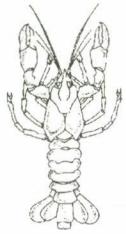
Byron Bay Marine Park Assessment

Tweed-Moreton Bioregion, Northern NSW



Supplementary Information

(APPENDICES 3-10)

FINAL DRAFT
14 February 2000

R.P. Avery

A report for the NSW Marine Parks Authority

Contents Volume II

- Supplementary Information -

Appendix 3

RBG Marine Algae Report

Dr Alan J.K. Millar (Royal Botanic Gardens Sydney) was commissioned by this project to conduct field investigations of algae in the northern section of the Solitary Islands Marine Park to complement his previous work in both the southern end of the Park and in the Byron Bay region, enabling delphic comparison between these sites.

Marine algae of the northern section of the Solitary Islands Marine Park

Dr Alan J.K. Millar
Royal Botanic Gardens Sydney
June 1998

Six sites were examined, collected and observed within the northern section of the Solitary Islands Marine Park (SIMP). These were two sites on Sandon Shoal, which is east-south-east of Sandon Bluff, one approximately 100 m off Minnie Water rock platform, the intertidal of the rock platform itself, one at Bare Point off Diggers Camp and one off Jones Point, near Wooli. Pimpernel Rock was not collected as the currents, tides and water conditions were unsuitable for diving at the time. This is apparently a regular feature of the Pimpernel Rock area as it is strongly influenced by the southward-flowing East Australia Current. Sandon Shoal had 1-2 knot currents over it at slack water during this survey. This, plus anecdotal evidence from local dive operators, suggests that other times of the tidal cycle would create even stronger currents.

Most marine algae are seasonal and the variation in species numbers can be considerable. For this region (as with much of the NSW coast) the late autumn - early winter month of June is known to be as little as one-half that of the spring - summer months in number of species present and the species numbers listed below reflect this. Many of the strictly winter/spring annuals exist for approximately 8 weeks, although some species gametophyte's can persist into late summer. None of these was present during this survey and the algae observed reflected a true indication of the late autumn/early winter growing season. In total, 11 species of green algae, 18 brown and 64 red algal species were collected.

The six sites observed gave a clear indication of the variation in submarine topography for this area and therefore habitats for marine algae. The overall impression is that the marine algal flora is very similar to that found in the southern section of SIMP. Anecdotal evidence of Pimpernel Rock suggests that it may have some similarities with Byron Bay in that it consists of a deep water rocky pinnacle with sea urchins, no *Ecklonia radiata*, but a turf algal flora and few macrophytes. Species comparisons between Byron Bay and SIMP suggest that while their marine floras contain many similar species, there are sufficient differences to warrant delineation of two separate (albeit minor) biogeographic regions. Two species in particular, the brown alga *Tomaculopsis herbertiana* and the red alga *Rodriguezella* sp., are not found in SIMP, while the northern limit of the brown alga *Hormosira banksii* is known to be at Boulder Bay near Ballina. The red algae *Schmitzia japonica* and *Curdiea crassa* occur from SIMP to Twofold Bay on the NSW south coast, but are absent from Byron Bay.

This survey resulted in the addition of three red algal species not previously recorded for SIMP; *Haraldiophyllum infossum*, *Tricleocarpa oblongata*, and the undescribed genus of the tribe Lophothalieae. Apart from the latter, the other two species are known from elsewhere on the NSW coast.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Site descriptions

Sandon Shoal - deep site **29° 42' 758 S; 153° 21' 192 E**

Sandon Shoal is a large area of the seabed (approx. 400 x 200 m) made up of uneven rocky substrata rising from the seabed at about 25 m depths up to the shallows of 7-10 m depths. At the time of this survey, there were no *Ecklonia radiata* plants on either site of the shoal which were approximately 200 m apart. Numerous sea urchins (mostly *Centrostephanus rodgersii*) were apparent and this would explain the depauperate nature of macrophytic algae both in abundance and diversity at either site. There are areas similar in topography to those found at Split Solitary Island, but the algal composition does not reflect this. The algae were mostly turf components, growing no larger than 0.5-3 cm and consisting of early colonising species such as *Ceramium* and *Polysiphonia*. Larger macrophytes included the greens *Halimeda cuneata* and *Codium lucasii*, brown algae of the order Dictyotales, and reds including *Pachymenia prostrata*, *Martensia australis*, *Peyssonnelia capensis*, *Gigartina intermedia* and the coralline algae *Amphiroa anceps* and *Corallina berteri*. A small epiphyte on a tube worm stalk may represent an undescribed genus in the tribe Lophothalieae.

Chlorophyta

Codium lucasii
Halimeda cuneata

Phaeophyta

Zonaria crenata
Zonaria diesingiana

Rhodophyta

Lophothalieae gen. nov.?
Pachymenia prostrata
Amphiroa anceps
Amphiroa sp. nov.
Corallina berteri
Melanthalia polydactylis
Griffithsia japonica
Centroceras clavulatum
Anotrichium planatum
Phycodrys australasica
Dictyothamnion saltatum
Acrosorium decumbens
Gelidium sp.
Platysiphonia marginalis
Scageliopsis patens
Dasyclonium incisum
Martensia australis
Peyssonnelia capensis
Peyssonnelia novae-hollandiae
Gigartina intermedia
Herposiphonia calva
Curdiea crassa

Sandon Shoal - shallow site 29° 42' 704 S; 153° 20' 762 E

At the shallower site, the algae were even more sparse than the deeper site and consisted of a fine turf of *Caulerpa brachypus* and *C. peltata*, more Dictyotales, and reds such as *Delisea pulchra*, a mat of *Symphyocladia marchantioides*, *Ceramium* spp. on sponges and *Gigartina intermedia* on the sand-covered rocks on the seabed.

Chlorophyta

Bryopsis indica
Caulerpa brachypus
Caulerpa peltata
Chlorodesmis major

Phaeophyta

Zonaria diesingiana

Rhodophyta

Acrosorium decumbens
Corallina officinalis
Herposiphonia calva
Ceramium lentiforme
Griffithsia japonica
Antithamnion amphigeneum
Delisea pulchra
Symphyocladia marchantioides
Gigartina intermedia

Minnie Water subtidal 29° 46' 859 S; 153° 18' 302 E

Although a relatively exposed site, the south-east side of the rock platform at Minnie Water is probably the best area for marine algal biodiversity within the northern section of SIMP. With a submarine topography remarkably similar to that found on the northern side of Muttonbird Island at Coffs Harbour, this area hosts a large population of *Ecklonia radiata* interspersed with lushly covered rocks forming gutters, overhangs, bommies and flat algal meadows. There are no sea urchins at this site and hence there is a remarkably healthy cover of marine algae as well as invertebrates (which also offer a good substrate on which algae can germinate and grow). The undescribed genus was found attached to tube worm stalks in large numbers at this site.

Chlorophyta

Halimeda cuneata
Bryopsis indica
Caulerpa geminata
Caulerpa brachypus var. parvifolia
Caulerpa hodgkinsoniae
Cladophora feredayi
Codium lucasii

Phaeophyta

Stypopodium flabelliforme
Lobophora variegata
Dictyota bartayresiana
Dilophus intermedius
Dilophus marginatus
Taonia australasica
Ecklonia radiata

Rhodophyta

Lophothalieae gen. nov. ?
Anotrichium planatum
Gloiocladia minutula
Champia womersleyi
Lomentaria monochlamydea
Callithamnion korffense
Callithamnion arrawarricum
Ceramium vagans
Wrangelia sp.
Beckerella pectinata
Martensia australis
Corallina berteri
Amphiroa anceps
Melanthalia polydactylis
Delisea pulchra
Callophycus tridentifer
Peyssonnelia capensis
Peyssonnelia novae-hollandiae
Tricleocarpa oblongata
Tricleocarpa cylindrica
Galaxaura marginata
Micropeuce mucronata
Heterosiphonia crassipes
Polysiphonia sphaerocarpa
Polysiphonia constricta
Dictyothamnion saltatum
Ceramium sp.
Symphyocladia marchantioides
Dasyclonium incisum
Herposiphonia calva
Gracilaria rhodymenioides
Rhodymenia leptophylla
Hypoglossum harveyanum
Apoglossum unguiculescens Millar
Lophocladia kuetzingii
Balliella repens
Curdiea crassa
Griffithsia japonica
Solieria robusta
Dasya trichophora
Nitophyllum delicatum
Spirocladia barodensis
Pachymenia prostrata
Champia parvula

Minnie Water intertidal **100 m north west of subtidal site**
(near boat launching area)

This intertidal rock platform is extensive and exposed even at high tide. The marine algae on and within its pools are very similar to those species found on the rock platform at Arrawarra further south and is substantially covered with *Hormosira banksii*. This *Hormosira* cover would most likely be annual (as is the case for the Arrawarra area and the entire NSW coast) and disappear during the hot summer months. Unlike the Arrawarra platform, however, the Minnie Water platform has a community of seagrass growing in the shallows on the protected, beach side. Consisting of *Halophila ovalis* and a *Zostera* species, these grow in the sandy areas in 0.5 - 1.5 m depths, but appear to be free of epiphytic marine algae. These seagrass beds would seemingly be vulnerable to trampling by people fossicking on the intertidal platform, but seem to be well established given the present known use of the intertidal area by tourists and locals alike.

Chlorophyta

Ulva lactuca
Valoniopsis pachynema
Cladophoropsis herpestica
Caulerpa geminata
Chlorodesmis major

Phaeophyta

Sargassum spp.
Hinksia mitchelliae
Endarachne binghamiae
Petalonia fascia
Ralfsia verrucosa
Stypopodium flabelliforme
Dictyota acutiloba
Padina crassa Yamada

Rhodophyta

Corallina officinalis
Jania micrarthrodia
Haliptilon roseum
Lophosiphonia prostrata
Chondria infestans
Centroceras clavulatum
Gelidiella sp.
Champia parvula
Polysiphonia scopulorum
Ralfsia verrucosa
Ceramium sp.

Bare Point 29° 49' 612 S; 153° 17' 711 E

A more exposed site than Minnie Waters, but with very much the same submarine topography over similar depths of 12 m. The *Ecklonia radiata* beds are more substantial with a higher density of plants at this site and this would explain the poor diversity of small macrophytic algae under the dense canopy. The understorey is made up of invertebrates including sponges, ascidians and cunjevoi all with a fine covering of turf algae.

Chlorophyta

Halimeda cuneata
Caulerpa geminata
Caulerpa hodgkinsoniae
Codium lucasii

Phaeophyta

Zonaria diesingiana
Ecklonia radiata

Rhodophyta

Martensia australis
Delisea pulchra
Apoglossum unguiculescens
Tricleocarpa oblongata
Galaxaura marginata
Laurencia distichophylla
Haraldiophyllum infossum
Micropeuce mucronata
Amphiroa anceps
Branchioglossum epiphyticum
Heterosiphonia crassipes
Griffithsia japonica
Callophycus tridentifer
Gigartina intermedia

Jones Point 29° 53' 447 S; 153° 16' 577 E

A very shallow (2-5 m), flat-topped rocky reef with *Ecklonia radiata* sporadically placed on sides and bottom along with substantial coverage of *Sargassum* species. Massive amounts of *Amphiroa anceps* covered with the red algal epiphyte *Herposiphonia calva* were observed.

Chlorophyta

Ulva lactuca
Halimeda cuneata
Caulerpa geminata
Caulerpa hodgkinsoniae
Caulerpa peltata

Phaeophyta

Dictyopteris crassinervia
Dilophus intermedius

Stypopodium flabelliforme
Taonia australasica
Lobophora variegata
Dictyota acutiloba
Ecklonia radiata
Sargassum spp.

Rhodophyta

Stenogramme phyllophoroides
Micropeuce mucronata
Coralline berteri
Amphiroa anceps
Amphiroa sp. nov.?
Callophycus tridentifer
Portieria hornemannii
Galaxaura marginata
Delisea pulchra

Species list for the northern section of SIMP observed during this survey

Division **Chlorophyta** (Green algae)

Order **Ulvales**
Family **Ulvaceae**
Ulva lactuca Linnaeus

Order **Derbesiales**
Family **Bryopsidaceae**
Bryopsis indica Gepp & Gepp

Order **Cladophorales**
Family **Cladophoraceae**
Cladophora feredayi Harvey
Cladophoropsis herpestica (Montagne) Howe

Order **Codiales**
Family **Codiaceae**
Codium lucasii Setchell in Lucas

Order **Caulerpales**
Family **Caulerpaceae**
Caulerpa geminata Harvey
Caulerpa brachypus Harvey var. parvifolia (Harvey) Cribb
Caulerpa hodgkinsoniae J. Agardh

Family **Halimedaceae**
Halimeda cuneata Heriung in Krauss

Family **Udoteaceae**
Chlorodesmis major Zanardini

Order **Siphonocladales**
Family **Valoniaceae**
Valoniopsis pachynema (Martens) Boergesen

Division **Phaeophyta** (Brown algae)

Order **Ectocarpales**
Family **Ectocarpaceae**
Hinksia mitchelliae (Harvey) Silva

Order **Chordariales**
Family **Ralfsiaceae**
Ralfsia verrucosa (Areschoug) J. Agardh

Order **Scytosiphonales**
Family **Scytosiphonaceae**
Endarachne binghamiae J. Agardh
Petalonia fascia (Mueller) Kuntze

Order **Dictyotales**
Family **Dictyotaceae**
Dictyopteris crassinervia (Zanardini) Schmidt
Dictyota bartayresiana Lamouroux
Dictyota acutiloba J. Agardh
Dilophus intermedius (Zanardini) Allemder & Kraft

Dilophus marginatus J. Agardh
Lobophora variegata (Lamouroux) Womersley
Padina crassa Yamada
Stypopodium flabelliforme Weber-van Bosse
Taonia australasica J. Agardh
Zonaria diesigiana J. Agardh
Zonaria crenata J. Agardh

Order **Fucales**
Family **Hormosiraceae**
Hormosira banksii (Turner) Decaisne

Family **Sargassaceae**
Sargassum spp

Order **Laminariales**
Family Alariaceae
Ecklonia radiata (C. Agardh) J. Agardh

Division **Rhodophyta** (Red algae)

Order **Nemaliales**
Family **Galaxauraxeae**
Galaxaura marginata (Ellis & Solander) Lamouroux
Tricleocarpa cylindrica (Ellis & Solander) Huisman & Borowitzka
Tricleocarpa oblongata (Ellis & Solander) Huisman & Borowitzka

Order **Gelidiales**
Family **Gelidiaceae**
Beckerella pectinata (Gepp & Gepp) Fan & Papenfuss
Gelidium sp.

Order **Corallinales**
Family **Corallinaceae**
Amphiroa anceps (Lamarck) Decaisne
Amphiroa sp. nov. ?
Corallina berteri Montagne in Harvey
Corallina officinalis Linnaeus
Haliptilon roseum (Lamarck) Decaisne
Jania micrarthrodia Lamouroux

Order **Gigartinales**
Family **Gigartinaceae**
Gigartina intermedia Suringar

Family **Peyssonneliaceae**
Peyssonnelia capensis Montagne
Peyssonnelia novae-hollandiae Kuetzing

Order **Halymeniales**
Family **Halymeniaceae**
Pachymenia prostrata J. Agardh

Family **Solieriaceae**
Callophycus tridentifer Kraft
Solieria robusta (Greville) Kylin

Family **Phyllophoraceae**
Stenogramme phyllophoroides (J. Agardh) Millar

Family **Rhizophyllidaceae**
Portieria hornemannii (Lyngbye) Silva in Silva et al.

Order **Gracilariales**
Family **Gracilariaceae**
Curdiea crassa Millar
Gracilaria rhodymenioides Millar in Abbott
Melanthalia polydactylis J. Agardh

Order **Rhodymeniales**
Family **Rhodymeniaceae**
Gloiocladia minutula (Weber-van Bosse) Millar
Rhodymenia leptophylla J. Agardh

Family **Champiaceae**
Champia parvula (C. Agardh) Harvey
Champia womersleyi Millar

Family **Lomentariaceae**
Lomentaria monochlamydea (J. Agardh) Kylin
Dictyothamnion saltatum Millar

Order **Bonnemaisoniales**
Family **Bonnemaisoniaceae**
Delisea pulchra (Greville) Montagne

Order **Ceramiales**
Family **Ceramiaceae**
Anotrichium planatum Millar
Antithamnion amphigeneum Millar
Balliella repens Huisman
Callithamnion arrawarricum Millar
Callithamnion korfense Millar
Centroceras clavulatum (C. Agardh) Montagne
Ceramium vagans Silva
Ceramium lentiforme Millar
Griffithsia japonica Okamura
Scageliopsis patens Wollaston
Wrangelia plumosa Harvey

Family **Dasyaceae**
Dasya trichophora Millar
Heterosiphonia crassipes (Harvey) Falkenberg

Family **Delesseriaceae**
Acrosorium decumbens (J. Agardh) Kylin
Apoglossum unguiculescens Millar
Branchioglossum epiphyticum Millar & Wynne
Haraldiophyllum infossum Millar
Hypoglossum harveyanum (J. Agardh) Womersley & Shepley
Martensia australis Harvey
Nitophyllum delicatum Millar
Phycodrys australasica Millar
Platysiphonia marginalis Wynne, Millar & Kraft

Family **Rhodomelaceae**
Chondria infestans (Lucas) Millar
Dasyclonium incisum (J. Agardh) Kylin
Herposiphonia calva Millar

Laurencia distichophylla J. Agardh
Lophocladia kuetzingii (Kuntze) Silva
Lophosiphonia prostrata (Harvey) Falkenberg
Lophothalieae gen. nov.
Micropeuce mucronata (Havery) Kylin
Polysiphonia constricta Womersley
Polysiphonia scopulorum Harvey
Polysiphonia sphaerocarpa Boergesen
Spirocladia barodensis Boergesen
Symphyocladia marchantioides (Harvey) Falkenberg

Appendix 4

Australian Museum Invertebrate Species List

This species list represents electronic records held in the Australian Museum's Invertebrate database for the 12 selected marine invertebrate Phyla listed below. These data are represented unmodified from extraction (i.e. without correction or validation of entries).

Phylum	No. of Records
Annelida	215
Bryozoa	16
Chelicerata	47
Coelenterata	13
Crustacea	1063
Echinodermata	1127
Echiura	5
Nemertea	2
Platyhelminthes	43
Porifera	3
Sipuncula	11
Urochordata	8
Grand Total	2553

Australian Museum Marine Invertebrate Database

- Unmodified from extraction, 12 Selected Phylum

Species Name	No. of Records
Acanthodesia savarti	1
Acetes australis	1
Achelia assimilis	1
Achelia australiensis	5
Achelia shepherdi	2
Achelia variabilis	3
Actaea affinis	2
Actaea lobipes	2
Actaea spinosissima	1
Actaea tomentosa	4
Actaecia bipleura	2
Adeonelliopsis mucronata	1
Adeonellopsis foliacea	1
Aega deshayesiana	1
Aethon morelandi	1
Albunea symnista	3
Alella pagelli	1
Alima laevis	1
Allogalathea elegans	1
Allomurraytrema spari	1
Allostichaster polyplax	1
Alope orientalis	1
Alpheus architectus	1
Alpheus australiensis	5
Alpheus distinguendus	1
Alpheus edwardsii	1
Alpheus euphrosyne richardsoni	3
Alpheus facetus	1
Alpheus gracilis	2
Alpheus inopinatus	1
Alpheus lottini	1
Alpheus maindroni	1
Alpheus papillosus	1
Alpheus rapacida	1
Alpheus strenuus cremnus	8
Alpheus strenuus strenuus	1
Alpheus sudara	1
Alpheus sulcatus	2
Alpheus tumidomanus	2
Amaeana trilobata	2
Amblypneustes pachistus	1
Ammothella biunguiculata australiensis	2
Amphinome rostrata	1
Amphipholis squamata	6
Amphiura constricta	17
Amphiura micra	1
Amphiura poecila	1
Anchistus custos	1
Anoplocotyle australis	2
Anoplodactylus evansi	2
Anoplodactylus longiceps	1
Anoropallene valida	1
Antatelson antennatum	3
Antedon incommoda	13
Antedon loveni	13
Anthenea edmondi	5
Aora mortoni	1
Arcania undecimspinosa	2
Archaster typicus	1
Arctides antipodarum	3
Arthropoma cecilli	1
Asterina inopinata	12
Astrobrachion adhaerens	6
Astropecten vappa	2
Astrosierra densus	1
Astrostole rodolphi	2
Atergatis floridus	2
Atergatis latissimus	3
Atergatis ocyroe	5
Athanas granti	4
Athanas indicus	2
Aulacolambrus hoplonotus	1
Australonuphis parateres	8
Australonuphis teres	5
Australoplax tridentata	2
Austrofromia polypora	15
Austrosquilla vercoi	2
Axiopsis appendiculis	2
Axiopsis australiensis	3
Balanus algicola	1
Balanus trigonus	1
Baseodiscus hemprichii	2
Beania hirtisima	2
Bemlos ephippium	4
Benedenia sekii	1
Betaeus australis	1
Bivagina pagrosomi	4
Boccardia chilensis	3
Boccardia polybranchia	1
Bomolochus stocki	2

Australian Museum Marine Invertebrate Database

- Unmodified from extraction, 12 Selected Phylum

Species Name	No. of Records	Species Name	No. of Records
Brachiella buccalis MS	1	Charybdis feriatus	2
Branchiomma nigromaculata	1	Charybdis jaubertensis	1
Brissus agassizii	2	Charybdis natator	1
Calappa hepatica	1	Charybdis truncata	1
Calappa philargius	1	Chasmagnathus laevis	2
Calcinus gaimardii	1	Chelanthura salvia	1
Calcinus imperialis	2	Chelonibia patula	1
Calcipila cornuta	1	Chlorodiella nigra	2
Caleschara denticulata	1	Chondracanthus distortus	1
Caligus aesopus	1	Choricotyle australiensis	2
Caligus asymmetricus	2	Chthamalus antennatus	4
Caligus biseriodentatus	3	Cilunculus australiensis	1
Caligus bonito	1	Cirolana australiense	1
Caligus epidemicus	1	Cirolana concinna	1
Caligus epinepheli	1	Cirolana solitaria	9
Caligus kurochkini	3	Cirriformia capensis	4
Caligus longipedis	1	Cirriformia tentaculata	4
Caligus pagrosomi	1	Cladolabes perspicillum	2
Caligus sclerotinosus	4	Clarkcoma pulchra	17
Caligus spinosus	1	Clarksoma bollonsi	8
Caligus truncatogenitalis	1	Clavellopsis parasargi	3
Caligus willungae	1	Clavellopsis sargi	1
Callianassa australiensis	4	Clibanarius taeniatus	2
Callioplana marginata	1	Clibanarius virescens	2
Callipallene emaciata micrantha	3	Clypeaster tumidus	2
Caphyra curtipes	2	Clypeaster virescens	1
Caphyra unidentata	1	Cohenia sp x1	2
Caphyra yookadai	6	Cohenia sp x	3
Caprella danilevskii	1	Cohenia sp x1	4
Caprella equilibra	3	Coitocaecum gymnophallum	2
Caprella inermis	5	Colochirus crassus	1
Caprella penantis	2	Colochirus quadrangularis	5
Carpilius convexus	1	Comanthina nobilis	1
Carpilius maculatus	1	Comanthus parvicirrus	2
Carpilodes cinctinan	1	Comatula cratera	3
Carpilodes rugatus	6	Comatula purpurea	5
Catoessa ambassae	6	Conchoderma virgata	2
Catophragmus polymerus	1	Coronula diadema	1
Cenolia glebosus	12	Coscinasterias muricata	26
Cenolia tasmaniae	5	Creniola saurida	2
Cenolia trichoptera	11	Crisina radians	1
Centrostephanus rodgersii	12	Crucigera inconstans	2
Ceratonereis aequisetis	3	Cryptopelta granulifera	2
Chalinissa communis	1	Cryptopodia spatulifrons	2
Chamaesipho columna	1	Ctenocheles collini	1

Australian Museum Marine Invertebrate Database

- Unmodified from extraction, 12 Selected Phylum

Species Name	No. of Records
Cucuvitrum rowei	2
Cunina duplicata	1
Cyclograpsus punctatus	1
Cyclops australis	1
Cylindroleberidid sp 1	1
Cylindroleberidid sp 2	1
Cylindroleberidid sp MS	2
Cylindroleberidid sp NL	6
Cylindroleberidid sp NS	6
Cylindroleberidid sp NS1	2
Cymodetta gambosa	1
Cymothoa vicina	1
Cypridinodes favus	7
Cypridinodes nsp CH	1
Cypridinodes nsp L	1
Cypridinodes sp C	1
Cypridinodes sp CH	12
Cypridinodes sp CRE	1
Cypridinodes sp GS	1
Cypridinodes sp L	7
Dactylostomum gracile	1
Dardanus crassimanus	1
Dardanus deformis	1
Dardanus haani	1
Dardanus megistos	3
Dardanus setifer	4
Diadema palmeri	2
Diadema savignyi	13
Diaptomus orientalis	2
Dictenophiura ctenophora	5
Didemnum moseleyi	3
Didemnum psammatodes	1
Diogenes custos	1
Diogenes senex	2
Diopatra dentata	3
Dorometra nana	4
Dromidiopsis australiensis	3
Dromidiopsis excavata	1
Echinaster colemani	2
Echinaster luzonicus	4
Echinometra mathaei	13
Echinoneus cyclostomus	1
Echinothrix calamaris	3
Electra pilosa	1
Encotyllabe pagrosomi	2

Species Name	No. of Records
Endeis flaecida	4
Ephippias endeavouri	1
Ergasilus australiensis	2
Erilepturus acanthopagri	1
Eriphia scabricula	5
Eriphia sebana	9
Etisodes electra	1
Etisus anaglyptus	1
Euantedon sanuki	1
Eumedonus niger	5
Eumedonus vicinus	1
Eunice antennata	2
Eunice aphroditois	7
Eunice fuscafasciata	1
Eunice tentaculata	3
Eunice tubifex	1
Euplax tridentata	6
Euryale aspera	1
Eurythoe complanata	9
Exoediceros fossor	1
Fibularia oblonga	1
Fungia fungites	1
Galeolaria caespitosa	1
Geoplana coerulea	1
Geoplana variegata	1
Gippsia jonesae	2
Gladioferens brevicornis	1
Glossobius anctus	1
Golfingia misakiana	3
Gonatonotus pentagonus	1
Goniastrea australensis	1
Goniocidaris tubaria	3
Goniopara tenuidens	1
Gonodactylus chiragra	1
Gonodactylus platysoma	1
Grapsus variegatus	1
Hadrachaeta aspeta	6
Halicarcinus australis	3
Halicarcinus ovatus	8
Haliotrema spariensis	7
Harmothoe charlottae	1
Harmothoe dictyophora	1
Harpiosquilla melanoura	4
Hatschekia pagrosomi	2
Helice leachii	16

Australian Museum Marine Invertebrate Database

- Unmodified from extraction, 12 Selected Phylum

Species Name	No. of Records
Heliocidaris erythrogramma	30
Heliocidaris tuberculata	5
Heloecius cordiformis	30
Helograpsus haswellianus	1
Hemiaegina minuta	17
Hemipodus australiensis	1
Hemisquilla stylifera	1
Herdmania momus	1
Heteropanope serratifrons	3
Hiantopora ferosa	1
Hippa adactyla	2
Hippa ovalis	2
Hippa pacifica	2
Hippolysmata ensirostris	1
Hippolysmata vittata	1
Hippomedon rodericki	1
Hircella cornigera	7
Hirsutonuphis mariahirsuta	4
Holopneustes inflatus	2
Holopneustes purpurascens	18
Holothuria arenicola	4
Holothuria difficilis	1
Holothuria dofleini	1
Holothuria hilla	6
Holothuria impatiens	1
Holothuria leucospilota	4
Holothuria lineata	3
Holothuria pervicax	2
Holothuria rigida	2
Holothuria scabra	1
Homola orientalis	1
Huenia bifurcata	3
Hyastenus elatus	1
Hyboscolex dicranochaetus	2
Hydroides brachyacantha	1
Hydroides brachyacanthus	3
Hymeniscus varius	1
Ibacus incisus	1
Ichnopus sp 20	7
Idanthyrsus pennatus	1
Ixa inermis	3
Jasus hugelii	1
Jasus verreauxi	1
Jonas leuteanus	1
Labidodemas semperianum	4

Species Name	No. of Records
Laganum depressum	1
Lamellodiscus acanthopagri	2
Lamellodiscus major	1
Lamellodiscus pagrosomi	2
Lamellodiscus squamosus	2
Lamprometra palmata	35
Lanice bidewa	2
Lanicides tribranchiata	3
Laomedia healyi	1
Latreillopsis petterdi	1
Lepas anserifera	1
Lepeophtheirus sekii	1
Leptastrea purpurea	1
Leptodius exaratus	6
Leptodius sanguineus	2
Leptograpsus variegatus	3
Leptomithrax parvispinosus	6
Leptomithrax sternocostulatus	3
Leptomithrax tuberculatus	2
Leptosynapta dolabrifera	1
Leptosynapta latipatina	1
Lernanthropus atrox	4
Lernanthropus gisleri	2
Lernanthropus mollis	1
Lernanthropus mugilii	2
Lernanthropus paenulatus	1
Leucosia anatum	1
Leucosia leslii	1
Leucothoe boolpooli	1
Leucothoe commensalis	2
Liomera cinctimana	9
Liomera rugata	1
Lobochesis bibrancha	1
Loimia ingens	1
Lophosquilla costata	1
Lophozozymus pictor	3
Luidia hardwicki	1
Lupocyclus philippinensis	1
Lyreidus tridentatus	1
Lysidice collaris	1
Lysidice ninetta	1
Lysilla jennacubinae	2
Lysiosquilla latrifrons brazieri	1
Lysiosquilla tredecimdentata	1
Macrobrachium novaehollandiae	1

Australian Museum Marine Invertebrate Database

- Unmodified from extraction, 12 Selected Phylum

Species Name	No. of Records
Macrobrachium tolmerum	1
Macrophiothrix lampra	8
Macrophiothrix rhabdota	1
Macrophthalmus punctulatus	1
Macrophthalmus setosus	4
Magelona dakini	1
Marphysa macintoshi	1
Matuta planipes	5
Melita australis	1
Melitodes densa	4
Menaethius orientalis	1
Mercierella enigmatica	1
Mesochaetopterus minutus	1
Mespilia globulus	1
Metalia latissima	1
Metapenaeopsis mogiensis	1
Metapenaeopsis novae-guineae	2
Metapenaeopsis novaeguineae	1
Metapenaeopsis palmensis	2
Metapenaeus macleayi	3
Metaprotella haswelliana	2
Metopograpsus thukuhar	2
Mictyris livingstonei	3
Mictyris longicarpus	18
Mictyris platycheles	3
Mopsella zimmeri	1
Mothocya renardi	1
Myzostoma fissum	1
Nagada uwedoae	2
Namalycastis abiuma	2
Natatolana arrama	3
Natatolana bulba	3
Natatolana gorung	1
Natatolana kahiba	4
Natatolana nammuldi	2
Natatolana pellucida	2
Natatolana rusteni MS	1
Natatolana vieta	2
Naxia spinosa	1
Naxia tumida	5
Naxioides robillardi	2
Neanthes cricognatha	1
Neobrachiella chevreuxii	1
Neobrachiella lata	1
Neoleprea macrocercus	5

Species Name	No. of Records
Neopomatus uschakovi	2
Nepanthia gracilis	1
Nepanthia nigrobrunnea	13
Nephtys australiensis	2
Nereis persica	1
Nereis thompsoni	3
New gen C nsp x	2
New gen III sp I	11
New gen IV sp RR	6
Nicolea amnis	5
Niphargus australiensis	1
Nymphon aequidigitatum	1
Nymphon molleri	3
Nymphon singulare	1
Nymphopsis acinacispinatus	5
Ochetostoma australiense	4
Ochetostoma baronii	1
Octolasmis hoeki	1
Ocypode ceratophthalma	25
Ocypode cordimana	6
Odontodactylus cultrifer	1
Odontodactylus japonicus	2
Odontodactylus scyllarus	1
Oenone fulgida	1
Oligometra serripinna	3
Oligometrides adeonae	3
Ommatocarcinus macgillivrayi	1
Onuphis mariahirsuta	8
Onuphis teres	10
Opecoelus lobatus	1
Ophelia elongata	1
Ophiacantha alternata	13
Ophiactis luteomaculata	1
Ophiactis macrolepidota	3
Ophiactis modesta	1
Ophiactis resiliens	26
Ophiactis savignyi	19
Ophiarachna megacantha	2
Ophiarachnella gorgonia	2
Ophiarachnella ramsayi	9
Ophidiaster confertus	13
Ophiocoma dentata	4
Ophiocoma endeani	34
Ophiomaza cacaotica	4
Ophiomyxa australis	4

Australian Museum Marine Invertebrate Database

- Unmodified from extraction, 12 Selected Phylum

Species Name	No. of Records
Ophionereis schayeri	14
Ophionereis semoni	1
Ophiopeza spinosa	1
Ophioplocus imbricatus	4
Ophiopsammus assimilis	3
Ophiothela danae	15
Ophiothrix acestra	16
Ophiothrix caespitosa	15
Ophiothrix ciliaris	35
Ophiothrix spongicola	1
Oratosquilla australis MS	2
Oratosquilla australis MS	2
Oratosquillina interrupta	1
Oropallene minor	1
Ovalipes australiensis	2
Oxycomanthus comanthipinna	5
Oxycomanthus perplexum	8
Oxycomanthus perplexus	1
Ozius truncatus	4
Pachycheles granti	10
Pachycheles sculptus	1
Pachygrapsus laevimanus	2
Pachygrapsus transversus	3
Paguristes squamosus	1
Pagurus janitor	1
Pagurus sinuatus	1
Palaemon debilis	2
Palola siciliensis	4
Palythoa australiensis	1
Panulirus homarus	2
Panulirus japonicus	2
Panulirus longipes	1
Paradeutella echinata	1
Paradoloria sp FC	5
Paraergasilus acanthopagri	1
Paragiopagurus diogenes	1
Paragrapsus laevis	4
Paralepas tuberosa	1
Paralysianopsis sp 102	1
Paramithrax barbicornis	5
Paramolopsis boasi	1
Paranepanthia grandis	5
Parapallene australiensis	1
Parapenaeopsis cornuta cornuta	1
Parapenaeopsis cornuta maxillipedo	1

