Heterodontus portusjacksoni	Heterodontidae	3		19	9	2	1		16		3
Orectolobus ornatus	Orectolobidae										1
Orectolobus ornatus halei							1				
Sutorectus tentaculatus											
Parascyllium variolatum											
Halaelurus analis	Scyliorhinidae										
Furgaleus ventralis	Triakidae		2		1	1	1				
Mustelus antarcticus				2		2					
Carcharhinus obscurus	Carcharhinidae				2				3		
Sphyrna lewini	Sphyrnidae		1								
Aptychotrema vincentiana	Rhinobatidae								3		
Trygonorhina fasciata			2	3	2	6	3	1	9	2	2
Dasyatis brevicaudata	Dasyatidae	1		1	3		4	2		1	
Dasyatis thetides							1				
Urolophus testaceus	Urolophidae										
Myliobatis australis	Myliobatidae		1	30	9	1	4	5	6	1	8
Cnidoglanis macrocephalus	Plotosidae						1				
Neosebastes pandus	Scorpaenidae										
Glaucosoma hebraicum	Glaucosomidae	3						2			
Chrysophrys unicolor	Sparidae					1		3			
Scorpis georgianus	Scorpididae		1						1		
Vinculum sexfasciatum											
Others (Squid							1				
Others (Starfish				1	5		2			2	1
Total		7	7	56	31	13	19	13	38	6	15
Catch rate (1 fish per x hooks)		26	13	10	12	14	28	28	10	23	36
Catch value		$72	$23	$5	$9	$21	$46	$80	$9	$0	$8
Catch value per hook		$0.40	$0.26	$0.01	$0.03	$0.12	$0.09	$0.22	$0.03	$0	$0.02

TABLE 1 (continued)

	2820/3			2820/4			2920/1			3019/2	3019/3
	Oct/Nov 1975	April 1976	Nov 1976	Oct/Nov 1975	April 1976	Nov 1976	Oct/Nov 1975	April 1976	Nov 1976	April 1976	April 1976
Number of hooks set	90	180	180	360	180	360	180	540	540	180	180
Scientific name											
Heterodontus portusjacksoni	1	5	1	8		1	10	9	11	11	3
Orectolobus ornatus								1			
Orectolobus ornatus halei								1			
Sutorectus tentaculatus				1							
Parascyllium variolatum							1				
Halaelurus analis			1								
Furgaleus ventralis			1	1		1	5				
Mustelus antarcticus				2				8		3	
Carcharhinus obscurus		3	1	5			1	4	1	2	
Sphyrna lewini				1							
Aptychotrema vincentiana					2						
Trygonorhina fasciata	1	1	1	7	7	2	1	13	6		9
Dasyatis brevicaudata								15			4
Dasyatis thetides				1							
Urolophus testaceus							2				
Myliobatis australis	4	5		8	6	3		9	2	1	18
Cnidoglanis macrocephalus		1		1							
Neosebastes pandus							1				
Glaucosoma hebraicum		3						1	3		
Chrysophrys unicolor							1			3	
Scorpis georgianus											
Vinculum sexfasciatum		1					1				
Others (Squid											
(Starfish			1				1	1			
Total	6	19	6	35	15	7	24	62	23	20	34
Catch rate (1 fish per x hooks)	15	10	30	10	12	51	8	9	24	9	5
Catch value	$0	$107	$9	$40	$0	$5	$30	$72	$96	$37	$0
Catch value per hook	$0	$0.59	$0.05	$0.11	$0	$0.01	$0.17	$0.13	$0.18	$0.21	$0

TABLE 1 (continued)

	TOTAL ALL BLOCKS				
	Oct/Nov 1975	April 1976	Nov 1976	Total Catch	Catch Rate
Number of hooks set	1260	2700	2340	6300	
Scientific name					
Heterodontus portusjacksoni	37	51	25	113	56
Orectolobus ornatus		1	1	2	
Orectolobus ornatus halei		2		2	
Sutorectus tentaculatus	1			1	
Parascyllium variolatum	1			1	
Halaelurus analis			1	1	
Furgaleus ventralis	9	1	3	13	485
Mustelus antarcticus	4	13		17	371
Carcharhinus obscurus	9	9	4	22	286
Sphyrna lewini	2			2	
Aptychotrema vincentiana	3	2		5	
Trygonorhina fasciata	26	38	14	78	81
Dasyatis brevicaudata		26	5	31	203
Dasyatis thetides	1	1		2	
Urolophus testaceus	2			2	
Myliobatis australis	20	74	27	121	52
Cnidoglanis macrocephalus	1	2		3	
Neosebastes pandus	1			1	
Glaucosoma hebraicum		7	5	12	525
Chrysophrys unicolor	3	3	3	9	700
Scorpis georgianus	1			1	
Vinculum sexfasciatum	1	1		2	
Others (Squid		1		1	
Others (Starfish	1	6	7	14	450
Total	123	238	95	456	14
Catch rate (1 fish per x hooks)	10	11	25	14	
Catch value	$123	$339	$207	$669	
Catch value per hook	$0.10	$0.13	$0.09	$0.11	

TABLE 2: SET LINE CATCHES BUNBURY MARINE AREA 1943 AFTER WHITLEY (1943)

Date	Location (Bunbury Area)	No. of Hooks Set	Catch							
			Port Jackson shark	Grey nurse shark	Whiskery	Gummy	Bronze-whaler shark	Tiger shark	Stingray	Total Fish
03.06.43	4m N breakwater	180	2	1		4		1	2	10
15.07.43	near breakwater	90								0
16.07.43	near breakwater	90								0
17.07.43	3-4m west	180			1	3	1			5
18.07.43	3-4m west	180				6	2			8
19.07.43	3-4m west	180				2				2
19.07.43	2m NE	140							1	1
20.07.43	8m north	180		1		1				2
20.07.43	2m west	140								0
20.07.43	2m west	200	1			1				2
	TOTAL:	1 560	3	2	1	17	3	1	3	30

TABLE 3: COMPARISON OF SET LINE CATCHES BETWEEN 1943 AND 1975/76 FOR THE BUNBURY MARINE AREA

Date	1943		1975/76	
Number of Hooks Set	1560		1980	
	June/July 1943	Catch Rate 1 fish per X hooks	Total	Catch rate 1 fish per X hooks
CATCH				
Port Jackson shark	3	520	28	71
Grey nurse	2	880		
Wobbegong (3 spp)			2	990
Whiskery	1	1 560	2	990
Gummy	17	92	2	990
Bronze whaler	3	520	8	248
Tiger shark	1	1 560		
Hammer head shark			1	1 980
Shovel nose ray			5	396
Southern fiddler shark			29	68
Black stingray (2 spp)	3	520	2	990
Eagle ray			32	62
Other marine species			5	396
TOTAL	30	52	116	17

TABLE 4: GEOGRAPHE BAY/BUNBURY MARINE AREA FISH TRAP CATCHES

		2720/2	2720/4			2820/1			2820/2		
		April 1976	Oct/Nov 1975	April 1976	Nov 1976	Oct/Nov 1975	April 1976	Nov 1976	Oct/Nov 1975	April 1976	Nov 1976
Number of traps set		3	4	12	8	12	9	12	4	3	12
Scientific name	Family										
Trachichthys australis	Trachichthyidae										1
Pelsartia humeralis	Theraponidae							1			
Apogon rueppellii	Apogonidae										
Sillago bassensis	Sillaginidae								2		
Caranx georgianus	Carangidae		3					11			2
Trachurus mccullochi								1			
Gerres subfasciatus	Gerridae										
Parequula melbournensis		2				5	12	43	21	35	
Upeneichthys lineatus	Mullidae			1		1	2	3			
Schuettea woodwardi	Monodactylidae			8							
Parapriacanthus elongatus	Pempheridae			1	16			3			121
Pempheris klunzingeri											
Pempheris multiradiata				21		73	48				
Neatypus obliquus	Scorpididae										
Scorpis georgianus						2					
Vinculum sexfasciatum		1	1	7			6				
Enoplosus armatus	Enoplosidae						2				
Sphyraena obtusata	Sphyraenidae										
Austrolabrus maculatus	Labridae										1
Ophthalmolepis lineolatus											2
Pseudolabrus parilus				1			3				
Scomber australasicus	Scombridae							1			
Meuschenia freycineti	Monacanthidae					2	1	3			3
Penicipelta vittiger		1			10	2	1	12	1	2	9
Scobinichthys granulatus		7	1	9	20	8	2	9	3	7	8
Other leatherjackets						3					3
Aracana aurita	Ostraciontidae							1	2		2
Other boxfish								1	1		
Contusus richei	Tetraodontidae										1
Others (Squid			1	1			1				
(Octopus				2				1			
(Cuttlefish			1	2					1		
(Starfish											
Total catch		11	7	53	46	96	78	100	31	44	153
Catch rate (fish per trap)		3.7	1.8	4.4	5.8	8.0	8.7	8.3	7.8	14.7	12.8

TABLE 4 (continued)

