

Volume 3

Appendices

This is the third of four volumes in the Environmental Impact Statement on the Ocean Hauling Fishery.

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APPENDIX A

APPENDIX A1. LIST OF PROPONENTS

(As at 10 January 2002)

PROponents	ADDRESS		
A & J Virtu Fishing Industries	198 KEMBLA STREET	WOLLONGONG NSW	2500
A.R. Broadhurst & K. Appleby	24 ALEXANDER DRIVE	BERMAGUI	2546
Aarne L. Byron & Anthony Williams	PO BOX 1105	MONA VALE	2103
Aish, Barry Arthur	43 KANAHOOKA ROAD	DAPTO	2530
Aish, Craig Anthony	43 KANAHOOKA ROAD	DAPTO	2530
Aish, Troy	43 KANAHOOKA ROAD	DAPTO	2530
Alldritt, John	COASTERS RETREAT	VIA PALM BEACH	2108
Anderson, Keith Henry	16 BONVILLE STATION ROAD	BONVILLE	2441
Anderson, Keith Lyndon	57 AZALEA AVENUE	COFFS HARBOUR	2450
Anthony & Gerrit Jan Bobeldyk	2 BIMBADEEN AVENUE	BANORA POINT	2486
Ardler, Anthony	C/O 28 PARK STREET	WRECK BAY VIA HUSKISSON	2540
Ardler, Paul James	38 NEW STREET	WRECK BAY VIA JERVIS BAY	2540
Armitage, John Edgar	PO BOX 186	TIN CAN BAY	4580
Armitage, Stephen John	94 INVESTIGATOR AVENUE	COOLOOLA COVE, TIN CAN BAY, QLD	4580
Armstrong, Donald Mackay	LPO BOX 31	MANSFIELD QLD	4122
Asquith, Herbert Charles	6 DALTON STREET	NELSON BAY	2315
Asquith, Leslie John	HARRIS STREET	ANNA BAY	2316
Asquith, Raymond	24 GRAFTON STREET	NELSON BAY	2315
Asquith, William John	78 MOOLA ROAD	BUFF POINT	2262
Auston, Ross	398 NORTH BANK ROAD	PALMERS ISLAND	2463
Bailin, Matthew	82 LEO DRIVE	NARRAWALLEE	2539
Baker, Gary Robert	11 PANORAMA AVE	SOUTH WEST ROCKS	2431
Baker, Robert William	172 GREGORY STREET	SOUTH WEST ROCKS	2431
Baker, William Donald	45 CLARENCE STREET	MACLEAN	2463
Baker, William Neil	259 BAKER DRIVE	CRESCENT HEAD	2440
Ballantyne, Garry & Michael	PO BOX 88	PAMBULA	2549
Barnsley, Vaughan Owen	39 PARKES STREET	TUNCURRY	2428
Barter, Alan	3 JACARANDA AVENUE	BENDALONG	2539
Baxter, Barry Arthur	28 BURNS STREET	BYRON BAY	2481
Beattie, Barry Norman	1 MELROSE STREET	EDEN	2551
Bell, John	22 BELLEVUE PLACE	EDEN	2551
Bell, Michael John	PO BOX 476	EDEN	2551