Species Name	No. of Records
Parastichopora vanna	1
Parelasmopus echo	1
Parschisturella sp 47	5
Parthenope longimanus	1
Parthenope valida	1
Patiriella calcar	120
Patiriella gunnii	20
Penaeopsis macleayi	1
Penaeus canaliculatus	1
Penaeus indicus	1
Penaeus longistylus	1
Penaeus macleayi	1
Penaeus merguiensis	1
Penaeus monodon	2
Penaeus plebejus	1
Pentagonaster dubeni	19
Percnon planissimum	4
Periclimenes brevicarpalis	2
Periclimenes psamathe	1
Perinereis akuna	3
Perinereis amblyodonta	11
Perinereis barbara	6
Perinereis calmani	2
Perinereis mictodontoides	1
Petalomera lamellata	1
Petalomera lateralis	4
Petricia vernicina	12
Petrolisthes fimbriatus	1
Petrolisthes lamarckii	4
Phascolosoma scolops	2
Phascolosoma stephensoni	4
Philyra undecimspinosa	1
Phisidia echuca	1
Phronima sedentaria	1
Phrosina semilunata	1
Phyllacanthus parvispinus	26
Phymodius ungulatus	1
Pilumnopeus serratifrons	1
Pilumnus acer	1
Pilumnus rufopunctatus	2
Pilumnus spinicarpus	1
Pilumnus terraereginae	6
Pilumnus tomentosus	1
Pilumnus vestitus	5
Pinnotheres pisum	1

Australian Museum Marine Invertebrate Database

- Unmodified from extraction, 12 Selected Phylum

Species Name	No. of Records
Pista violacea	1
Placophiothrix spongicola	44
Plagusia capensis	4
Plagusia glabra	7
Planes cyaneus	2
Planes minutus	2
Platynereis dumerilii antipoda	1
Platynereis polyscalma	1
Plectaster decanus	11
Plesiocolochirus australis	4
Plesiocolochirus ignava	3
Plesionika spinipes	1
Pocillopora damicornis	1
Polyabroides australis	2
Polyabroides multispinosus	4
Polycirrus disjunctus	3
Polycirrus nephrosus	1
Polycirrus tesselatus	2
Polydora protuberata	1
Porcellana dispar	1
Porcellana gravelei	8
Porites lichen	1
Portunus argentatus	2
Portunus orbitosinus	1
Portunus pelagicus	7
Portunus sanguinolentus	3
Potamilla reniformis	1
Prionocidaris australis	5
Prionocidaris callista	15
Processa australiense	1
Protula palliata	2
Psammocinia rugosa	1
Pseudoboletia indiana	9
Pseudoboletia maculata	4
Pseudoceros albomarginatus	1
Pseudoceros luteus	1
Pseudocolochirus violaceus	1
Pseudocycnoides armatus	1
Pseudodistoma inflatum	1
Pseudoeucanthus australiensis	2
Pseudolana concinna	2
Pseudosquilla stylifera	1
Pseudotryphosa sp 45	5
Pterochondria alatalongicollis	1
Pterocypridina sp NP1	1

Species Name	No. of Records
Ptilometra australis	18
Pycnogonum aurilineatum	1
Pycnothea flynni	3
Pyura praeputialis	1
Pyura stolonifera	1
Ranina ranina	5
Reteterebella aloba	2
Salmaciella dussumieri	3
Salmacina dysteri	3
Salmacis belli	1
Salmacis sphaeroides	7
Schizoporella jacksoniensis	1
Scoloplos cylindrifer	1
Scoloplos simplex	3
Scopimera inflata	1
Scopimera inflata	6
Scopimera inflata	1
Scuticella plagiostoma	1
Scylla serrata	1
Sesarma Erythrodactyla	20
Sesarma fasciatum	1
Sicyonia cristata	1
Siphonosoma cumanense	1
Skogsbergia nsp Ws	1
Skogsbergia sp CH	3
Skogsbergia sp CHP	3
Skogsbergia sp CHS	10
Smittina latisinuata	1
Smittoidea calceolus	1
Solenocera choprai	1
Spasmopallene tubirostris	1
Spiraserpula lineatuba	1
Spirobranchus polytrema	2
Spirobranchus tetraceros	3
Squilla laevis	3
Stellaster equestris	3
Stenopus hispidus	1
Stenopus robustus	2
Stenothoe miersi	1
Stichopus ellipes	3
Streblosoma minutum	2
Styela etheridgii	1
Stylopallene dorsospinum	1
Stylopallene tubirostres	1
Syllis corruscans	1

Australian Museum Marine Invertebrate Database

- Unmodified from extraction, 12 Selected Phylum

Species Name	No. of Records
Synalpheus fossor	1
Synalpheus tumidomanus	2
Taeniogyrus australianus	4
Tamaria marmorata	3
Tanystylum hooperi	3
Temnopleurus alexandri	9
Temnopleurus toreumaticus	2
Terebella pappus	8
Terebella tantabiddycreekensis	7
Tetilla dactyloidea	1
Thalamita admete	1
Thalamita crenata	1
Thalamita picta	2
Thalamita stimpsoni	2
Thelepus extensus	2
Thor amboinensis	1
Thormora jolli	1
Thyone okeni	6
Thysanote exornata	1
Tiarinia mooloolah	5
Tittakunara katoa	1
Toxopneustes pileolus	1
Trachypenaeus curvirostris	6
Trapezia septata	1
Trigonoplax spathulifera	1
Tripneustes gratilla	31
Trochodota maculata	1
Tropiometra afra	52
Tryphosella camela	6
Tryphosella sp 485	5
Tryphosella sp 486	1
Tumulosternum longimanus	1
Tumulosternum parvispinosus	6
Uca marionis	1
Uca marionis vomeris	26
Uca perplexa	1
Uca polita	1
Uca vomeris	20
Unicolax chrysophryenus	4
Uniophora granifera	8
Urohaustorius metungi	1
Uterovesiculurus yamagutii	1
Valettiopsis sp 184	1
Vargula nsp W1	6
Vargula sp CH	2
Vargula sp F	1
Vargula sp NEC	11
Vargula sp NVS	8
Vargula sp w1	6
Vargula tubulata	13
Vittaticella praetenuis	1
Waldeckia sp 68(b)	13
Waldeckia sp 68(d)	6
Weltneria aapta	1
Xanthias astromanus	1
Xanthias atromanus	3
Xanthias lamarcki	3
Xanthias notatus	6
Xantho crassimanus	2
Xenobalanus globicipitis	1
Zosimus aeneus	2

Number of Unique Taxa	**691**
Number of Records	**2553**

Appendix 5.1

Australian Museum Finfish Species List (unverified)

This species list represents electronic records held in the Australian Museum's Finfish database. These data are presented in an unmodified form from that extraction (i.e. without correction or validation of entries).

Australian Museum Finfish Database - Unmodified Species List

Species Name	No. of Records	Species Name	No. of Records
Abudefduf bengalensis	1	Apogon limenus	1
Abudefduf saxatilis	9	Apogon nigripinnis	5
Abudefduf sordidus	4	Apogon semiornatus	3
Acanthistius cinctus	1	Apogonops anomalous	2
Acanthistius ocellatus	22	Aprion microlepis	1
Acanthopagrus australis	10	Aprion roseus	1
Acanthurus bleekeri	2	Aprion virescens	16
Acanthurus dussumieri	5	Aptychotrema bougainvillii	1
Acanthurus grammoptilus	3	Aptychotrema rostrata	7
Acanthurus nigrofuscus	1	Arenigobius bifrenatus	9
Acanthurus nigrofuscus?	1	Arenigobius frenatus	7
Acanthurus spinifrons	2	Arenigobius leftwichi	1
Acanthurus triostegus	6	Argentina australiae	1
Acanthurus troughtoni	1	Argyrops spinifer	1
Acanthurus xanthopterus	2	Arius graeffei	21
Acentrogobius decoratus	1	Arius graeffei(jun.synupdat)	19
Achirus hedleyi	1	Arnoglossus fisoni	2
Achoerodus viridis	1	Arnoglossus fisoni?	1
Aeoliscus strigatus	1	Arnoglossus japonicus	1
Aesopia cornuta	3	Arothron firmamentum	2
Aesopia microcephalus	2	Arothron hispidus	4
Albula neoguinaica(junsynupd)	1	Arothron manillensis	1
Alectis ciliaris	2	Arothron nigropunctatus	1
Alepisaurus ferox	1	Arothron stellatus	2
Allotaius spariformis	4	Arothron stellatus?	1
Alopias superciliosus	1	Arrhamphus sclerolepis	20
Ambassis agassizi	9	Arripis trutta	2
Ambassis agassizi(jun.synupdte)	2	Aseraggodes haackeanus	2
Ambassis jacksoniensis	22	Aseraggodes macleayanus	2
Ambassis marianus	9	Aspasmogaster costatus	1
Ambassis marianus(jun.synupdat)	1	Aspasmogaster tasmaniensis	6
Ambiserrula jugosa	1	Asterropteryx semipunctatus	3
Amphichaetodon howensis	1	Astronesthes lucifer	1
Amphiprion akindynos	2	Asymbolus analis	5
Amphiprion latezonatus	5	Atractoscion aequidens	1
Amphotistius kuhlii	1	Atule mate	4
Anchisemus multistriatus	1	Atypichthys strigatus	9
Anguilla australis	5	Aulacocephalus temmincki	1
Anguilla reinhardtii	10	Aulopus curtirostris	1
Anoplocapros lenticularis	1	Aulopus purpurissatus	7
Anoplocapros lentiginosus	1	Aulostomus chinensis	1
Antennarius coccineus	1	Balistoides viridescens	2
Antennarius pictus	1	Banjos banjos	2
Antennarius striatus	12	Bassanago bulbiceps	1
Anthias squamipinnis	2	Bathygobius cocosensis	25
Antigonia rhomboidea	2	Bathygobius fuscus	4
Antigonia rubescens	3	Bathygobius kreffti	11
Antigonia rubicunda	6	Bathygobius watkinsoni	2
Antipodocottus elegans	2	Bathystethus cultratus	1
Antipodocottus galatheae	1	Batrachomoeus dubius	11
Aphareus rutilans	5	Bembras japonicus	1
Apistus carinatus	7	Bembrops aethalea	2
Aploactis aspera	7	Bembrops platyrhynchus	3
Aploactisoma milesii	1	Benthodesmus elongatus	1
Apogon cookii	1	Benthosema suborbitale	1
Apogon ellioti	2	Beryx splendens	2
Apogon fasciata	3	Bodianus frenchii	1
Apogon fasciatus	2	Bodianus perditio	1

Australian Museum Finfish Database

Species Name	No. of Records
Bodianus vulpinus	3
Bothus myriaster	1
Brachaelurus waddi	9
Brachaluteres jacksonianus	3
Brachaluteres taylori	2
Brachirus brachypterus	1
Brama brama	1
Branchiostegus serratus	3
Butis butis	3
Caesio cuning	1
Caesioperca lepidoptera	1
Callimucenus macdonaldi	1
Callionymus calcaratus	6
Callionymus japonicus	4
Callionymus kaianusmoretonensis	1
Callionymus limiceps	6
Callionymus macdonaldi	3
Callionymus macdonaldi?	2
Callionymus moretonensis	4
Callogobius depressus	2
Cantherhines longicaudus	1
Cantherhines pardalis	2
Cantheschenia longipinnis	5
Canthigaster callisternus	2
Canthigaster coronatus	1
Canthigaster valentini	1
Carangoides caeruleopinnatus	4
Carangoides chrysophrys	6
Carangoides ferdau	1
Carangoides fulvoguttatus	2
Carangoides orthogrammus	1
Caranx malabaricus	1
Caranx melampygus	1
Caranx nobilis	1
Caranx papuensis	1
Caranx sexfasciatus	4
Caranx sexfasciatus(j.s.u.)	1
Carcharhinus altimus	1
Carcharhinus longimanus	1
Centroberyx affinis	1
Centrobranchus andreae	1
Centrobranchus nigroocellatus	1
Centropogon australis	33
Centropyge tibicen	2
Centropyge vroliki	1
Cepola australis	4
Ceratoscopelus warmingii	1
Chaetoderma penicilligera	1
Chaetodon auriga	1
Chaetodon flavirostris	2
Chaetodon guentheri	4
Chaetodon kleinii	1
Chaetodon lunula	1
Chaetodon setifer	1
Chaetodon vagabundus	1
Chaetodontoplus ballinae	1
Champsodon machaeratus	2
Champsodon nudivittis	2

Species Name	No. of Records
Chanos salmoneus	2
Chascanopsetta lugubris	2
Chaunax fimbriatus	4
Chaunax penicillatus	5
Cheilinus bimaculatus	3
Cheilodactylus fuscus	3
Cheilodactylus vestitus	3
Chelidonichthys kumu	2
Chelmon rostratus	1
Chelmonops howensis	2
Chelmonops truncatus	3
Chilomycterus reticulatus	2
Chironemus marmoratus	12
Choerodon ommopterus	4
Choerodon venustus	4
Chromis abyssicola	1
Chromis hypsilepis	1
Chromis weberi	1
Chromis weberi?	1
Chrysiptera cyanea	1
Chrysophrys auratus	2
Cirrhitichthys aprinus	1
Cleidopus gloriamaris	6
Clupea hypselosoma	1
Clupea novae-hollandiae	3
Cnidoglanis macrocephalus	3
Coelorinchus mirus	1
Conger cinereus	4
Conger verreauxi	1
Conger wilsoni	3
Cookeolus boops	1
Cookeolus japonicus	1
Cookeolus macracanthus	1
Coris bulbifrons	1
Coris dorsomacula	2
Coris picta	1
Coryphaena hippurus	1
Crapatalus arenarius	4
Craterocephalus marjoriae	1
Crenimugil crenilabis	1
Crinodus lophodon	9
Cristiceps aurantiacus	4
Cristiceps pataecoides	2
Crossorhinus ornatus	1
Crossorhombus azurea	2
Crossorhombus azureus	1
Crossorhombus valde-rostratus	7
Crossorhombus valde-rostratus?	1
Cryptocentroides cristatus	3
Cryptocentroides cristatus(jun.syn.upd)	9
Cryptocentrus cristatus(jun.syn.upd)	2
Ctenochaetus binotatus	1
Cubiceps capensis?	2
Cubiceps squamiceps	2
Cybiosarda elegans	1
Cynoglossus maculipinnis	4
Cynoglossus maculipinnis?	1
Cyttopsis roseus	1

Australian Museum Finfish Database

Species Name	No. of Records
Dactylophora nigricans	5
Dactyloptena orientalis	2
Dactyloptena papilio	3
Dactylopterus orientalis	2
Dactylopus dactylopus	1
Dascyllus trimaculatus	1
Deania quadrispinosa	2
Decapterus macarellus	1
Decapterus macrosoma	1
Decapterus russelli	5
Dendrochirus brachypterus	3
Dendrochirus zebra	1
Dentex spariformis	1
Dentex tumifrons	2
Dermatopsis macrodon	10
Dicotylichthys punctulatus	2
Diodon holocanthus	5
Diogenichthys atlanticus	1
Dipterygonotus balteatus	5
Diretmus argenteus	1
Ebosia bleekeri	2
Echeneis naucrates	3
Echidna nebulosa	2
Echidna polyzona	1
Echinorhinus brucus	1
Electrona risso	1
Ellerkeldia profunda	1
Ellogobius stigmaticus	3
Emmelichthys struhsakeri	1
Engraulis australis	1
Engyprosopon bleekeri	2
Engyprosopon bleekeri?	4
Engyprosopon grandisquama	8
Engyprosopon macroptera	2
Engyprosopon macropterus	1
Engyprosopon maculipinnis	1
Enneapterygius atrogulare	21
Enneapterygius hemimelas	3
Enoplosus armatus	14
Epigonus denticulatus	1
Epigonus robustus	1
Epinephelus caeruleopunctatus	1
Epinephelus daemelii	4
Epinephelus ergastularius	7
Epinephelus fasciatus	2
Epinephelus lanceolatus	1
Epinephelus malabaricus	1
Epinephelus morrhua	1
Epinephelus octofasciatus	1
Epinephelus radiatus	1
Epinephelus rivulatus(j.s.u.)	1
Epinephelus septemfasciata	1
Epinephelus tauvina	3
Epinephelus undulatostriatus	2
Epinephelus woorei	1
Eptatretus cirrhatus	4
Erosa erosa	7
Etrumeus teres	2

Species Name	No. of Records
Euclichthys polynemus	2
Euleptorhamphus viridis	1
Euristhmus lepturus	2
Eurypegasus draconis	1
Euthynnus affinis	1
Eviota viridis	2
Exocoetus volitans	1
Favonigobius exquisitus	11
Favonigobius lateralis	8
Favonigobius tamarensis	6
Fistularia commersonii	7
Fistularia petimba	2
Foetorepus calauropomus	3
Fowleria variegata	1
Galaxias maculatus	4
Galaxias olidus	5
Galeus boardmani	1
Gambusia affinis	1
Gambusia holbrooki	14
Gasterochisma melampus	1
Gempylus serpens	1
Gerres ovatus	1
Gerres subfasciatus	3
Gerres subfasciatusj.s.u.	7
Girella cyanea	2
Girella tricuspidata	14
Glaucosoma scapulare	5
Glyphidodontops flavipinnis	1
Glyphidodontops glaucus	1
Glyphidodontops leucopomus	3
Glyphidodontops rex	1
Gnathagnus elongatus	1
Gnathagnus innotabilis	2
Gnathanodon speciosus	1
Gnathodentex aureolineatus	1
Gnatholepis inconsequens	1
Gnathophis longicauda	2
Gnathophis umbrellabia	2
Gobiodon quinquestrigatus	1
Gobiomorphus australis	38
Gobiomorphus coxii	13
Gobiopterus semivestita	3
Gobiopterus semivestitus	2
Gonorynchus greyi	1
Grammatobothus pennatus	9
Grammatobothus polyophthalmus	2
Grammatorcynus bicarinatus	1
Gymnocranius ?elongatus	1
Gymnothorax chilospilus	1
Gymnothorax cribroris	2
Gymnothorax eurostus	1
Gymnothorax obesus	1
Gymnothorax prasinus	9
Gymnothorax undulatus	2
Halichoeres margaritaceus	2
Halichoeres marginatus	2
Halichoeres nebulosus	1
Halichoeres poecila	1

Australian Museum Finfish Database

Species Name	No. of Records	Species Name	No. of Records
Halichoeres prosopeion	3	Ichthyscopus barbatus	1
Halieutaea brevicauda	8	Ichthyscopus lebeck	2
Halophryne diemensis	1	Ichthyscopus sannio	3
Helicolenus papillosus	1	Inimicus caledonicus	2
Helicolenus percoides	2	Insidiator jugosus	1
Hemiramphus robustus	1	Iso rhothophilus	1
Heniochus acuminatus	2	Istiblennius edentulus	10
Heniochus diphreutes	3	Istiblennius meleagris	17
Heptranchias perlo(juniorsynupdate)	1	Johnius vogleri	1
Herklotsichthys castelnaui	5	Kentrocapros flavofasciatus	1
Herklotsichthys koningsbergeri	1	Kuhlia mugil	1
Heteroclinus heptaeolus	1	Kuhlia taeniura	3
Heteroclinus longicaudus	1	Kuiterichthys furcipilis	2
Heteroclinus nasutus	6	Kyphosus sydneyanus	1
Heteroclinus roseus	6	Kyphosus sydneyanus(j.s.u.)	1
Heteroclinus whiteleggii	27	Lactoria cornuta	1
Heteroclinus whitleyi	5	Lactoria fornasini	2
Heterodontus galeatus	1	Lagocephalus cheesemani	2
Heterodontus portusjacksoni	1	Lagocephalus inermis	2
Heteropriacanthus cruentatus	1	Lagocephalus sceleratus	3
Hexanchus griseus	1	Lampanyctus alatus	1
Himantura uarnak	1	Lampanyctus ater	1
Hippichthys heptagonus	6	Lampris guttatus	2
Hippichthys penicillus	1	Leiognathus moretoniensis	5
Hirundichthys oxycephalus	1	Leiognathus mortoniensis	2
Hirundichthys speculiger	3	Lepadichthys caritus	1
Histiophryne bougainvilli	1	Lepadichthys frenatus	1
Hologymnosus doliatus	1	Lepidoblennius haplodactylus	13
Holotrachys major	1	Lepidoblennius haplodactylus?	1
Hoplichthys citrinus	1	Lepidoperca caesiopercula	2
Hoplichthys filamentosus	2	Lepidoperca pulchellus	1
Hoplichthys haswelli	3	Lepidotrigla argus	4
Hoplichthys ogilbyi	2	Lepidotrigla grandis	1
Hoplostethus atlanticus	1	Lepidotrigla papilio	3
Hoplostethus intermedius	1	Lepidotrigla umbrosa	6
Hoplostethus melanopus	2	Lepidotrigla vanessa	1
Hydrolagus lemures	1	Leptoscarus vaigiensis	1
Hydrolagus ogilbyi	4	Lestidium nudum	1
Hygophum hygomii	1	Lethrinus nematacanthus	2
Hygophum proximum	1	Lethrinus rubrioperculatus	1
Hygophum reinhardtii	3	Limnichthys fasciatus	1
Hymenocephalus longiceps	1	Lioscorpius longiceps	1
Hyperlophus vittatus	7	Lissocampus runa	6
Hypnos monopterygium	5	Liza argentea	8
Hypogaleus hyugaensis	1	Lobotes surinamensis	4
Hypoplectrodes annulatus	1	Lophiodes mutilus	4
Hypoplectrodes maccullochi	5	Lophiodes naresi	1
Hypoplectrodes nigrorubrum	1	Lophiomus setigerus	2
Hyporhamphus ardelio	3	Lophonectes gallus	7
Hyporhamphus australis	1	Lotella phycis	1
Hyporhamphus dussumieri	1	Lotella rhacinus	3
Hyporhamphus regularis	3	Lubricogobius ornatus	1
Hypseleotris compressa	29	Lutjanus amabilis	1
Hypseleotris compressa?	1	Lutjanus argentimaculatus	1
Hypseleotris galii	18	Lutjanus carponotatus	1
Hypseleotris galli	5	Lutjanus fulviflamma	1
Hypseleotris klunzingeri	2	Lutjanus kasmira	1
Hypseleotris klunzingeri?	1	Lutjanus malabaricus	6

Australian Museum Finfish Database

Species Name	No. of Records	Species Name	No. of Records
Lutjanus russelli	4	Myxus pettardi	1
Lutjanus sebae	4	Nannoperca oxleyana	5
Luvarus imperialis	1	Narcine tasmaniensis	1
Maccullochella macquariensis	3	Nemadactylus douglasii	3
Macquaria colonorum	1	Nemadactylus douglassi	1
Macquaria colonorum(jun.syn.upd)	7	Nemadactylus valenciennesi	1
Macquaria colonorum?	2	Nematops macrochirus?	1
Macquaria novemaculeata	2	Nemipterus aurifilum	3
Macquaria novemaculeata(jun.sy.up)	3	Nemipterus theodorei	8
Macropharyngodon choati	1	Neoniphon sammara	1
Macroramphosus elevatus	3	Neosebastes incisipinnis	7
Macroramphosus gracilis	2	Neosebastes thetidis	1
Macroramphosus molleri	1	Nettastoma solitarium	1
Macroramphosus scolopax	1	Nomeus gronovii	2
Macrorhamphosodes uradoi	1	Norfolkia striaticeps	1
Malacocephalus laevis	1	Notesthes robusta	3
Malakichthys elegans	1	Notesthes robusta(jun.syn.update)	1
Marilyna pleurosticta	2	Notolabrusjun.syn.upd. gymnogenis	11
Maroubra perserrata	1	Notolychnus valdiviae	2
Masturus lanceolatus	1	Notopogon xenosoma	1
Maxillicosta lopholepis	3	Novaculichthys jacksoniensis	1
Maxillicosta scabriceps	1	Odax cyanomelas	3
Maxillicosta whitleyi	5	Omobranchus anolius	5
Mecaenichthys immaculatus	5	Ophisurus serpens	4
Megalaspis cordyla	1	Opistognathus jacksoniensis	5
Melambaphes zebra	1	Optivus elongatus	2
Melanotaenia duboulayi	9	Orectolobus ornatus	4
Melanotaenia fluviatilis	10	Ostracion cornutus	1
Melanotaenia nigrans	1	Ostracion diaphanus	1
Melanotaenia splendida	7	Ostracoberyx paxtoni	1
Mene maculata	3	Ostreogobius australis	3
Meuschenia trachylepis	11	Owstonia totomiensis	1
Microcanthus strigatus	26	Oxyconger leptognathus	1
Mimasia taeniosoma	1	Pandaka lidwilli	1
Minous versicolor	1	Parablennius intermedius	9
Mogurnda adspersa	3	Parablennius tasmanianustasmanianus	1
Monacanthus chinensis	3	Paracaesio pedleyi	7
Monocentris gloriamaris	4	Paracanthurus heptatus	1
Monodactylus argenteus	6	Paraglyphidodon coracinus	1
Monothrix polylepis	5	Paragobiodon lacunicolon	1
Mordacia mordax	1	Paralichthys tenuirastrum	4
Mugil cephalus	15	Paramonacanthus oblongus	1
Mugil peronii	1	Paramonacanthus otisensis	5
Mugilogobius devisi	2	Paramonacanthus otisensis?	1
Mugilogobius paludis	3	Paramonacanthus pusillus	1
Mugilogobius stigmaticus	1	Parapegasus natans	1
Muraenichthys australis	3	Parapercis allporti	2
Mustelus antarcticus	1	Parapercis binivingata	1
Myctophum asperum	3	Parapercis binivirgata	1
Myctophum nitidulum	2	Parapercis cylindrica	1
Myctophum obtusirostre	1	Parapercis haakei	1
Myctophum phengodes	2	Parapercis nebulosa	4
Myctophum spinosum	1	Parapercis ramsayi	3
Mylio australis	10	Paraplagusia unicolor	1
Myliobatus hamlyni	1	Parascyllium collare	2
Myxus elongatus	25	Parastromateus niger	2
Myxus petardi	2	Paratrachichthys trailli	1
Myxus petardi(jun.synupdate)	6	Paratrigla papilio	2

Australian Museum Finfish Database

Species Name	No. of Records
Parazen pacificus	3
Pardachirus hedleyi	10
Pardachirus pavoninus	1
Parexocoetus mento	1
Paristiopterus labiosus	1
Parkraemeria ornata	4
Parma microlepis	5
Parma oligolepis	6
Parma polylepis	3
Parma unifasciata	9
Parma(j.s.u.) microlepis	1
Parupeneus signatus	3
Parvicrepis parvipinnis	1
Pastinachus sephen	2
Pavoraja nitida	3
Pavoraja spf(last&stevens)	2
Pelates quadrilineatus	12
Pelates sexlineatus	1
Pempheris affinis	1
Pempheris analis	3
Pempheris compressa	6
Pempheris compressa?	1
Pempheris macrolepis	2
Pentapodus paradiseus	1
Peristedion liorhynchus	1
Peristedion picturatum	2
Pervagor alternans?	1
Petraites nasutus	4
Petroscirtes lupus	11
Philypnodon grandiceps	13
Philypnodon nsp	3
Philypnodon spnov	1
Physiculus breviuscula	1
Physiculus luminosa	1
Physiculus therosideros	1
Pictiblennius iredalei	1
Pictiblennius tasmanianus	6
Plagiopsetta glossa	3
Plagiotremus tapeinosoma	2
Platax teira	2
Platycephalus bassensis	1
Platycephalus caeruleopunctatus	6
Platycephalus caerulopunctatus	1
Platycephalus fuscus	8
Platycephalus laevigatus	2
Platycephalus longispinis	3
Platycephalus marmoratus	4
Platycephalus richardsoni	2
Plectorhinchus flavomaculatus	1
Plectorhinchus gibbosus	2
Plectorhinchus niger	1
Plectorhinchus picta	1
Plectorhinchus pictus	1
Plectorhinchus reticulatus	3
Plectorhinchus reticulatus?	3
Plectorhinchus roughleyi	1
Plectorhinchus schotaf	1
Plectranthias maculicauda	4

Species Name	No. of Records
Plectroglyphidodon johnstonianus	1
Plectroglyphidodon leucozona	2
Pleurosicya mossambica	1
Plotosus anguillaris	2
Poeciloconger kapala	3
Polydactylus multiradiatus	1
Polydactylus multiradiatus?	1
Polydactylus nigripinnis	2
Polydactylus specularis	1
Polymixia berndti	1
Polymixia nobilis	3
Polyprion moeone	1
Pomacanthus semicirculatus	1
Pomacentrus coelestis	3
Pomacentrus(j.s.u.) coelestinus	3
Pomadasys hasta	5
Pomatomus saltatrix	3
Potamalosa richmondia	3
Prenes quadranus	1
Priacanthus hamrur	1
Priacanthus macracanthus	4
Priacanthus niphonia	1
Priolepis nuchifasciata	1
Prionurus maculatus	2
Prionurus microlepidotus	2
Pristigenys niphonia	3
Pristilepis oligolepis	3
Pristiophorus cirratus	1
Pristipomoides argyrogrammicus	2
Pristipomoides filamentosus	3
Pristipomoides filamentosus?	2
Pristipomoides multidens	2
Pristipomoides sieboldii	6
Pristis zijsron	3
Psettina gigantea	2
Psettina gigantea?	1
Psettina iijimae?	1
Psettina? gigantea	1
Pseudalutarius nasicornis	3
Pseudocaranx dentex	2
Pseudogobius olorum	14
Pseudojuloides arquatus	1
Pseudojuloides cerasinus	3
Pseudojuloides elongatus	2
Pseudolabrus guntheri	16
Pseudolabrus gymnogenys	2
Pseudolabrus luculentus	2
Pseudomonacanthus peroni	1
Pseudomugil signifer	29
Pseudophycis breviuscula	7
Pseudopristipoma nigra	1
Pseudopristipoma nigris	1
Pseudorhombus arsius	6
Pseudorhombus dupliciocellatus	4
Pseudorhombus jenynsii	1
Pseudorhombus tenuirastrum	9
Pseudorhombus ternirastrum	1
Pseudupeneus porosus	1

Australian Museum Finfish Database

Species Name	No. of Records
Pseudupeneus signatus	1
Pteraclis aesticola	1
Pteraclis velifer	1
Pteragogus flagellifera	1
Pterocaesio chrysozona	9
Pterocaesio tile	2
Pterois antennata	1
Pterois volitans	4
Pterygotrigla polyommata	1
Rachycentron canadus	2
Raja polyommata	2
Raja spc(last&stevens)	2
Raja sph(last&stevens)	1
Ranzania laevis	1
Ratabulus diversidens	1
Redigobius macrostoma	12
Reicheltia halsteadi	1
Remora remora	1
Repomucenus calcaratus	3
Retropinna semoni	18
Rexea antefurcata	4
Rexea solandri	25
Rhabdosargus sarba	13
Rhadinocentrus ornatus	8
Rhynchobatus djiddensis	1
Ruvettus pretiosus	2
Samaris cristatus	2
Sarda australis	2
Sardinella castlenaui	1
Sardinella gibbosa	1
Sardinope neopilchardus	1
Sardinops neopilchardus	3
Satyrichthys nierstraszi	1
Saurida filamentosa	3
Saurida undosquamis	5
Scarichthys auritus	1
Scarus ghobban	1
Scarus ghobban?	1
Scarus niger	1
Scatophagus argus	2
Schizochirus insolens	1
Schuettea scalaripinnis	4
Sciaena antarctica	2
Scomber australasicus	4
Scomber australasicus?	1
Scomberoides lysan	1
Scorpaena cardinalis	1
Scorpaena jacksoniensis	2
Scorpaena papillosus	1
Scorpaenodes littoralis	1
Scorpaenodes scaber	3
Scorpis lineolatus	13
Scorpis violaceus	1
Selar crumenophthalmus	3
Selaroides leptolepis	5
Selenotoca multifasciata	3
Seriola hippos	1
Seriolella brama	1
Seriolella labyrinthica	1
Seriolina nigrofasciata	1
Siderea thrysoidea	1
Siganus fuscescens	1
Siganus nebulosus	2
Sillago ciliata	8
Sillago maculata	3
Sillago robusta	2
Sillago sihama	1
Simenchelys parasiticus	2
Siphamia roseigaster	3
Solegnathus dunckeri	7
Solegnathus fasciatus	1
Solegnathus hardwickii	1
Solenostomus cyanopterus	1
Solenostomus paradoxus	1
Sphoeroides pachygaster	1
Sphoeroides pleurogramma	1
Sphyraena africana	1
Sphyraena obtusata	2
Sphyraenella obtusata	1
Sphyrna lewini	1
Sphyrna zygaena	2
Squalus megalops	3
Squalus mitsukurii	1
Squalus mitsukurii(jun.synupd)	1
Stegastes(j.s.u.) fasciolatus	1
Stegastes(j.s.u.) gascoynei	1
Stephanolepis melanocephalus	1
Stethojulis bandanensis	1
Stigmatopora nigra	3
Strophiurichthys robustus	1
Strophiurichthys robustus?	1
Suezichthys gracilis	7
Sufflamen bursa	1
Sufflamen fraenatus	2
Suggrundus diversidens	1
Suggrundus jugosus	4
Symbolophorus barnardi	4
Symphurus australis	1
Synanceia verrucosa	1
Synaptura fasciata	2
Synaptura nigra	1
Synchiropus calauropomus	1
Synchiropus rameus	3
Synclidopus macleayanus	1
Syngnathoides biaculeatus	3
Syngnathus altirostris	1
Synodus doaki	1
Synodus hoshinonis	8
Synodus variegatus	3
Taenianotus triacanthus	1
Taenioides mordax	1
Taenioides purpurascens	3
Tandanus tandanus	14
Terapon jarbua	4
Terapon theraps	3
Tetractenos glaber	5