	2820/3			2820/4			2920/1			3019/2	3019/3		
	Oct/Nov 1975	April 1976	Nov 1976	Oct/Nov 1975	April 1976	Nov 1976	Oct/Nov 1975	April 1976	Nov 1976	April 1976	April 1976	Total	Fish per trap
Number of traps set	4	3	4	15	3	12	4	9	8	3	3	147	
Scientific name													
Trachichthys australis												1	
Pelsartia humeralis												1	
Apogon rueppellii											3	3	
Sillago bassensis				4	5		9					20	0.1
Caranx georgianus					2		27					45	3.0
Trachurus mccullochi												1	
Gerres subfasciatus		1			18	1						20	0.1
Parequula melbournensis		3	7	1	11	4	21	19	2		2	188	1.3
Upeneichthys lineatus		1					1					9	
Schuettea woodwardi												8	
Parapriacanthus elongatus									196			337	2.3
Pempheris klunzingeri							3					3	
Pempheris multiradiata								2				144	1.0
Neatypus obliquus									4			4	
Scorpis georgianus												2	
Vinculum sexfasciatum	1	1	1		1		1	1				21	0.1
Enoplosus armatus												2	
Sphyraena obtusata						1						1	
Austrolabrus maculatus					1							1	
Ophthalmolepis lineolatus							1		3			5	
Pseudolabrus parilus					1							7	
Scomber australasicus												1	
Meuschenia freycineti		1	1	4	2			1	2			18	0.1
Penicipelta vittiger	1		10	7		1	1	13	1			72	0.5
Scobinichthys granulatus	2			6	8	4	4	36	8		30	174	0.5
Other leatherjackets	1			3			1	11	1			23	0.2
Aracana aurita	4				3							12	
Other boxfish		1		1								4	
Contusus richei												1	
(Squid			1		1							2	
Others (Octopus			1	3		2			1			10	
(Cuttlefish			1						1	2		7	
(Starfish				1		1					4	10	
Total catch	9	8	22	30	53	14	69	83	219	2	39	1157	7.9
Catch rate (fish per trap)	2.3	2.7	5.5	2.0	17.7	1.2	17.3	9.2	27.4	0.7	13.0		

TABLE 5: GEOGRAPHE BAY/BUNBURY MARINE AREA FISH NET CATCHES

BLOCK		2720/4			2820/1		2820/2		2820/4		
DATE		Oct/Nov 1975	April 1976	Nov 1976	Oct/Nov 1975	April 1976	Oct/Nov 1975	April 1975	Oct/Nov 1975	Jan 1976	Nov 1976
Number of times net set		2	1	1	1	1	2	1	1	2	1
Scientific name	Family										
Heterodontus portusjacksoni	Heterodontidae	9									
Orectolobus maculatus	Orectolobidae			1							
Furgaleus ventralis	Triakidae									2	
Mustelus antarcticus											
Carcharhinus obscurus	Carcharhinidae									4	
Notogaleus rhinopanes		1									
Sphyrna lewini	Sphyrnidae	2		4			1				
Aptychotrema vincentiana	Rhinobatidae							2			
Myliobatis australis	Myliobatidae									1	
Etrumeus micropus	Clupeidae			1							
Cnidoglanis macrocephalus	Plotosidae										
Cypselurus exsiliens	Exocoetidae										
Belone ciconia	Belonidae			1							
Hemiramphus robustus	Hemiramphidae										
Hyporhamphus melanochir											
Platycephalus longispinis	Platycephalidae										
Helotes sexlineatus	Theraponidae									1	
Pelsartia humeralis						2					
Apogon rueppellii	Apogonidae									1	
Pomatomus saltator	Pomatomidae	2		6		2		9			
Caranx georgianus	Carangidae			3				7		1	
Seriola hippos								1			
Trachurus mccullochi											
Arripis georgianus	Arripidae			47	1	31	1	19			
Parequula melbournensis	Gerridae										3
Chrysophrys unicolor	Sparidae										
Upeneichthys lineatus	Mullidae										
Vinculum sexfasciatum	Scorpididae									1	
Parma victoriae	Pomacentridae									3	
Dactylophora nigricans	Cheilodatylidae									2	
Nemadactylus valenciennsi										1	
Australuzza novaehollandiae	Sphyraenidae					3					
Pseudolabrus parilus	Labridae										1
Olisthops cyanomelas	Odacidae									1	
Sarda orientalis	Scombridae										
Penicipelta vittiger	Monacanthidae									1	2
Scobinichthys granulatus										1	
Others Crabs		2									
Total		16	0	63	1	38	2	38	0	20	6
Total per net		8.0	0.0	63.0	1.0	33.0	1.0	33.0	0.0	10.0	6.0

TABLE 5 (continued)

BLOCK	2920/1	2920/2		3019/3	3020/1	Total	
DATE	Nov 1975	April 1976	Nov 1976	April 1976	April 1976	Total	Catch Fish per Net
Number of times net set	1	1	1	2	1	19	
Scientific name							
Heterodontus portusjacksoni		1		2		12	0.6
Orectolobus maculatus						1	0.1
Furgaleus ventralis						2	0.1
Mustelus antarcticus				4		4	0.2
Carcharhinus obscurus	1			2		7	0.4
Notogaleus rhinopanes						1	0.1
Sphyrna lewini						7	0.4
Aptychotrema vincentiana						2	0.1
Myliobatis australis				6		7	0.4
Etrumeus micropus						1	0.1
Cnidoglanis macrocephalus				1		1	0.1
Cypselurus exsiliens	1		5	5		11	0.6
Belone ciconia						1	0.1
Hemiramphus robustus				1		1	0.1
Hyporhamphus melanochir	1					1	0.1
Platycephalus longispinis					1	1	0.1
Helotes sexlineatus						1	0.1
Pelsartia humeralis		1		59		62	3.3
Apogon rueppellii						1	0.1
Pomatomus saltator					1	20	1.1
Caranx georgianus						10	0.5
Seriola hippos						1	0.1
Trachurus mccullochi						1	0.1
Arripis georgianus	24	1	2	14		140	7.4
Parequula melbournensis					1	4	0.2
Chrysophrys unicolor					1	1	0.1
Upeneichthys lineatus					2	2	0.1
Vinculum sexfasciatum						1	0.1
Parma victoriae						3	0.2
Dactylophora nigricans				1		3	0.2
Nemadactylus valenciennsi						1	0.1
Australuzza novaehollandiae	2			3		8	0.4
Pseudolabrus parilus						1	0.1
Olisthops cyanomelas						1	0.1
Sarda orientalis			1			1	0.1
Penicipelta vittiger				12		15	0.8
Scobinichthys granulatus		19		9		29	1.5
Others Crabs	3					5	0.3
Total	32	22	8	119	6	371	
Total per net	32.0	22.0	8.0	59.5	6.0	19.5	

TABLE 6: BEACH SEINE CATCHES FOR LOCALITIES WITHIN GEOGRAPHE BAY.

Scientific Name	Family	2/3.4.76			20/21.5.76			22/23.7.76		
		Toby's	Duns.	Eagle B.	Toby's	Duns.	Eagle B.	Toby's	Duns.	Eagle B.
Aptychotrema vincentiana	Rhinobatidae		12		1	2		4		
Trygonorhina fasciata										
Urolophus testaceus	Urolophidae		1							
Spratelloides robustus	Clupeidae	20				43	166		14	
Gonorhynchus greyi	Gonorhynchidae		1							
Cnidoglanis macrocephalus	Plotosidae							3		
Hyporhamphus melanochir	Hemiramphidae		1		2	1				
Atherinosoma presbyteroides	Atherinidae	1641	150		5	4540	275	40	3516	
Pranesus ogilbyi		65	1528 7		1244	1740	54	1	24	
Gymnapistes marmoratus	Scorpaenidae							2		
Platycephalus longispinis	Platycephalidae	1	2		12			7	1	
Platycephalus haackei			1							
Amphitherapon caudavittatus	Theraponidae				1	1				
Helotes sexlineatus		86	31		7	2		1		
Crapatalus arenarius	Leptoscopidae									
Apogon rueppellii	Apogonidae	53						25		
Sillago bassensis	Sillaginidae	8	115		155	13		75	1	
Sillago punctata		22	133		3	16		5	1	
Sillago robusta			3							
Sillago schomburgkii			128		19	36		1	36	
Sillago sp.									2	
Pomatomus saltator	Pomatomidae				1					
Caranx georgianus	Carangidae	40			2			14		
Arripis georgianus	Arripidae		5		9	2				
Arripis trutta esper			1					2	3	
Parequula melbournensis	Gerridae				3			7		
Upeneichthys lineatus	Mullidae									
Schuettea woodwardi	Monodactylidae				1					
Aldrichetta forsteri	Mugilidae	2	469		21	55		85	65	22
Mugil cephalus			40					5		
Australuzza novaehollandiae	Sphyraenidae									
Pseudolobrus parilus	Labridae							1		
Neoodax radiatus	Odacidae		2					4		
Neoodax semifasciatus		1	3					1		
Callionymus goodladi	Callionymidae		1			1				
Favonigobius lateralis	Gobiidae		2						1	
Pseudorhombus jenynsii	Bothidae	1	2		1	4		2		
Ammotretis elongatus	Pleuronectidae	1	2		10	7			1	
Bigener brownii	Monacanthidae	1						1		
Brachaluteres jacksonianus		4								
Meuschenia freycineti										
Meuschenia hippocrepis										
Scobinichthys granulatus					2			7		
Aracana aurita	Ostraciontidae	1						1		
Strophiurichthys inermis										
Strophiurichthys robustus								2		
Contusus richei	Tetraodontidae	1	2			1		99	5	
Torquigener pleurogramma		1	27			3		2	2	
Diodon nicthemerus	Diodontidae	3	1							