Bell, Paul Barry	22 BELLEVUE PLACE	BAYVIEW ESTATE, EDEN	2551
Bennett, Michael	PO BOX 590	EDEN	2551
Berry, Ian Edwin	PO BOX 18	BYRON BAY	2481
Bevan, William Brian	P O BOX 530	NAMBUCCA HEADS	2444
Bielby, Peter Ernest	8 GLACKEN STREET	HARRINGTON	2427
Billingsley, Chris John	8 LITTLE STREET	HARRINGTON	2427
Blackburn Brinsley Pty Ltd	5 BONVILLE STATION ROAD	BONVILLE	2441
Blanch, David John	RMB 2396	FULLERTON COVE ROAD, FULLERTON COVE	2318
Blanch, Phillip	2396 FULLERTON COVE RD	FULLERTON COVE	2318
Boggis, Ronald Henry	75 SHIRLEY STREET	BYRON BAY	2481
Braithwaite, Garry	19 WEST STREET	BERMAGUI	2546
Bramble, Graham	1677 COOMBA ROAD	COOMBA PARK	2428
Brown, Denis Noel	9 MATTHEWS DRIVE	MOUNT WARRIGAL	2528
Bull, Colin Wayne	43 PACIFIC STREET	CRESCENT HEAD	2440
Bull, Roger Leonard	PO BOX 16	CRESCENT HEAD	2440
Bull, Timothy Colin	43 PACIFIC STREET	CRESCENT HEAD	2440
Burgess, Jeffrey Kevin	6 SUSSEX STREET	BERKELEY	2506
Burley, Graeme John	10 THE JETTY	SALAMANDER BAY	2317
Burnes, Graham Oswald	31 PACIFIC DRIVE	CROWDY HEAD	2427
Burnes, William Douglas	17 RIVERVIEW STREET	ILUKA	2466
Butler, Leonard William	16 WONNAWONG PLACE	BAWLEY POINT	2539
Byrnes, Alan Alfred	80 LAKEVIEW PARADE	PRIMBEE	2502
Byrnes, Edward John	48 WALLACE STREET	SCOTTS HEAD	2447
Byrnes, Graeme Stanley	C/O 80 LAKEVIEW PARADE	PRIMBEE	2502
Byrnes, Phillip Paul	82 LAKEVIEW PARADE	PRIMBEE	2502
Cairney, Gregory Brent	35 MITCHELL STREET	EDEN	2551
Camilleri, Ray Michael	24 THE OUTLOOK ROAD	SURFSIDE, BATEMANS BAY	2536
Campbell, Brian John	PO BOX 923	BYRON BAY	2481
Campbell, Brian Patrick	112 JUBILEE STREET	TOWNSEND	2463
Camporeale, Vito	11 EYRE CRESCENT	FORSTER	2428
Carey, Randall Scott	16 MAIN STREET	CUNDLETOWN	2430
Carle (Jnr), Allen John	2 OCEANIC PLACE	OLD BAR	2430
Carle (Snr), Allen John	C/- POST OFFICE	BOHNOCK	2430
Carle, Malcolm Troy	POST OFFICE	BOHNOCK	2430
Cartwright, Adam Michael	11 EVANS CLOSE	KALARU	2550
Cavallo, James Richard	4 CAVE STREET	ILUKA	2466
Chadburn, Garry David	238 OLD BOGANGAR ROAD	CUDGEN	2487