Australian Museum Finfish Database

Species Name	No. of Records	Species Name	No. of Records
Tetractenos hamiltoni	9		
Tetragonurus cuvieri	1		
Tetrosomus concatenatus	8		
Thalassoma amblycephalum	1		
Thalassoma lunare	1		
Thamnaconus hypargyreus	1		
Thamnaconus modestoides	1		
Thamnaconus tessellatus?	1		
Thryssa aestuaria	1		
Thunnus alalunga	1		
Torquigener altipinnis	1		
Torquigener pleurogramma	12		
Torquigener tuberculiferus	5		
Trachichthys australis	2		
Trachinocephalus myops	6		
Trachinops taeniatus	5		
Trachinotus baillonii	1		
Trachinotus botla	2		
Trachinotus russelli	4		
Trachipterus arawatae	1		
Trachipterus jacksonensis	1		
Trachurus novaezelandiae	2		
Trachypoma macracanthus	3		
Trachyrhamphus bicoarctatus	1		
Triodon macropterus	3		
Tripodichthys angustifrons	3		
Tripterophycis gilchristi	3		
Triso dermopterus	4		
Trygonorhina fasciata	4		
Tylosurus gavialoides	3		
Upeneus filifer	2		
Upeneus moluccensis	1		
Upeneus signatus	1		
Upeneus tragula	1		
Uranoscopus terraereginae	3		
Uranoscopus terraereginae?	1		
Urocampus carinirostris	10		
Urolophus testaceus	1		
Urolophus viridis	2		
Vanacampus margaritifer	3		
Vauclusella annulata	2		
Velifer hypselopterus	1		
Velifer multiradiatus	4		
Ventrifossa nigrodorsalis	1		
Ventrifossa nigromaculata	1		
Xenolepidichthys dalgleishi	2		
Xiphasia setifer	5		
Xiphias gladius	1		
Zanclistius elevatus	1		
Zebrias scalaris	6		
Zenopsis nebulosus	1		

Number of unique taxa	**863**
Number of Specimens	**2712**

Appendix 5.2

Australian Museum Finfish Distribution

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Abudefduf	bengalensis		y	trop	GRA ms
Abudefduf	saxatilis	valid species but not in Check			
Abudefduf	sordidus		n	trop/temp	Check
Acanthistius	cinctus		y?	temp	Check
Acanthistius	ocellatus		n	temp	SFA
Acanthopagrus	australis		n	temp	MM
Acanthurus	bleekeri	valid but not in Check			GRA ms
Acanthurus	dussumieri		n	trop	GRA ms
Acanthurus	grammoptilus	m		trop	SFA
Acanthurus	nigrofuscus		n	trop	GRA ms
Acanthurus	spinifrons	s			GRA ms
Acanthurus	triostegus		n	trop	MM
Acanthurus	troughtoni	s			GRA ms
Acanthurus	xanthopterus		n	trop	GRA ms
Acentrogobius	decoratus	DFH ms - there is an Istigobius decoratus			
Achirus	hedleyi	s = Pardachirus hedleyi	n	subtrop	DFH ms
Achoerodus	viridis		n	temp	SFA
Aeoliscus	strigatus		y?	trop	SFA
Aesopia	cornuta		y	trop	DFH ms
Aesopia	microcephalus		y?	temp	SFA
Albula	neoguinaica (j.s.u.)		n	trop/temp	Check
Alectis	ciliaris		n	trop/temp	MM
Alepisaurus	ferox	bathypelagic	y?	temp	Check
Allotaius	spariformis		n	subtrop	database
Alopias	superciliosus				L&S
Ambassis	agassizi	fw			MM
Ambassis	jacksoniensis		n	temp	CFSEA
Ambassis	marianus		n	temp	
Ambiserrula	jugosa		n	trop/temp	Imamura
Amphichaetodon	howensis		n	temp	SFA
Amphiprion	akindynos		y	trop	GRA ms
Amphiprion	latezonatus		y	trop/temp	GRA ms
Amphotistius	kuhlii		n	trop/temp	check
Anchisemus	multistriatus	s + Feroxodon multistriatus	y	trop	DFH ms
Anguilla	australis	fw			MM
Anguilla	reinhardtii	fw			MM
Anoplocapros	lenticularis	m		temp	GRA ms
Anoplocapros	lentiginosus	not in checklist - not sure if valid			GRA ms
Antennarius	coccineus		n	trop/temp	check
Antennarius	pictus		n	trop/temp	SFA
Antennarius	striatus		n	trop/temp	SFA
Anthias	squamipinnis		n	trop/temp	SFA

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Antigonia	rhomboidea		n	trop/temp	check
Antigonia	rubescens	m			
Antigonia	rubicunda		n	trop/temp	check
Antipodocottus	elegans		n	temp	check
Antipodocottus	galatheae		n	trop/temp	check
Aphareus	rutilans	m		trop	GRA ms
Apistus	carinatus	s - check name	y?	trop/temp	check
Aploactis	aspera		n	trop/temp	check
Aploactisoma	milesii	m	n	temp	check
Apogon	cookii	m?	y?	trop	SAF
Apogon	ellioti	m?	y?	trop	check
Apogon	fasciata		n	trop/temp	SAF
Apogon	limenus		y	trop/temp	SAF
Apogon	nigripinnis		n	trop/temp	check
Apogon	semiornatus		n	trop	SAF
Apogonops	anomalous		n	temp	check
Aprion	microlepis	s = Pristipomoides filamentosus			Eschmeyer
Aprion	roseus	s = Pristipomoides filamentosus			GRA ms
Aprion	virescens		y	trop	GBR/GRA ms
Aptychotrema	bougainvillii		n	temp	check
Aptychotrema	rostrata		n	temp	check
Arenigobius	bifrenatus		n	temp	DFH ms
Arenigobius	frenatus		n	temp	DFH ms
Arenigobius	leftwichi		y	subtrop	DFH ms
Argentina	australiae	mesopelagic	y	temp	check
Argyrops	spinifer		y	trop	database
Arius	graeffei	fw			
Arnoglossus	fisoni		n	temp/trop	db
Arnoglossus	japonicus		y?	trop	db
Arothron	firmamentum		n	temp	GRA ms
Arothron	hispidus		n	trop	GRA ms
Arothron	manilensis		n	trop	GRA ms
Arothron	nigropunctatus		y	trop	GRA ms
Arothron	stellatus		n	trop	GRA ms
Arrhamphus	sclerolepis		y?	trop	check
Arripis	trutta		n	temp/trop	CFSEA
Aseraggodes	haackeanus	m - SA & WA only			DFH ms
Aseraggodes	macleayanus		n	trop	DFH ms
Aspasmogaster	costatus		y	temp	DFH ms
Aspasmogaster	tasmaniensis		n	temp	SAF
Asterropteryx	semipunctatus		n	trop	GRA ms
Astronesthes	lucifer	deepwater	n	temp	check
Asymbolus	analis		y	temp	L&S
Atractoscion	aequidens	deepwater	n?	temp/trop	Hutch

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Atule	mate	m?	n	temp	SAF
Atypichthys	strigatus		n	temp	SAF
Aulacocephalus	temmincki	on E coast (1 WA record)	y	temp	check & SAF
Aulopus	curtirostris		n	trop/temp	check
Aulopus	purpurissatus		n	temp	SAF
Aulostomus	chinensis		n	trop/temp	check, SAF
Balistoides	viridescens		n	trop	GRA ms
Banjos	banjos	m?	y		
Bassanago	bulbiceps	deeper water	y	temp	check
Bathygobius	cocosensis		n	trop	DFH ms
Bathygobius	fuscus		y	trop	DFH ms
Bathygobius	kreffti		n	temp	DFH ms
Bathygobius	watkinsoni	s			DFH ms
Bathystethus	cultratus		y	temp	check
Batrachomoeus	dubius		n	temp	SAF
Bembras	japonicus	y - but trop WA specimen!	y	temp	check
Bembrops	aethalea		n	trop	database
Bembrops	platyrhynchus		y	trop	database
Benthodesmus	elongatus		y	temp	JRP ms
Benthosema	suborbitale		n	temp	check
Beryx	splendens		y	temp	check
Bodianus	frenchii		n	temp	GRA ms
Bodianus	perditio		n	trop	GRA ms
Bodianus	vulpinus	m; WA endemic			GRA ms
Bothus	myriaster		y	trop	DFH ms
Brachaelurus	waddi		n	temp	L&S
Brachaluteres	jacksonianus		n	temp	GRA ms
Brachaluteres	taylori	m			GRA ms
Brachirus	brachypterus	m			GRA ms
Brama	brama		n	temp	JRP ms
Branchiostegus	serratus		n	trop/temp	check
Butis	butis	fw			
Caesio	cuning	m	n	trop	GRA ms
Caesioperca	lepidoptera		n	temp	Check/SAF
Callimucenus	macdonaldi	s = Repomucenus sagitta	n	trop	DFH ms
Callionymus	calcaratus		n	temp/trop	DFH ms
Callionymus	japonicus		y	trop	DFH ms
Callionymus	kaianus moretonensis		n	trop/temp	DFH ms
Callionymus	limiceps		n	trop/temp	DFH ms
Callionymus	macdonaldi	s = Repomucenus sagitta			DFH ms
Callionymus	moretonensis	see C.k.m	n	trop/temp	DFH ms
Callogobius	depressus		n	temp	DFH ms
Cantherhines	longicaudus	m? - valid species - described from Tahiti			
Cantherhines	pardalis		n	trop	GRA ms

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Cantheschenia	longipinnis	m			GRA ms
Canthigaster	callisterna		y	temp	GRA ms
Canthigaster	coronatus		n	trop	GRA ms
Canthigaster	valentini		n	trop	GRA ms
Carangoides	caeruleopinnatus	m? juv?	y?	trop	SFA
Carangoides	chrysophrys		n	trop/temp	check
Carangoides	ferdau	m?	y	trop	check
Carangoides	fulvoguttatus	id?	y	trop	check
Carangoides	orthogrammus		y	trop	check
Caranx	malabaricus	id?	y	trop	check
Caranx	melampygus		y	trop	check
Caranx	papuensis	id?	y	trop	check
Caranx	sexfasciatus		n	trop/temp	check
Caranx	nobilis	s of P,dentx	n	trop/temp	check
Carcharhinus	altimus		y	trop/temp	L&S
Carcharhinus	longimanus		n	trop	L&S
Centroberyx	affinis		n	temp	check
Centrobranchus	andreae	m?	?	trop - deepwater	check
Centrobranchus	nigroocellatus		n	trop/temp	check
Centropogon	australis		n	temp/trop	SFA
Centropyge	tibicen		n	trop	GRA ms
Centropyge	vroliki		n	trop	GRA ms
Cepola	australis		n	subtrop	DFH ms
Ceratoscopelus	warmingii		n	trop/temp	check
Chaetoderma	penicilligera		n	trop	GRA ms
Chaetodon	auriga		n	trop	GRA ms
Chaetodon	flavirostris		n	trop	GRA ms
Chaetodon	guentheri		n	trop	GRA ms
Chaetodon	kleinii		n	trop	GRA ms
Chaetodon	lunula		n	trop	GRA ms
Chaetodon	setifer	s = Chaetodon auriga			Eschmeyer
Chaetodon	vagabundus		n	trop	GRA ms
Chaetodontoplus	ballinae		y	temp	GRA ms
Champsodon	machaeratus		n	subtrop	JRP ms
Champsodon	nudivittis		n	trop	JRP ms
Chanos	salmoneus	s = Chanos chanos	n	trop	Eschmeyer
Chascanopsetta	lugubris		n	trop	DFH ms
Chaunax	fimbriatus		n	temp	check
Chaunax	penicillatus	deepwater	y	temp	check
Cheilinus	bimaculatus		n	trop	GRA ms
Cheilodactylus	fuscus		n	temp/trop	CFSEA
Cheilodactylus	vestitus		n	trop/temp	SFA/MM
Chelidonichthys	kumu		n	temp	check
Chelmon	rostratus	m - to Noosa			GRA ms

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Chelmonops	howensis	y, if ID is correct - GRA has Seal Rocks south	y	temp	GRA ms
Chelmonops	truncatus		n	temp	GRA ms
Chilomycterus	reticulatus	valid - not complete in check	y	temp	database
Chironemus	marmoratus		n	?	SFA
Choerodon	ommopterus	m, s = Choerodon schoeleinii			Esch, GRA ms
Choerodon	venustus		n	trop	GRA ms
Choerodon	ommopterus	duplicate			
Chromis	abyssicola		y	temp	GRA ms
Chromis	hypsilepis		y	temp	GRA ms
Chromis	weberi		n	trop	GRA ms
Chrysiptera	cyanea		n	trop	GRA ms
Chrysophrys	auratus		n	temp/trop	SFA
Cirrhitichthys	aprinus		n	trop	GRA ms
Cleidopus	gloriamaris		n	temp/trop	check
Clupea	hypselosoma	s			
Clupea	novae-hollandiae	s Sprattus novae.	n	trop/temp	check
Cnidoglanis	macrocephalus		n	temp/trop	SFA
Caelorinchus	mirus		n	temp/trop	check
Conger	cinereus		y?	trop	check/Database
Conger	verreauxi		y?	temp	check/CFSEA
Conger	wilsoni		n	temp	check
Cookeolus	boops		y	temp/trop	check
Cookeolus	japonicus	s?			
Cookeolus	macracanthus	s? P.macra.	n	temp/trop	check
Coris	bulbifrons		y	temp	GRA ms
Coris	dorsomacula	c = dorsomaculata	n	trop	GRA ms
Coris	picta		n	temp	GRA ms
Coryphaena	hippurus		n	trop/temp	SFSA
Crapatalus	arenarius	s = Lesueurina platycephala	n	temp	DFH ms
Craterocephalus	marjoriae	fw			
Crenimugil	crenilabis		n	trop/temp	CFSEA
Crinodus	lophodon		y	temp	SFSA
Cristiceps	aurantiacus		y	temp	SFSA
Cristiceps	pataecoides	s? - DFH unsure of senior syn			DFH ms
Crossorhinus	ornatus	s?			
Crossorhombus	azurea	C. azureus	y	trop	DFH ms
Crossorhombus	valde-rostratus		y	trop	DFH ms
Cryptocentroides	cristatus		n	trop/subtrop	DFH ms
Ctenochaetus	binotatus	m - to Carpicorn Grp - CHeck			
Cubiceps	capensis ?	m? - valid species - not in Check			
Cubiceps	squamiceps		n	trop	DFH ms
Cybiosarda	elegans		n	trop	FAO
Cynoglossus	maculipinnis		y	trop	DFH ms

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Cyttopsis	roseus		n	trop/subtrop	check
Dactylophora	nigricans	m?	n	temp - more southern	
Dactyloptena	orientalis		n	trop/temp	check
Dactyloptena	papilio		y?	trop	check
Dactylopterus	orientalis	s - see D.orientalis above			
Dactylopus	dactylopus		y?	trop	SFSA
Dascyllus	trimaculatus		n	trop	GRA ms
Deania	quadrispinosa		n	temp	L&S
Decapterus	macarellus		n	trop	check
Decapterus	macrosoma		n	trop/temp	check
Decapterus	russelli		y?	trop	check to 27deg S
Dendrochirus	brachypterus		n	trop/temp	check
Dendrochirus	zebra		n	trop/temp	check
Dentex	spariformis	s = Allotaius spariformis			
Dentex	tumifrons		n	trop	database
Dermatopsis	macrodon	heck	n	temp	check
Dicotylichthys	punctulatus		n	trop/temp	SFA
Diodon	holocanthus		n	trop/temp	SFA
Diogenichthys	atlanticus		n	trop/temp	check
Dipterygonotus	balteatus	m - to Michaelmas Cay, Check			
Diretmus	argenteus	m?	y?	temp	check/Database
Ebosia	bleekeri		y	trop	database
Echeneis	naucrates		n	trop/temp	check
Echidna	nebulosa		y	trop/temp	check
Echidna	polyzona		y	trop/temp	check
Echinorhinus	brucus		y	temp	database
Electrona	risso				
Ellerkeldia	profunda				
Ellogobius	stigmaticus	s	n	temp	DFH ms
Emmelichthys	struhsakeri	m - further south			GRA ms
Engraulis	australis		n	temp/trop	SFA
Engyprosopon	bleekeri		y	trop	DFH ms
Engyprosopon	grandisquama		n	trop/temp	DFH ms
Engyprosopon	macroptera		y	?	database
Engyprosopon	maculipinnis		y	trop/temp	DFH ms
Enneapterygius	atrogulare		n	trop/temp	DFH ms
Enneapterygius	hemimelas		y	trop/temp	DFH ms
Enoplosus	armatus		n	temp/trop	SFA
Epigonus	denticulatus	deepwater	y	temp	DFH ms
Epigonus	robustus	deepwater	y	temp	DFH ms
Epinephelus	caeruleopunctatus		y	trop	DFH ms
Epinephelus	daemelii		n	temp/trop	DFH ms
Epinephelus	ergastularius	s = E. octofasciatus			Kuiter
Epinephelus	fasciatus		y	trop/temp	DFH ms

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Epinephelus	lanceolatus		n	trop/temp	DFH ms
Epinephelus	malabaricus		n	trop/temp	DFH ms
Epinephelus	morrhua		y	trop/temp	DFH ms
Epinephelus	octofasciatus		y	temp	Kuiter/database
Epinephelus	radiatus	s?			
Epinephelus	rivulatus (j.s.u.)	s?			
Epinephelus	septemfasciata		y	temp	DFH ms
Epinephelus	tauvina	y? most likely more widespread	y?	temp	DFH ms
Epinephelus	undulatostriatus		n	trop/temp	DFH ms
Epinephelus	woorei	y? single record off east coast	y?	trop/temp	DFH ms
Eptatretus	cirrhatus		n	trop/temp	DFH ms
Erosa	erosa		y	trop/temp	check
Etrumeus	teres		n	trop/temp	check
Euclichthys	polynemus		n	temp/temp	check
Euleptorhamphus	viridis		n	trop/temp	check
Euristhmus	lepturus		n	trop/temp	check
Eurypegasus	draconis		n	trop/temp	check
Euthynnus	affinis		n	trop/temp	Database
Eviota	viridis	s, m; WA only			DFH ms
Exocoetus	volitans		n	trop/temp	check
Favonigobius	exquisitus		n	subtrop	DFH ms
Favonigobius	lateralis	m; Not in NSW			DFH ms
Favonigobius	tamarensis	s + Afurcagobius tamarensis	n	temp	DFH ms
Fistularia	commersonii		n	trop/temp	check
Fistularia	petimba		n	trop/temp	check
Foetorepus	calauropomus		n	trop/temp	DFH ms
Fowleria	variegata		y	trop/temp	Database
Galaxias	maculatus	fw			
Galaxias	olidus	fw			
Galeus	boardmani		n	trop/temp	check
Gambusia	affinis	fw, s. of G.holbrooki			
Gambusia	holbrooki	fw			
Gasterochisma	melampus		n	trop/temp	FAO
Gempylus	serpens		n	trop/temp	Database
Gerres	ovatus	s?	n	trop	DFH ms
Gerres	subfasciatus		n	trop/temp	DFH ms
Girella	cyanea		y	temp	DFH ms
Girella	tricuspidata		n	temp/trop	DFH ms
Glaucosoma	scapulare		n	trop/temp	DFH ms
Glyphidodontops	flavipinnis	s = Chrysiptera	n	trop	GRA ms
Glyphidodontops	glaucus	s = Chrysiptera	y	trop	GRA ms
Glyphidodontops	leucopomus	s = Chrysiptera	n	trop	GRA ms
Glyphidodontops	rex	s = Chrysiptera	y	trop	GRA ms

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Gnathagnus	elongatus	s = Xenocephalus australiensis	n	trop	Check ms
Gnathagnus	innotabilis	s. = Xenocephalus armatus	y	temp	Gomon
Gnathanodon	speciosus		y	trop	SFA
Gnathodentex	aureolineatus		y	trop	GRA ms
Gnatholepis	inconsequens		n	trop/temp	database
Gnathophis	longicauda		y	temp	database/check
Gnathophis	umbrellabia	m?	y	temp	database
Gobiodon	quinquestrigatus	m; not in NSW			DFH ms
Gobiomorphus	australis	fw			
Gobiomorphus	coxii	fw			
Gobiopterus	semivestita	c = semivestitus	n	subtrop	DFH ms
Gonorynchus	greyi		n	trop/temp	check
Grammatobothus	pennatus		y	trop	check
Grammatobothus	polyophthalmus		y	trop	check
Grammatorcynus	bicarinatus		y	trop	FAO/database
Gymnocranius	?elongatus	m - to Arnhem land,check			
Gymnothorax	chilospilus		y	trop	database
Gymnothorax	cribroris		n	temp/trop	check
Gymnothorax	eurostus		y	trop	check
Gymnothorax	obesus	m?			
Gymnothorax	prasinus		y	temp	check
Gymnothorax	undulatus		y	trop	database
Halichoeres	margaritaceus		y	trop	GRA ms
Halichoeres	marginatus		n	trop	GRA ms
Halichoeres	nebulosus		n	trop	GRA ms
Halichoeres	poecila	s? species not in Eschmeyer			
Halichoeres	prosopeion		n	trop	GRA ms
Halieutaea	brevicauda		n	trop/temp	check
Halophryne	diemensis		y	trop	database
Helicolenus	papillosus	s?			
Helicolenus	percoides		y	temp	database
Hemiramphus	robustus		n	trop/temp	check
Heniochus	acuminatus		n	trop	GRA ms
Heniochus	diphreutes		n	trop/temp	GRA ms
Heptranchias	perlo (j.s.u.)		y	temp	check
Herklotsichthys	castelnaui		n	trop/temp	SFA
Herklotsichthys	koningsbergeri		n	trop/temp	check
Heteroclinus	heptaeolus		n	temp	DFH ms
Heteroclinus	longicaudus	s? = not in Eschmeyer or Check			
Heteroclinus	nasutus		y	temp	DFH ms
Heteroclinus	roseus		y	temp	DFH ms
Heteroclinus	whiteleggii		n	temp	DFH ms
Heteroclinus	whitleyi	s? = not in Eschmeyer or Check			

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Heterodontus	galeatus		n	temp	SFA
Heterodontus	portusjacksoni		n	temp	SFA
Heteropriacanthus	cruentatus		y	trop	check
Hexanchus	griseus		y	temp	database
Himantura	uarnak		n	trop/temp	check
Hippichthys	heptagonus		y	trop	check
Hippichthys	penicillus		n	trop/temp	check
Hirundichthys	oxycephalus	y? taxonomy bodgy!	y?	trop/temp	check
Hirundichthys	speculiger		n	trop/temp	check
Histiophryne	bougainvilli		n	trop/temp	check
Hologymnosus	doliatus		n	trop	GRA ms
Holotrachys	major	s. of Ostichthys japonicus	y	temp	check
Hoplichthys	citrinus		n	trop/temp	check
Hoplichthys	filamentosus		n	trop/temp	check
Hoplichthys	haswelli		n	trop/temp	check
Hoplichthys	ogilbyi		n	temp/trop	check
Hoplostethus	atlanticus		y	temp	database
Hoplostethus	intermedius		y	temp	check
Hoplostethus	melanopus		y?	temp	database
Hydrolagus	lemures		y	temp	check
Hydrolagus	ogilbyi		n	temp/trop	check
Hygophum	hygomii		n	temp/trop	check
Hygophum	proximum		y?	temp	database
Hygophum	reinhardtii		n	temp/trop	check
Hymenocephalus	longiceps		n	temp/trop	check
Hyperlophus	vittatus		n	temp/trop	check
Hypnos	monopterygium		n	temp/trop	check
Hypogaleus	hyugaensis		n	temp/trop	L&S
Hypoplectrodes	maccullochi		n	temp/trop	check
Hypoplectrodes	annulatus		n	temp/trop	check
Hypoplectrodes	nigrorubrum	m?	y?	temp	database
Hyporhamphus	ardelio	s of H.regularis	n	temp/trop	check
Hyporhamphus	australis		n	temp/trop	check
Hyporhamphus	dussumieri		y	trop	check
Hyporhamphus	regularis		n	temp/trop	check
Hypseleotris	compressa		n	trop	DFH ms
Hypseleotris	galii	fw	n	subtrop	DFH ms
Hypseleotris	klunzingeri	fw	n	subtrop/temp	DFH ms
Ichthyscopus	barbatus		y	temp	Gomon
Ichthyscopus	lebeck		n	trop/temp	SFSA
Ichthyscopus	sannio		n	subtrop	Gomon
Inimicus	caledonicus		y	trop	database
Insidiator	jugosus	s. suggrundus jugosus	n	temp/trop	check
Iso	rhothophilus		y	temp	check

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Istiblennius	meleagris		n	trop/temp	check
Istiblennius	edentulus		n	temp/trop	DFH ms
Istiblennius	meleagris		n	trop	DFH ms
Johnius	vogleri	s = Johnius borneensis	?	trop	JRP ms
Kentrocapros	flavofasciatus	s = Aracana flavofasciata	y	trop	GRA ms
Kuhlia	mugil		n	trop	DFH ms
Kuhlia	taeniura	s. of K.mugil	n	trop	DFH ms
Kuiterichthys	furcipilis		y?	temp	DFH ms
Kyphosus	sydneyanus		n	temp	SFA
Lactoria	cornuta		n	trop	GRA ms
Lactoria	fornasini		n	trop	GRA ms
Lagocephalus	cheesemani		y?	temp	DFH ms
Lagocephalus	inermis		n	trop/temp	DFH ms
Lagocephalus	sceleratus		n	trop/temp	DFH ms
Lampanyctus	alatus		n	trop/temp	check
Lampanyctus	ater		n	trop/temp	check
Lampris	guttatus		y	temp	check
Leiognathus	moretoniensis		n	trop	JRP ms
Lepadichthys	caritus		y	trop	DFH ms
Lepadichthys	frenatus		y	trop	DFH ms
Lepidoblennius	haplodactylus		n	trop/temp	DFH ms
Lepidoperca	caesiopercula	? C.lepid.			
Lepidoperca	pulchellus	?	y	temp	check
Lepidotrigla	argus		n	trop/temp	check
Lepidotrigla	grandis		n	trop/temp	check
Lepidotrigla	papilio	m?	y?	temp	database
Lepidotrigla	umbrosa		n	temp/trop	check
Lepidotrigla	vanessa	m?	y?	temp	database
Leptoscarus	vaigiensis		n	trop	GRA ms
Lestidium	nudum	y/n east coast but also off NT	y?	trop/temp	check
Lethrinus	nematacanthus	s = Lethrinus genivittatus	n	trop	GRA ms
Lethrinus	rubrioperculatus		y	trop	GRA ms
Limnichthys	fasciatus		n	trop/temp	DFH ms
Lioscorpius	longiceps	m?	y?	trop/temp	database
Lissocampus	runa		y	temp	check
Liza	argentea		n	trop/temp	DFH ms
Lobotes	surinamensis		n	trop/temp	CFSEA
Lophiodes	mutilus		n	trop/temp	check
Lophiodes	naresi		n	trop/temp	check
Lophiomus	setigerus		n	trop/temp	check
Lophonectes	gallus		n	temp/trop	DFH ms
Lotella	phycis		y	temp	check
Lotella	rhacinus		y	temp	check
Lubricogobius	ornatus	m - to Lizard Is.			DFH ms

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Lutjanus	amabilis	s = L adetii	n	trop	GRA ms
Lutjanus	argentimaculatus		n	trop	GRA ms
Lutjanus	carponotatus	m - to Bangarra, Qld			
Lutjanus	fulviflamma		y	trop	GRA ms
Lutjanus	kasmira		n	trop	GRA ms
Lutjanus	malabaricus		n	trop	GRA ms
Lutjanus	russelli		n	trop	GRA ms
Lutjanus	sebae		n	trop	GRA ms
Luvarus	imperialis		y	subtrop/temp	JRP ms
Maccullochella	macquariensis				
Macquaria	colonorum	fw/estuarine	y	temp	check
Macquaria	novemaculeata	fw/estuarine	y	temp	check
Macropharyngodon	choati		n	trop	GRA ms
Macroramphosus	elevatus		n	trop/temp	check
Macroramphosus	gracilis	fw/estuarine	y	temp	check
Macroramphosus	molleri	s = M.gracilis			
Macroramphosus	scolopax	m?	y?	temp	database
Macrorhamphosodes	uradoi		n	trop	JRP ms
Malacocephalus	laevis		y	temp	check
Malakichthys	elegans	m?			
Marilyna	pleurosticta		n	trop/temp	DFH ms
Maroubra	perserrata		y	temp	check
Masturus	lanceolatus		y	temp	Gomon
Maxillicosta	lopholepis	m			
Maxillicosta	scabriceps	m			
Maxillicosta	whitleyi		n	temp/trop	check
Mecaenichthys	immaculatus		y	temp	GRA ms
Megalaspis	cordyla		n	trop/temp	check
Melambaphes	zebra	s = Girella zebra	y	temp	DFH ms
Melanotaenia	duboulayi	fw			
Melanotaenia	fluviatilis	fw			
Melanotaenia	nigrans	fw			
Melanotaenia	splendida	fw			
Mene	maculata		y	trop	JRP ms
Meuschenia	trachylepis		n	temp	GRA ms
Microcanthus	strigatus		n	temp/trop	SFA
Mimasia	taeniosoma	s = Thrysitoides marleyi	y	temp	JRP ms
Minous	versicolor	m?	y?	trop	database
Mogurnda	adspersa	fw	y	subtrop	DFH ms
Monacanthus	chinensis		n	trop	GRA ms
Monocentris	gloriamaris	s. Cleidopus. Glor.	n	trop/temp	check
Monodactylus	argenteus		n	trop/temp	SFA
Monothrix	polylepis		n	trop/temp	check
Mordacia	mordax		y	temp	database

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Mugil	cephalus		n	trop/temp	DFH ms
Mugil	peronii	s = Liza argentea			Thomson, 1997
Mugilogobius	devisi	s of M stigmaticus			
Mugilogobius	paludis		n	temp	DFH ms
Mugilogobius	stigmaticus		n	temp	DFH ms
Muraenichthys	australis		y	temp	check
Mustelus	antarcticus		y?	temp	database
Myctophum	asperum		n	trop/temp	check
Myctophum	nitidulum		n	trop/temp	check
Myctophum	obtusirostre		y?	trop	database
Myctophum	phengodes		y?	temp	database
Myctophum	spinosum		y?	trop	database
Mylio	australis	s = Liza argentea			Thomson, 1997
Myliobatus	hamlyni	s Myliobatis australis	n	trop/temp	DFH ms
Myxus	elongatus		n	trop/temp	DFH ms
Myxus	petardi	s Trachystoma petardi	n	temp/trop	DFH ms
Nannoperca	oxleyana	fw			
Narcine	tasmaniensis		y	temp	check
Nemadactylus	douglasii		n	temp	GRA ms
Nemadactylus	valenciennesi		y	temp	GRA ms
Nematops	macrochirus		n	trop	DFH ms
Nemipterus	aurifilum		y	trop/temp	GRA ms
Nemipterus	theodorei		n	trop/temp	GRA ms
Neoniphon	sammara		y	trop	database
Neosebastes	incisipinnis		n	trop/temp	check
Neosebastes	thetidis		y	temp	database
Nettastoma	solitarium		y	temp	check
Nomeus	gronovii		n	trop/temp	DFH ms
Norfolkia	striaticeps	s = Trinorfolkia clarkei	y	temp	DFH ms
Notesthes	robusta		n	trop/temp	check
Notolabrus j.s.u.	gymnogenis		n	temp	GRA ms
Notolychnus	valdiviae		n	trop/temp	check
Notopogon	xenosoma	s / m?			
Novaculichthys	jacksoniensis	s = Xyrichthys jacksonensis	n	temp	GRA ms
Odax	cyanomelas		n	temp	SFA
Omobranchus	anolius		n	trop/temp	DFH ms
Ophisurus	serpens		y	temp	check
Opistognathus	jacksoniensis		n	temp/trop	DFH ms
Optivus	elongatus		n	temp	SFA
Orectolobus	ornatus		n	temp/trop	check
Ostracion	cornutus		n	trop	GRA ms
Ostracion	diaphanus		n	trop	GRA ms
Ostracoberyx	paxtoni	taxonomy bodgy	n?		
Ostreogobius	australis	s = Redigobius macrostoma			DFH ms

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Owstonia	totomiensis		y	trop	DFH ms
Oxyconger	leptognathus		y	trop	check
Pandaka	lidwilli		n	trop/temp	DFH ms
Parablennius	intermedius		n	temp/trop	DFH ms
Parablennius	tasmanianus tasmanianus	m?	n	temp	database
Paracaesio	pedleyi	s = Paracaesio xanthura	n	trop	GRA ms
Paracanthurus	heptatus	? not in Eschmeyer or Check			
Paraglyphidodon	coracinus	m, s = Neoglyphidodon nigroris - not NSW			Esch, GRA ms
Paragobiodon	lacunicolon		y	trop	DFH ms
Paralichthys	tenuirastrum	s: Pseudorhombus ten.?	n	temp/trop	DFH ms
Paramonacanthus	pusillus	m - WA only Checkl			GRA ms
Paramonacanthus	oblongus	s = P. otisensis Checkl			
Paramonacanthus	otisensis		n	trop	GRA ms
Parapegasus	natans	s= Pegasus volitans	n	trop/temp	check
Parapercis	allporti		n	temp	GRA ms
Parapercis	binivingata	s = P. binivirgata Checkl			
Parapercis	binivirgata		y	temp	GRA ms
Parapercis	cylindrica		n	trop	GRA ms
Parapercis	haakei = P. haackei	m - WA, SA only - checkl			
Parapercis	nebulosa		n	trop	GRA ms
Parapercis	ramsayi		y	temp	GRA ms
Paraplagusia	unicolor	s = Paraplagusia bilineata	n	trop	DFH ms
Parascyllium	collare		n	temp	check
Parastromateus	niger	m			check
Paratrachichthys	trailli	taxonomy bodgy	y	temp	check
Paratrigla	papilio	s: Lepidotrigla papillio	y?	temp	check
Parazen	pacificus	records further north but disjunct	y?	temp/trop	check
Pardachirus	hedleyi		n	trop/temp	DFH ms
Pardachirus	pavoninus		n	temp/trop	DFH ms
Parexocoetus	mento		y?	trop	database
Paristiopterus	labiosus		y	temp	CFSEA
Parkraemeria	ornata		n	trop/temp	DFH ms
Parma	microlepis		y	temp	GRA ms
Parma	oligolepis		n	trop/temp	GRA ms
Parma	polylepis		n	trop/temp	GRA ms
Parma	unifasciata		n	trop	GRA ms
Parupeneus	signatus		n	trop/temp	SFA
Parvicrepis	parvipinnis		y	temp	DFH ms
Pastinachus	sephen		y	trop	L&S
Pavoraja	nitida		y	temp	database
Pavoraja	sp f (last & stevens)		y	trop/temp	L&S
Pelates	quadrilineatus		n	trop/temp	check
Pelates	sexlineatus		n	trop/temp	check