TABLE 6 (continued)

Scientific Name	22/23.9.76 Toby's	Duns.	Eagle B.	17/18.11.76 Toby's	Duns.	Eagle B.	19/20.1.77 Toby's	Duns.	Eagle B.	Total
Aptychotrema vincentiana		1		3						23
Trygonorhina fasciata				1						1
Urolophus testaceus										1
Spratelloides robustus	3		6	109		10	91		2	464
Gonorhynchus greyi										1
Cnidoglanis macrocephalus							1			4
Hyporhamphus melanochir						52			6	62
Atherinosoma presbyteroides	159	113	244	98	130	83		107	16	12645
Pranesus ogilbyi	99	6		245	31	111	48		672	4347
Gymnapistes marmoratus										2
Platycephalus longispinis	4	3	1	2	6		2	2		43
Platycephalus haackei							1			2
Amphitherapon caudavittatus										2
Helotes sexlineatus	57			8				1		193
Crapatalus arenarius			1						1	2
Apogon rueppellii	33			3			34			150
Sillago bassensis	1	1	2	14	33		2	96	5	521
Sillago punctata	11	5		15	70		10	76		367
Sillago robusta										3
Sillago schomburgkii	35	106	4	17	79	1	2	82	2	548
Sillago sp.		1								3
Pomatomus saltator										1
Caranx georgianus						1				57
Arripis georgianus	23		1			44	1	79	3	167
Arripis trutta esper	7	15	5	1	1			1		36
Parequula melbournensis										10
Upeneichthys lineatus	2									2
Schuettea woodwardi										1
Aldrichetta forsteri	7	73			20			6		825
Mugil cephalus						1			1	47
Australuzza novaehollandiae	1									1
Pseudolobrus parilus										1
Neoodax radiatus	1									7
Neoodax semifasciatus	2									7
Callionymus goodladi										2
Favonigobius lateralis	5						2			10
Pseudorhombus jenynsii	1	6		1	7		2	6		33
Ammotretis elongatus	1			10	6		13			51
Bigener brownii										2
Brachaluteres jacksonianus										4
Meuschenia freycineti				1						1
Meuschenia hippocrepis	1									1
Scobinichthys granulatus										9
Aracana aurita	1						1			4
Strophiurichthys inermis	1									1
Strophiurichthys robustus				2						4
Contusus richei	2	5		3	8	1		8		135
Torquigener pleurogramma			1		1		1	3	1	42
Diodon nicthemerus	1									5

TABLE 7: SUMMARY OF BIOLOGICAL INFORMATION COLLECTED FROM FISHES CAPTURED DURING THREE SURVEY CRUISES IN OCTOBER/NOVEMBER 1975 APRIL AND NOVEMBER 1976.

SCIENTIFIC NAME	COMMON NAME	No. of Obser-vations	Size Range TL cm	Mean Size TL cm	Weight Range Kg	Sex Ratio M/F	FOOD HABITS (stomach contents)	BREEDING COMMENTS
Heterodontus portusjacksoni	Port Jackson shark	129	30-108	76.5	0.2-12	18/99		-
Orectolobus maculatus	Wobbegong	5	119-213	153.4	10.5-55.3	3/2	Jewfish, herring, octopus	-
Sutorectus tentaculatus	Cobbler carpet shark	1	82	-	3.2	/1	Squid remains	Ripe 6.11.75
Parascyllium variolatum	Varied catshark	2	38.5-52	45.2	-	-	-	-
Halaelurus analis	Spotted catshark	1	62	-	-	-	-	-
Furgaleus ventralis	Whiskery shark	17	99-135	119.7	4.2-10.2	5/12	Octopus	-
Mustelus antarcticus	Gummy shark	21	56.1-141	106.4	1.6-7.0	4/15	Octopus,crabs,fish	-
Carcharchinus calamaria	Inky-tail shark	1	94	-	4.2	/1	-	-
Carcharchinus obscurus	Bronze whaler	29	82-202	105.3	3.5-43.0	14/15	Cuttlefish, fish	
Notogaleus rhinopanes	Pencil shark	1	59	-	1	1/	Pilchard	-
Sphyrna lewini	Hammer head shark	11	88-133	104.0	1.7-10.5	7/4	Squid remains in most	-
Squatina australis	Angel shark	1	27.2	-	-	-	-	-
Aptychotrema vincentiana	Shovelnose ray	4	80-96	89.2	1.6-5.2	1/3	-	-
Trygonorhina fasciata	Southern fiddler	76	27.4-115	101.0	2.1-11.3	8/67	Snapping shrimps, crustacea	Ripe or with developing eggs 2.11.75
Dasyatis brevicaudata	Smooth stingray	25	58-135	80.3	7.4-62.7	7/18	Snapping shrimps, octopus	
Dasyatis thetides	Black stingray	4	53-145	85.6	5.8-22.2	1/3	Octopus,shrimps	-
Urolophus testaceus	Common stingaree	7	19.1-70	37.1	2.0-4.4	/3	Weed whiting	Ripe 3.11.75
Myliobatis australis	Eagle ray	111	39-99	55.3	3.0-34.0	57/51	Bivalves,crabs	-
Elops australis	Giant herring	1	50.0	-	1.4	-	-	-
Gymnothorax woodwardi	Woodward's reef eel	1	65.0	-	-	-	-	-
Ophisurus serpens	Serpent eel	2	58.5-79.0	68.7	-	-	-	-
Etrumeus micropus	Maray	1	19	-	-	-	-	-
Hyperlophus vittatus	Sandy sprat	5	3.8-7.6	5.8	-	-	-	-
Spratelloides robustus	Blue sprat	34	3.7-10	9.8	-	-	-	-
Saurida undosquamis	Large-scaled grinner	1	28.0	-	-	-	-	-
Gonorhynchus greyi	Beaked salmon	8	8.0-31.2	14.3	-	-	-	-
Cnidoglanis macrocephalus	Cobbler	4	58-61	50.2	0.9-1	2/	-	-
Sardinops neopilchardus	Pilchard	2	14-15	14.5	-	-	-	-
Physiculus barbatus	Southern rock cod	2	8-8.2	8.1	-	-	-	-
Lotella callarias	Beardie	1	30.9	-	-	-	-	-
Cypselurus exsiliens	Slender flying fish	6	25.6-29.2	27.0	-	/5	-	-
Belone ciconia	Slender long tom	3	68-70 LCF	69.0	-	/1	-	Ripe with roe 16.11.76
Hyporhamphus melanochir	Southern sea garfish	76 LCF	4.8-38.2	8.9	-	-	-	-
		TL	10.4-34.4	23.0				
Atherinosoma presbyteroides	Swan River hardyhead	3	6.5-7.3	6.9	-	-	-	-
Atherinosoma elongatus	Elongate hardyhead	3	8.8-9	8.9	-	-	-	-

TABLE 7 CONTINUED

SCIENTIFIC NAME	COMMON NAME	No. of Observations	Size Range TL cm	Mean Size TL cm	Weight Range kg	Sex Ratio M/F	FOOD HABITS: (stomach contents)	BREEDING COMMENTS
Rhabdosargus sarba	Tarwhine	3	16.9-26.1	20.8	-	-	-	-
Argyrosomus hololepidotus	Mulloway	1	29.4	-	-	-	-	-
Upeneichthys lineatus	Red mullet	212 LCF	2.3-21	9.1	-	-	-	-
Parapriacanthus elongatus	Slender bullseye	161 LCF	5-12.2	6.4	-	-	-	-
Pempheris klunzingeri	Rough bullseye	25 LCF	8.4-15	11.2	-	-	-	-
Pempheris multiradiata	Common bullseye	3 LCF	10.1-16.1	12.8	-	-	-	-
Kyphosus sydneyanus	Buffalo bream	4 LCF	9.9-27.6	18.6	-	-	-	-
Microcanthus strigatus	Stripey	3	13.2-14.5	14.0	-	-	-	-
Scorpis georgianus	Banded sweep	3	17.7-24.7	20.4	400g	-	-	-
Vinculum sexfasciatum	Moonlighter	7	32-42.5	36.7	1-1.9	3/4	Crab remains, prawns	Prespawning 29.10.75
Enoplosus armatus	Old wife	2	13.4-19.9	16.6	-	-	-	-
Dactylophora nigricans	Dusky morwong	2	91	91	7.5	1/	-	-
Aldrichetta forsteri	Yelloweye mullet	3	11.4-19.5	14.2	-	-	-	-
Mugil cephalus	Sea mullet	3	18.8-21.3	20.3	-	-	-	-
Sphyraena obtusata	Striped sea pike	6	23.2-71.2	50.9	-	-	-	-
Coris auricularis	King wrasse	1	16.7	-	-	-	-	-
Halichoeres brownfieldi	Wrasse	11	10-18.6	15.2	-	-	-	-
Ophthalmolepis lineolatus	Maori	17	24.6-34.8	29.9	-	/1	-	-
Pseudolabrus parilus	Brown-spotted parrot fish	44 LCF	9.9-28.2	16.3	-	-	-	-
		TL	7.5-37.7	20.6	-	-	-	-
Neoodax radiatus	Long-rayed rock whiting		7.8-16	11.9	-	-	-	-
Heteroscarus acroptilus	Rainbow fish	9 LCF	12.6-18.0	14.8	-	1/1	-	-
Ichthyscopus barbatus	Fringed stargazer	1	19.7	-	-	-	-	-
Kathetostoma laeve	Stargazer	1 LCF	4.7	-	-	-	-	-
Helcogramma decurrens	Black-throated three fin	1	2.8	-	-	-	-	-
Callionymus calcaratus	Spotted stinkfish	2	7.1-30	18.5	-	-	-	-
Sarda orientalis	Oriental bonito	58 LCF	23.1-54	44.2	1-2.8	24/33	Sandy sprats	Most ripe, 1 postspawning 6.11.75
Scomber australasicus	Blue mackerel	30 LCF	1.7-22.8	7.6	-	-	-	-
Thunnus maccoyii	Southern bluefin tuna	2	42.3-45.2	43.7	1.6-1.9	1/1	-	-
Pseudorhombus jenynsii	Small toothed flounder	6	7.6-18.6	15.0	-	-	-	-
Ammotretis elongatus	Elongate flounder	5	6.2-12	9.2	-	-	-	-
Cynoglossus broadhursti	Southern tongue sole	2	24.2-27.2	25.7	-	-	-	-
Eubalichthys gunnii	Mosaic leatherjacket	3	13.7-47.5	35.7	1.4-1.8	1/1	Sea urchins,squid	-
Eubalichthys mosaicus	Deep bodied leatherjacket	55 LCF	8.3-26	15.5	-	-	-	-
Meuschenia freycineti	Six-spined leatherjacket	21 LCF	11-55.5	33.8	1.8-2.8	4/5	Gastropod & urchin remains	-
		TL	10.9-56	41.1				