PROPOSERS	ADDRESS	
Chalkley, James Bryce	10 FINGAL STREET	SHOAL BAY 2315
Chapman, Reece Percival	3 CHAPMAN'S ROAD	TUNCURRY 2428
Chasper Investments Pty Ltd	7 DIPLACUS DRIVE	PALM BEACH QLD 4221
Cheers, Jamie Lyall	13 TROPIC GARDEN DRIVE	SMITHS LAKE 2428
Cheers, Leslie James	13 TROPIC GARDENS DRIVE	SMITHS LAKE 2428
Cheers, Mervyn George	LOT 3 RACECOURSE RD	BUNGWAHL 2423
Cheers, Micheal Whyllie	13 TROPIC GARDENS DRIVE	SMITHS LAKE 2428
Chhua, Khy Hua	56 LAKEVIEW PARADE	PRIMBEE 2502
Clare, Gregory Edward	59 MICALO STREET	ILUKA 2466
Clarke, Grahame John	16 STEFAN CLOSE	EMERALD HEIGHTS 2456
Clifford, Brian Frederick	53 BERGALIA STREET	MORUYA 2537
Collet, Geoffrey Stewart	PO BOX 97	EDEN 2551
Collis, Gary John	7 MICALO STREET	ILUKA 2466
Collis, John James	97 DUKE STREET	ILUKA 2466
Connolly, Frank	PO BOX 8	ORIENT POINT 2540
Connolly, Graham	4 ROSBY PARK	ORIENT POINT 2540
Convoy, Ian William	39 IMLAY STREET	MERIMBULA 2548
Cootes, Geoffrey Prout	544 ARMIDALE ROAD	GRAFTON 2460
Corocher, Shane Lenard Allan	90 WHARF STREET	MACLEAN 2463
Creighton, Anthony Charles	24 RIVERVIEW STREET	ILUKA 2466
Crofton, Richard	2967 PACIFIC HIGHWAY	TYNDALE 2460
Daly, Robert Ian	20A PIRRALEA PARADE	NELSON BAY 2315
Davidson, Warren James	PO BOX 187	EDEN 2551
Davies, Brian John	KINKA RD	SEAL ROCKS 2423
Davies, Joseph John	KINKA ROAD	SEAL ROCKS 2423
Davis, Keith Alfred	22 SOLDIERS POINT ROAD	SOLDIERS POINT 2317
Denniss, Gordon Stanley	29 WOLSELEY AVENUE	TACOMA 2259
Denniss, Ronald Stanley	59 JOHN LANE RD	YARRAVEL, KEMPSEY 2440
Dickinson, Robert Francis	17 CHURCH STREET	MACLEAN 2463
Dj & Lj Markwell Pty Ltd & Paddockmist Pty Ltd	PO BOX 6281	TWEED HEADS SOUTH 2486
Drew, Peter Lawrence	14 HAMMOND STREET	ILUKA 2466
Duckett, Phillip Ronald	5 NIOKA STREET	DALMENY 2546
Dunford, Charles Edward	C/O V F EGGINNS	RMB 1361 YAMBA ROAD, YAMBA 2464
Dunn, Charles Wayne	69 CHURCH STREET	ULLADULLA 2539
Dunn, David William	97 SOUTH STREET	ULLADULLA 2539
Dwyer, Gavin Paul	166 MYOCUM ROAD	EWINGSDALE VIA BYRON BAY 2481
Ecroyd, Peter William	20 BAY STREET	TATHRA 2550
Ellem, Gary Thomas Gordon	3 THE PENINSULA	YAMBA 2464
Elliott, Danny James	4 MORILLA PLACE	FORSTER 2428
Elliott, David Paul	6 CALEYI CRES	TUNCURRY 2428
Elliott, Dean Andrew	40 TUNCURRY STREET	TUNCURRY 2428
Elliott, James William	387 THE LAKESWAY	TUNCURRY 2428
Elliott, Mark Henry	45 TUNCURRY STREET	TUNCURRY 2428
Elliott, Robert Angus	40 TUNCURRY STREET	TUNCURRY 2428
Everson, Keith	9 AGER STREET	YAMBA 2464
Everson, Lenith James	49 MICALO STREET	ILUKA 2466
Everson, Noel Athol	1 CAVE STREET	ILUKA 2466
Everson, Raymond John	C/- B.A. ELLEM	19 UNION STREET, MACLEAN 2463
Everson, Rodney Craig	17 ELANORA AVENUE	POTTSVILLE 2489
Everson, Sean Athol	12 LONG STREET	ILUKA 2466
Everson, Stephen John	591 NORTHBANK RD	PALMERS ISLAND 2463
Fantham, Richard	P.O BOX 83	EDEN 2551
Farrell, Allan James	5 COMPTON STREET	ILUKA 2466
Farrington, Grant Gordon	26 HIAWATHA ROAD	MINNIE WATERS 2462
Fawkes, Warren Norman	11 ACACIA STREET	MINNIE WATER 2462
Fidden, Bruce Antony	LOT 13 WOOD ST	PINDIMAR 2324
Fidden, Geoffrey Robert	MORANTE STREET	PINDIMAR VIA TEA GARDENS 2324
Fidden, Glenn Andrew	59 MARINE DR	TEA GARDENS VIA TEA GARDENS 2324
Fidden, Ross Geoffrey	PO BOX 154	TEA GARDENS 2324
Foley, Barry Stephen	22 THE LAKESWAY	TARBUCK BAY VIA PACIFIC PALMS 2428
Forrester, Mark Raymond	10 WEST STREET	FIVE DOCK 2046
Forster, Anthony Robert	PO BOX 189	AVOCA BEACH 2251
Fourter, Michael Edwin	PO BOX 633	EDEN 2551
Fourter, Roger Michael	P.O. BOX 633	EDEN 2551
Franklin, Richard Barry	6 OTRANTO AVENUE	ORIENT POINT 2540
Franks, Danny	2 MURRUNA STREET	BERMAGUI 2546
Franks, John	LOT 71 HENRY STREET	BERMAGUI 2546
Gerald Dean & Janette Rose Dean	30 SIXTEENTH AVE	SAWTELL 2452
Gibson, Paul Keith	54 BLUE WATERS CRESCENT	TWEED HEADS WEST 2485