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Pempheris	affinis		n	temp/trop	SFA
Pempheris	analis		y?	trop	SFA
Pempheris	compressa		n	temp/trop	SFA
Pempheris	macrolepis	s = Pempheris multiradiata	y	temp	JRP ms
Pentapodus	paradiseus	m - to Moreton Is. - Checkl			
Peristedion	liorhynchus		n	temp	check
Peristedion	picturatum	s = Peristedion liorhynchus	n	trop/temp	check
Pervagor	alternans ?		n	trop/temp	GRA ms
Petraites	nasutus	s? Heteroclinus nasutus	y	trop	DFH ms
Petroscirtes	lupus		n	trop/temp	DFH ms
Philypnodon	grandiceps	fw			
Philypnodon	sp nov	fw			
Physiculus	luminosa		n	temp/trop	check
Physiculus	therosideros		y	trop/temp	Paulin, 1987
Physiculus	breviuscula	m. Pseudophycis b.	y	temp	check
Pictiblennius	iredalei	s = Parablennius intermedius	n	temp	DFH ms
Pictiblennius	tasmanianus	s = Parablennius tasmanianus	n	temp	DFH ms
Plagiopsetta	glossa		y	trop	DFH ms
Plagiotremus	tapeinosoma		n	tro/temp	DFH ms
Platax	teira		n	trop	GRA ms
Platycephalus	bassensis		n	temp	check
Platycephalus	caeruleopunctatus		n	temp/trop	check
Platycephalus	fuscus		n	temp/trop	check
Platycephalus	laevigatus		y	temp	check
Platycephalus	longispinis		n	temp/trop	check
Platycephalus	marmoratus		n	temp/trop	check
Platycephalus	richardsoni		y	temp	check
Plectorhinchus	reticulatus ?	m? - not in Check			
Plectorhinchus	flavomaculatus		n	trop	GRA ms
Plectorhinchus	gibbosus		n	trop	GRA ms
Plectorhinchus	niger	? = Macolor niger??			
Plectorhinchus	picta = P. picus		n	trop/temp	GRA ms
Plectorhinchus	pictus = P. picus		n	trop/temp	GRA ms
Plectorhinchus	reticulatus	m,s? - not in Check			
Plectorhinchus	roughleyi	s = P. flavomaculatus			GRA ms
Plectorhinchus	schotaf		y	trop	GRA ms
Plectranthias	maculicauda		y	temp/trop	check
Plectroglyphidodon	johnstonianus		y	trop	GRA ms
Plectroglyphidodon	leucozona		n	trop	GRA ms
Pleurosicya	mossambica		n	trop/temp	DFH ms
Plotosus	anguillaris	s Plotosus lineatus	n	trop/temp	check
Poeciloconger	kapala		y?	temp	database
Polydactylus	multiradiatus		y	trop	database

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Polydactylus	nigripinnis		y	trop	database
Polydactylus	specularis	s = Polynemus specularis	y	trop	database
Polymixia	berndti		n	trop/temp	check
Polymixia	nobilis		n	temp/trop	check
Polyprion	moeone		y	temp	check
Pomacanthus	semicirculatus		n	trop	GRA ms
Pomacentrus	coelestis		n	trop	GRA ms
Pomacentrus (j.s.u.)	coelestinus	wrong combination			
Pomadasys	hasta	? not in Checkl			
Pomatomus	saltatrix		n	temp/trop	check
Potamalosa	richmondia	fw & estuarine	y	temp	check
Prenes	quadranus	s = Scatophagus argus	n	trop	GRA ms
Priacanthus	hamrur		n	trop/temp	check
Priacanthus	macracanthus		n	trop/temp	check
Priacanthus	niphonia	m? s. Pristigenys niphonia			
Priolepis	nuchifasciata		n	trop/temp	DFH ms
Prionurus	maculatus		n	temp	GRA ms
Prionurus	microlepidotus		n	trop/temp	GRA ms
Pristigenys	niphonia	m? Northwest shelf?			
Pristilepis	oligolepis		y?	trop/temp disjunct	database
Pristiophorus	cirratus		n	trop/temp disjunct	check
Pristipomoides	argyrogrammicus	m = to Myrmidon Reef - Checkl			
Pristipomoides	filamentosus		n	trop	GRA ms
Pristipomoides	multidens		y	trop	GRA ms
Pristipomoides	sieboldii		n	trop	database
Pristis	zijsron		y?	trop	check to SE coast.
Psettina	gigantea		y	trop	DFH ms
Psettina	iijimae?		y	trop	DFH ms
Pseudalutarius	nasicornis		n	trop	GRA ms
Pseudocaranx	dentex		n	temp/trop	SFA
Pseudogobius	olorum		n	temo	Gomon
Pseudojuloides	cerasinus		y	trop	GRA ms
Pseudojuloides	arquatus	s. Suezichthys arquatus	n	temp/trop	SFA
Pseudojuloides	cerasinus		n	trop	SFSA
Pseudojuloides	elongatus		y	trop/temp	GRA ms
Pseudolabrus	guntheri		n	trop/temp	GRA ms
Pseudolabrus	gymnogenys	s = Notolabrus gymnogensis			
Pseudolabrus	luculentus		y	temp	GRA ms
Pseudomonacanthus	peroni	m = only to Bundaberg, Qld			
Pseudomugil	signifer	fw			
Pseudophycis	breviuscula		y	temp	check
Pseudopristipoma	nigra	s? - don't know what this is			
Pseudopristipoma	nigris	s? - don't know what this is			
Pseudorhombus	arsius		n	trop	check

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Pseudorhombus	dupliciocellatus		n	trop	check
Pseudorhombus	jenynsii		n	trop/temp	check
Pseudorhombus	tenuirastrum		n	temp/trop	check
Pseudorhombus	ternirastrum	misspelling			
Pseudupeneus	porosus	s = Upeneichthys lineatus	n	temp	DFH ms
Pseudupeneus	signatus	s = Parupeneus signatus	n	temp/trop	SFSA
Pteraclis	aesticola	beach washups only	y	temp	database
Pteraclis	velifer	m?			
Pteragogus	flagellifera	valid - not in Check			
Pterocaesio	chrysozona		y	trop	CFSEA
Pterocaesio	tile	m? northern distribution - not in NSW			
Pterois	antennata		n	trop	check
Pterois	volitans		n	trop/temp	check
Pterygotrigla	polyommata	m?	y?	temp	database
Rachycentron	canadus		n	trop/temp	SFSA
Raja	polyommata		y	trop	L&S
Raja	sp c (last & stevens)		y	temp	L&S
Raja	sp h (last & stevens)		y	trop	L&S
Ranzania	laevis		n	trop/temp	Gomon
Ratabulus	diversidens		n	trop/temp	check
Redigobius	macrostoma		n	trop/temp	DFH ms
Reicheltia	halsteadi		n	temp	SFSA
Remora	remora		n	trop/temp	DFH ms
Repomucenus	calcaratus		n	temp/trop	DFH ms
Retropinna	semoni	fw			
Rexea	antefurcata		n	trop/temp	FAO
Rexea	solandri		y	temp	FAO
Rhabdosargus	sarba		n	temp	FSA
Rhadinocentrus	ornatus	fw			
Rhynchobatus	djiddensis		n	trop/temp	check
Ruvettus	pretiosus		y	temp	most agree to northern NSW
Samaris	cristatus	m - not in NSW			
Sarda	australis		n	temp	SFSA
Sardinella	castlenaui	s? = Herklotsichthys castelnaui	n	trop/temp	check
Sardinella	gibbosa		n	trop/temp	check
Sardinope	neopilchardus	typo Sardinops	n	temp	check
Satyrichthys	nierstraszi		y	?	database - valid id
Saurida	filamentosa		y	trop	check
Saurida	undosquamis		n	trop/temp	check
Scarichthys	auritus	s = Leptoscarus vaigiensis	n	trop	Esch, GRA ms
Scarus	ghobban		n	trop/temp	SFSA
Scarus	niger	m		trop	GRA ms
Scatophagus	argus		n	trop	GRA ms

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Schizochirus	insolens		n	trop/temp	DFH ms
Schuettea	scalaripinnis		n	temp/trop	SFA
Sciaena	antarctica	s = Argyrosomus japonicus	n	?	JRP ms
Scomber	australasicus		n	trop/temp	SFSA
Scomberoides	lysan		n	trop/temp	check
Scorpaena	cardinalis		n	temp	check
Scorpaena	jacksoniensis	s = Scorpaena cardinalis			
Scorpaena	papillosus	m? too far north			
Scorpaenodes	littoralis	s = Scorpaenodes litoralis	n	trop/temp	check
Scorpaenodes	scaber		y	temp	check
Scorpis	lineolatus		n	temp	check
Scorpis	violaceus		y	trop/temp	DFH ms
Selar	crumenophthalmus	m?- too far south			
Selaroides	leptolepis		y	trop	database
Selenotoca	multifasciata		n	trop	GRA ms
Seriola	hippos		n	trop/temp	check
Seriolella	brama		y?	temp	DFH ms
Seriolella	labyrinthica		y?	trop/temp	DFH ms
Seriolina	nigrofasciata		y?	trop	database
Siderea	thrysoidea		y?	trop	check
Siganus	fuscescens	m. Probably S. nebulosus	n	temp	SFA
Siganus	nebulosus		n	temp	SFA
Sillago	ciliata		n	trop/temp	check
Sillago	maculata		n	trop/temp	check
Sillago	robusta		n	trop/temp	check
Sillago	sihama		y?	trop	database
Simenchelys	parasiticus		y?	temp	database
Siphamia	roseigaster		n	temp/trop	check
Solegnathus	dunckeri		n	trop/temp	check
Solegnathus	fasciatus	s = S. spinossissimus	n	temp	check
Solegnathus	hardwickii		y	trop	check
Solenostomus	cyanopterus		n	trop/temp	check
Solenostomus	paradoxus		n	trop/temp	check
Sphoeroides	pachygaster		n	trop/temp	DFH ms
Sphoeroides	pleurogramma	s = Torquigener pleur.	n	temp/trop	DFH ms
Sphyraena	africana	m?, s = Sphyraena acutipinnis - not in checklist			
Sphyraena	obtusata		n	trop/temp	SFSA
Sphyrna	lewini		n	trop/temp	L&S
Sphyrna	zygaena		y	temp	L&S
Squalus	megalops		n	temp/trop	L&S
Squalus	mitsukurii		n	trop/temp	L&S
Stegastes (j.s.u.)	fasciolatus		n	trop	GRA ms
Stegastes (j.s.u.)	gascoynei		n	trop/temp	GRA ms
Stephanolepis	melanocephalus	m, s = Pervagor melanocephalus - not in NSW			GRA ms

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Stethojulis	bandanensis		n	trop	SFA
Stigmatopora	nigra		n	temp	check
Strophiurichthys	robustus	s = Anoplocapros inermis	n	trop/temp	GRA ms
Suezichthys	gracilis	s? = S.devisis	n	trop/temp	SFA
Sufflamen	bursa		y	trop	SFA
Sufflamen	fraenatus		n	trop	SFA
Suggrundus	diversidens	s = Ratabulus diversidens	n	trop/temp	check
Suggrundus	jugosus		n	trop/temp	check
Symbolophorus	barnardi		y?	temp	database
Symphurus	australis		y	temp	DFH ms
Synanceia	verrucosa		y?	trop	database
Synaptura	fasciata	? S.nigra?			
Synaptura	nigra		n	temp/trop	DFH ms
Synchiropus	calauropomus	s = Foetorepus calaur.	n	temp/trop	DFH ms
Synchiropus	rameus		y	trop	DFH ms
Synclidopus	macleayanus				
Syngnathoides	biaculeatus		n	trop/temp	check
Syngnathus	altirostris	s = Hippichthys penicillus	n	trop/temp	check
Synodus	doaki		y?	trop	database
Synodus	hoshinonis		y?	trop	database
Synodus	variegatus		n	trop/temp	check
Taenianotus	triacanthus		y?	trop/temp	SFA vs SFSA
Taenioides	mordax		n	trop/temp	DFH ms
Taenioides	purpurascens		n	trop/temp	DFH ms
Tandanus	tandanus	fw			
Terapon	jarbua		n	trop/temp	check
Terapon	theraps	m? too far south			
Tetractenos	glaber		n	temp/trop	DFH ms
Tetractenos	hamiltoni		n	trop/temp	DFH ms
Tetragonurus	cuvieri		y?	temp	Gomon
Tetrosomus	concatenatus		n	trop/temp	SFA
Thalassoma	amblycephalum		n	trop/temp	SFA
Thalassoma	lunare		n	trop/temp	SFA
Thamnaconus	hypargyreus	m			
Thamnaconus	modestoides		y	trop	GRA ms
Thamnaconus	tessellatus?	m			
Thryssa	aestuaria		y	trop	check
Thunnus	alalunga		n	trop/temp	SFSA
Torquigener	altipinnis		n	trop/temp	DFH ms
Torquigener	pleurogramma		n	temp/trop	DFH ms
Torquigener	tuberculiferus		n	trop/temp	DFH ms
Trachichthys	australis		n	temp	check
Trachinocephalus	myops		n	trop/temp	check
Trachinops	taeniatus		y	temp	check

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Trachinotus	baillonii		n	trop/temp	check
Trachinotus	botla	T. copperingi? On E coast	n	trop/temp	check
Trachinotus	russelli	T. copperingi? On E coast	n	trop/temp	check
Trachipterus	arawatae		n	temp/trop	check
Trachipterus	jacksonensis		n	temp/trop	check
Trachurus	novaezelandiae		n	temp/trop	check
Trachypoma	macracanthus		y	temp	check
Trachyrhamphus	bicoarctatus		n	trop/temp	SFA
Triodon	macropterus		y	trop	database
Tripodichthys	angustifrons		y	trop	database
Tripterophycis	gilchristi		n	temp	check
Triso	dermopterus		n	trop	database
Trygonorhina	fasciata		n	temp/trop	check
Tylosurus	gavialoides		n	trop/temp	check
Upeneus	filifer		y	trop	DFH ms
Upeneus	moluccensis		n	trop/temp	DFH ms
Upeneus	signatus	s = Parupeneus signatus	n	trop/temp	SFA
Upeneus	tragula		n	temp/trop	DFH ms
Uranoscopus	terraereginae		n	subtrop	Gomon
Urocampus	carinirostris		n	temp/trop	check
Urolophus	testaceus		n	temp/trop	SFA
Urolophus	viridis		n	temp/trop	check
Vanacampus	margaritifer		n	temp/trop	check
Vauclusella	annulata	s = Enneapterygius atrogulare			
Velifer	multiradiatus		y	temp	check
Velifer	hypselopterus	m= WA species should be V.multiradiatus			
Ventrifossa	nigrodorsalis		n	temp/trop	check
Ventrifossa	nigromaculata		y	temp	check
Xenolepidichthys	dalgleishi		n	trop/temp	check
Xiphasia	setifer		n	trop/temp	SFA
Zanclistius	elevatus		y?	temp	database

Finfish Distribution (Cleaned Australian Museum Finfish Records plus Other Published Records)

Species		Remarks	Distibution Limit in Zone	Overall Distribution	Dervivation
Zebrias	scalaris		n	temp/trop	DFH ms
Zenopsis	nebulosus		y?	temp/trop	check & Gomon

SUMMARY

Count of Distibution Limit in Zone	
Distibution Limit in Zone	Total
y	186
y?	56
?	2
n?	2
n	447
Excluded (blank)	123
Grand Total	**817**

1. Remarks: Contains comments pertaining to... 'm' (misidentification); 's' (synonym?); 'fw' (freshwater); 'jsu' (junior synonym update)

2. Distribution Limit in Zone: Lists whether the limit of geographic distribution occurs within the zone between Tweed Heads and Port Maquarie. Most cases are identified with a 'y' (yes, limit lise within the zone) or'n' (no). '?' distribution represents uncertainty

3. Overal Distribution: Lists whether the distibution of the species is primarily tropical (trop), temporate (temp), or both (trop/temp). An indication of whether the distribution is mostly tropical (trop/temp) or mostly temporate (temp/trop) is provided (use only as an indication).I

4. Dervivation of information:

Checklist (check): Paxton, J.R., D.F. Hoese, G.R. Allen and J.E. Hanley (1989) Zoological Catalogue of Austraila. Vol. 7 Pisces Petromyzontidae to Carangidae. Canberra, Australian Biological Resources Survey. pp i-xii, 1-665.

L&S: Last, P.R. and J.D. Stevens (1994) Sharks and Rays of Australia. CSIRO. Pp513, Pl.1-84.

CFSEA: Kuiter, R.H (1993) Coastal Fishes of South-eastern Australia. Crawford House Press. Pp 437

SFA: Kuiter, R.H (1993) Guide to Sea Fishes of South-eastern Australia. New Holland Press. Pp 433

Gomon: Gomon, M.F, J.C.M. Glover and R.H. Kuiter (Eds) (1994) The Fishers of Australia's South Coast. State Print, Adelaide. Pp. 992.

Database: The actual record listed in the Australian Museum Finfish database.

DFH ms, GRA ms: Doug Hoese and Gerald Allen manuscripts for the second volume of the catalogue (see "check" above).

5. Information in this table was prepared by: Dr. Mark McGrouther, Australian Museum, Sydney.

Appendix 6

CSIRO Sea Surface Temperature Report

Satellite infrared images of the coastal and offshore waters of NSW

George Cresswell
CSIRO Marine Ressearch
Hobart, Tasmania

Prepared for NSW Marine Parks Authority

Report GC-NPWS-1998
July 1998

Contents

Executive summary

In response to a request from the National Parks and Wildlife Service of NSW we have reviewed information on the central and northern coastal and offshore waters of NSW. We have prepared three collections of satellite infrared images and posted these on the world wide web. One is of monthly mean images for a 6 year period; another is of seasonal images, both for individual years and the entire 6 year data set; and the final one is of single pass images, several per month, for a 16-month period. We have identified the main ocean current features and regions where coastal upwellings occur.

1. Introduction to NSW coastal and offshore waters

The continental shelf of NSW is narrow, with an average width of about 25 km, and at midshelf it is 60-80 m deep. The waters of the continental shelf are subject to a variety of processes including atmospheric forcing, tides, longshore currents, and coastal trapped and internal waves. The most significant effects on the shelf waters, however, come from episodic incursions of waters driven by the East Australian Current (EAC) and its eddies. These incursions quickly overwhelm existing current patterns, replace large parts of the shelf waters, and appear to be one of the mechanisms for driving nutrient-rich intrusions of slope water in towards the coast. Near the coast the intrusions upwell to the surface through forcing by northerly winds. The intrusions probably have significant implications for marine life. The East Australian Current (EAC) core runs southward above the continental slope, reaching speeds of up 2 ms^{-1} between 28° and 33°S (Hamon et al. 1975; Godfrey et al. 1980). The edge of the EAC can reach in to the shore to drive southward currents of ~0.5 ms^{-1} at promontories like Cape Byron, Smoky Cape and Cape Hawke/Sugarloaf. This means that it is more of an influence on the circulation of the NSW shelf than is the Gulf Stream on the US eastern shelf, which is 70-120 km wide, with a typical depth of 30 m.

The processes of enrichment of the continental shelf waters of NSW are complex and interesting. Early attention was focussed on the intrusions of continental slope water near Sydney (Rochford, 1958; Humphrey, 1960; Newell, 1966; Grant, 1971; Newell and Bulleid, 1975; Hahn et al., 1977; Boland, 1979); on the northern waters off Evans Head, 29°08'S, (Rochford, 1972; Tranter et al., 1980) and Laurieton, 31°30'S, (Rochford, 1975); and the southern waters as they related to the southern bluefin tuna fishery (Newell, 1961). Rochford (1984) concluded that the prime source of nitrates in all NSW coastal waters was the intrusion of slope waters onto the shelf, particularly in spring-summer (Rochford, 1984).

Sydney region

Humphrey (1960) found that the intrusions, which he arbitrarily defined to have temperature ≤14°C; phosphate ≥0.7 μg-atoms l^{-1}; nitrate ≥5.0 μg-atoms l^{-1}; and pH ≤8.15, were accompanied by bursts of chlorophyll pigment production. He also noted that the intrusion patterns , as indicated by the nitrate and phosphate concentrations, were qualitatively similar to the patterns of pigment maxima in the surface waters. Grant (1971) suggested that waters that upwelled off Laurieton and were then carried 300 km southward by the EAC may also contribute to surface enrichment off Sydney. This process was later examined by Cresswell (1994).

The slope intrusions occurred spasmodically at the 100 m Port Hacking station near Sydney between September and March from 1953-62 and had associated with them increases in algal population (chlorophyll a) and zooplankton biomass (Newell, 1966). Newell ascribed the slope intrusions to alterations in the velocity and position of the bordering EAC. Similarly, Boland (1979) found that the intrusions seemed to occur when there was a strong EAC above the slope and he suggested that this would drive a bottom Ekman boundary layer onshore.

Tranter, Carpenter and Leech (1986) found that slope intrusions occurred when a warm anticyclonic eddy or EAC meander came within 90 km of the shelf edge, thereby driving waters from the continental slope onto the shelf edge. When their anticyclonic Eddy J swept southward past Sydney's latitude (34°S) in October-November 1979 the properties at the bottom at the 100 m station were temperature

<14°C, salinity <35.3, and nitrate >10 μg-atoms l^{-1}. Wind was an additional factor: northerly winds favoured the intrusions, but alone were not sufficient to produce them. The intrusions were rare from May to July when the EAC is weak and the prevailing winds are from the west.

Huyer et al (1988) found that EAC eddies had significant effects on the shelf and slope. During a 3-week period in January 1984 a slope intrusion brought the 15°C isotherm in to the 50 m contour on the shelf near Sydney. The fast current core of the anticyclonic eddy was initially 45 km seaward of the shelf edge; there was upward doming of the isotherms between the core and the continental slope, consistent with the rotary cyclonic currents detected by current meters.

Griffin and Middleton (1991) similarly used their data and historical observations to view the NSW shelf in its entirety. In the north the EAC is generally strong and frequently spreads across the shelf to drive upwelling through a bottom Ekman layer. In addition, as compared with the south, the winds are less likely to suppress upwelling and coastal trapped wave currents are weaker. Near Sydney at periods of about 20 days bottom stress from the longshore current is again important, for example in the case of an eddy squashed up against the shelf. At several-day periods (the weather band) the nutrient-rich slope waters are driven shoreward principally by the alongshore component of the (southward) windstress. Griffin and Middleton (*loc. cit.*) noted that strong winds at Sydney are generally *downwelling* favourable and last only a few days. McClean-Padman and Padman (1991) had earlier concluded that the major upwelling events that they observed at the Sydney coast were due equally to the EAC and upwelling favourable winds. Condie (1995) developed a model for the interaction of western boundary currents and shelf waters and found that strong upwelling can occur, even before the current comes into direct contact with the bottom.

Laurieton region

Upwellings with nitrate concentrations of 6 µg-atoms l-1 occur off north-central NSW at Laurieton in spring and summer with their water properties fixing their source at depths of 125-275 m (Rochford, 1975, 1984). Hallegraeff and Jeffrey (1993) reported that the highest phytoplankton maximum (8 µg l-1) that they observed in October 1981 occurred at 30-40 m depth at a mid-shelf station (at the 90 m isobath) near Cape Hawke (32°S), south of where the East Australian Current had separated from the coast. The high value occurred just below the bottom of mixed layer where the nitrate concentration was 8 µg-atoms l-1.

Evans Head region

In the Evans Head area, 29°07'S, nearshore upwellings of 4 ug-atoms l-1 nitrate and 17-19° C occur between late July and mid-December (Rochford, 1972). A study by Cresswell (unpublished manuscript) with a research vessel, moored instruments, satellite radiometers, satellite-tracked drifters, tide gauges and meteorological instruments was done on the currents of northern NSW in late 1989. The East Australian Current (EAC) was a major influence and ran southward just beyond the shelf edge with its core at 50-100 m depth. In this core the speed steadily increased from 0.9 to 1.6 ms^{-1} between 27° and 29°S. The EAC often spread in across the shelf. The nearshore edge of the EAC commonly developed instabilities downstream of its separation from the shelf. Each commenced as a small meander to the west from which a warm plume reached back and around a growing cyclonic eddy in its wake. The instabilities formed roughly every 5 days, were carried southward at 0.3-0.5 ms^{-1}, and were separated by about 120 km.

A current meter at 90 m depth at the 200 m isobath showed that the EAC was certainly not steady, having steps lasting 1-2 months, plus variability at periods of several days. The current during the measurement period September 1989 to March 1990 ranged from 1.5 ms^{-1} southward to 0.5 ms^{-1} northward. The current decreased with depth so that at 130 m and 190 m depth on this mooring it was about 1/2 and 1/5 respectively of the 90 m value. Moorings across the shelf showed a progressive transition from domination by the EAC at the 200 m isobath to domination by local wind forcing at the inner shelf. At the innermost mooring (at the 44 m isobath 7 km from shore) the variability detected by the single current meter 10 m above the bottom had a dominant period of ~1 week with amplitude ~0.25 ms^{-1} and a smaller amplitude one of 2-3 days period.

After late October, when summer stratification presumably overcame winter mixing, two effects could be observed: Upwelling-favourable winds (northerlies) lowered coastal sea level and on the inner shelf they drove a southward current with an (inferred) onshore component near the bottom that caused a drop in temperature. The opposite occurred with upwelling-favourable winds (southerlies).

2. Comments on wind-driven upwellings

Wind-driven upwelling is frequently referred to in this report and in this section we present a simple background to it. Upwelling, whereby waters as much as 200 m deep are brought to the surface, is a common phenomenon in regions where moderate to strong winds blow parallel to the coast for lengthy periods. The combined effects of wind-forcing and the earth's rotation, i.e. the Coriolis force, are interesting (**Figure 1**). Let us simplify the upper ocean to a stack of many slabs. The wind stress moves the surface slab about 45° to its left; the surface slab, through friction, drives the one beneath it. But it doesn't quite bring it to its own speed and, as well, the lower slab

resists flowing in the direction of the surface slab. Rather, it flows a little to the left. The second slab similarly acts through friction on the third, and so on until the vectors turn and shrink to very small values. At this point the bottom of the Ekman layer has been reached. (Ekman was the mathematician early this century who developed a theory to interpret observations of wind-driven flow that were made by the explorer Nansen in the Arctic Ocean). When the current vectors are integrated from the surface to the bottom of the Ekman layer (from theory about 50 m thick) the result is flow (Ekman flow) to the left of the wind, as shown in the diagram.

If there is a coastline on the right side of the wind vector the Ekman flow becomes an offshore flow that must be replaced by deeper waters from below the Ekman layer that "upwell" to the surface (Figure 2).

3. Satellite images

Monthly mean images

We have prepared monthly mean images of the coastal and offshore waters east from the NSW coast for 6 years from February 1991 to December 1996. The images can be found on:

www.marine.csiro.au/~cresswel/NSWNPWS/index.html

The monthly composites each incorporate as many as 50 images. This approach has the advantage of reducing the blocking effects of cloud. However, because ocean features move several kilometres per day (eddies off southern NSW can move at over 20 km per day) the compositing process tends to smear sharp features that move. Also, the importance of events such as upwellings that may last from a few days to a week at a location may be downplayed in the monthly mean images.

Because of the wide range of temperatures that exist over NSW waters it is challenging to select a false colour rainbow to assign to these temperatures, given that one wants to identify a range of feaures. We have attempted to false-colour the warmest waters in each image about the same red colour. Thus each image has an individual temperature scale. The viewer will see that coastal waters off Eden, which are invariably cold because of flow coming from Bass Strait, have been coloured white in order to give a dynamic range of colours necessary for identifying ocean features further northward.

The monthly mean images are attractive as they give a regular time series that reveals large scale behaviour of the EAC system. This system includes the parent EAC stream that flows southward into northern NSW waters, along with meanders and eddies that form all the way down to Bass Strait. The viewer will see these features wander northward and southward, offshore and onshore, in the series of images. In the northern half of NSW the inshore edge of the EAC can come close inshore at Cape Byron, Smoky Cape and Sugarloaf Point. Sometimes a branch of the EAC can run southward from Sugarloaf Point along the continental shelf .

Seasonal images

We have assembled the various monthly images into seasons and posted these on web address:

www.marine.csiro.au/~cresswel/NSWNPWS/seasonal/

There are four columns: summer (Jan/Mar), autumn (Apr/Jun), winter (Jul/Sep) and spring (Oct/Dec). The first row is for all the years. The others are 1991-1996, so it is possible to compare the seasons of different years.

Single pass images

The examination of many single pass images over the years (as well as work by other oceanographers with other tools) revealed regions where upwellings often occur — probably from the combined effects of the EAC and wind forcing. To highlight these we have prepared a web page of good single pass images (several per month) for the period July 1991 to October 1992 where the viewer can see the upwelling features discussed above. These can be found on:

www.marine.csiro.au/~cresswel/NSWNPWS/single/

Note that in doing this job we have had to break new ground in deciding how best to get the information on different coastal and offshore ocean features across to the viewer. Because of the wide range temperatures we present two images for each pass: they have been colour enhanced with northern and southern NSW waters as the priority respectively. Their web addresses reflect this, e.g. the image for 15 October 1991 has been enhanced for the north with 911015d**N**.html and for the south with 911015d**S**.html. Many other single pass images can be found on the CSIRO Marine Research web page under the section on yacht races.

www.marine.csiro.au/yacht_races/

4. Discussion

In introducing the single pass images in the previous section we pointed out that over the years such images, combined with other data, have helped us identify upwelling regions along the NSW coast. These are part of our folklore rather than the scientific literature. The regions — and single-pass images to illustrate them — are:

Cape Byron/Evans Head — 13 May 92, 30 July 92, 8 Nov 92
Smoky Cape/Laurieton — 8 and 15 Dec 91, 5 and 13 Sep 92, 26 Nov 92
Sugarloaf Point/Newcastle — 5 and 13 September 92
Royal National Park — 5 Mar 92
Jervis Bay vicinity— 26 Nov 92

Note that on 6 and 9 October 1992 there was coastal upwelling over most of the northern NSW coast from Evans Head to south of Sugarloaf Point.

In response to a query from the NPWS, I feel that the Byron/Evans and Solitary Islands regions are quite different, with upwellings being a strong feature of the former, but not the latter.

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Tranter, D.J., D.J. Carpenter and G.S. Leech (1986) The coastal enrichment effect of the East Australian Current eddy field. *Deep-Sea Research* **33**, 1705-1728.

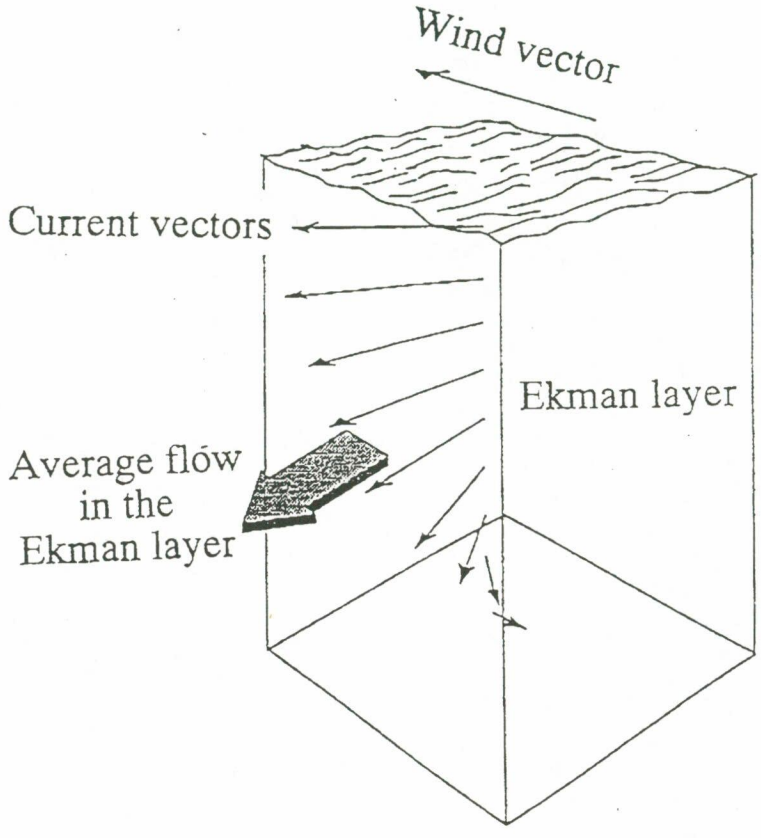


Figure 1 A cartoon of the theoretical Ekman spiral showing first how the wind-driven surface current is directed to the left of the wind , and then how the current vectors rotate and decrease in strength with increasing depth to the bottom of the Ekman layer. The average flow in the Ekman layer is at right angles to the wind. Adapted from Stewart (1969).