TABLE 7 CONTINUED

SCIENTIFIC NAME	COMMON NAME	No. of Obser-vations		Size Range TL cm	Mean Size TL cm	Weight Range Kg	Sex Ratio M/F	FOOD HABITS: (stomach contents)	BREEDING COMMENTS
Pranesus ogilbyi	Marine hardyhead	19		5.4-14.5	9.1	-	-	-	-
Trachichthys australis	Roughy	1		10.8	-	-	-	-	-
Cleidopus gloriamus	Knight fish	2		15	15	-	-	-	-
Metavelifer multiradiatus	Veilfin	3		4.9-15.0	9.6	-	-	-	-
Stigmatophora argus	Spotted pipefish	25		3.2-21.5	7.7	-	-	-	-
Syngathus phillipi	Port Phillip pipefish	2		11.6-25.5	18.5	-	-	-	-
Neosebastes pandus	Gurnard perch	4		27.2-37.8	31.8	1.0	1/1	-	-
Neosebastes scabriceps	Little scorpion fish	12		4.2-12.6	9.2	-	-	-	-
Scorpaena sumptuosa	Red rock cod	2		11.4-12.1	11.7	-	-	-	-
Helicolenus papillosus	Ocean perch	1		14.6	-	-	-	-	-
Chelidonichthys kumu	Red gurnard	1		14.6	-	-	-	-	-
Paratrigla vanessa	Butterfly gurnard	2		5.4-43.5	24.4	-	-	-	-
Aetapcus maculatus	Warty prow fish	1		17.5	-	-	-	-	-
Platycephalus longispinis	Sand flathead	3		13.3-54	33.6	1.5	-	-	-
Platycephalus haackei	Long-headed flathead	3		14.1-25.8	20.3	-	-	-	-
Platycephalus laevigatus	Rock flathead	8		16.9-36.6	27.6	-	-	-	-
Thysanophrys cirronasus	Tassel snouted flathead	1		21.6	-	-	-	-	-
Paraplesiops meleagris	Blue devil	3		11.9-28.6	64.2	-	-	-	-
Glaucosoma hebraicum	Westralian jewfish	10		59-96.5	79.0	4.0-15.6	2/8	Squid,octopus,leather-jacket	Post spawning 3.4.75
Helotes sexlineatus	Striped trumpeter	6		9.8-20	15.8	-	-	-	-
Pelsartia humeralis	Sea trumpeter	59		16.2-22.2	19	-	-	-	-
Apogon rueppellii	Northern gobbleguts	2		5.5	5.5	-	-	-	-
Dinolestes lewini	Long-finned pike	7		22.0-54.5	47.4	-	2/3	Blue sprats	-
Sillago bassensis	Silver whiting	13	LCF	10.4-26.3	20.3	-	4/7	-	2 immature 3prespawning 5.11.75
Sillago maculata	Trumpeter whiting	3		17-19.1	17.8	-	-	-	-
Sillago punctata	King George whiting	5		16.5-26.2	22.2	-	-	-	-
Pomatomus saltator	Tailor	21	LCF	4.6-36.0	23.9	-	4/6	Blue sprats	-
			TL	16.4-35.6	23.5				
Caranx georgianus	Skippy	81	LCF	5.4-32.5	22.9	350-800g	10/7	Sandy sprats	Ripe 29.10.75
			TL	9.2-37.7	16.4				
Seriola lalandi	Yellowtail Kingfish	1		20	-	-	/1	-	-
Trachurus mccullochi	Yellowtail scad	3		16.4-27.7	20.2	-	-	-	-
Arripis georgianus	Herring	142		5.9-23.4	19.2	-	37/9	Blue sprats,bees, prawns	-
Gerres subfasciatus	Silver belly	1		15.4	-	-	-	-	-
Parequula melbournensis	Roach	281		6.4-14.7	10.7	-	-	-	-
Chrysophrys unicolor	Snapper	8	LCF	47-72	56.0	0.4-8.8	1/5	Squid,sea urchin	Ripe with roe 15.11.76
			TL	26.8-87.5	68.1				

TABLE 7 CONTINUED

SCIENTIFIC NAME	COMMON NAME	No. of Observations		Size Range TL cm	Mean Size TL cm	Weight Range Kg	Sex Ratio M/F	FOOD HABITS: (stomach contents)	BREEDING COMMENTS
Meuschenia galii	Gales leatherjacket	1		15.3	-	-	/1	-	-
Penicipelta vittiger	Toothbrush leatherjacket	99	LCF	12.7-39.5	17.8	0.5-1.0	6/8	-	-
			TL	9.5-29	15.3				
Scobinichthys granulatus	Rough leatherjacket	108	LCF	14.5-21.5	17.9	-	6/3	-	-
			TL	11.1-24	17.1				
Anoplocapros lenticularis	Smooth boxfish	2	LCF	18.3-23.1	20.7	-	-	-	-
Aracana aurita	Shaw's cowfish	26	LCF	4.3-20.2	16.1	-	/2	-	-
			TL	8.1-15.6	12.8				
Strophiurichthys inermis		4	LCF	12.5-28.3	16.8	-	-	-	-
			TL	15.2-16.5	15.7				
Strophiurichthys robustus	Robust boxfish	1		25.8	-	-	-	-	-
Diodon nicthemerus	Globe fish	2		13.8	13.8	-	-	-	-
Arothron armilla	Ringed toadfish	4	LCF	16.6-17.5	17.0	-	-	-	-
			TL	13.9-20.3	17.1				

TABLE 8: CHECKLIST OF THE FISHES OF GEOGRAPHE BAY AND THE BUNBURY MARINE AREA.