PROPOSERS	ADDRESS		
Legge, Colin James	PO BOX 127	FORSTER	2428
Legge, Robert John	57 MACWOOD ROAD	SMITHS LAKE	2428
Legge, Terrence Henry	24 SEABREEZE PARADE	GREEN POINT	2428
Lewis, Peter Wayne	7/5 OWEN STREET	PORT MACQUARIE	2444
Lewis, William Bruce	23/65 HILL ST	PORT MACQUARIE	2444
Livingstone, Robert Reece	11 CROMARTY CRES	ANNA BAY	2316
Lloyd, Terrance Richard	41 ALLINGA STREET	COOMBABAH	4216
Loughnan, Ian Anthony	32 KEATING DRIVE	BERMAGUI	2546
Loy, Garry James	4/11 PERIWINKLE PL	BALLINA	2478
Loy, Graeme Donald	79 NORTH CREEK ROAD	BALLINA	2478
Lund, Robert Keith	5 HAMMERSMITH ROAD	ERINA	2250
Lydon, William Thomas	17 MATHEW ROAD	SMITHS LAKE	2428
Macbean, Barry Thomas	19 MYAN CLOSE	CORLETTE	2315
Maddock, Maurice Ian	287 BEACH STREET	HARRINGTON	2427
Maher, Mark Anthony	788 MAIN ROAD	COLEDALE	2513
Malcolm Lionel Gorry & Scott Westley	15 LAKESHORE PARADE	SUSSEX INLET	2540
Malone, David John	54 MOIRA PARADE	HAWKS NEST	2324
Manwaring, Nigal Allan	397 TOMAKIN ROAD	MOGO	2536
Markwell, Benjamin Troy	19 CHINDERAH BAY DR	CHINDERAH	2487
Martin, Scott Gregory	420 COMERONG ISLAND ROAD	NUMBAA	2541
Massey, Colin Alfred Ernest	49 KANAHOOKA ROAD	DAPTO	2530
Massey, Neil	49 KANAHOOKA ROAD	DAPTO	2530
Massey, Russell William	8 SHORT STREET	BERKELEY	2506
Massey, Scott William	2 VENN STREET	BERKELEY	2506
Massey, Shirley Marie	8 SHORT STREET	BERKELEY	2506
Massey, Stacey Elizabeth Marie	8 SHORT STREET	BERKELEY	2506
Mcgary, Paul Frederick	34 NICOLLE ROAD	PRIMBEE	2502
Mcpherson, Dennis James	20 GLENSHEATHER DRIVE	NAMBUCCA HEADS	2448
Mcrae, Peter Kenneth	9 MIRREEN STREET	HAWKS NEST	2324
Mellows, Anthony	2 BAY STREET	NELSON BAY	2315
Micallef, Braiden Thomas	127 GRIFFITH STREET	MANNERING PARK	2259
Micallef, David Thomas	127 GRIFFITH STREET	MANNERING PARK	2259
Miles, Brian Joseph	43 FERRY STREET	NORTH MACKSVILLE	2447
Miles, William Frederick	17 EGAN STREET	NORTH MACKSVILLE	2447
Milliken, Marc Robert	403 CASSIA CLOSE	BAYWAY VILLAGE, FULLERTON OVE	2318
Mitchell, David Joseph	P.O. BOX 126	SOUTH WEST ROCKS	2431
Moane, Frederick	129 NORTHCLIFFE DRIVE	LAKE HEIGHTS	2502