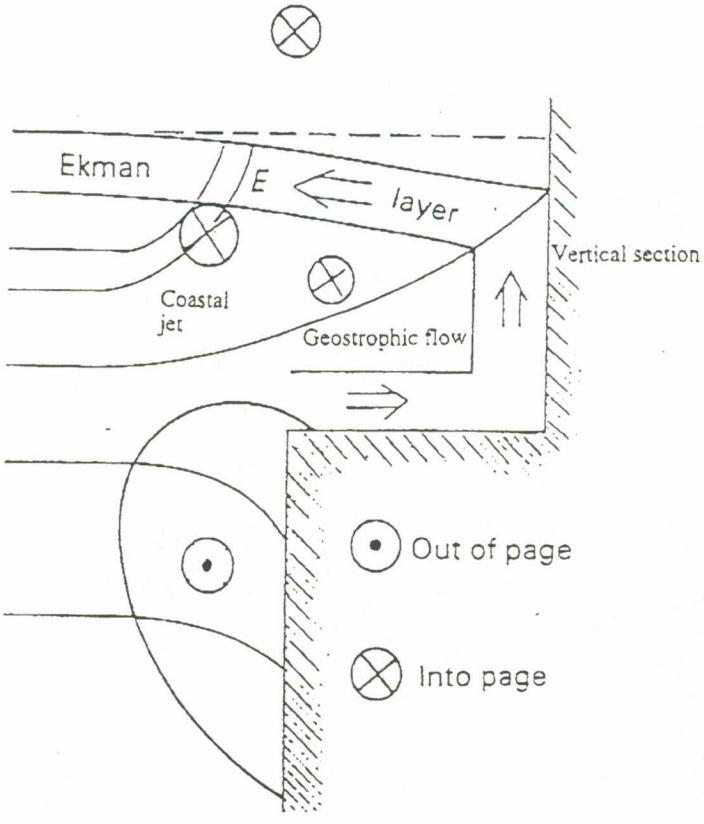
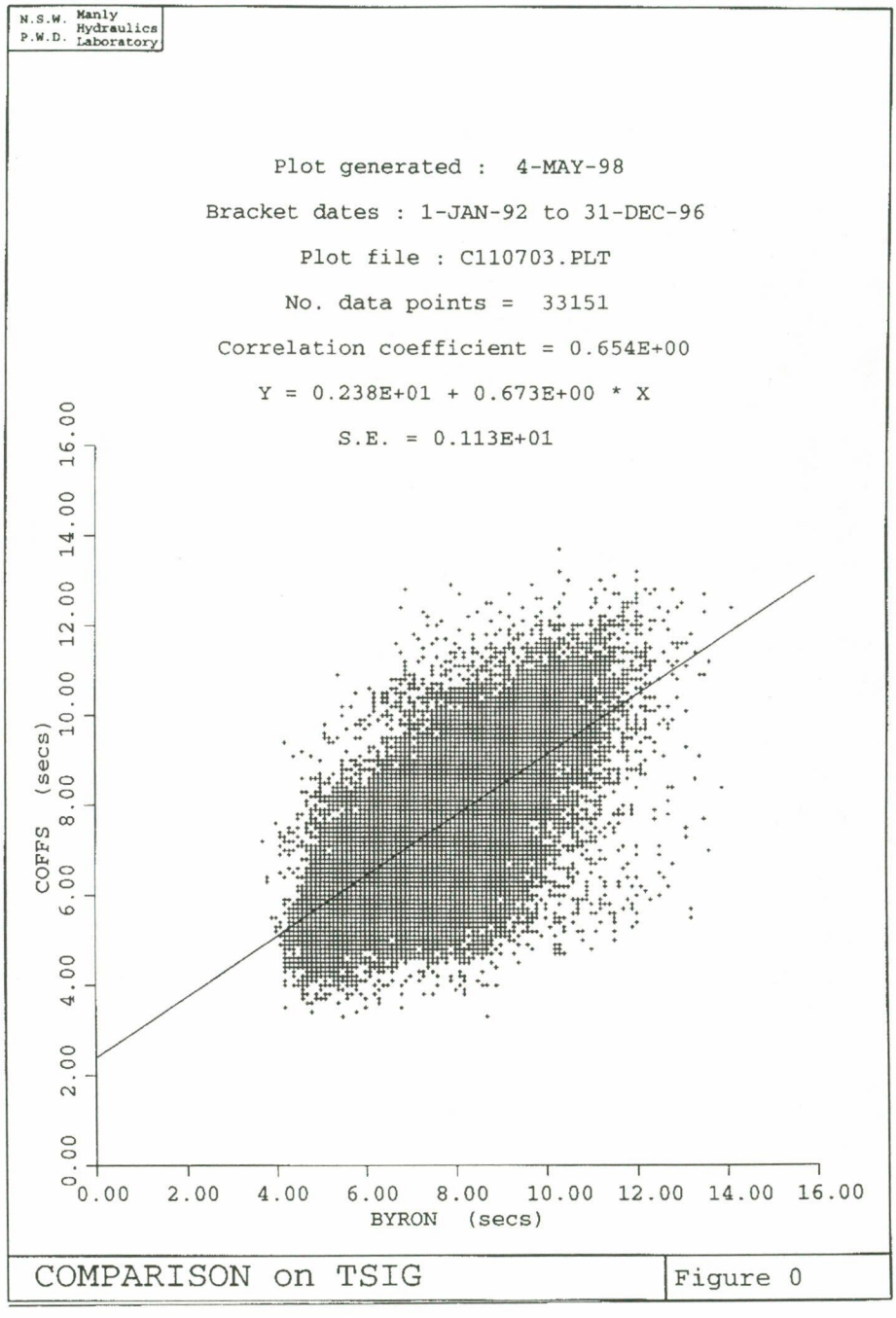


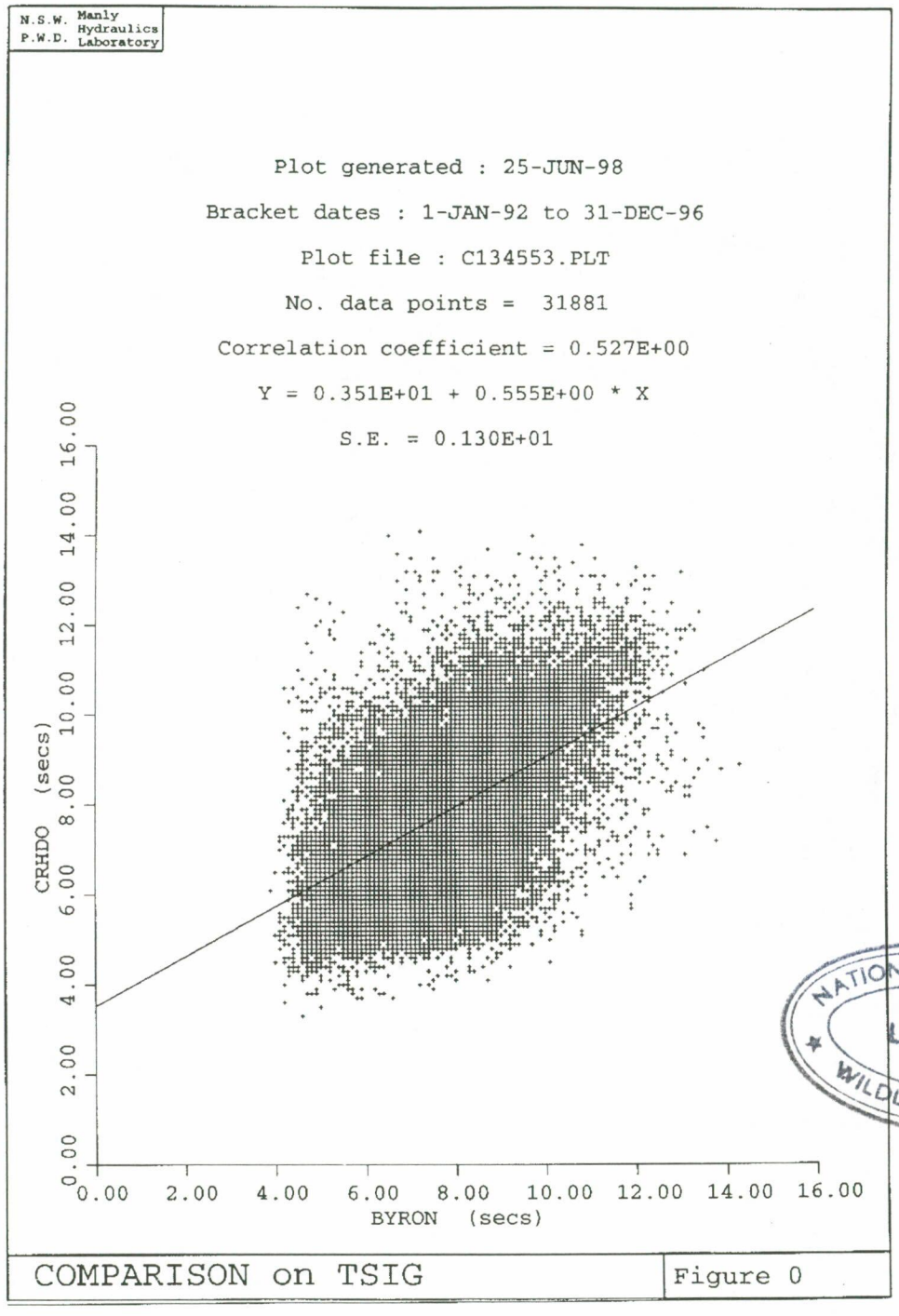
Figure 2 A cartoon of wind-driven coastal upwelling in the southern hemisphere (adapted from Tomczak and Godfrey, 1994). The wind blows parallel to the coast and drives an Ekman layer flow offshore (imagine looking southward with the NSW coast on your right). This is replaced by offshore water flowing at depth towards the coast. The five lines that start out as being horizontal on the left of the diagram indicate arbitrary isotherms — they diverge as the land is approached. There is an intensification of the flow (the coastal jet) where the isotherms are clustered together. There is deep flow contrary to the wind direction.

Appendix 7

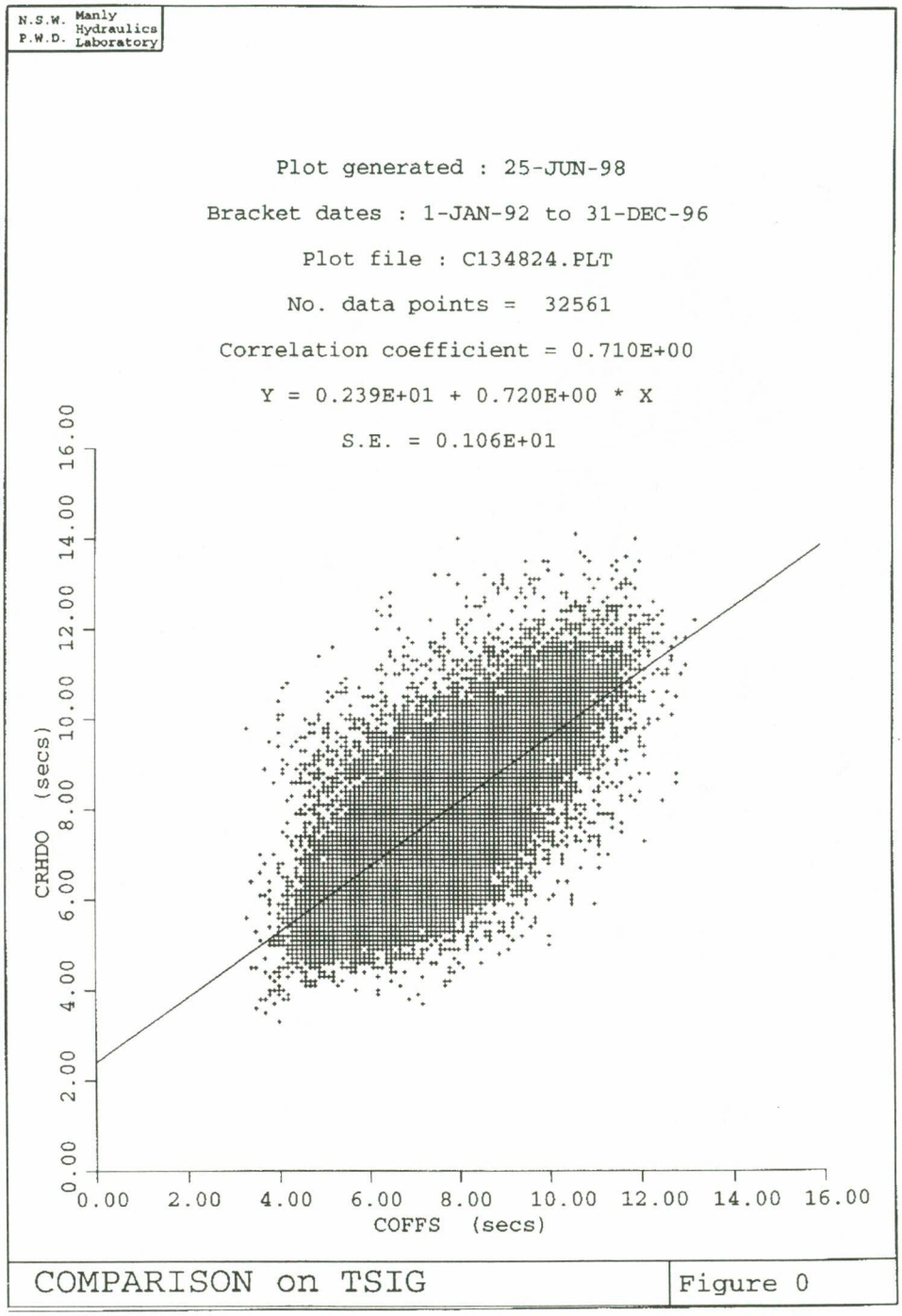
Wave Climate



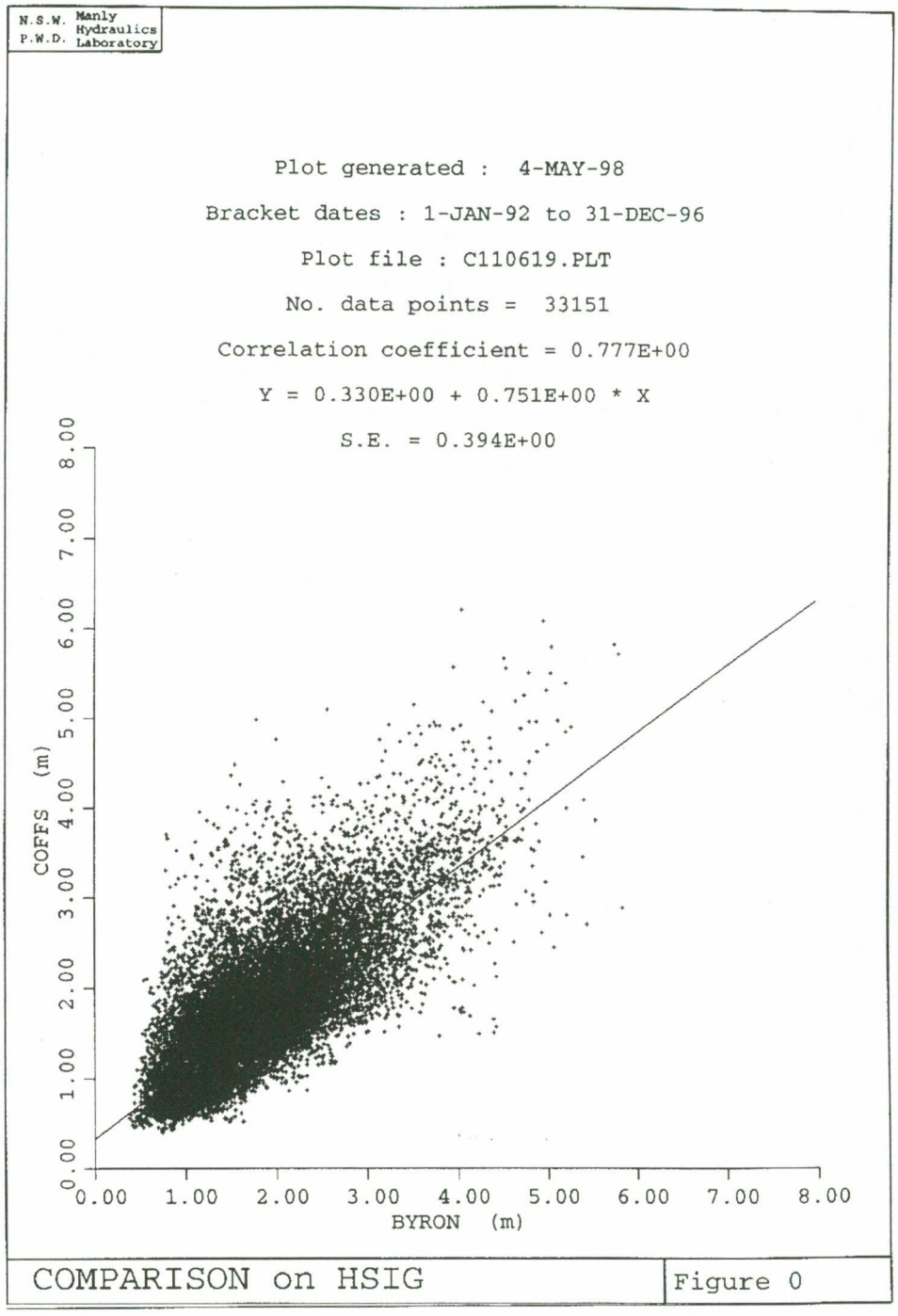
Appendix 6a Significant Wave Period (Tsig) Plots: comparison between ***Byron*** *(Lat. 28°39') and* ***Coffs*** *(Lat. 30° 21'). Tsig is a measure of wave speed of the highest 33% of waves, with each point representing coincident data between the two sites. There appears to be little difference in the range and distribution of Tsig values for Byron and Coffs. (Plot Provided by Mark Kulmar, Manly Hydraulics Laboratory).*



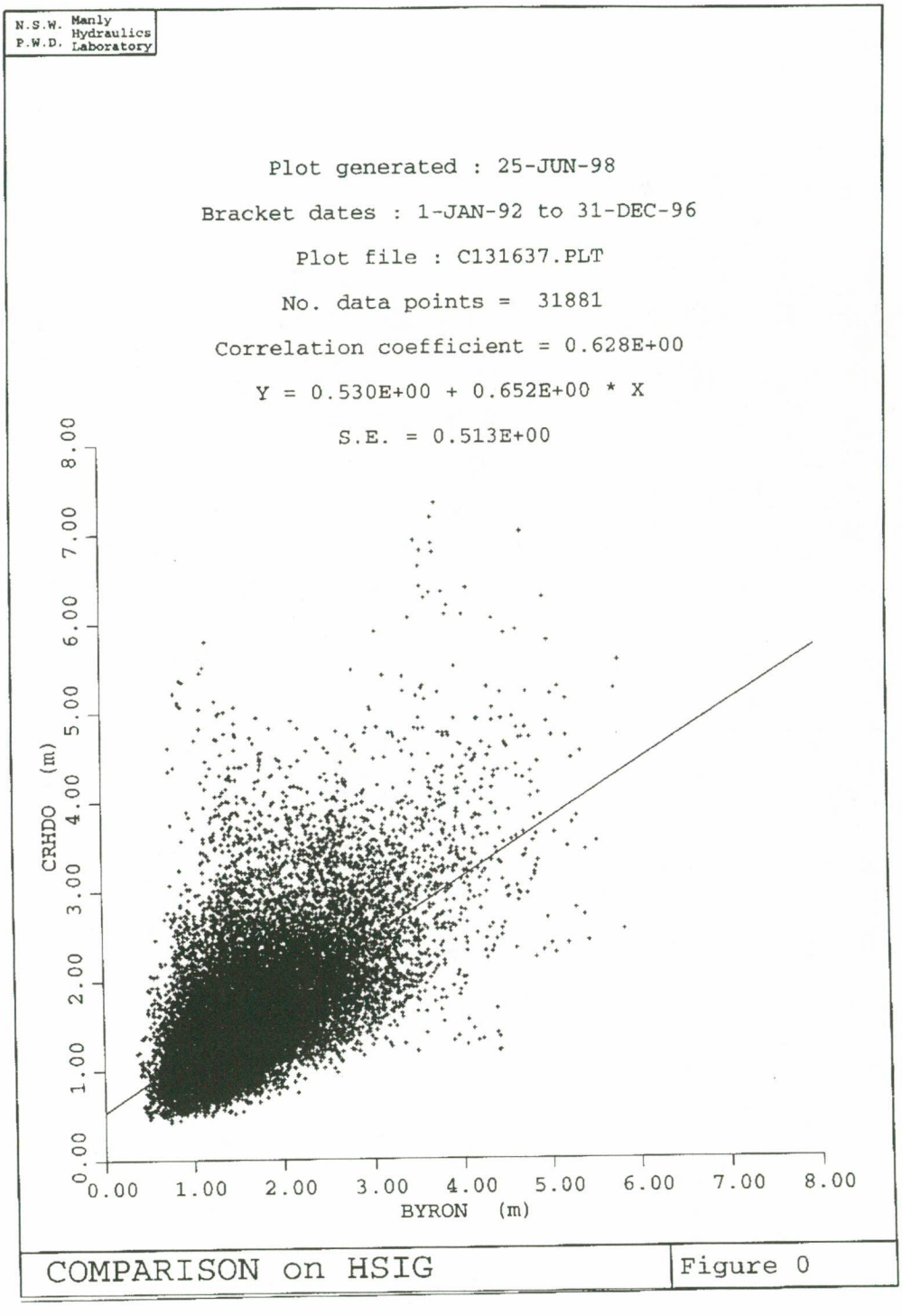
*Appendix 6b Significant Wave Period (Tsig) Plots: comparison between **Byron** (Lat. 28°39') and **Crowdy Head** (Lat. 31° 49'). Tsig is a measure of wave speed of the highest 33% of waves, with each point representing coincident data between the two sites. There appears to be little difference in the range and distribution of Tsig values for Byron and Crowdy Head. (Plot provided by Mark Kulmar, Manly Hydraulics Laboratory).*



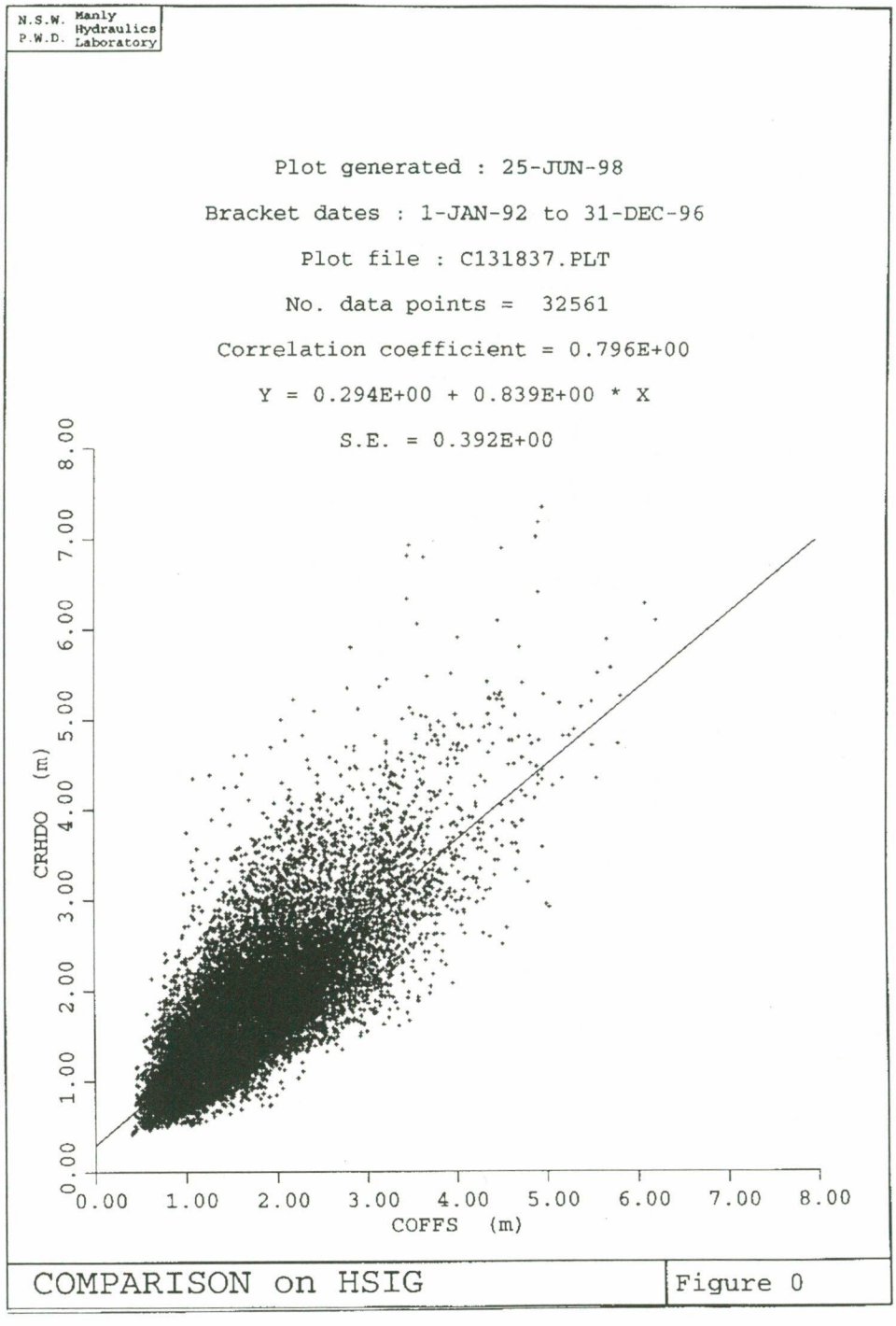
*Appendix 6c Significant Wave Period (Tsig) Plots: comparison between **Coffs** (Lat. 30° 21') and **Crowdy Head** (Lat. 31° 49'). Tsig is a measure of wave speed of the highest 33% of waves, with each point representing coincident data between the two sites. There appears to be little difference in the range and distribution of Tsig values for Coffs and Crowdy Head. (Plot provided by Mark Kulmar, Manly Hydraulics Laboratory).*



Appendix 6d Significant Wave Height (Hsig) Plots: comparison between ***Byron*** *(Lat. 28°39') and* ***Coffs*** *(Lat. 30° 21'). Hsig is a measure of the average height of the highest 33% of waves, with each point representing coincident data between the two sites. There appears to be little difference in the range and distribution of Hsig values for Byron and Coffs. (Plot provided by Mark Kulmar, Manly Hydraulics Laboratory).*



Appendix 6e Significant Wave Height (Hsig) Plots: comparison between ***Byron*** *(Lat. 28°39') and* ***Crowdy Head*** *(Lat. 31° 49'). Hsig is a measure of the average height of the highest 33% of waves, with each point representing coincident data between the two sites. Large Hsig waves (range 6 -7.5 m) are experienced in the south at Crowdy Head which are not experienced in Byron. (Plot provided by Mark Kulmar, Manly Hydraulics Laboratory).*



Appendix 6f Significant Wave Height (Hsig)Plots: comparison between ***Coffs*** *(Lat. 30° 21') and* ***Crowdy Head*** *(Lat. 31° 49'). Hsig is a measure of the average height of the highest 33% of waves, with each point representing coincident data between the two sites. Large Hsig waves (range 6 -7.5 m) are experienced in the south at Crowdy Head which are not experienced in Coffs. (Plot provided by Mark Kulmar, Manly Hydraulics Laboratory).*

OCCURRENCE STATISTICS FOR BYRON

Nominated start/finish: 01-JAN-92 to 31-DEC-96
Data start/finish: 01-JAN-92 to 31-DEC-96

Creation date: 04-MAY-98
Maximum value: 5.85 recorded on 15-FEB-95
Minimum value: 0.38 recorded on 23-MAY-94

Public Works Department, NSW
Manly Hydraulics Laboratory
110B King Street
MANLY VALE NSW 2093

PERCENTAGE OCCURRENCE FOR HSIG IN METRES

HSIG	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0.00 - 0.49	0.00	0.00	0.00	0.00	0.43	0.00	0.00	0.39	0.00	0.00	0.00	0.25	0.098
0.50 - 0.99	19.34	12.41	6.36	7.80	11.26	11.56	10.17	18.62	14.88	14.65	15.84	17.29	13.546
1.00 - 1.49	36.57	45.40	22.44	30.09	35.40	34.76	37.84	42.36	44.25	41.67	44.02	38.77	37.983
1.50 - 1.99	23.62	17.93	29.00	39.67	21.69	31.41	29.56	23.99	23.85	22.58	21.08	23.55	25.486
2.00 - 2.49	15.28	10.60	18.78	15.66	13.81	14.16	14.49	10.04	11.53	12.33	9.26	12.63	13.137
2.50 - 2.99	3.75	8.44	14.30	4.19	7.97	4.23	5.82	3.04	2.67	6.08	6.59	5.14	5.919
3.00 - 3.49	1.17	3.02	4.68	0.91	5.32	1.91	1.60	0.86	1.45	2.15	1.66	1.54	2.172
3.50 - 3.99	0.16	0.76	2.66	0.91	2.58	1.66	0.46	0.55	0.73	0.44	0.91	0.34	1.001
4.00 - 4.49	0.13	0.62	0.94	0.47	1.35	0.31	0.07	0.14	0.55	0.10	0.61	0.17	0.451
4.50 - 4.99	0.00	0.46	0.57	0.29	0.18	0.00	0.00	0.00	0.09	0.00	0.03	0.22	0.150
5.00 - 5.49	0.00	0.33	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.047
5.50 - 5.99	0.00	0.03	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.011
Number of data points used for statistical analysis:	3175	3046	2972	2745	3251	3193	3058	3614	3442	2928	2960	3562	37946
Percent capture based on Data start/finish:	85.35	87.53	79.89	76.25	87.39	88.69	82.20	97.15	95.61	78.71	82.22	95.78	86.40
Percent capture based on Nominated start/finish:	85.35	87.53	79.89	76.25	87.39	88.69	82.20	97.15	95.61	78.71	82.22	95.78	86.40
Average value:	1.51	1.64	1.98	1.69	1.77	1.64	1.62	1.45	1.52	1.56	1.54	1.53	1.62

Appendix 6g ***BYRON****: Percentage occurrence of waves of significant height (Hsig) by month. The largest Hsig waves (4.50 - 5.99 m) occur in February and March. Throughout the year Hsig waves Hsig waves in the range 0.00 - 2.49 m account for the majority (90.385%) of occurrences, while 2.50 - 4.99 m range accounts for 9.557% of occurrences, and 5.00+ m accounts for the remaining 0.058%. (Table provided by Mark Kulmar, Manly Hydraulics Laboratory)*

OCCURRENCE STATISTICS FOR COFFS

Nominated start/finish: 01-JAN-92 to 31-DEC-96
Data start/finish: 01-JAN-92 to 31-DEC-96

Creation date: 04-MAY-98
Maximum value: 6.21 recorded on 07-MAR-95
Minimum value: 0.40 recorded on 04-JUL-92

Public Works Department, NSW
Manly Hydraulics Laboratory
110B King Street
MANLY VALE NSW 2093

PERCENTAGE OCCURRENCE FOR HSIG IN METRES

HSIG	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0.00 - 0.49	0.00	0.00	0.00	0.00	0.25	0.07	0.45	0.11	0.00	0.00	0.00	0.00	0.073
0.50 - 0.99	13.72	20.67	7.99	11.85	21.68	13.49	12.21	25.83	19.48	14.14	16.74	15.30	16.171
1.00 - 1.49	45.27	37.43	21.32	45.35	28.86	36.26	38.65	34.41	41.26	46.34	48.29	42.42	38.812
1.50 - 1.99	25.88	20.95	30.61	26.68	20.81	26.67	31.95	24.26	23.43	22.24	21.95	24.87	25.040
2.00 - 2.49	12.06	11.90	22.16	11.07	13.93	15.76	8.71	8.26	8.83	10.84	7.58	9.98	11.663
2.50 - 2.99	2.56	6.11	8.98	3.35	9.42	4.10	5.68	3.27	3.62	3.27	3.15	3.95	4.748
3.00 - 3.49	0.51	1.77	4.79	1.08	2.74	1.93	2.14	2.32	2.06	1.41	1.42	2.02	2.037
3.50 - 3.99	0.00	0.88	1.99	0.60	1.31	1.22	0.22	1.13	0.92	0.64	0.44	0.94	0.870
4.00 - 4.49	0.00	0.24	0.93	0.03	0.50	0.30	0.00	0.40	0.36	0.67	0.44	0.23	0.352
4.50 - 4.99	0.00	0.04	0.87	0.00	0.40	0.17	0.00	0.00	0.03	0.39	0.00	0.15	0.175
5.00 - 5.49	0.00	0.00	0.12	0.00	0.09	0.03	0.00	0.00	0.00	0.06	0.00	0.09	0.034
5.50 - 5.99	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.021
6.00 - 6.49	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.005
Number of data points used for statistical analysis:	2770	2487	3218	3343	3215	2951	3136	3705	3589	3606	2957	3418	38395
Percent capture based on Data start/finish:	74.46	71.47	86.51	92.86	86.42	81.97	84.30	99.60	99.69	96.94	82.14	91.91	87.42
Percent capture based on Nominated start/finish:	74.46	71.47	86.51	92.86	86.42	81.97	84.30	99.60	99.69	96.94	82.14	91.91	87.42
Average value:	1.48	1.54	1.94	1.52	1.65	1.62	1.56	1.46	1.49	1.53	1.45	1.54	1.56

Appendix 6h ***COFFS****: Percentage occurrence of waves of significant height (Hsig) by month. The largest Hsig waves (4.50 - 6.49 m) occur in February and March. Throughout the year Hsig waves in the ranges 1.00-2.49 m, 2.50 - 4.99 m, and 5.00+ m accounts 91.758, 8.182 and 0..060% of occurrences, respectively. (Table provided by Mark Kulmar, Manly Hydraulics Laboratory).*

OCCURRENCE STATISTICS FOR CRHDO

Nominated start/finish: 01-JAN-92 to 31-DEC-96
Data start/finish: 01-JAN-92 to 31-DEC-96

Creation date: 25-JUN-98
Maximum value: 7.35 recorded on 04-MAR-95
Minimum value: 0.42 recorded on 04-JUL-92

Public Works Department, NSW
Manly Hydraulics Laboratory
110B King Street
MANLY VALE NSW 2093