NAME	SCIENTIFIC NAME	COMMON NAME	DISTRIBUTION		PREFERRED HABITAT								SOCIAL BEHAVIOUR		FOOD HABITS						STATUS		
								Demersal			Depth													
			Temperate	Tropical	Pelagic	Migratory	Surface Waters	Mud-sand	Weed	Rock-reef	Inshore (<15m)	Offshore (15-100m)	Deeper waters (>100m)	Solitary	Schooling	Herbivorous	Planktivorous	Iliophagic	Omnivorous	L. Carnivore	H. Carnivore	Angler interest	Commercial W.A.	Commercial elsewhere
HETERODONTIDAE	*Heterodontus portusjacksoni* (Myer), 1793	Port Jackson shark	x					x	x	x	x	x	x	x						x				
ODONTASPIDIDAE	† *Odontaspis taurus* (Rafinesque), 1810	Grey nurse	x					x	x	x	x	x	x	x							x		x	x
ISURIDAE	† *Carcharodon carcharias* (Linnaeus), 1758	White pointer	x	x	x								x	x							x		x	x
	Isurus oxyrinchus Rafinesque, 1810	Mako	x	x	x								x	x							x		x	x
CETORHINIDAE	Δ *Cetorhinus maximus* (Gunner), 1765	Basking shark	x	x	x	x							x	x			x							
ALOPIIDAE	*Alopias caudatus* Phillips, 1932	Thresher shark	x	x	x								x	x							x		x	x
ORECTOLOBIDAE	*Orectolobus maculatus* (Bonnaterre), 1788	Wobbegong	x							x	x	x		x						x		x	x	x
	Orectolobus ornatus (De Vis), 1883	Banded wobbegong	x							x	x	x		x						x		x	x	x
	Orectolobus ornatus halei Whitley, 1940	Gulf wobbegong	x							x	x	x		x						x		x	x	x
	Sutorectus tentaculatus (Peters), 1864	Cobbler carpet shark	x							x	x	x		x						x		x	x	x
	Parascyllium ferrugineum McCulloch, 1911	Rusky catshark	x							x	x	x		x						x				
	Parascyllium variolatum (Dumeril), 1853	Varied catshark	x							x	x	x		x						x				
SCYLIORHINIDAE	*Halaelurus analis* (Ogilby), 1885	Spotted catshark	x							x	x	x		x						x				
	Δ *Halaelurus labiosus* (Waite), 1905	Black-spotted shark	x							x	x	x		x						x				
TRIAKIDAE	*Furgaleus ventralis* (Whitley), 1943	Whiskery shark	x		x	x					x	x			x					x		x	x	x
	Mustelus antarcticus Günther, 1870	Gummy shark	x		x						x	x		x						x		x	x	x
CARCHARHINIDAE	*Carcharhinus calamaria* (Whitley), 1944	Inky-tail shark	x		x	x					x	x			x						x	x	x	
	Carcharhinus obscurus (Le Sueur), 1818	Bronze whaler	x		x	x					x	x			x						x	x	x	
	Carcharhinus brachyurus (Günther), 1870	Bronze whaler	x		x	x					x	x			x						x	x	x	
	† *Galeocerda cuvieri* (Le Sueur), 1822	Tiger shark	x	x	x						x	x	x	x							x		x	x
	Notogaleus rhinopanes Peron, 1807	Pencil shark	x		x						x	x			x						x	x	x	
	Δ *Prionace glauca* (Linnaeus), 1758	Blue whaler	x	x	x	x					x	x		x							x	x	x	
SPHYRNIDAE	*Sphyrna lewini* (Griffith), 1834	Hammer head shark	x		x	x					x	x		x						x		x		
PRISTIOPHORIDAE	Δ *Pristiophorus cirratus* (Latham), 1793	Common saw shark	x		x						x	x		x						x			x	
	Δ *Pristiophorus nudipinnis* Günther, 1870	Southern saw shark	x		x						x	x		x						x			x	
SQUALIDAE	*Squalus megalops* (Macleay), 1881	Dog shark	x		x								x	x						x			x	x
SQUATINIDAE	*Squatina australis* Regan, 1906	Angel shark	x					x	x				x	x						x			x	
	Squatina tergocellata McCulloch, 1914	Ornate angel shark	x					x	x				x	x						x			x	
RHINOBATIDAE	*Aptychotrema vincentiana* (Haacke), 1885	Shovelnose ray	x					x	x		x	x		x						x				
	Trygonorhina fasciata Müller & Henle, 1841	Southern fiddler	x					x	x		x	x		x						x		x	x	
TORPEDINIDAE	Δ *Hypnos monoptergium* (Shaw and Nodder), 1795	Numbfish	x					x	x					x						x				
DASYATIDAE	*Dasyatis brevicaudata* (Hutton), 1875	Smooth stingray	x					x	x		x	x	x	x						x				
	Dasyatis thetides Waite, 1899	Black stingray	x					x	x		x	x	x	x						x				
UROLOPHIDAE	* *Urolophus gigas* Scott, 1954	Spotted stingaree	x					x	x		x	x	x	x						x				
	Urolophus mucosus Whitley, 1929	Western stingaree	x					x	x		x	x	x	x						x				
	Urolophus testaceus (Müller and Henle), 1841	Common stingaree	x					x	x		x	x	x	x						x				
MYLIOBATIDAE	*Myliobatis australis* Macleay, 1881	Eagle ray	x					x	x		x	x		x						x			x	
ELOPIDAE	*Elops australis* Regan, 1909	Giant herring		x	x	x					x			x						x		x		
ANGUILLIDAE	*Anguilla australis* Schmidt, 1928	Short finned eel	x			x		x	x		x			x						x		x		x
MURAENIDAE	*Gymnothorax woodwardi* McCulloch, 1912	Woodward's reef eel	x							x	x	x		x						x				

NAME		SCIENTIFIC NAME	COMMON NAME	DISTRIBUTION		PREFERRED HABITAT								SOCIAL BEHAVIOUR		FOOD HABITS						STATUS		
								Demersal			Depth													
				Temperate	Tropical	Pelagic	Migratory	Surface Waters	Mud - sand	Weed	Rock - reef	Inshore (<15m)	Offshore (15-100m)	Deeper waters (>100m)	Solitary	Schooling	Herbivorous	Planktivorous	Iliophagic	Omnivorous	L. Carnivore	H. Carnivore	Angler interest	Commercial W.A.	Commercial elsewhere
OPHICHTHYIDAE		*Calamuraena calamus* (Günther), 1870	Fringe-lipped snake eel	x					x			x			x					x					
	Δ	*Muraenichthys tasmaniensis* McCulloch, 1911	Tasmanian worm eel	x					x			x			x					x					
		Muraenichthys sp	Worm eel	x					x			x			x					x					
		Ophisurus serpens (Linnaeus), 1758	Serpent eel	x					x			x			x					x					
		Pisodonophis cancrivorus (Richardson), 1844	Burrowing snake eel	x					x			x			x					x					
CLUPEIDAE		*Amblygaster postera* Whitley, 1931	Scaly mackerel	x		x		x				x				x		x					x		
		Etrumeus micropus (Schlegel), 1878	Maray	x	x	x		x				x				x		x					x	x	x
		Hyperlophus vittatus (Castelnau), 1875	Sandy sprat	x		x		x				x				x		x					x	x	x
		Sardinops neopilchardus (Steindachner), 1879	Pilchard	x		x	x	x				x	x			x		x					x	x	x
		Spratelloides robustus Ogilby, 1879	Blue sprat	x		x		x				x				x		x					x	x	x
ENGRAULIDAE		*Engraulis australis* (Shaw), 1790	Australian anchovy	x			x	x	x	x		x				x		x					x	x	x
AULOPIDAE		*Latropiscus purpurissatus* (Richardson), 1843	Sergeant baker	x							x	x	x		x					x			x		
SYNODONTIDAE		*Saurida undosquamis* (Richardson), 1848	Large-scaled grinner		x	x		x				x	x			x				x					
GONORHYNCHIDAE		*Gonorhynchus greyi* (Richardson), 1845	Beaked salmon	x					x			x	x	x	x					x					
PLOTOSIDAE		*Cnidoglanis macrocephalus* (Valenciennes), 1840	Cobbler	x					x			x			x					x			x	x	x
GOBIESOCIDAE	Δ	*Aspasmogaster tasmaniensis* (Günther), 1861	Tasmanian clingfish	x								x			x					x					
	Δ	New genus New species	Clingfish	x								x			x					x					
	Δ	New genus New species	Clingfish	x								x			x					x					
ANTENNARIIDAE	Δ	*Histiophryne scortea* McCulloch and Waite, 1918	White-spotted angler fish	x					x	x		x			x						x				
		Rhycherus filamentosus (Castelnau), 1812	Tasselled angler fish	x					x	x		x			x						x				
MORIDAE		*Physiculus barbatus* (Günther), 1863	Southern rock cod	x							x	x	x		x					x					x
		Lotella callarias Günther, 1863	Beardie	x							x	x	x		x					x					x
OPHIDIIDAE	Δ	*Genypterus blacodes* (Bloch and Schneider), 1801	Australian rock ling	x							x	x	x		x					x					x
EXOCOETIDAE		*Cypselurus exsiliens* (Linnaeus), 1771	Slender flying fish	x		x		x				x	x			x					x				
BELONIDAE		*Belone ciconia* Richardson, 1846	Slender long tom	x	x			x				x	x			x					x				
HEMIRAMPHIDAE		*Euleptorhamphus viridus* (van Hassett), 1823		x	x			x					x	x		x	x								
		Hemiramphus robustus Günther, 1866	Robust garfish	x				x				x	x			x	x						x	x	x
		Hyporhamphus melanochir (Valenciennes), 1846	Southern sea garfish	x				x				x	x			x	x						x	x	x
ATHERINIDAE		*Atherinosoma presbyteroides* Richardson, 1843	Swan River hardyhead	x				x	x			x				x		x							
		Atherinosoma elongatus (Klunzinger), 1879	Elongate hardyhead	x				x	x			x				x		x							
		Pranesus ogilbyi Whitley, 1930	Marine hardyhead	x				x	x			x				x		x							
TRACHICHTHYIDAE		*Trachichthys australis* Shaw and Nodder, 1799	Roughy	x							x	x	x		x						x				
SOROSICHTHYIDAE		*Sorosichthys ananassa* Whitley, 1945	Little pineapple fish	x							x		x	x	x						x				
MONOCENTRIDAE		*Cleidopus gloriamus* De Vis, 1882	Knight fish	x							x		x	x	x						x				
ZEIDAE		*Zeus faber* Linnaeus, 1758	John Dory	x					x	x				x	x						x			x	x
VELIFERIDAE		*Metavelifer multiradiatus* Regan, 1907	Veilfin	x					x				x	x	x					x					
REGALECIDAE		*Regalecus pacificus* Haust, 1878	Oar fish	x										x	x						x				