PERCENTAGE OCCURRENCE FOR HSIG IN METRES

HSIG	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0.00 - 0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.19	0.00	0.00	0.00	0.00	0.032
0.50 - 0.99	14.88	12.64	4.12	13.56	19.91	13.55	12.59	23.00	13.17	19.73	16.10	12.39	14.452
1.00 - 1.49	43.03	36.74	29.10	43.47	36.38	35.72	39.48	32.46	38.64	44.32	42.36	43.16	38.525
1.50 - 1.99	27.06	25.57	30.99	28.04	24.73	30.11	26.44	21.67	23.18	24.18	24.25	23.32	25.874
2.00 - 2.49	8.81	12.93	17.41	11.69	12.22	12.63	14.16	12.71	13.73	8.49	10.76	10.09	12.312
2.50 - 2.99	5.17	6.40	9.18	1.66	5.29	3.97	4.94	5.39	4.76	2.22	3.48	6.16	4.936
3.00 - 3.49	1.01	3.15	3.92	0.76	1.13	1.90	1.23	2.98	2.33	0.24	1.62	3.45	2.013
3.50 - 3.99	0.04	1.98	1.86	0.45	0.33	1.64	0.59	1.12	2.16	0.77	1.07	0.73	1.078
4.00 - 4.49	0.00	0.45	1.43	0.33	0.00	0.39	0.39	0.22	0.90	0.04	0.35	0.17	0.411
4.50 - 4.99	0.00	0.13	0.80	0.03	0.00	0.10	0.00	0.15	0.83	0.00	0.00	0.42	0.210
5.00 - 5.49	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.06	0.30	0.00	0.00	0.10	0.083
5.50 - 5.99	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.022
6.00 - 6.49	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.030
6.50 - 6.99	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.013
7.00 - 7.49	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.008
Number of data points used for statistical analysis:	2668	3078	3498	3310	3004	3049	3566	3226	3007	2473	3447	2873	37199
Percent capture based on Data start/finish:	71.72	88.45	94.03	91.94	80.75	84.69	95.86	86.72	83.53	66.48	95.75	77.25	84.70
Percent capture based on Nominated start/finish:	71.72	88.45	94.03	91.94	80.75	84.69	95.86	86.72	83.53	66.48	95.75	77.25	84.70
Average value:	1.50	1.68	1.95	1.50	1.51	1.61	1.59	1.55	1.68	1.42	1.52	1.61	1.60

Appendix 6i ***CROWDY HEAD****: Percentage occurrence of waves of significant height (Hsig) by month. The largest Hsig waves (5.00 -7.49 m) occur in March. Throughout the year Hsig waves in the ranges 1.00-2.49 m, 2.50 - 4.99 m, and 5.00+ m accounts 91.196, 8.648 and 0.156% of occurrences, respectively. (Table provided by Mark Kulmar, Manly Hydraulics Laboratory).*

OCCURRENCE STATISTICS FOR BYRON

Nominated start/finish: 01-JAN-92 to 31-DEC-96
Data start/finish: 01-JAN-92 to 31-DEC-96

Creation date: 04-MAY-98
Maximum value: 14.30 recorded on 08-MAY-93
Minimum value: 3.70 recorded on 29-JUN-95

Public Works Department, NSW
Manly Hydraulics Laboratory
110B King Street
MANLY VALE NSW 2093

PERCENTAGE OCCURRENCE FOR TSIG IN SECONDS

TSIG	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0.00 - 1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
2.00 - 3.99	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.03	0.011
4.00 - 5.99	9.73	9.59	3.47	3.79	4.52	7.14	5.62	11.95	14.93	17.38	19.83	13.34	10.204
6.00 - 7.99	44.54	47.47	28.26	35.96	38.05	34.98	31.29	35.31	38.00	34.36	46.96	50.45	38.937
8.00 - 9.99	42.96	38.97	55.62	52.68	48.08	44.13	50.69	44.49	40.30	42.76	28.45	33.18	43.333
10.00 - 11.99	2.30	3.94	10.97	6.81	8.27	11.81	11.31	7.94	6.68	5.50	4.73	2.98	6.910
12.00 - 13.99	0.47	0.03	1.68	0.77	1.05	1.85	1.05	0.30	0.09	0.00	0.03	0.03	0.601
14.00 - 15.99	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.005
Number of data points used for statistical analysis:	3175	3046	2972	2745	3251	3193	3058	3614	3442	2928	2960	3562	37946
Percent capture based on Data start/finish:	85.35	87.53	79.89	76.25	87.39	88.69	82.20	97.15	95.61	78.71	82.22	95.78	86.40
Percent capture based on Nominated start/finish:	85.35	87.53	79.89	76.25	87.39	88.69	82.20	97.15	95.61	78.71	82.22	95.78	86.40
Average value:	7.77	7.72	8.53	8.27	8.28	8.31	8.37	7.91	7.72	7.68	7.35	7.49	7.94

Appendix 6j ***BYRON****: Percentage occurrence of waves with a significant wave period (Tsig) by month. (Table provided by Mark Kulmar, Manly Hydraulics Laboratory).*

OCCURRENCE STATISTICS FOR COFFS

Nominated start/finish: 01-JAN-92 to 31-DEC-96
Data start/finish: 01-JAN-92 to 31-DEC-96

Creation date: 04-MAY-98
Maximum value: 18.90 recorded on 19-DEC-93
Minimum value: 3.30 recorded on 21-AUG-93

Public Works Department, NSW
Manly Hydraulics Laboratory
110B King Street
MANLY VALE NSW 2093

PERCENTAGE OCCURRENCE FOR TSIG IN SECONDS

TSIG	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0.00 - 1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
2.00 - 3.99	0.22	0.00	0.06	0.06	0.00	0.00	0.54	0.24	0.03	0.03	0.27	0.00	0.120
4.00 - 5.99	15.70	8.85	6.12	8.38	5.44	8.07	6.38	10.93	14.77	19.99	23.67	20.28	12.486
6.00 - 7.99	50.36	52.03	37.88	42.54	34.56	36.90	32.97	35.33	45.72	43.21	52.49	54.10	42.904
8.00 - 9.99	31.70	35.02	44.78	41.52	51.07	43.24	49.39	42.65	34.83	31.45	20.32	23.90	37.575
10.00 - 11.99	2.02	4.10	10.50	6.73	8.30	11.11	10.08	10.66	4.65	5.32	3.21	1.67	6.610
12.00 - 13.99	0.00	0.00	0.65	0.78	0.62	0.68	0.64	0.19	0.00	0.00	0.03	0.03	0.302
14.00 - 15.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
16.00 - 17.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
18.00 - 19.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.003
Number of data points used for statistical analysis:	2770	2487	3218	3343	3215	2951	3136	3705	3589	3606	2957	3418	38395
Percent capture based on Data start/finish:	74.46	71.47	86.51	92.86	86.42	81.97	84.30	99.60	99.69	96.94	82.14	91.91	87.42
Percent capture based on Nominated start/finish:	74.46	71.47	86.51	92.86	86.42	81.97	84.30	99.60	99.69	96.94	82.14	91.91	87.42
Average value:	7.40	7.63	8.15	7.89	8.23	8.18	8.21	8.01	7.55	7.41	7.02	7.10	7.73

Appendix 6k ***COFFS****: Percentage occurrence of waves with a significant wave period (Tsig) by month. (Table provided by Mark Kulmar, Manly Hydraulics Laboratory).*

OCCURRENCE STATISTICS FOR CRHDO

Nominated start/finish: 01-JAN-92 to 31-DEC-96
Data start/finish: 01-JAN-92 to 31-DEC-96

Creation date: 25-JUN-98
Maximum value: 14.10 recorded on 21-AUG-94
Minimum value: 3.30 recorded on 04-JUL-92

Public Works Department, NSW
Manly Hydraulics Laboratory
110B King Street
MANLY VALE NSW 2093

PERCENTAGE OCCURRENCE FOR TSIG IN SECONDS

TSIG	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0.00 - 1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
2.00 - 3.99	0.00	0.00	0.00	0.03	0.00	0.00	0.42	0.09	0.00	0.00	0.00	0.00	0.051
4.00 - 5.99	15.18	9.65	3.34	10.06	6.99	7.54	5.13	5.36	5.95	19.37	18.80	14.72	9.885
6.00 - 7.99	48.99	49.16	40.68	42.93	41.91	33.75	30.51	31.77	33.02	46.50	55.18	46.92	41.555
8.00 - 9.99	31.90	35.32	43.37	41.00	41.18	41.69	49.94	44.23	46.86	29.76	22.77	34.70	38.859
10.00 - 11.99	3.75	5.23	11.38	5.71	9.32	14.99	13.32	15.96	14.03	4.37	3.02	3.65	8.909
12.00 - 13.99	0.19	0.65	1.23	0.27	0.60	2.03	0.67	2.48	0.13	0.00	0.23	0.00	0.734
14.00 - 15.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.008
Number of data points used for statistical analysis:	2668	3078	3498	3310	3004	3049	3566	3226	3007	2473	3447	2873	37199
Percent capture based on Data start/finish:	71.72	88.45	94.03	91.94	80.75	84.69	95.86	86.72	83.53	66.48	95.75	77.25	84.70
Percent capture based on Nominated start/finish:	71.72	88.45	94.03	91.94	80.75	84.69	95.86	86.72	83.53	66.48	95.75	77.25	84.70
Average value:	7.48	7.72	8.30	7.78	8.05	8.35	8.34	8.53	8.34	7.33	7.19	7.48	7.93

Appendix 6l ***CROWDY HEAD****: Percentage occurrence of waves with a significant wave period (Tsig) by month. (Table provided by Mark Kulmar, Manly Hydraulics Laboratory).*

OCCURRENCE STATISTICS FOR BYRON

Nominated start/finish: 01-JAN-92 to 31-DEC-96
Data start/finish: 01-JAN-92 to 31-DEC-96

Creation date: 04-MAY-98

Wave direction origin: Hindcast - 100 %

Public Works Department, NSW
Manly Hydraulics Laboratory
110B King Street
MANLY VALE NSW 2093

PERCENTAGE OCCURRENCE FOR WAVE_DIRECTION IN DEGREES FROM TRUE NORTH

DIRN	DEG	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
N	348.75 - 11.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
NNE	11.25 - 33.74	0.00	0.00	0.00	0.00	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.061
NE	33.75 - 56.24	13.80	3.51	2.96	0.26	5.35	0.00	2.42	1.41	12.17	12.60	16.86	15.27	7.300
ENE	56.25 - 78.74	18.96	12.54	8.28	8.60	7.38	5.10	3.07	7.89	8.57	10.79	15.54	14.40	10.099
E	78.75 - 101.24	34.27	33.19	27.86	14.61	12.06	20.98	5.30	9.93	14.88	8.88	22.57	25.69	19.148
ESE	101.25 - 123.74	17.95	19.37	16.62	19.42	15.10	18.23	15.37	12.09	13.04	11.78	6.28	8.65	14.376
SE	123.75 - 146.24	8.06	20.49	19.72	24.59	28.88	29.50	27.24	32.60	19.17	27.66	16.08	16.68	22.593
SSE	146.25 - 168.74	3.59	5.94	15.81	15.99	18.03	10.37	24.56	17.21	15.51	14.86	11.55	9.88	13.590
S	168.75 - 191.24	3.37	4.96	8.75	16.54	12.49	15.82	22.04	18.87	16.65	13.42	11.11	9.43	12.834
SSW	191.25 - 213.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
SW	213.75 - 236.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
WSW	236.25 - 258.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
W	258.75 - 281.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
WNW	281.25 - 303.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
NW	303.75 - 326.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
NNW	326.25 - 348.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Number of days used for statistical analysis:		132	127	124	114	135	133	127	151	143	122	123	148	1581
Percent capture based on Data start/finish:		85.35	87.53	79.89	76.25	87.39	88.69	82.20	97.15	95.61	78.71	82.22	95.78	86.40
Percent capture based on Nominated start/finish:		85.35	87.53	79.89	76.25	87.39	88.69	82.20	97.15	95.61	78.71	82.22	95.78	86.40
Average direction:		91.47	106.99	117.61	129.24	126.65	127.09	141.56	134.50	120.80	120.71	104.12	103.23	118.89

Appendix 6m ***BYRON****: Percentage occurrence for wave-direction in degrees from the north by month. Modelled from hindcast data. The >0.00% isobath indicated by dotted line (-----), and >12% isobath is indicated by bold line (——). Three wind seasons can be observed throughout the year around Byron: Jan-March; April-August; September-December (Table provided by Mark Kulmar, Manly Hydraulics Laboratory).*

OCCURRENCE STATISTICS FOR COFFS

Nominated start/finish: 01-JAN-92 to 31-DEC-96
Data start/finish: 01-JAN-92 to 31-DEC-96

Creation date: 04-MAY-98

Wave direction origin: Hindcast - 100 %

Public Works Department, NSW
Manly Hydraulics Laboratory
110B King Street
MANLY VALE NSW 2093

PERCENTAGE OCCURRENCE FOR WAVE_DIRECTION IN DEGREES FROM TRUE NORTH

DIRN	DEG	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
N	348.75 - 11.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
NNE	11.25 - 33.74	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.060
NE	33.75 - 56.24	13.75	4.46	2.08	0.75	6.07	0.00	2.55	0.00	6.88	10.57	13.26	10.65	5.842
ENE	56.25 - 78.74	18.59	9.37	8.45	6.01	6.00	5.29	4.46	7.23	10.03	10.95	19.17	13.17	9.767
E	78.75 - 101.24	27.91	29.51	29.12	21.48	15.43	21.99	6.63	10.88	14.91	10.82	15.52	23.82	18.534
ESE	101.25 - 123.74	20.90	20.06	19.67	20.70	17.85	13.62	17.79	13.17	13.76	11.31	9.71	9.71	15.486
SE	123.75 - 146.24	7.94	23.96	21.54	25.73	27.03	30.63	25.03	30.77	20.73	28.34	16.44	18.72	23.334
SSE	146.25 - 168.74	5.52	8.52	12.52	14.06	16.55	12.30	22.45	17.06	16.49	15.72	12.04	10.01	13.872
S	168.75 - 191.24	5.38	4.10	6.62	11.28	10.36	16.16	21.08	20.89	17.19	12.29	13.87	13.93	13.106
SSW	191.25 - 213.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
SW	213.75 - 236.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
WSW	236.25 - 258.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
W	258.75 - 281.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
WNW	281.25 - 303.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
NW	303.75 - 326.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
NNW	326.25 - 348.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Number of days used for statistical analysis:		115	104	134	139	134	123	131	154	150	150	123	142	1600
Percent capture based on Data start/finish:		74.46	71.47	86.51	92.86	86.42	81.97	84.30	99.60	99.69	96.94	82.14	91.91	87.42
Percent capture based on Nominated start/finish:		74.46	71.47	86.51	92.86	86.42	81.97	84.30	99.60	99.69	96.94	82.14	91.91	87.42
Average direction:		95.03	110.36	115.18	123.96	123.13	128.37	138.38	136.13	124.67	121.22	109.13	111.56	120.66

Appendix 6n ***COFFS****: Percentage occurrence for wave-direction in degrees from the north by month. Modelled from hindcast data. The >0.00% isobath indicated by dotted line (-----), and >12% isobath is indicated by bold line (——). Three wind seasons can be observed throughout the year around Coffs: Jan-March; April-August; September-December (Table provided by Mark Kulmar, Manly Hydraulics Laboratory).*

OCCURRENCE STATISTICS FOR CRHDO

Nominated start/finish: 01-JAN-92 to 31-DEC-96
Data start/finish: 01-JAN-92 to 31-DEC-96

Creation date: 25-JUN-98

Wave direction origin:
Hindcast - 100 %

Public Works Department, NSW
Manly Hydraulics Laboratory
110B King Street
MANLY VALE NSW 2093

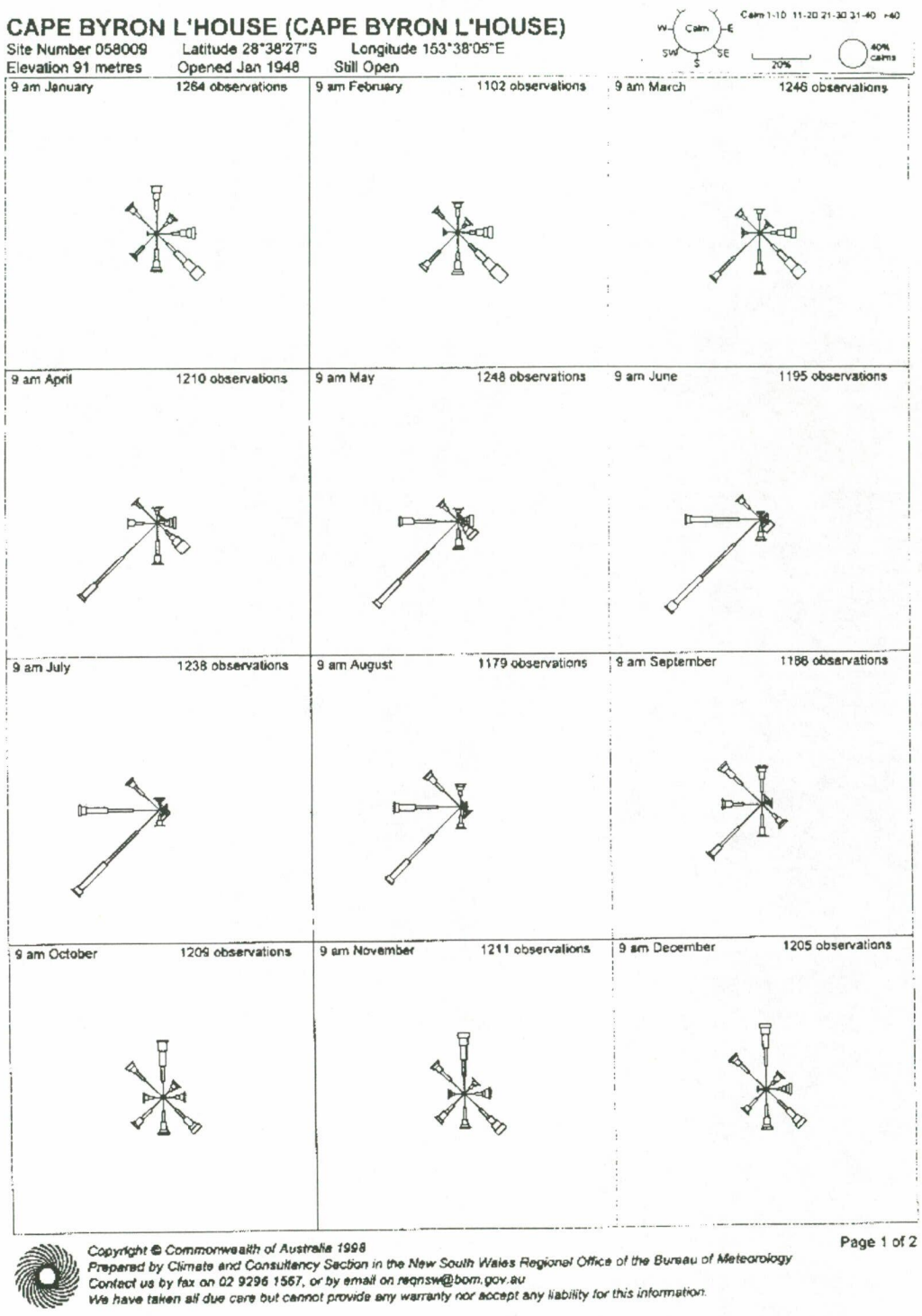
PERCENTAGE OCCURRENCE FOR WAVE_DIRECTION IN DEGREES FROM TRUE NORTH

DIRN	DEG	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
N	348.75 - 11.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
NNE	11.25 - 33.74	1.35	0.00	0.00	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.159
NE	33.75 - 56.24	9.37	0.62	1.03	0.63	3.73	0.00	0.67	0.00	0.76	4.89	5.66	11.10	3.011
ENE	56.25 - 78.74	17.02	11.73	10.72	9.06	10.32	5.31	5.95	6.14	11.64	16.05	20.19	17.26	11.589
E	78.75 - 101.24	21.29	23.91	25.81	22.39	10.52	16.76	7.63	8.18	19.45	16.13	13.11	18.55	16.882
ESE	101.25 - 123.74	25.60	24.79	20.24	17.28	16.48	14.59	18.98	11.87	15.53	12.01	9.49	12.15	16.576
SE	123.75 - 146.24	9.90	22.09	18.75	22.21	28.50	28.01	26.00	34.56	21.45	18.28	19.44	15.49	22.310
SSE	146.25 - 168.74	6.33	10.92	14.78	15.56	18.74	19.68	19.94	19.16	19.52	14.88	16.48	10.89	15.767
S	168.75 - 191.24	9.15	5.95	8.66	12.87	10.95	15.64	20.84	20.09	11.64	17.75	15.64	14.55	13.707
SSW	191.25 - 213.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
SW	213.75 - 236.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
WSW	236.25 - 258.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
W	258.75 - 281.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
WNW	281.25 - 303.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
NW	303.75 - 326.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
NNW	326.25 - 348.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Number of days used for statistical analysis:		111	128	146	138	125	127	149	134	125	103	144	120	1550
Percent capture based on Data start/finish:		71.72	88.45	94.03	91.94	80.75	84.69	95.86	86.72	83.53	66.48	95.75	77.25	84.70
Percent capture based on Nominated start/finish:		71.72	88.45	94.03	91.94	80.75	84.69	95.86	86.72	83.53	66.48	95.75	77.25	84.70
Average direction:		102.62	114.80	117.35	123.38	125.71	132.30	137.18	138.55	123.90	121.37	119.33	110.52	122.99

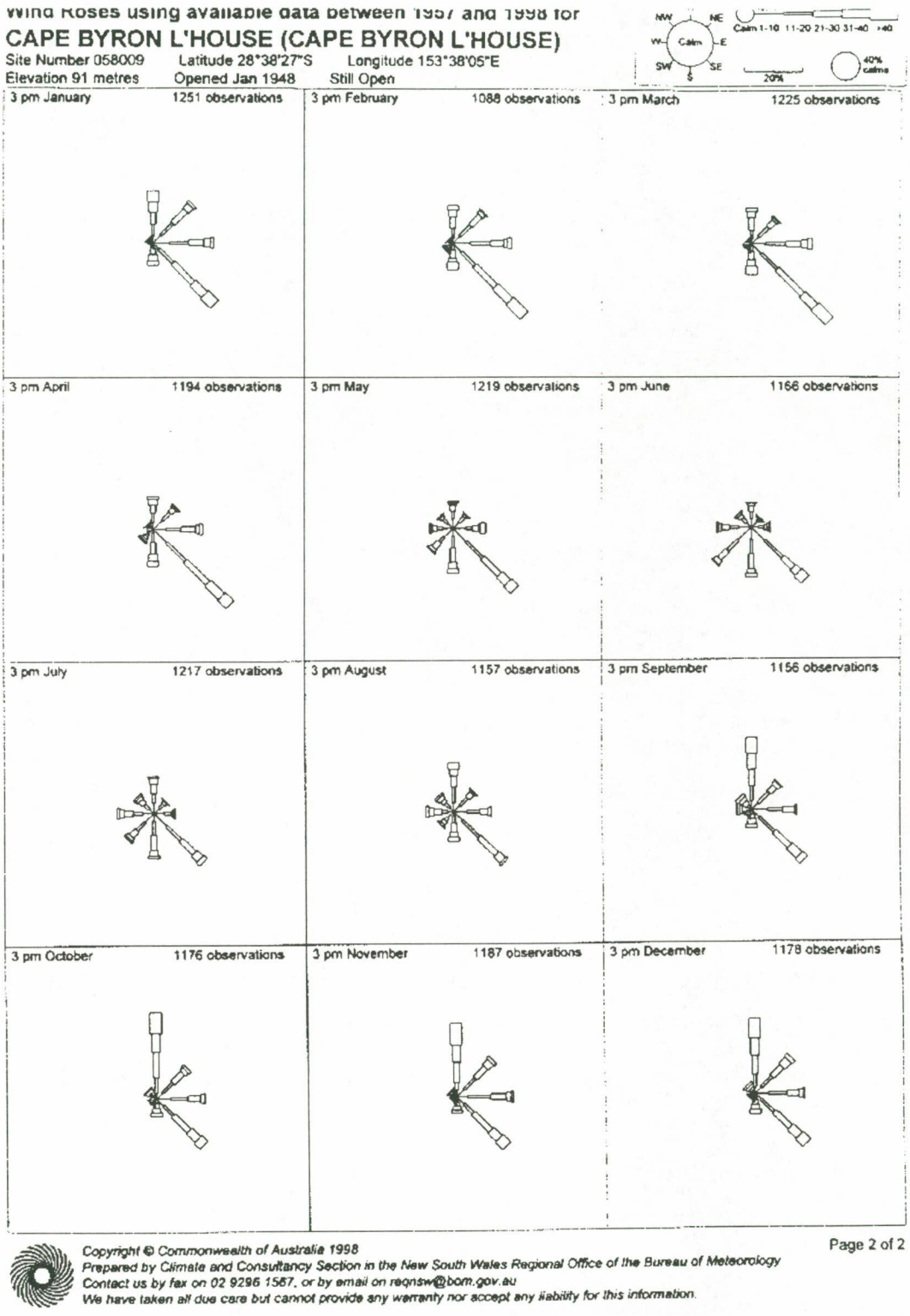
Appendix 6p ***CROWDY HEAD:*** *Percentage occurrence for wave-direction in degrees from the north by month. Modelled from hindcast data. The >0.00% isobath indicated by dotted line (-----), and >12% isobath is indicated by bold line (——). Three wind seasons can be observed throughout the year around Coffs: Jan-March; April-August; September-December (Table provided by Mark* Kulmar, Manly Hydraulics Laboratory).

Appendix 8

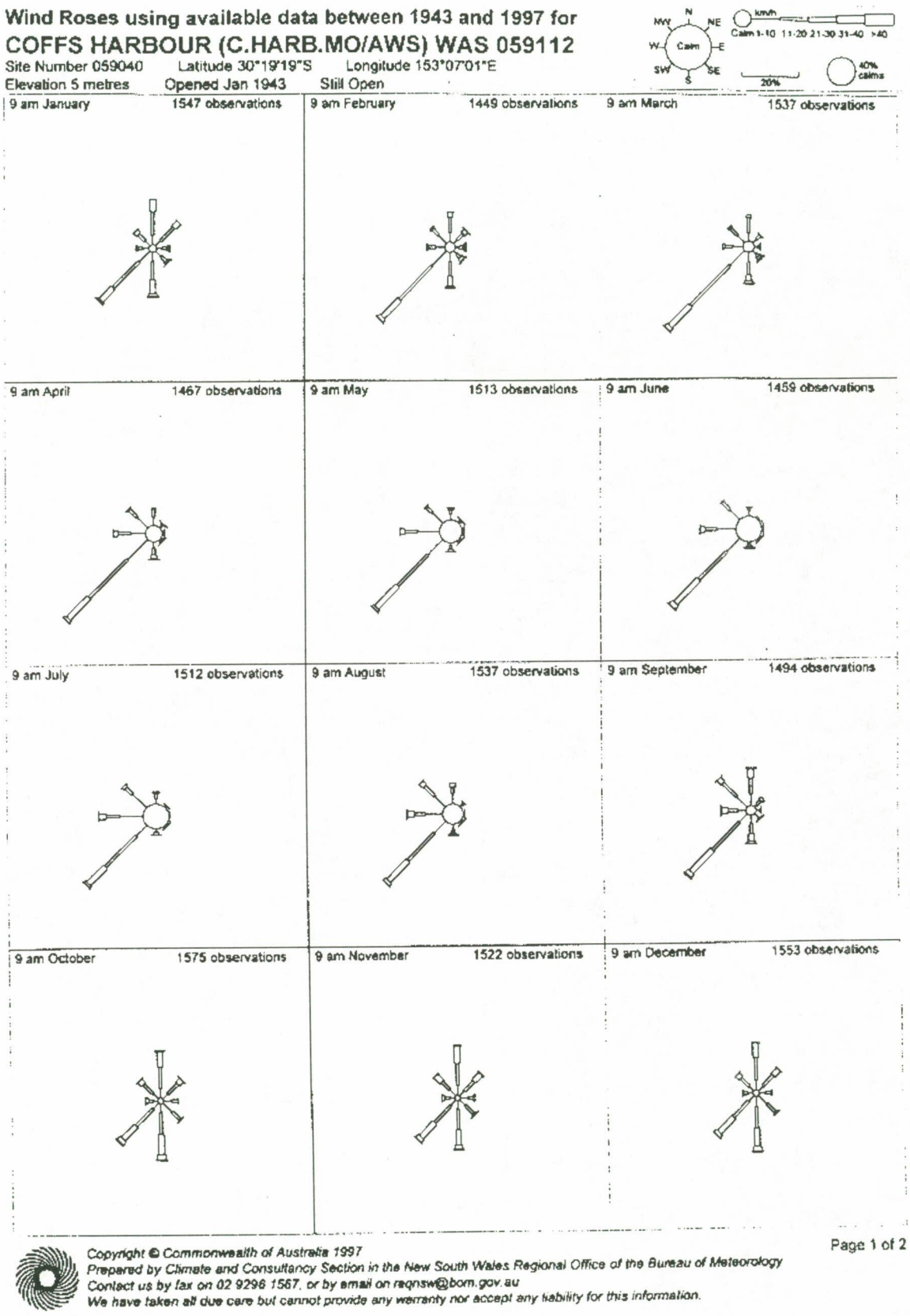
Wind Climate



Appendix 7a ***Cape Byron*** *mean annual Wind summeries by month. i) Morning 9:00 A. ii) Afternoon 3:00PM Roses indicate both strenght (km/hr) and wind direction (ie. direction from which the wind is blowing). (Source: Bureau of Meterology, Sydney).*

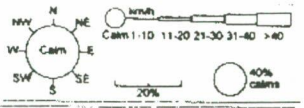


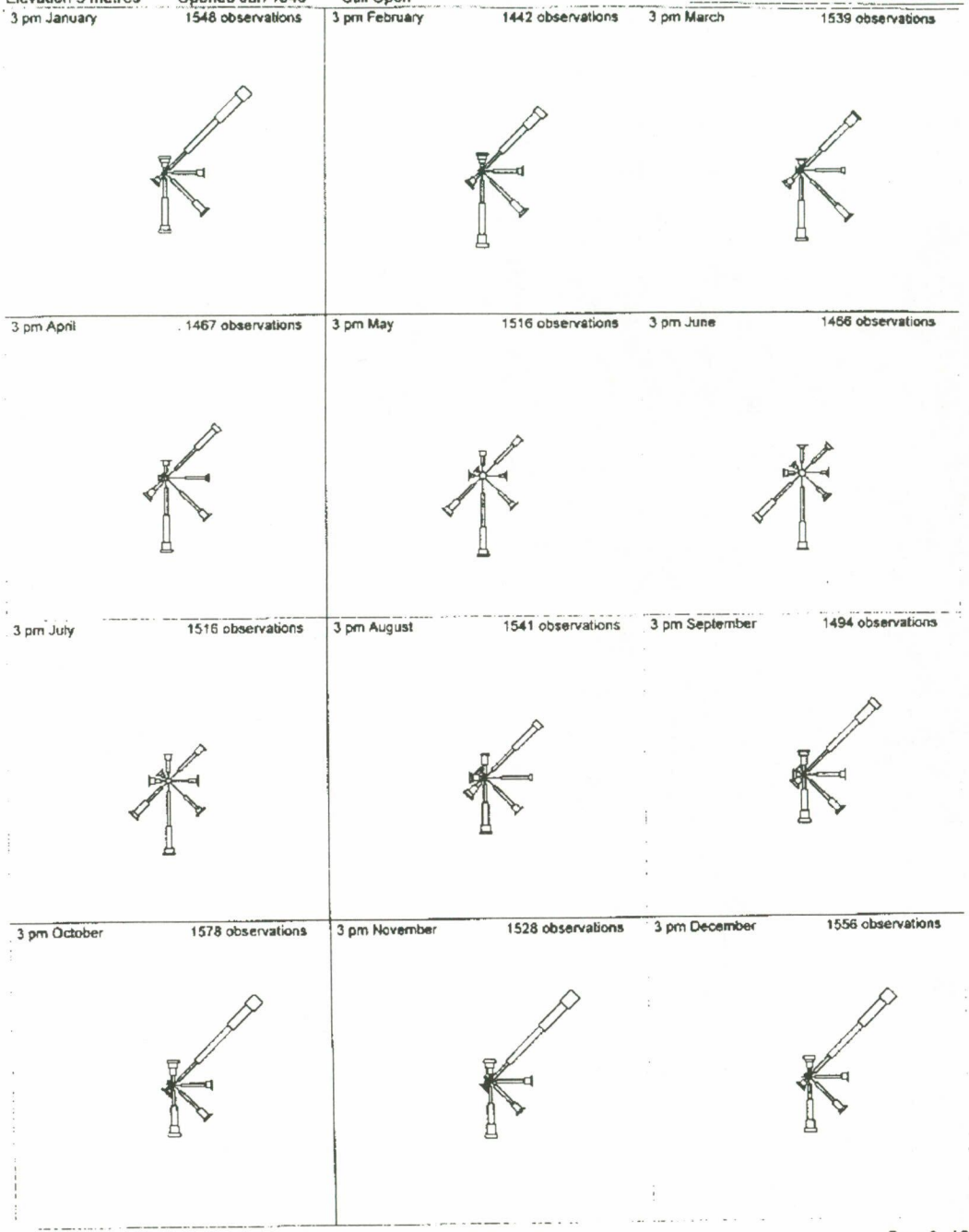
Appendix 7a continued ***Cape Byron*** *mean annual Wind summeries by month. i) Morning 9:00 A. ii) Afternoon 3:00PM Roses indicate both strenght (km/hr) and wind direction (ie. direction from which the wind is blowing). (Source: Bureau of Meterology, Sydney).*