FAMILY	SCIENTIFIC NAME	COMMON NAME	DISTRIBUTION		PREFERRED HABITAT								SOCIAL BEHAVIOUR		FOOD HABITS						STATUS		
								Demersal			Depth													
			Temperate	Tropical	Pelagic	Migratory	Surface Waters	Mud - sand	Weed	Rock - reef	Inshore (<15m)	Offshore (15-100m)	Deeper waters (>100m)	Solitary	Schooling	Herbivorous	Planktivorous	Iliophagic	Omnivorous	L. Carnivore	H. Carnivore	Angler interest	Commercial W.A.	Commercial elsewhere
SYNGATHIDAE	*Hippocampus breviceps* Peters (1870)	Short-snouted seahorse	x						x	x	x	x		x			x							
	Phyllopteryx taeniolatus (Lacépède, 1804)	Common seadragon	x						x	x	x	x		x			x							
	Δ *Histiogamphelus cristatus* (McCulloch and Waite), 1918	Ring-backed pipefish	x						x	x	x	x		x			x							
	Stigmatophora argus (Richardson), 1840	Spotted pipefish	x						x	x	x	x		x			x							
	Syngathus phillipi Lucas, 1891	Port Phillip pipefish	x						x	x	x	x		x			x							
	Yosia tigris (Castlenau), 1879	Tiger pipefish	x						x	x	x	x		x			x							
SCORPAENIDAE	*Gymnapistes marmoratus* (Cuvier),1829	Scorpion fish	x							x	x	x		x						x			
	Helicolenus papillosus (Bloch & Schneider), 1801	Ocean perch	x							x	x	x	x	x						x	x	x	x
	Neosebastes pandus (Richardson), 1842	Gurnard perch	x							x	x	x	x	x						x	x	x	x
	Neosebastes scabricaps (Whitley), 1935	Little scorpion fish	x							x	x	x		x						x			
	Scorpaena cumptuosa Castelnau, 1875	Red rock cod	x							x	x	x		x						x			
TRIGLIDAE	*Chelidonichthys kumu* (Lesson & Garnot), 1826	Red gurnard	x					x	x	x	x	x	x	x						x			x
	**Paratrigla vanessa* (Richardson), 1839	Butterfly gurnard	x					x	x	x	x	x	x	x						x			x
	Pterygotrigla polyommata (Richardson), 1839	Sharp-beaked gurnard	x					x	x	x	x	x	x	x						x			x
PEGASIDAE	**Acanthopegasus lancifer* (Kaup), 1861	Sea moth	x					x			x	x		x			x						
PATAECIDAE	*Aetapcus maculatus* (Günther), 1861	Warty prow fish	x							x	x	x		x						x			
	Neopataecus waterhousii (Castelnau), 1872	Whiskered prow fish	x							x	x	x		x						x			
APLOACTINIDAE	Δ *Aploactisoma milesii* (Richardson), 1850	Velvet fish	x							x	x	x		x						x			
PLATYCEPHALIDAE	*Platycephalus longispinis* Macleay, 1884	Sand flathead	x					x			x	x		x						x	x	x	x
	Platycephalus haackei Steindachner, 1894	Long-headed flathead	x					x	x		x	x		x						x	x	x	x
	Platycephalus laevigatus Cuvier, 1829	Rock flathead	x						x	x	x	x		x						x	x	x	x
	Thysanophrys cirronasus (Richardson), 1848	Tassel snouted flathead	x					x	x		x	x		x						x	x	x	x
SERRANIDAE	*Acanthistius serratus* (Cuvier), 1828	Wirrah	x							x	x	x		x						x	x	x	
	Δ *Anthias pulchellus* Waite, 1899	Orange perch	x							x	x	x		x						x	x		
	Ellerkeldia sp	Spotted sea perch	x							x	x	x		x						x	x		
	Hypoplectrodes nigrorbrum (Cuvier), 1828	Black-banded sea perch	x							x	x	x		x						x	x		
	Otos dentex (Cuvier), 1828	Harlequin fish	x							x	x	x		x						x	x		
PLESIOPIDAE	*Paraplesiops meleagris* (Peters), 1870	Blue devil	x							x	x	x		x						x			
GLAUCOSOMIDAE	*Glaucosoma hebraicum* Richardson, 1845	Westralian jewfish	x							x	x	x		x							x	x	x
THERAPONIDAE	*Amphitherapon caudavittatus* (Richardson), 1845		x					x	x		x	x		x				x					
	Helotes sexlineatus (Quoy and Gaimard), 1825	Striped trumpeter	x					x	x		x	x		x				x					
	Pelsartia humeralis (Ogilby), 1899	Sea trumpeter	x					x	x		x	x		x				x					
APOGONIDAE	*Apogon rueppellii* (Gunther), 1859	Northern gobblequts	x						x	x	x	x			x					x			
	Δ *Siphamia cephalotes* Castlelnau, 1875	Wood's siphon fish	x						x	x	x	x			x					x			
DINOLESTIDAE	*Dinolestes lewini* (Griffith), 1834	Long-finned pike	x						x	x	x	x		x						x	x	x	
SILLAGINIDAE	*Sillago bassensis* Cuvier, 1829	Silver whiting	x					x			x	x			x					x			
	Sillaga maculata Quoy and Gaimard, 1824	Trumpeter whiting	x					x			x	x			x					x			
	Sillago punctata Cuvier, 1829	King George whiting	x					x	x		x	x			x					x			
	Sillago robusta Stead, 1908	Robust whiting	x					x			x	x			x					x			
	Sillago schomburgkii Peters, 1865	Yellow-finned whiting	x					x			x				x					x			
	Sillago sp		x					x			x				x					x			

FAMILY	SCIENTIFIC NAME	COMMON NAME	DISTRIBUTION		PREFERRED HABITAT								SOCIAL BEHAVIOUR		FOOD HABITS						STATUS		
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POMATOMIDAE	*Pomatomus saltator* (Linnaeus), 1766	Tailor	×		×	×					×	×			×					×	×	×	×
RACHYCENTRIDAE	*Rachycentron canadus* (Linnaeus), 1766	Black kingfish		×	×	×					×	×		×						×	×	×	×
ECHENEIDAE	*Echeneis naucrates* Linnaeus, 1758	Slender suckerfish	×	×							×	×	×	×					×				
CARANGIDAE	Δ *Alectis ciliaris* (Bloch), 1787	Pennant fish		×	×						×	×			×					×			
	Caranx georgianus (Cuvier),1833	Skippy	×		×						×	×			×					×	×	×	×
	Gnathanodon speciosus (Forsskal), 1775	Golden trevally		×	×						×	×			×					×			
	Naucrates ductor (Linnaeus), 1758	Pilot fish	×		×						×	×		×						×			
	Seriola lalandi Valenciennes, 1833	Yellowtail kingfish	×		×		×				×	×			×						×	×	×
	Seriola hippos Günther, 1876	Sampson fish	×			×		×	×		×	×		×						×	×	×	×
	Δ *Trachinotus russelli* Cuvier, 1832	Dart	×		×	×					×			×					×		×		
	Trachurus declivis (Jenyns), 1841	Jack mackerel	×		×	×	×					×	×		×				×			×	×
	Trachurus mccullochi Nicols, 1920	Yellowtail scad	×		×	×	×				×	×	×		×				×			×	×	×
CORYPHAENIDAE	Δ *Coryphaena hippurus* Linnaeus, 1758	Dolphin fish	×	×	×	×						×	×	×						×			
ARRIPIDAE	*Arripis georgianus* (Cuvier), 1831	Australian herring	×		×	×					×	×			×					×	×	×	×
	Arripis trutta esper Whitley, 1951	Australian salmon	×		×	×					×	×			×					×	×	×	×
NEMIPTERIDAE	*Pentapodus* sp		×					×	×			×			×					×			
	Pentapodus vitta Quoy and Gaimard, 1824	Butterfly bream	×	×				×	×			×			×					×			
GERRIDAE	*Gerres subfasciatus* Cuvier, 1830	Silver belly	×					×	×	×	×	×		×					×			×	
	Parequula melbournensis (Castelnau), 1872	Roach	×					×	×	×	×	×		×					×				
SPARIDAE	*Chrysophrys unicolor* Quoy and Gaimard, 1824	Snapper	×							×	×	×			×					×		×	×
	Rhabdosargus sarba (Forsskal), 1775	Tarwhine	×					×		×	×	×		×						×		×	×
SCIAENIDAE	*Argyrosomus hololepidotus* Lacépède, 1802	Mulloway	×			×	×	×	×		×	×			×						×	×	×	×
MULLIDAE	*Upeneichthys lineatus* (Bloch and Schneider), 1801	Red mullet	×					×	×	×	×	×		×					×			×	
MONODACTYLIDAE	*Schuettea woodwardi* (Waite), 1905-7	Woodward's pemfret	×					×	×	×	×	×		×					×				
PEMPHERIDAE	*Parapriacanthus elongatus* (McCulloch), 1911	Slender bullseye	×							×	×	×			×				×				
	Pempheris klunzingeri McCulloch, 1911	Rough bullseye	×							×	×	×			×				×				
	Pempheris multiradiata (Klunzinger), 1879	Common bullseye	×							×	×	×			×				×				
KYPHOSIDAE	*Kyphosus sydneyanus* (Günther), 1886	Buffalo bream	×						×	×	×	×			×	×							
	Melambaphes zebra (Richardson), 1846	Zebra fish	×						×	×	×	×			×	×							
EPHIPPIDAE	Δ *Platax pinnatus* (Linné), 1758	Batfish		×				×	×	×	×	×			×				×				
SCORPIDIDAE	*Microcanthus strigatus* (Cuvier), 1831	Stripey	×							×	×	×		×					×				
	Neatypus obliquus Waite, 1905-7	Footballer	×							×	×	×		×					×				
	Scorpis aequipinnis Richardson, 1848	Sea sweep	×							×	×	×		×					×				
	Scorpis georgianus Valenciennes, 1832	Banded sweep	×							×	×	×		×	×				×	×		×	
	Vinculum sexfasciatum (Richardson), 1842	Moonlighter	×							×	×	×		×						×		×	
CHAETODONTIDAE	*Chelmonops truncatus* (Kner), 1859	Coral fish	×	×						×	×	×			×				×				
ENOPLOSIDAE	*Enoplosus armatus* (White), 1790	Old wife	×							×	×	×		×					×			×	
HISTIOPTERIDAE	*Zanclistius elevatus* (Ramsay and Ogilby), 1888	Black-spotted boarfish	×					×	×	×		×	×	×						×			
OPLEGNATHIDAE	*Oplegnathus woodwardi* (Waite), 1900	Knife jaw	×					×	×	×		×	×	×						×			