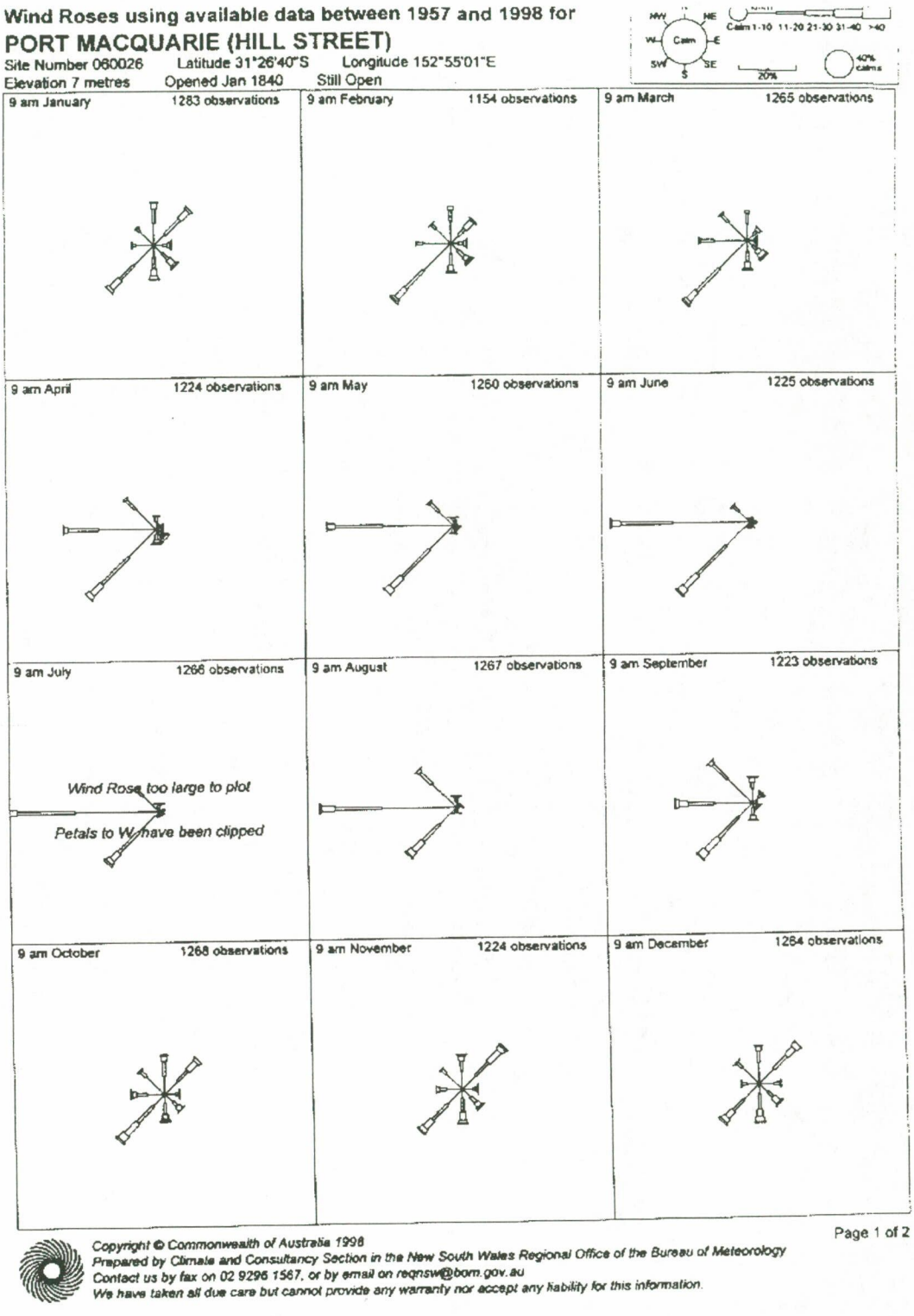
Appendix 7b ***Coffs Harbour*** *mean annual Wind summeries by month. i) Morning 9:00 AM ii) Afternoon 3:00PM Roses indicate both strenght (km/hr) and wind direction (ie. direction from which the wind is blowing). (Source: Bureau of Meterology, Sydney).*

Wind Roses using available data between 1943 and 1997 for
COFFS HARBOUR (C.HARB.MO/AWS) WAS 059112
Site Number 059040 Latitude 30°19'19"S Longitude 153°07'01"E
Elevation 5 metres Opened Jan 1943 Still Open

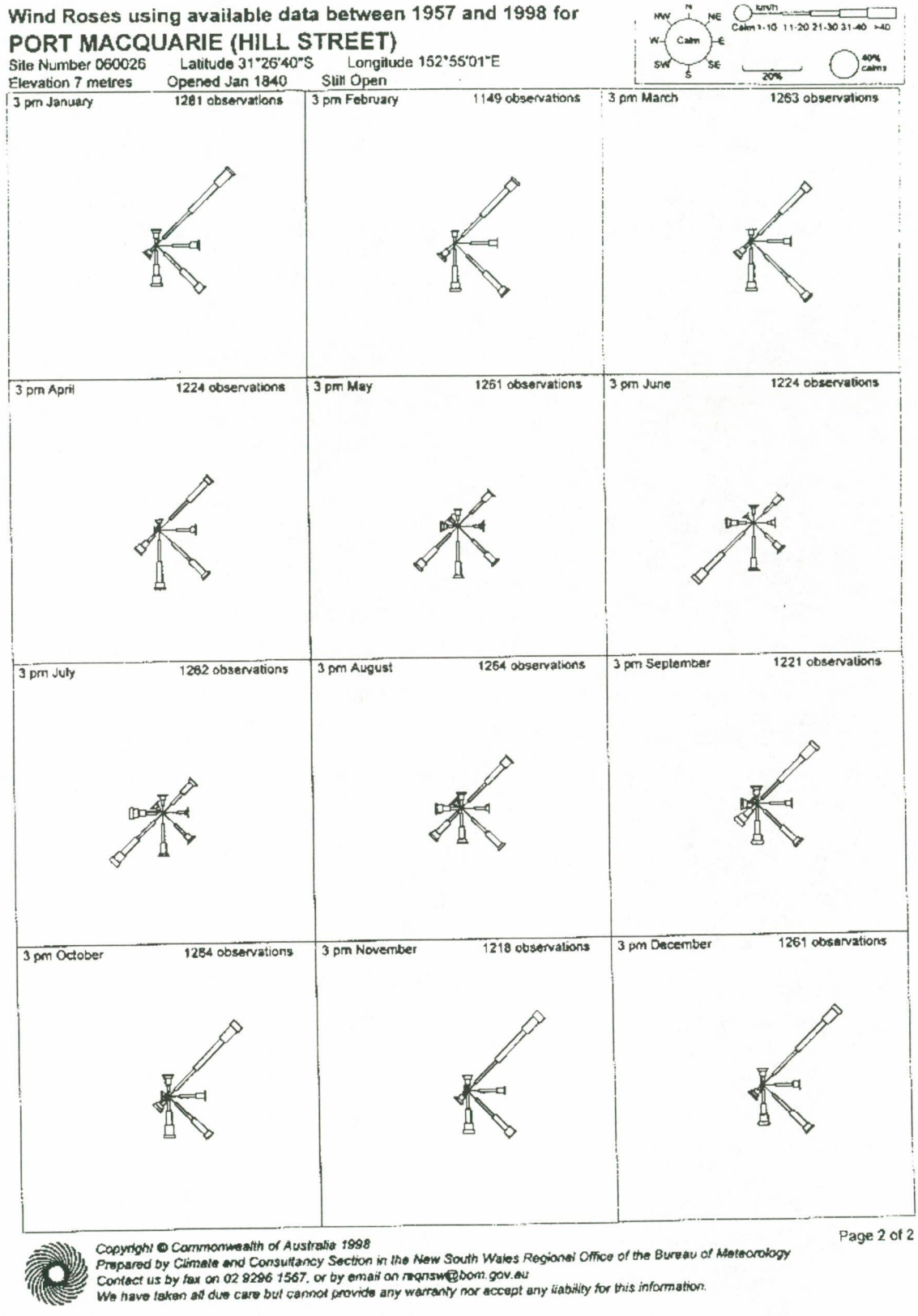




Appendix 7b continued ***Coffs Harbour*** *mean annual Wind summeries by month. i) Morning 9:00 AM ii) Afternoon 3:00PM Roses indicate both strenght (km/hr) and wind direction (ie. direction from which the wind is blowing). (Source: Bureau of Meterology, Sydney).*



Appendix 7c ***Port Macquarie*** *mean annual Wind summeries by month. a) Morning 9:00 AM b) Afternoon 3:00PM Roses indicate both strenght (km/hr) and wind direction (ie. direction from which the wind is blowing). (Source: Bureau of Meterology, Sydney).*



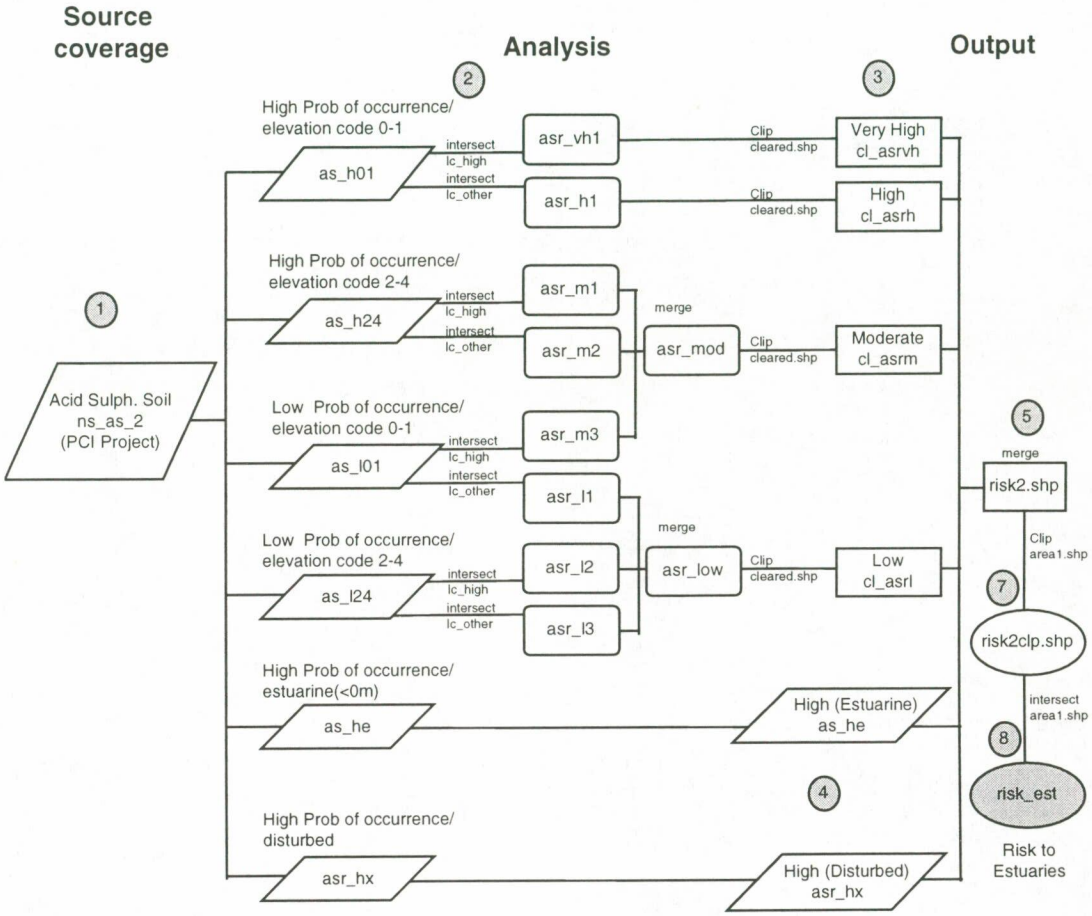
Appendix 7c continued ***Port Macquarie*** *mean annual Wind summeries by month. a) Morning 9:00 AM b) Afternoon 3:00PM Roses indicate both strenght (km/hr) and wind direction (ie. direction from which the wind is blowing). (Source: Bureau of Meterology, Sydney).*

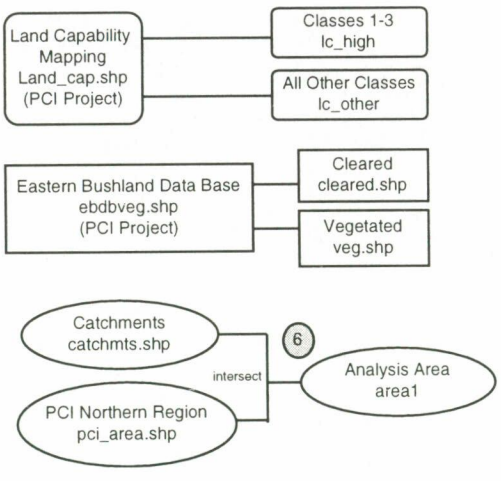
Appendix 9.1

Vulnerability Analysis - G.I.S. Metadata

Vulnerability Analysis:

Acid Soil Risk

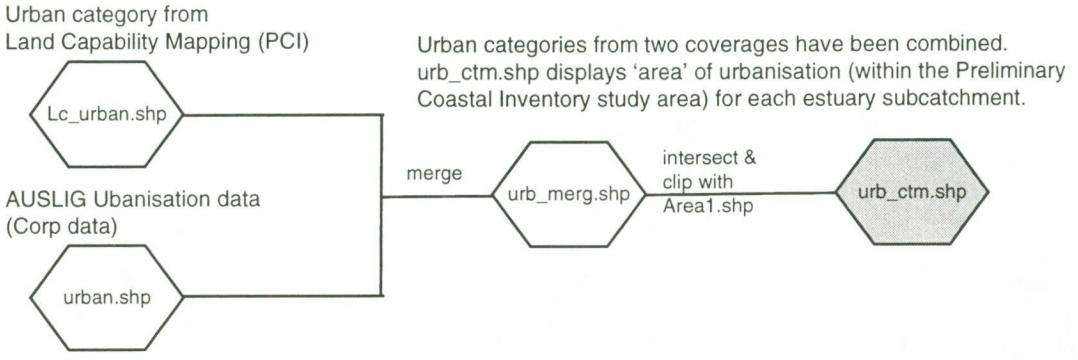




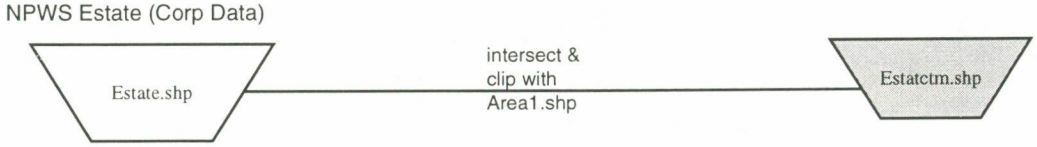
1. DLWC Acide Sulphate Soils mapping prepared by the Prelimanary Coastal Inventory Project . Data cropped to PCI investigation area.
2. Acid Risk = prob. of occurence of acid soils+ depth of acid soil (elevation) + land-use(eg. sugar cain farming). Land suitable for cain farming defined as croppable land (ieland Capability classes 1-3) which has been cleared.
3. Risk of acid soil runoff due to cropping (ie cain farming) is represented by first 4 risk categories.
4. The remaning 2 risk categories are classes within the ASS mapping & do not relate directly to cropping. They include high reisk estuarine sediments (ie below water bodies) & high disturbed lands forms.
5. Risk categories merged into single coverage.
6. Area1 is used as the analysis area for this assessment. Area1 does not represe nt catchment boundary, but represents a zone of influence. Defined by the intersection of PCI study area (which is based partly on distance from coast and estuaries) and catchment of each estuary.
7. Risk2 coverage clipped to area1 to exclude acid risk outside the subcatchments.
8. Risk2clp coverage intersected with area1 to partition acid risk areas into catchments

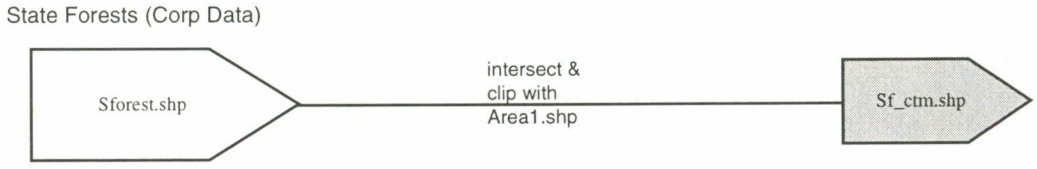
Vulnerability Analysis:

Ubanisation

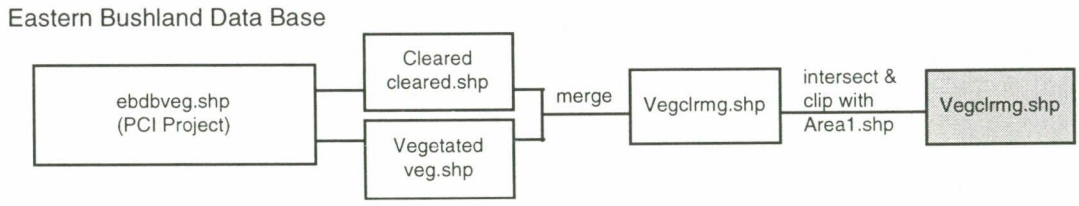


Catchment Protection





Catchment Clearing



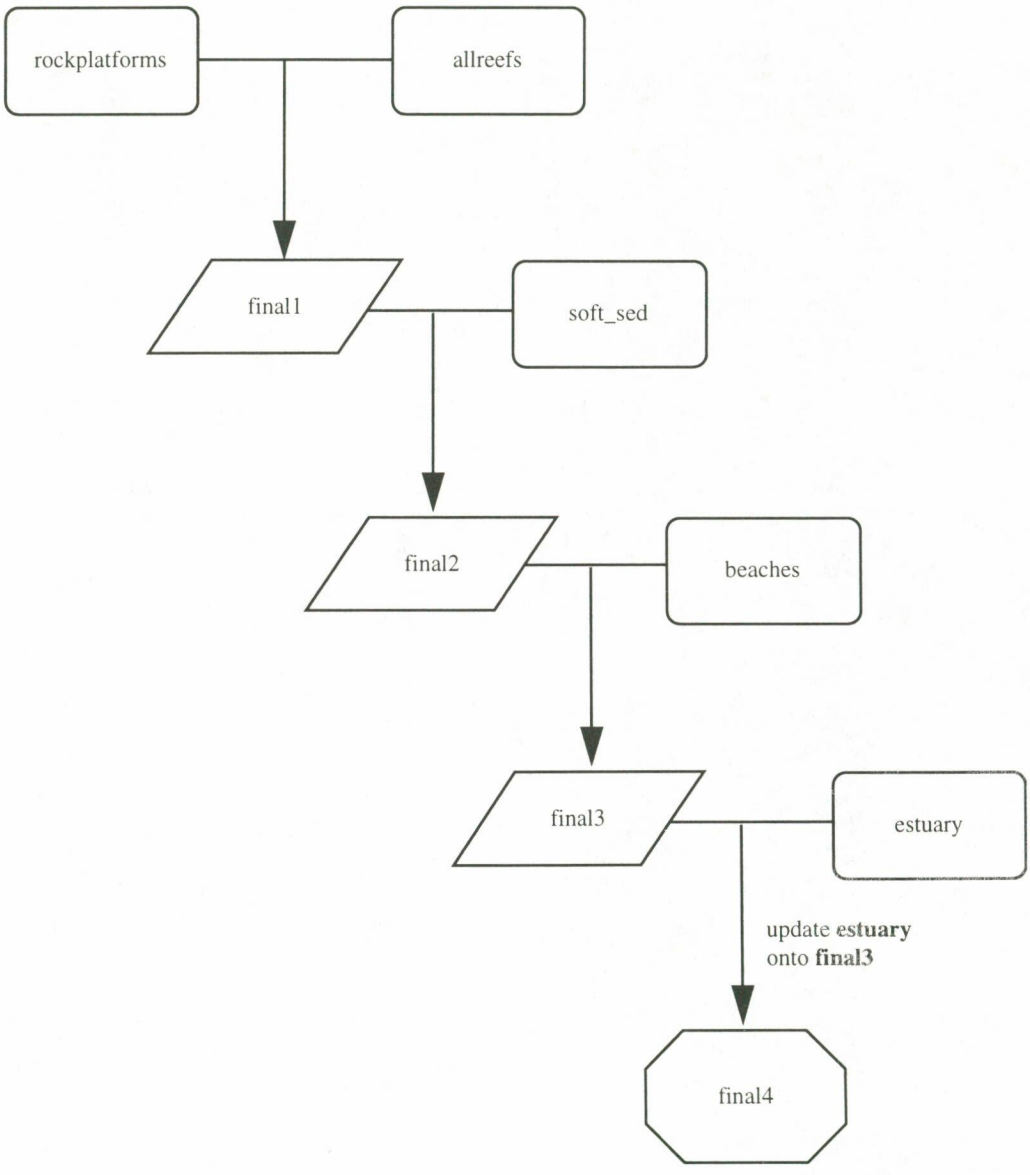
Appendix 9.2

Mapping Physiographic Units - G.I.S. Metadata

GIS METADATA

Physiographic Units - compilation method

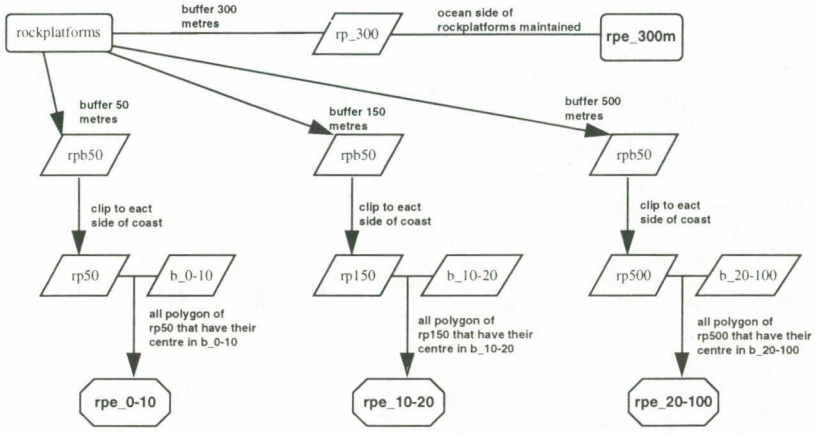
Five coverages were 'merged' together in an order of priority to form physiographics units (Physiographic units form a key component of the marine ecosystems map). The order of priority from highest to lowest is as follows: Estuary, Beach, Soft_sed, Allreefs, Rockplatforms



GIS METADATA

Rock Platforms

The Rock Platform coverage was buffered 300m then clipped to the east side of the coastline so the buffered rocks did not appear inland from the coast, this coverage is called 'rpe_300m'.
The same was done for buffers of 50m, 150m and 500m. These were then intersected with the bathymetry coverages that were derived in previous steps.
N.B. The coverage rpe_300m will overwrite the coverages rpe_0-10 and rpe_10-20 when the final datasets are merged. (also see Physiographic Units flow chart)

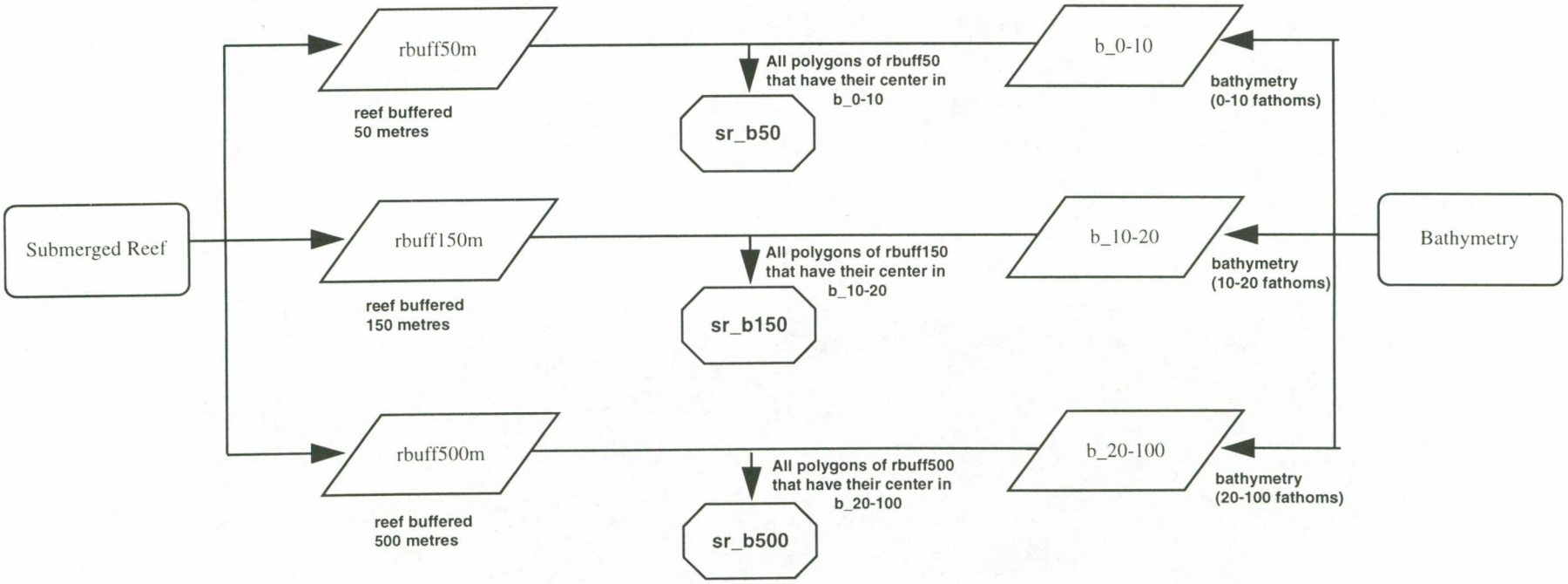


GIS METADATA

Reefs Layer

Step 1

a) Extract depth categories from Bathymetry Layer (0-10fathoms, 10-20fathoms &20-100fathoms)
b) Buffer submerged reefs from the Submerged Reef Layer (50m, 150m & 500m).
c) Intersect appropriate shape files.

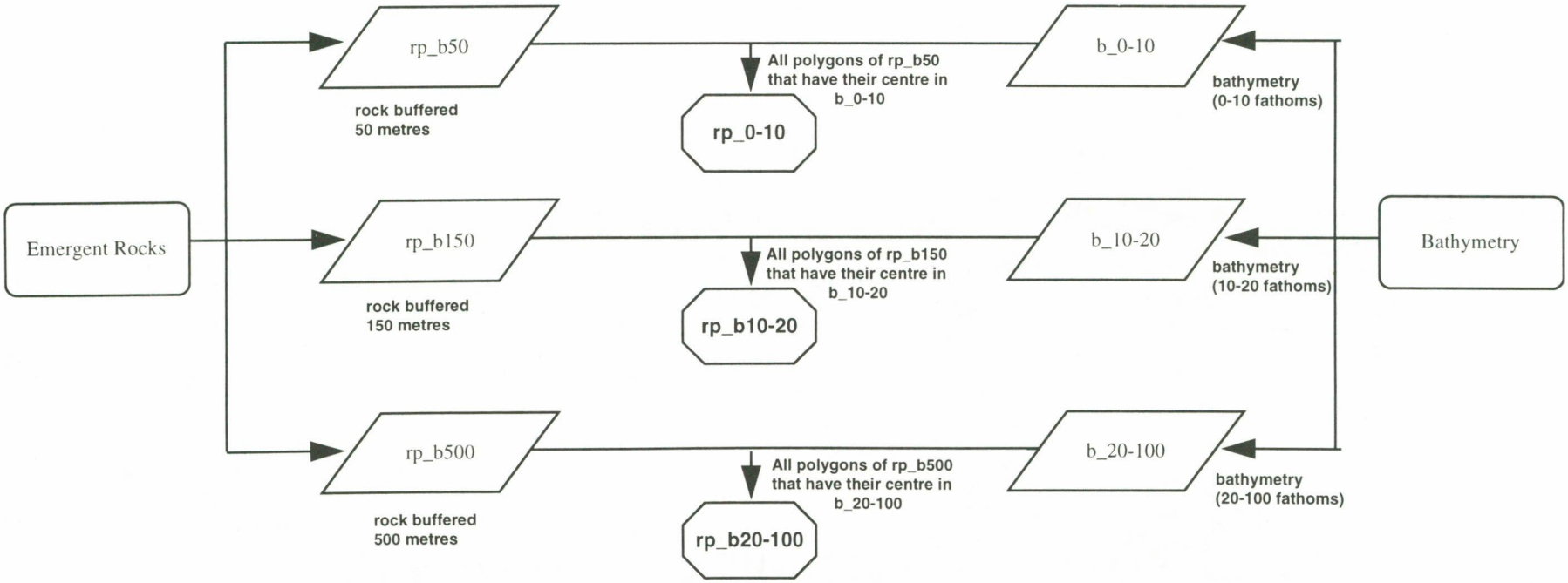


GIS METADATA

Reefs Layer

Step 2

a) Extract depth categories from Bathymetry Layer (0-10fathoms, 10-20fathoms &20-100fathoms)
b) Buffer submerged reefs from the Emergent Rock Layer (rock platforms) (50m, 150m & 500m).
c) Intersect appropriate shape files.

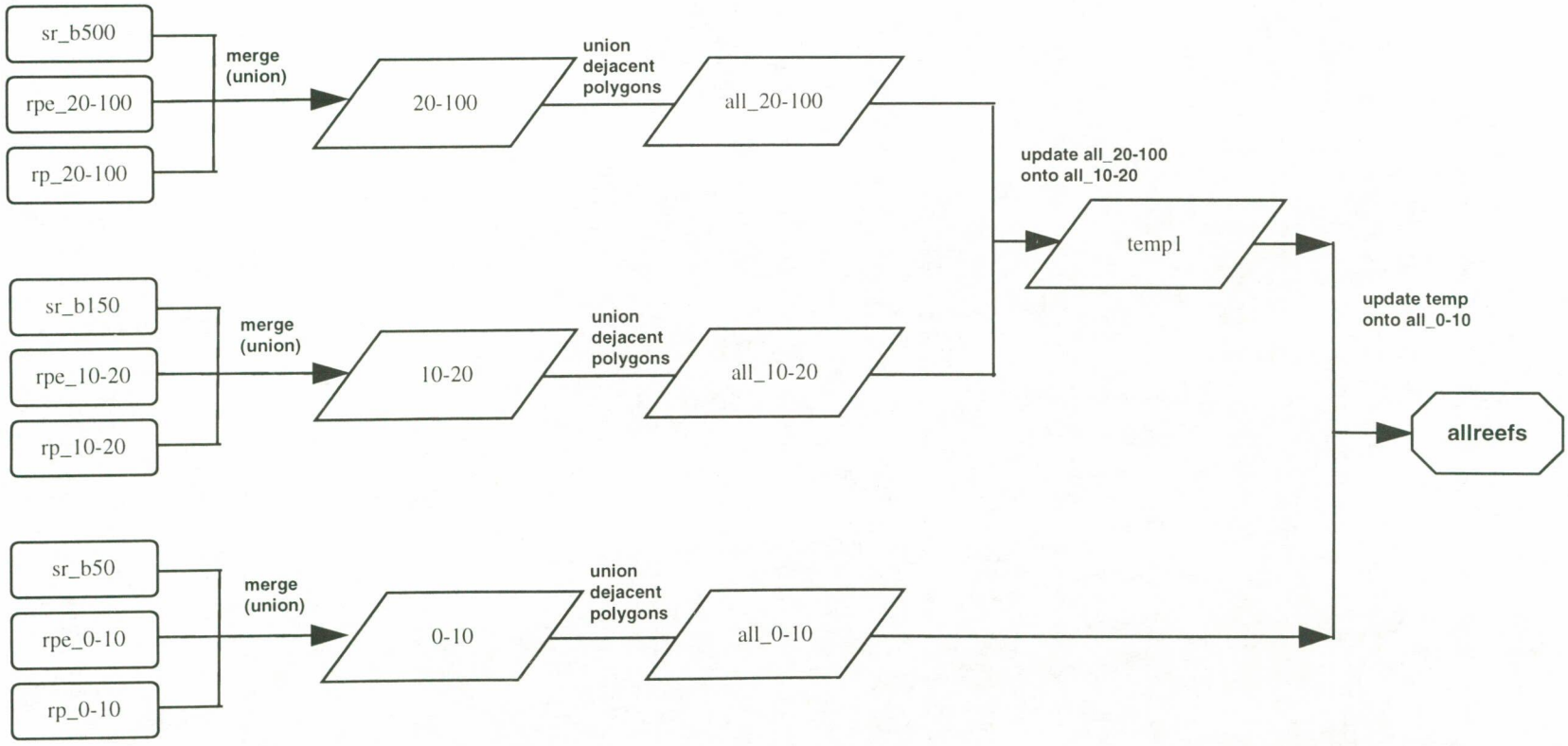


GIS METADATA

Reefs Layer

Step 3

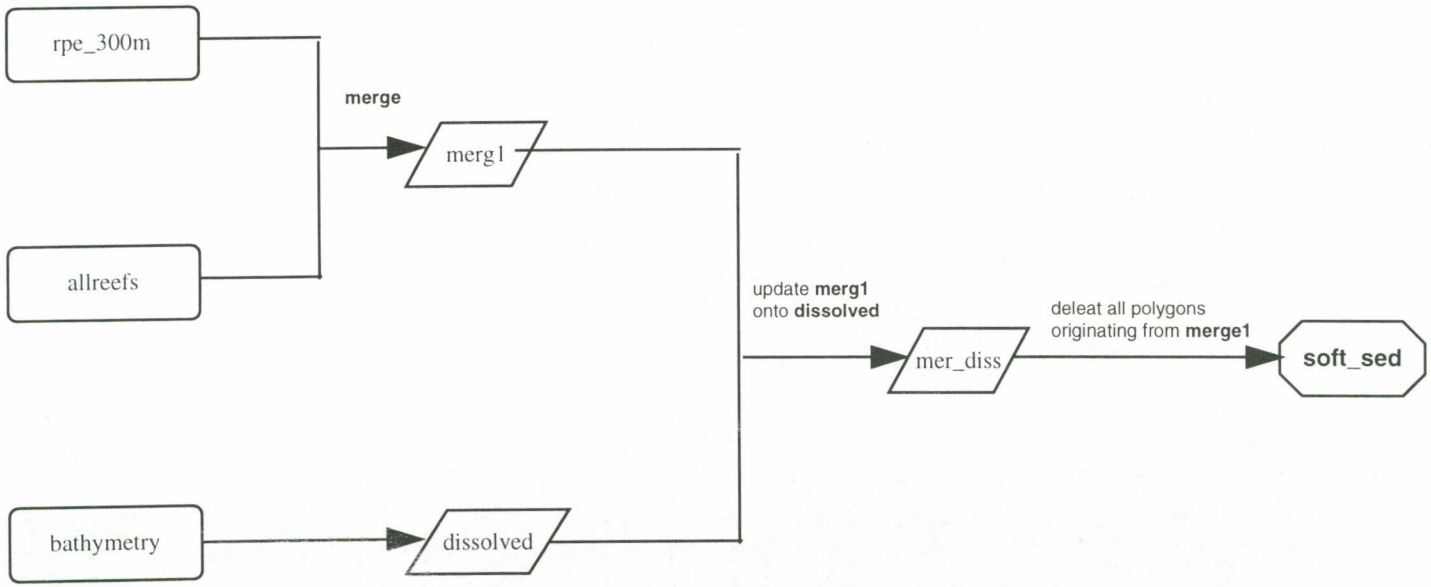
a) Merge all datasets from Rock Platforms, buffered Emergent Rocks and Submerged Reefs



GIS METADATA

Soft sediments

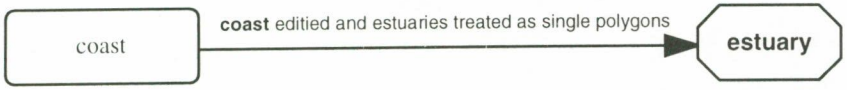
Soft Sediments were derived from the remaining ocean areas not covered by the coverages **allreefs** and **rpe_300m**



GIS METADATA

Estuary

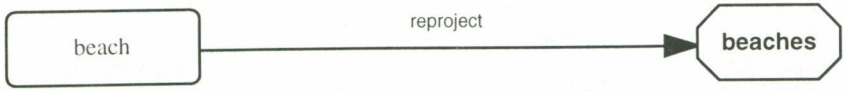
The Estuary coverage was derived from a coastline coverage which contained estuaries. River entrances were closed off and large islands within estuaries were connected to the mainland so the estuary could be treated as a single polygon. The coastline was then deleted simply leaving estuaries.