FAMILY	SCIENTIFIC NAME	COMMON NAME	DISTRIBUTION		PREFERRED HABITAT							SOCIAL BEHAVIOUR		FOOD HABITS						STATUS		
								Demersal		Depth												
			Temperate	Tropical	Pelagic	Migratory	Surface Waters	Mud - sand	Weed	Rock - reef	Inshore (<15m)	Offshore (15-100m)	Deeper waters (>100m)	Solitary	Schooling	Herbivorous	Planktivorous	Iliophagic	Omnivorous	L. Carnivore	H. Carnivore	Angler interest	Commercial W.A.	Commercial elsewhere
POMACENTRIDAE	Δ *Parma victoriae* (Günther), 1863	Scaly fin	x							x	x	x		x					x			x		
	*Parma mcculloch*i Whitley, 1929		x							x	x	x		x					x			x		
CHIRONEMIDAE	*Threpterius maculosus* Richardson, 1850	Silver spot	x							x	x	x		x					x					
APLODACTYLIDAE	Δ *Dactylosargus arctidens* (Richardson), 1839	Sea carp	x						x	x	x	x		x		x						x		
CHEILODATYLIDAE	*Dactylophora nigricans* (Richardson), 1850	Dusky morwong	x						x	x	x	x		x		x						x		
	Cheilodactylus gibbosus (Richardson), 1841	Crested morwong	x						x	x	x	x		x		x						x		
	Nemadactylus valenciennsi (Whitley), 1937	Queen snapper	x						x	x	x	x	x	x					x			x	x	
MUGILIDAE	*Aldrichetta forsteri* (Valenciennes), 1836	Yelloweye mullet	x		x			x	x		x	x			x				x			x	x	x
	Mugil cephalus Linnaeus, 1758	Sea mullet	x	x	x	x		x	x		x	x			x			x				x	x	x
SPHYRAENIDAE	*Australuzza novaehollandiae* (Günther), 1860	Pike	x					x	x		x	x		x	x					x		x	x	
	Sphyraena obtusata (Cuvier), 1829	Striped sea pike	x					x	x	x	x	x			x					x		x	x	
LABRIDAE	*Achoerodus gouldii* (Richardson), 1843	Blue groper	x							x	x	x	x							x		x	x	x
	Austrolabrus maculatus (Macleay), 1881	Black-spotted parrot	x							x	x	x		x					x			x		
	Bodianus vulpinus (Richardson), 1850	Foxfish	x							x	x	x		x					x				x	
	Coris auricularis (Valenciennes), 1838	King wrasse	x							x	x	x		x					x					
	Eupetrichthys angustipes Ramsay and Ogilby, 1888		x							x	x	x		x					x					
	Halichoeres brownfieldi (Whitley), 1945		x							x	x	x		x					x			x		
	Ophthalmolepis lineolatus (Valenciennes), 1838	Moari	x							x	x	x		x					x				x	
	Δ *Pictilabrus laticlavius* (Richardson), 1839	Senator fish	x							x	x	x		x					x			x		
	Pseudolabrus aurantiacus (Castelnau), 1872	Castelnau's parrot fish	x							x	x	x		x					x			x		
	Pseudolabrus bostockii (Castelnau), 1873		x							x	x	x		x					x					
	Pseudolabrus parilus (Richardson), 1850	Brown-spotted parrot fish	x							x	x	x		x					x			x	x	
ODACIDAE	*Neodax radiatus* (Quoy and Gaimard), 1835	Long-rayed rock whiting	x						x		x	x		x					x					
	Neodax semifasciatus (Valenciennes), 1830	Blue rock whiting	x						x		x	x		x					x					
	Olisthops cyanomelas Richardson, 1850	Herring cale	x						x		x	x		x					x			x		
SIPHONOGNATHIDAE	*Siphonognathus argyrophanes* Richardson, 1858	Tubemouth	x						x	x	x	x		x			x							
SCARIDAE	*Heteroscarus acroptilus* (Richardson), 1846	Rainbow fish	x						x	x		x		x					x					
MUGILOIDIDAE	Δ *Parapercis ramsayi* Steindachner, 1884	Spotted grub fish	x					x	x	x	x			x					x			x		
LIMNICHTHYIDAE	Δ *Limnichthys fasciatus* Waite, 1904		x					x			x			x					x					
LEPTOSCOPIDAE	*Crapatalus arenarius* McCulloch, 1915	Sand fish	x					x			x			x					x					
URANOSCOPIDAE	*Ichthyscopus barbatus* Mees, 1960	Fringed stargazer	x					x			x	x	x	x						x				
	Kathetostoma laeve Bloch and Schneider, 1801	Stargazer	x					x			x	x		x						x				
BLENNIIDAE	*Pictiblennius tasmanianus* (Richardson), 1849	Blenny	x						x	x	x			x					x					
OPHICLINIDAE	Δ *Ophiclinus gracilis* Waite, 1906	Black-spotted snake blenny	x						x	x	x			x					x					
	Δ *Breoni greeni* Scott, 1936		x						x	x	x			x					x					
TRIPTERYGIIDAE	*Helcogramma decurrens* McCulloch and Waite, 1918	Black-throated threefin	x						x	x	x			x					x					
	Δ *Lepidoblennius marmoratus* (Macleay), 1878	Jumping blenny	x						x	x	x			x					x					
	Δ *Verconsates bucephalus* (McCulloch and Waite), 1918		x						x	x	x			x					x					

FAMILY	SCIENTIFIC NAME	COMMON NAME	DISTRIBUTION		PREFERRED HABITAT									SOCIAL BEHAVIOUR		FOOD HABITS						STATUS		
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			Temperate	Tropical	Pelagic	Migratory	Surface Waters	Mud - sand	Weed	Rock - reef	Inshore (<15m)	Offshore (15-100m)	Deeper waters (>100m)	Solitary	Schooling	Herbivorous	Planktivorous	Illophagic	Omnivorous	L. Carnivore	H. Carnivore	Angler interest	Commercial W.A.	Commercial elsewhere
CLINIDAE	*Cristiceps aurantiacus* Castelnau, 1879		x						x	x	x			x					x					
	Cristiceps australis Valenciennes, 1836	Crested weedfish	x						x	x	x	x		x					x					
	Δ *Heteroclinus adelaidae* Castelnau, 1872		x						x	x	x			x					x					
	Δ *Heteroclinus heptaeolus* (Ogilby), 1885	Weedfish	x						x	x	x			x					x					
	Δ *Heteroclinus roseus* Günther, 1861		x						x	x	x			x					x					
CALLIONYMIDAE	*Callionymus calcaratus* Macleay, 1881	Spotted stinkfish	x					x	x		x	x		x					x					
	Callionymus goodladi (Whitley), 1944	Stinkfish	x					x	x		x			x					x					
	Callionymus grossi McCulloch, 1910		x					x	x		x	x		x					x					
GOBIIDAE	Δ *Callogobius mucosus* (Günther), 1871	Sculptured goby	x					x			x	x		x					x					
	Favonigobius lateralis (Macleay), 1881	Long-finned goby	x					x			x			x					x					
	Δ *Pseudogobius bifrenatus* (Kner), 1865	Bridled goby	x					x			x			x					x					
GEMPYLIDAE	Δ *Leionura atun* (Euphrasen), 1791	Barracouta	x		x						x	x			x						x	x	x	x
TRICHIURIDAE	Δ *Trichiurus coxii* Ramsay and Ogilby, 1887	Australian hairtail	x		x						x	x		x						x		x		
SCOMBRIDAE	Δ *Auxis thazard* (Lacépède), 1801	Frigate mackerel		x	x		x				x	x			x					x		x	x	x
	Sarda orientalis (Temminck and Schlegal), 1844	Oriental bonito	x		x		x				x	x			x					x		x	x	x
	Scomber australasicus Cuvier, 1832	Blue mackerel	x		x		x				x	x			x					x		x	x	x
	Δ *Thunnus alalunga* (Bonnaterre), 1800	Albacore	x		x	x	x				x	x	x		x						x	x	x	x
	Thunnus maccoyii Castelnau, 1872	Southern bluefin tuna	x	x	x	x	x				x	x	x		x						x	x	x	x
XIPHIDAE	*Xiphias gladius* Linnaeus , 1758	Broadbill sword fish	x	x	x	x						x	x	x							x	x	x	x
ISTIOPHORIDAE	Δ *Tetrapturus audax* (Philippi), 1887	Striped marlin	x	x	x	x						x	x	x							x	x	x	x
	Δ *Tetrapturus angustirostris* Tanaka, 1914	Short headed sword fish	x	x	x	x						x	x	x							x	x	x	x
LUVARIDAE	*Luvarus imperialis* Rafinesque, 1810	Loo	x		x									x			x							
BOTHIDAE	*Pseudorhombus jenynsii* (Bleeker), 1855	Small toothed flounder	x					x			x	x		x						x		x	x	x
PLEURONECTIDAE	*Ammotretis elongatus* McCulloch, 1914	Elongate flounder	x					x			x	x		x						x		x	x	x
SOLEIDAE	Δ *Aseraggodes haackeanus* (Steindachner), 1883	Southern sole	x					x			x	x		x						x				
	Strabozebrias cancellatus (McCulloch), 1916	Harrowed sole	x					x			x	x		x						x				
CYNOGLOSSIDAE	*Cynoglossus broadhursti* Waite, 1905	Southern tongue sole	x					x			x	x		x						x				
MONACANTHIDAE	*Bigener brownii* (Richardson), 1846	Spiny-tailed leather-jacket	x					x	x	x	x	x		x					x			x	x	x
	Acanthaluteres spilomelanurus (Quoy & Gaimard), 1824	Bridled leatherjacket	x					x	x	x	x	x		x					x			x		
	Brachaluteres jacksonianus (Quoy and Gaimard), 1824	Pigmy leatherjacket	x					x	x	x	x	x		x					x					
	Chaetoderma penicilligera (Cuvier), 1817			x				x	x	x	x	x		x					x			x		
	Eubalichthys gunnii (Günther), 1870	Mosiac leatherjacket	x					x	x	x	x	x		x					x			x		
	Eubalichthys mosaicus (Ramsay and Ogilby), 1889	Deep bodied leather-jacket	x					x	x	x	x	x		x					x			x		
	Meuschenia flavolineata Hutchins, 1977	Yellow-striped leatherjacket	x					x	x	x	x	x		x					x			x		
	Meuschenia freycineti (Quoy and Gaimard), 1824	Six-spined leather-jacket	x					x	x	x	x	x		x					x			x	x	x
	Meuschenia galii (Waite), 1905	Gales leatherjacket	x					x	x	x	x	x		x					x			x		
	Meuschenia hippocrepis (Quoy and Gaimard), 1824	Horse shoe leather-jacket	x					x	x	x	x	x		x					x			x		
	Nelusetta ayraudi (Quoy and Gaimard), 1824	Chinaman leather-jacket	x					x	x	x		x	x	x					x			x	x	x
	Penicipelta vittiger (Castelnau), 1873	Toothbrush leather-jacket	x					x	x	x	x	x		x					x			x	x	x
	Scobinichthys granulatus (Shaw), 1790	Rough leatherjacket	x					x	x	x	x	x		x					x			x	x	x

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OSTRACIONTIDAE	*Anoplocapros lenticularis* (Richardson), 1841	Smooth boxfish	x					x	x	x	x	x	x	x					x					
	Aracana aurita Shaw, 1798	Shaw's cowfish	x					x	x	x	x	x	x	x					x					
	Capricchthys gymnura McCulloch and Waite, 1915		x					x	x	x	x	x	x						x					
	Δ *Lactoria cornuta* (Linnaeus), 1758	Long-horned cowfish		x				x	x	x	x	x		x					x					
	Strophiurichthys inermis Fraser-Brunner, 1935		x					x	x	x	x	x	x	x					x					
	Strophiurichthys robustus Fraser-Brunner, 1941		x					x	x	x	x	x	x	x					x					
DIODONTIDAE	*Diodon nicthemerus* Cuvier, 1818	Globe fish	x					x	x		x	x		x						x				
TETRAODONTIDAE	*Contusus richei* (Freminville), 1873	Prickly toadfish	x					x	x	x	x	x		x						x				
	Lagocephalus sceleratus (Gmelin), 1788	Silver toadfish	x					x	x	x	x	x								x				
	Arothron armilla (McCulloch and Waite), 1915	Ringed toadfish	x					x	x	x	x	x	x	x						x				
	Torquigener pleurogramma (Regan), 1903	Banded toadfish	x					x	x	x	x	x			x				x					
MOLIDAE	Δ *Ranzania laevis* (Pennant), 1776	Oblong sunfish	x		x								x	x			x							

* = new record for Western Australia.

Δ = not collected during study, recorded in W.A. Museum records.

† = not collected during study, recorded Whitley (1943).

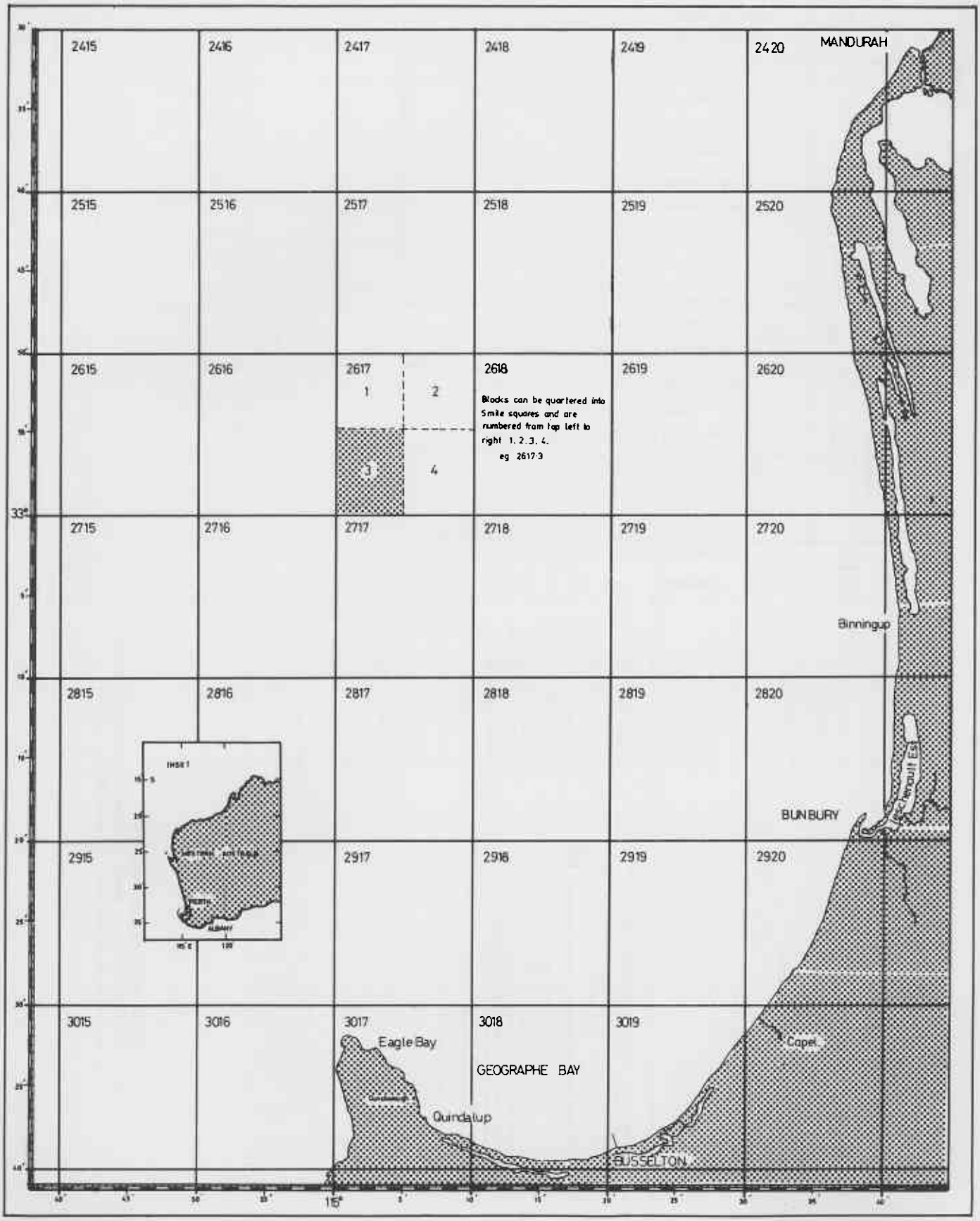

FIGURE 1: SAMPLING AREAS WITHIN THE GEOGRAPHE BAY/BUNBURY MARINE AREA.