GIS METADATA

Beaches

The Beaches coverage had already been derived (from LIC topo) and simply needed reprojecting into AMG Zone 56 coordinates.



Appendix 10

NSW Commercial Catch Data

- Ocean Production(kg) by Ocean Zone of Landing - 1996/97
- Ocean Production(kg) by Ocean Zone of Landing - 1997/98
- Days of Effort by Ocean Zone of Landing - 1996/97 & 97/98

Notes on data interpretation:
Reporting by zone of landing (i.e. the zone in which the catch was landed) does not necessarily mean the fish was caught in that zone, but is probably close estimate. This method is the most consistent approach, as fishers working in the ocean haul fishery do not report a port of landing whereas they do in all other fisheries.

Be aware that in July 1997 there was a change to a new reporting system (which may account for some variations in the data). Notice the extra fields in the 9798 production table (invalid port and invalid zone), used when fishers did not report a zone or reported operating/landing in more than one zone. Although these problems have since been addressed, past data was still in the process of being corrected at the time of preparing this table.

The effort day are the sum of days for each method (i.e. it is not the number of days the fisher fished). So, if a fisher used 2 methods on one day, this would be 2 days of effort.

Source NSW Fisheries Commercial Catch Database.
Extracted September 1999

Commercial Production (kg) by Ocean Zone of Landing - 1996/97

Species	1	2	3	4	5	6	7	8	9	10	Mixed
Scale Fish											
Albacore	346	1983	10915	1167	1420	9015	485	55515	42728	19548	
Amberjack	314	674	8		40	48					
Anchovy	6832	1126			9	408		2000		10130	
Australian salmon		7	482	4099	78120	9700	56669	95264	8390	73669	
Barracouta	4	3			91	103	145	23	5715	5354	
Blue-eye	199	909	5373	3996	12	23475	32752	16260	78215	39636	
Boarfish	141	603	1284	126	3127	3288	879	159	228	14	
Bonito	690	660	23536	25337	15668	8211	29783	7072	2006		
Bonito, Leaping	55	33	1683	1583	172	188			147		
Bony bream (bony herring)											
Bream, Black and Yellowfin	1194	4489	54608	2430	35914	21591	3728	2536	39	1825	
Bream, Ray's		44	102			2					
Carp											
Catfish, Estuary											
Catfish, Forktailed		48					31				
Catfish, Freshwater											
Catfish, Longtailed											
Catfish, Unspecified		46	27	10	52	101	14				
Cobia	1565	1567	1141	48	139	94					
Cod, Bar	4002	430	6659	2155	1560	559	23	53			
Cod, Maori	73	72	191	3	5	7					
Cod, Red Rock	144	1486	950	4593	839	328	130	631	706	380	
Cod, Unspecified	331	653	356	56	233	505	24	1875	171	903	
Dart	506	2	2020		132						
Diamond Fish			111								
Dolphinfish	78	1642	3607	52	1418	888	141	192	69	167	
Dory, John	103	1134	2203	444	11828	10375	22923	27063	6133	5169	
Dory, King	2	2	1			51		5	233	226	
Dory, Mirror		22	164	113	45051	33134	35324	32714	11472	3982	
Dory, Silver		9			14	8	253	2763	14577	1558	
Dory, Unspecified		1	1		28	1254		159	313	963	
Drummer	245		13	4	111	91					
Eel, Conger		94	148	603	2742	5560	1948	1477	473	654	
Eel, Longfin River			1								
Eel, Pike					130						
Eel, Shortfin River											
Eel, Short-finned Conger			74	47	491	282	15	46			
Eel, Unspecified			126	112	371	188		89			

Commercial Production (kg) by Ocean Zone of Landing - 1996/97

Species	1	2	3	4	5	6	7	8	9	10	Mixed
Emperor, Red		2	799	1					56		
Emperor, Spangled	4	5	266								
Fish, Unspec. Freshwater			166								
Fish, Unspecified Estuary		27	59			543					
Fish, Unspecified Ocean	3461	3797	36659	6231	38469	25401	33558	192898	107317	472906	
Flathead, Dusky	215	1412	344	83	1526	61	4	8	22	16	
Flathead, Marbled				6	15						
Flathead, Sand	6207	41747	20544	5112	47891	11381	1526	219	790	2	
Flathead, Tiger	955	3597	2342	2076	118019	43576	100885	64946	36099	26697	
Flathead, Unspecified	44	190	278	138	1600	176	24				
Flounder, Unspecified	1725	7462	3806	2051	15890	1993	1534	151	7	14	
Flutemouth					24						
Fusilier	8	185	81								
Garfish, River						93					
Garfish, Sea	2124	468	1153	627	21291	19788	25325	18025	81	2214	
Garfish, shortbill			54								
Garfish, Unspecified				7							
Gemfish	22		64	1038	2183	14329	98066	10420	22836	6488	
Goatfish, Blackspot											
Goatfish, Blue-striped	20		40								
Golden perch (yellowbelly)		6	10								
Grenadier, Blue		316		27	306	1325	1202	6062	8314	1562	
Gurnard, Red	39	103	2	29	4475	574	6125	7585	1190	1328	
Gurnard, Spotted	1		151	7	1775	902	981	266		203	
Hairtail		3	33	90	136	379	65			53	
Hapuku	249	315	1043	5609	342	3421	2160	1423	1733	9517	
Hardyhead											
Hussar		1									
Imperador					44		3				
Jack, Mangrove			34								
Jobfish, Rosy	143	52	144	17		48	73				
Kingfish, Yellowtail	7795	2514	13166	7250	3109	16839	15961	2796	11464	48	
Latchet	10	194	802	948	16798	7329	7226	2916	3678	1039	
Leadenall			2018				90				
Leatherjacket, Black Reef		3	24	213		40		232			
Leatherjacket, Chinaman	25				2531	436					
Leatherjacket, Rough			2		124	239					
Leatherjacket, Unspecified	2544	8856	18969	17671	30708	26625	10720	8671	10770	7386	
Ling	1	17	1820	265	1734	24212	25935	75735	90756	69806	
Longtom				9	34						

Commercial Production (kg) by Ocean Zone of Landing - 1996/97

Species	1	2	3	4	5	6	7	8	9	10	Mixed
Luderick	1427	5882	40579	2802	11251	2225	979	2491	448	4414	
Mackerel, Blue	493	76	5374	20	4190	20683	102640	45926	18109	29217	
Mackerel, Jack		5	25	66	344	2263	15090	3638	3680	4869	
Mackerel, Spanish	9726	6110	5145	29	120	176		8	1280	9	
Mackerel, Spotted	7821	15558	6521		7	115		5	1397		
Mackerel, Unspecified	37	221	233			95	30	1000		9	
Marlin, Black			68					30			
Marlin, Blue			755					387			
Marlin, Striped	139	2162	15515	79	3604	2562	66	7379	13934	6482	
Moki			30	11	164	63	312	63	1473	195	
Morwong, Jackass	566	903	1099	1059	1148	1107	4769	11335	13400	21298	
Morwong, Red	202	347	1180	1509	1592	1410	195	2831	13	60	
Morwong, Rubberlip	5372	6971	25005	20956	38406	52230	20145	21849	4484	1625	
Mullet, Fantail	48	528	4662		2242	33	349	150		11	
Mullet, Pink-eye											
Mullet, Red	8064	16412	7415	941	4838	525	158	5			
Mullet, Sand	180										
Mullet, Sea	112316	31107	123151	120689	169902	108977	29157	52181	7493	12135	
Mullet, Unspecified	339	41	1769	14042	744	115	387	5030		9	
Mulloway	2878	7907	9302	3447	8041	15607	679	102		150	
Murray cod											
Oilfish		19	107		346	1112	1020	1555	1931	1448	
Old Maid					575	2					
Opah		42	215	47	3217	272		377	306	361	
Orange Roughy				3		3755	224				
Oreo Dory	3	1				206			15		
Parrotfish	2654	692	1394	119	43	48	40	213	419	351	
Perch, Moses	69	83	91	4							
Perch, Ocean	27	71	1377	1285	8191	43714	20784	36068	37292	15088	
Perch, Orange	4	7	36	38	113	4749	10000	4007	248	2061	
Perch, Pearl	3395	2501	2656	191	14	338	122	363	6	63	
Perch, Silver											
Perch, Unspecified	2	9	8	41	138	1816	4361	2559	440	439	
Pigfish	319	1305	1318	1047	864	1587	847	277	20	14	
Pike	92		34	2	406	541	708	16		1	
Pilchard	93214	69271	11810		1928	2159	1200	60230		63990	
Rainbow Runner	182	19	7		2						
Redfin perch											

Commercial Production (kg) by Ocean Zone of Landing - 1996/97

Species	1	2	3	4	5	6	7	8	9	10	Mixed
Redfish	113	394	1932	4283	34975	70730	130874	140834	62727	31855	
Ribbonfish		2	1	5	1272	23335	9615	17961	16057	2535	
Rudderfish	203	590	2123		912	1351	918	2812	4265	2047	
Sailfish	41				77					20	
Samson Fish	2669	3062	5090	919	331	221	6219	1651			
Sergeant Baker		25	46	31	36	4		50			
Silver biddy		41	30		1026	1201	5	30			
Snapper	31808	45058	63090	28286	31619	54017	33847	10751	1850	640	
Snook	31			2			37				
Sole, Black	45	3	282	584	1852	68	1310		25	10	
Sole, Lemon	32		175	50	477		200				
Spearfish, Shortbill			340		135	73			18	39	
Stargazer					51	1136	175		126	294	
Surgeonfish	7	8	108	28		21					
Sweep	4374	3422	9664	10408	16123	39462	35990	10204	539		
Sweetlip, Emperor		2									
Sweetlip, Unspecified		11	2								
Swordfish, Broadbill	4885	5066	24194	110	2881	4178	641	20752	28889	9723	
Tailor	726	676	3565	2086	9368	4384	854	666		8	
Tarwhine	177	3103	6458	1017	17210	3918	679	253		6	
Teraglin	901	6148	11405	7305	1346	1333	126	23	20		
Trevally, Black	2	292	544	53	1139	1780	306	144	26	3826	
Trevally, Silver	1084	1743	10841	30190	304921	79346	82496	46846	37214	6340	
Trumpeter		2		253	5365	757	13	52		58	
Trumpeter, Tasmanian				1	148	569	195	137	1300	785	
Trumpeter, Unspecified					9						
Tuna, Bigeye	2396	13076	24232	200	2424	3833	958	3543	5501	3745	
Tuna, Mackerel	189	153	4359	87	6842	2914	4104	490	337		
Tuna, Northern Bluefin	94	444	2183		12	386		284	754		
Tuna, Skipjack	452	96	1804	433	420	4747	11984	91929	6198	156478	
Tuna, Southern Bluefin	5	107	1144		74	9168	230	46249	16627	30786	
Tuna, Unspecified											
Tuna, Yellowfin	3461	31219	203832	24736	44233	41802	11239	144095	180498	74388	
Wahoo	21	139	335	18	83	844	6	5257	1107	3181	
Warehou, Blue						9			24456	7906	
Warehou, Blue and Silver			14		24		38	1220	26239	5374	
Whitebait (Glass fish)	19268	1745	5021		1468	6185	166	363	81		
Whiting, Grass				1							
Whiting, King George					61						
Whiting, Sand	522	5041	936	6445	7420	2811	1460	3399		215	

Commercial Production (kg) by Ocean Zone of Landing - 1996/97

Species	1	2	3	4	5	6	7	8	9	10	Mixed
Whiting, School	8145	331346	147729	66832	260576	97251	31291	13289	3922	1199	
Whiting, Stout		5									
Whiting, Trumpeter		465	401		128	1735					
Whiting, Unspecified	1443				83	650				15	
Wirrah		20	35	1278	690	108	22	47	59		
Wrasse, Crimson Banded			7		1				206		
Wrasse, Maori			20	291	7	7	6		419	419	
Yellowtail	1501	610	12636	135	14180	30391	127217	53858	18409	11330	
Total Scale Fish	***376580***	***711375***	***1032116***	***450977***	***1541170***	***1088374***	***1224213***	***1515513***	***1010985***	***1280978***	
Molluscs											
Scallop	4				82						
Cockle	20				128	636					
Scallop, Saucer	21				11						
Shells	311	3390	26	36	3102	390	7	13	49	341	
Calamari, Southern	465	1824	1120	841	64453	14097	2206	599	1457	669	
Shellfish, Unspecified	1086	788	14	28	1697	1865	3	668	62	19488	
Cuttlefish	5041	36789	109819	12254	65360	21089	12148	17080	4230	4243	
Squid	6797	21647	8467	940	22038	11602	6114	19833	14764	11996	
Octopus	48594	246082	90206	8114	51873	5634	1299	1098	9261	9029	
Pipi	134820	26757	15577	2617	122019	111	40	1		5418	
Mussel, Blue		343			41					488	
Squid, arrow		30									
Total Molluscs	***197159***	***337650***	***225229***	***24830***	***330804***	***55424***	***21817***	***39292***	***29823***	***51672***	***0***
Crustaceans											
Bug, Balmain	19357	46258	16950	2125	10634	8008	3270	801	1030	560	
Crab, Blue Swimmer	2487	1994	335	690	12493	461		9		2008	
Crab, Coral	6										
Crab, Hermit	15	318	8	1094	350	151		46	5		
Crab, Mud	55	43		47	17	1					
Crab, Redspot	3		7								
Crab, Sand	7703	8274	1384	44	1855	32	21	191		25335	
Crab, Unspecified	76	122	70		5930	18	3		54		
Crayfish, Murray											
Krill											
Lobster, Painted	11	35	14								
Lobster, Shovelnose		7	33		112		45				
Lobster, Slipper			61								
Lobster, Southern Rock						21	4	35	128	190	
Lobster, Unspecified	2	4	6	15	1	2		11	18	355	
Nipper							63				

Commercial Production (kg) by Ocean Zone of Landing - 1996/97

Species	1	2	3	4	5	6	7	8	9	10	Mixed
Prawn, Carid	1481	1956	254		213	26	426		7		
Prawn, Eastern King	156172	230887	114817	15763	82743	223	255	227		37	
Prawn, Greasyback	192	88	16	16	29			1			
Prawn, Racek				5	4458						
Prawn, Royal Red	1400	6932	15733	6541	41599	105997	102045	17657	231	3710	
Prawn, Scarlet			108	1		8					
Prawn, School	8292	140793	14296	5349	16346	157	4270	3550		317	
Prawn, Tiger	32	320	1044	12	221	3					
Prawn, Unspecified Estuary						84					
Prawn, Unspecified Ocean	19	58	42		616	185	288				
Prawn,Endeavour		17									
Shrimp, Mantis					21						
Spanner crab	315821	2676	5558						33		
Yabby, Freshwater											
Total Crustaceans	***513124***	***440782***	***170736***	***31702***	***177638***	***115377***	***110690***	***22528***	***1506***	***32512***	***0***
Other											
Beachworms	3257	368	12136	14326	11873	595	4670		63	212	72
Total Other	***3257***	***368***	***12136***	***14326***	***11873***	***595***	***4670***		***63***	***212***	***72***
Sharks											
Shark, Angel	32	332	2169	703	12172	8786	17330	13773	5529	2834	
Shark, Black Tip	2590	10036	9528	3398	3225	1178	272	625	87	637	
Shark, Carpet	2914	8075	8806	6852	11876	7324	9795	3699	2865	960	
Shark, Dogfish Endeavour			400	353	5021	24284	6410	5215	2226	2358	
Shark, Dogfish Greeneye	587	123	741	3201	7765	18758	18152	11817	4153	4761	
Shark, Dogfish Unspecified					569						
Shark, Fiddler	1024	1515	6014	5852	66828	12477	1898	1121	1189	233	
Shark, Ghost	38	63	227	86	2497	4217	708	716		324	
Shark, Gummy	930	2606	1732	300	5140	2280	4960	6396	8875	15105	
Shark, Hammerhead	258	177	2586	150	2412	106	230	526	127	250	
Shark, Mako	280	914	4337	254	866	6155	2549	3639	8714	4940	
Shark, Roughskin			70			516	147				
Shark, Saw	36	176	10	389	10886	6502	6294	4064	435	669	
Shark, School	835	59	5173	278	7861	2994	2044	1621	679	149	
Shark, Shovelnose	3166	4504	2059	718	2324	505	907	83	27	41	
Shark, Unspecified	5278	9422	17885	550	11949	14106	9444	11733	12392	11158	
Stingray			85	411	7906	5184	16724	8471	2366	2805	
Total Sharks	***17968***	***38002***	***61822***	***23495***	***159297***	***115372***	***97864***	***73499***	***49664***	***47224***	
Total 96/97	**1108088**	**1528177**	**1502039**	**545330**	**2220782**	**1375142**	**1459254**	**1650832**	**1092041**	**1412598**	**72**

Commercial Production (kg) by Ocean Zone of Landing - 1997/98

Species	1	2	3	4	5	6	7	8	9	10	Invalid Port	Invalid Zone
Scale Fish												
Albacore	64		2258		130	554	400	8947	481	1676		
Alfonsino						91	15		147			
Amberjack	115	531		3	63	171	22					
Anchovy	1150		600		142			50				
Australian salmon	87733		99	21301	35113	1778	21008	9985	27096	369		60497
Barracouta		5			9			40		2704		
Bass groper	275	9	362	1247	27	1160	364	239	157	220		
Batfish							16					
Blue-eye	389	17	5602	2484	16	16108	23908	7380	42833	8583		
Boarfish	174	849	775	170	1414	1334	142	82	22	12	459	
Bonito	2983	2548	56578	59379	37801	6194	15799	1174	4038	350	18	2525
Bonito, Leaping			1									
Bony bream (bony herring)												
Box fish					645							
Bream, Black and Yellowfin	842	5609	20848	8445	43649	13958	3593	1506	617		154	20711
Bream, Ray's			7			133	50	93				
Bullseye, Red			7			3						
Carp												
Catfish, Estuary						44						
Catfish, Forktailed		0	4									
Catfish, Longtailed												12
Catfish, Unspecified		8	13	2	185	6						9
Cobia	1242	981	318	272	428							
Cod, Bar	7547	742	6242	539	961	147	99	15			49	
Cod, Bearded			5									
Cod, Estuary												
Cod, Maori	86	130	194	3		13	2	105	112			
Cod, Red Rock	293	760	618	2774	1562	42	37	46	345		15	
Cod, Unspecified	179	2136	101	1	204	632	18	5	31	63	18	
Dart	160	34	4497	12	90							1770
Diamond Fish			1251									145
Dolphinfish	1247	278	2637	733	3584	1297	4551	742			1	
Dory, John	76	1119	841	535	5421	2607	1074	3482	1144	2953	211	
Dory, King					40		2					
Dory, Mirror			5	554	21014	24055	206	11161		3902	104	
Dory, Silver				20	40	220		137		2188		
Dory, Unspecified		4	2	3		17						
Drummer	28	1	34	161	167	35				10	10	2

Commercial Production (kg) by Ocean Zone of Landing - 1997/98

Species	1	2	3	4	5	6	7	8	9	10	Invalid Port	Invalid Zone
Eel, Conger		64		49	1216	2185	3205	275	94	23		
Eel, Longfin River				214		231		106				
Eel, Pike			3	6	552	33					12	
Eel, Shortfin River												
Eel, Short-finned Conger												
Eel, Unspecified			83	490	2874	951	1244	1526	613		6	
Emperor, Red	2	1	2									
Emperor, Spangled	78	11	102			5						
Fish, Unspec. Freshwater												
Fish, Unspecified Estuary		2				35						108
Fish, Unspecified Ocean	1589	1933	8449	767	18304	25706	24886	5788	6658	16488	422	6529
Flathead, Dusky	29	363	5	9	1079	97	16					0
Flathead, Marbled		168		602	82						4	
Flathead, Sand	6000	52094	11905	3064	39180	11202	1371	233	2718	3650	2764	
Flathead, Tiger	1155	2544	1214	6714	104044	21832	17638	16526	7954	22692	8929	
Flathead, Unspecified	33	601	951	248	419	252	85	53	79		1	3
Flounder, Unspecified	569	5615	3343	3917	12667	1001	355	151	69		595	
Flutemouth					40	22						
Fusilier	5	33	321								16	
Garfish, River												485
Garfish, Sea	2648	4309	5072	2615	35958	26633	22554	10880	994			35811
Garfish, shortbill			14									157
Garfish, Unspecified		15							37			
Gemfish	2	20	6	413	4118	8276	89164	7647	9021	6684	44	
Goatfish, Blackspot		2	23		589							
Goatfish, Blue-striped			3									
Golden perch (yellowbelly)												
Grenadier, Blue					57	1589		165	311	4495		
Gurnard, mixed						217						
Gurnard, Red	38	132	51	38	1933	1130	260	938	133		150	
Gurnard, Spotted					202	118						
Hairtail	1	13	5	2	96	931						
Hapuku	14	16	159	1374	50	1243	2522	1375	562	956		
Hardyhead					8			40				
Hussar	12	13	8									
Imperador							39		4			
Jack, Mangrove	5		9									
Jobfish, Rosy	59	19	6			1277	129					
Kingfish, Yellowtail	3798	1206	12126	4443	2162	20371	15051	9442	6298	20		116

Commercial Production (kg) by Ocean Zone of Landing - 1997/98

Species	1	2	3	4	5	6	7	8	9	10	Invalid Port	Invalid Zone
Latchet	2	293	618	367	11747	2609	951	1401	422	1402	481	
Leadenall		400	8904		110							2519
Leatherjacket, Black Reef	104			161								
Leatherjacket, Chinaman					6842							
Leatherjacket, Rough					178							
Leatherjacket, Unspecified	3400	11461	18931	18592	26953	28616	8663	5086	1936	2637	1041	
Ling	45	54	38	170	3739	16148	1995	7637	3660	22682	20	
Longtom		3	94	0	7							35
Luderick	2976	893	47732	4446	20539	350	612	2536	3044			27068
Mackerel, Blue	14062	657	2237	1	5459	15159	173688	11176	89973	1298		141564
Mackerel, Jack	37	100	134		173	450	13762	283	170	2071		388
Mackerel, scaley		7	13									
Mackerel, Spanish	6396	5491	1847	26	32				176			
Mackerel, Spotted	11025	28530	11329		3	60	337	8	52		40	
Mackerel, Unspecified	52	30	17		185	3		1100	2220		9	
Marlin, Striped			2169		210			3247				
Milkfish												
Moki					142	7			12	81		
Morwong, Jackass	173	644	392	309	1277	610	6756	7930	3049	23633	49	
Morwong, Red	16	26	488	873	903	498	20	28	11	55	8	
Morwong, Rubberlip	5747	6542	12709	12670	41972	39448	20794	13075	1250	203	4310	
Morwong, Unspecified	58	428	270	484	23	110					7	
Mullet, Fantail	165		2773	28	3331	464	412	124				1037
Mullet, Pink-eye												
Mullet, Red	7557	16549	7502	2464	11766	206	32				708	
Mullet, Sand												
Mullet, Sea	80729	69318	305527	608898	309477	292534	43300	53218	18915			625913
Mullet, Unspecified	56		193	92987	1208	33		66				8162
Mulloway	1984	5277	8286	2728	6238	10960	776	218			74	298
Murray cod												
Oilfish			16			213	265	39	2076	136	4	
Old Maid					118			7		24		1
Old Wife								6				
Opah			12		979			201		18	11	
Orange Roughy			5		237	2109		3		354		
Oreo Dory						225						
Oreo Dory, Spiky						20						
Parrotfish	3157	1093	1678	351	94	90	430	48	244	287	9	
Perch, longfinned						70	255	60				

Commercial Production (kg) by Ocean Zone of Landing - 1997/98

Species	1	2	3	4	5	6	7	8	9	10	Invalid Port	Invalid Zone
Perch, Moses	61	59	33								3	
Perch, Ocean	160	246	1459	461	30955	22252	1950	3553	3295	4389	128	
Perch, Orange			55		3	3925	283					
Perch, Pearl	4049	5615	2296	344	388	527	29		47		6	
Perch, Scarlet							8					
Perch, Unspecified	3	0	20	73	4	1549	525		2			
Pigfish	1085	1139	1029	954	1093	1195	1121	381	20		15	
Pike	99	41	37	3	189	304	450	42			20	8
Pilchard	76184	56590	3793	5375	230	1300	556	45865	200			101189
Queenfish	13		40									
Rainbow Runner	440	20	235	1	16		50					
Redfin perch												
Redfish	345	88	1180	674	19366	18259	30102	88964	2094	35767	1793	
Ribbonfish					5248	11039	5024	6139	1751	3337		
Rudderfish			295		635	118		1800		26		
Sailfish	29		23									
Samson Fish	3039	3954	4547	536	308	72	8				4	
Sandy sprat (whitebait)	6184	665	5178	1321		6740	3204	4				73755
Sergeant Baker		59	215	90	235		120	58				
Silver biddy			606	45	2561	466	433	424				17
Snapper	31505	43256	61574	21571	31843	31104	35621	9311	834	114	741	
Snapper, queen	7											
Sole, Black		9	22	992	1925		367					
Sole, Lemon			4		44							
Sole, mixed	0		368	466	4827		416	20			28	
Spearfish, Shortbill			93					43				
Stargazer		2					37					
Surgeonfish	79	66	146	276								
Sweep	3273	3819	9106	16548	20502	29681	48987	2189			199	9626
Sweetlip, Emperor			2									
Sweetlip, Unspecified		10	12		15							
Swordfish, Broadbill			3155	84	221	123		2099	1007	288		
Tailor	922	521	7612	3539	7349	7732	1104	357	32		183	1763
Tarwhine	216	1962	2470	756	8211	2494	171	191			439	229
Teraglin	1715	7165	9694	10225	3989	942	36	9			38	
Trevally, bigeye												
Trevally, Black			274			7	231				1	1
Trevally, golden												
Trevally, Silver	1421	1425	8430	6910	105752	51415	44401	44221	59897	5509	4672	866

Commercial Production (kg) by Ocean Zone of Landing - 1997/98

Species	1	2	3	4	5	6	7	8	9	10	Invalid Port	Invalid Zone
Trumpeter			9	152	3251	11	9	91				
Trumpeter, Tasmanian					76	24	155		47			
Trumpeter, Unspecified				78	397							
Tuna, Bigeye					336			1458		93		
Tuna, Mackerel	1084	781	11466	212	117	103	3260	302	55			6101
Tuna, Northern Bluefin	31	293	3969		194			179		386		1569
Tuna, Skipjack	350	4	657	120	30	6023	1905	3672	742	51		
Tuna, Southern Bluefin			22									
Tuna, Unspecified					8							
Tuna, Yellowfin	209	16	12951		1822	255	420	22189	1918	4934		292
Tuskfish, Venus		1										
Wahoo						13						
Warehou, Blue					82	27	205	50	100	4027	23	
Warehou, Blue and Silver								10		3342		
Warehou, spotted/silver										15722		
Whitebait (Glass fish)		82				314						4939
Whiting, Grass					2			73				
Whiting, King George	12				5							
Whiting, Sand	333	114	432	570	1963	1134	1146	3084				2295
Whiting, School	119164	515437	108261	257149	266654	90452	38423	1719	2130	43	12838	
Whiting, Trumpeter	450				8	10	125	41				
Whiting, Unspecified	4560	812	3	14	82		1598	22		58		
Wirrah			45	1245	985	160	50	28	25		4	
Wrasse, Crimson Banded		4	20									
Wrasse, Maori	4		8	150	113	6	83	13	12			
Wrasse, mixed		2	28	310	113	58			769		3	
Yellowtail	8386	739	7910	99	14038	22251	269177	20690	92193		169	35082
Total Scale Fish	***523773***	***877727***	***851457***	***1200501***	***1368462***	***919013***	***1014663***	***467122***	***406948***	***211005***	***42060***	***1173597***
Molluscs												
Calamari, Southern	1688	2554	1157	1071	79757	23649	1982	3024	2260	606	6666	15
Cockle												4430
Cuttlefish	4527	55562	90375	18756	45158	14377	2846	3379	1352	2895	6922	
Mussel, Blue	1400											
Octopus	38169	458354	75060	21601	46201	7132	2010	1453	1005	3042	11250	
Pipi	240543	30	3536	8864	7415							18129
Scallop												
Scallop, Saucer	30											
Shellfish, Unspecified		11			60							
Shells		3064	148	14	1752	36	2			371	122	

Commercial Production (kg) by Ocean Zone of Landing - 1997/98

Species	1	2	3	4	5	6	7	8	9	10	Invalid Port	Invalid Zone
Squid	131	8320	1864	45	1742	754	189	1166	30		31	500
Squid, arrow	3746	16807	4720	2605	2207	5236	661	3549	309	13145	1091	
Total Molluscs	***290234***	***544702***	***176860***	***52956***	***184292***	***51184***	***7690***	***12571***	***4956***	***20059***	***26082***	***23074***
Crustaceans												
Bug, Balmain	16626	20174	6138	3817	7923	2479	273	81	12		1313	
Bug, Deepwater	228	424	12	176	464	3624					135	
Crab, Blue Swimmer	1098	2156	106	1063	10040	60		112			133	
Crab, Coral					22							
Crab, Hermit				151		23		10084				
Crab, Mud		126	9	121	52						20	
Crab, Sand	1015	7840	896	86	1056	13		258		105	24	
Crab, Unspecified			2		1162	90						
Lobster, Painted		1										
Lobster, Slipper	10		1									
Lobster, Southern Rock								233				
Lobster, Unspecified	29											
Nipper			4									
Prawn, Carid	116							53				
Prawn, Eastern King	104697	229535	95691	50469	145784	1026	700	65		1055	22593	
Prawn, Greasyback												
Prawn, Racek					2374						141	
Prawn, Royal Red	12	4295	2003	4488	81205	82491	16659	1700		1134		
Prawn, Scarlet						38						
Prawn, School	264	23829	1058	3737	10463		1757	4331		345	4275	
Prawn, Tiger	402	4010	635	54	139	30					64	
Prawn, Unspecified Estuary					8							
Prawn, Unspecified Ocean	282	1016	5200	3882	2937						13	
Prawn,Endeavour		13										
Shrimp, Mantis					4							
Spanner crab	296447	4850	1088	44	2	8					140	
Yabby, Freshwater												
Total Crustaceans	***421226***	***298269***	***112843***	***68088***	***263635***	***89882***	***19389***	***16917***	***12***	***2639***	***28851***	
Other												
Beachworms	*	*	*	*	*	*	*	*	*	*	*	*
Other - Invalid	43	10	87	88	1621		970	1291			374	1
Total Other	***43***	***10***	***87***	***88***	***1621***	***0***	***970***	***1291***	***0***	***0***	***374***	***1***
Sharks												
Bronze Whaler					902			109				
Shark, Angel	10	160	2372	2081	11143	3896	2474	3394	3983	1519	1352	28

Commercial Production (kg) by Ocean Zone of Landing - 1997/98

Species	1	2	3	4	5	6	7	8	9	10	Invalid Port	Invalid Zone
Shark, Black Tip	2342	7919	1637	10138	970	955	110	542	470	149	32	
Shark, blue whaler			45				190	109	45	109		
Shark, Carpet	601	5004	9605	7502	17578	23298	3962	4065	2234	1308	1342	
Shark, Dogfish Endeavour	117	3	868	603	7142	3166	3171	2572	63	2840	404	
Shark, Dogfish Greeneye	161	2	31	1528	5132	6312	543	992			789	
Shark, Dogfish Unspecified			25				160	18				
Shark, Fiddler	491	433	4101	8123	69037	7698	867	851	996		2826	166
Shark, Ghost	6		50		421						51	
Shark, Gummy	469	3346	2543	949	4268	1958	3191	7018	12196	14361	463	
Shark, Hammerhead	60		40		365	124	46	825				
Shark, Mako	112	9	219	46	172	308	1995	910	150	41		
Shark, Port Jackson					80							
Shark, Roughskin					60	3529						
Shark, Saw		88	30	1217	10796	5269	206	1384	93	2045	1508	
Shark, School	472	413	1995	411	5686	3982	1305	4003	444	70	316	24
Shark, Shovelnose	1461	4021	1033	251	734			74	5	890	11	31
Shark, tiger	146	4	43			16		50				
Shark, Unspecified	1969	3934	3353	311	1861	2776	13868	7917	275	2714	194	318
Stingray		419	28	1898	7264	1554	3256	3582	987	130	315	10
Total Sharks	***8417***	***25755***	***28018***	***35058***	***143611***	***64841***	***35344***	***38415***	***21941***	***26176***	***9603***	***577***
Total 97/98	**1243693**	**1746463**	**1169265**	**1356691**	**1961621**	**1124920**	**1078056**	**536316**	**433857**	**259879**	**106970**	**1197249**

Days of effort by zone of landing

Year	Zone of landing	Days of Effort
9697	1	12420
9697	2	17328
9697	3	21886
9697	4	9548
9697	5	19225
9697	6	12720
9697	7	10725
9697	8	7045
9697	9	5151
9697	10	5033
9697	Mixed	11
9798	1	9585
9798	2	13755
9798	3	14379
9798	4	6371
9798	5	13240
9798	6	7815
9798	7	5434
9798	8	3707
9798	9	2338
9798	10	823
9798	Invalid Port	631
9798	Invalid Ocean	3313

Effort day is the sum of days for each method (i.e. it is not the number of days the fisher fished). So, if a fisher used 2 methods on one day, this would we 2 days of effort.