Moane, Mark Edward	129 NORTHCLIFFE DRIVE	LAKE HEIGHTS	2502
Monin, Lee Stewart	61 SPINNAKER WAY	CORLETTE	2315
Morgan, Anne Elizabeth	196 PRINCE CHARLES PDE	KURNELL	2231
Morgan, David John	75 TORRES STREET	KURNELL	2231
Morgan, Joseph Robert	5 GLEN HAVEN DRIVE	LAURIETON	2443
Morley, Terry	2 BENELONG STREET	BULLI	2516
Mom, Keith Frederick	R.M.B. 2027	CLYBUCCA	2440
Morrow, John David	PO BOX 146	MACKSVILLE	2447
Moyce, Edward Sydney	19 GOORAWAHL AVENUE	LA PEROUSE	2036
Moyce, Jason Edward	19 GOORAWAHL AVENUE	LA PEROUSE	2036
Newlands, Brian Francis	60 TREELANDS CRESCENT	BALLINA	2478
Noel & Colleen Patricia Rodahl	P.O. BOX 448	EDEN	2551
Norford, Rodney John	760 HUSKISSON ROAD	HUSKISSON	2540
Nye, Andrew Stanley	VEITCH STREET	MOGO	2536
Nye, David Andrew	11 ISON STREET	MOGO	2536
Nye, William Thomas	9 TOMAKIN PLACE	TOMAKIN	2537
O'Donnell, Michael Everingham	PO BOX 15	GREENWELL POINT	2540
Oestmann, Mark Dean	P O BOX 110	ILUKA	2466
O'Sullivan, Edward James	PO BOX 160	TATHRA	2550
Palmer, Keith	204 CHARLOTTE BAY STREET	PACIFIC PALMS	2428
Park, John	7 EMANUEL CRESENT	SOUTH WEST ROCKS	2431
Parkinson, David Allen	5 STRATA AVENUE	BARRACK HEIGHTS	2528
Parkinson, Kevin James	14 TALLYAN POINT ROAD	BASIN VIEW	2540
Parkinson, Peter John	7 TALLYAN POINT ROAD	BASIN VIEW	2540
Paton, Robert Edward	7 MAIN ROAD	PACIFIC PALMS	2428
Patterson, Neville Hamilton	38 WOLSELEY AVENUE	TACOMA	2259
Paul Charles Wallace & Paul Anthony Harrison	LEOPOLD STREET	CROWDY HEAD	2427
Payne, Mervyn John	1 WATTLE STREET	BERMAGUI	2546
Pemberton, Graham John	14 HIGHVIEW STREET	FARMBOROUGH HEIGHTS	2526
Pemberton, Paul John	200 CHARLES AVENUE	MINNAMURRA	2532
Perry, Jason Thomas	100 GOLDENS ROAD	FORSTER	2428
Peter William Offner & Michael Joseph Kilp	LOT 212 PATONGA ST	KINCUMBER	2251

PROPOSERS	ADDRESS		
Phelps, Mark Alan	14 ARMIDALE AVENUE	NELSON BAY	2315
Phillis, Norman Henry	459 PRINCES HIGHWAY	BOMADERRY	2541
Phillis, Wayne Norman	734 WOOLLAMIA ROAD	HUSKISSON	2540
Pickford, Adam Regan	24 HIGH STREET	COOPERNOOK	2426
Pickford, Allan John	441 CORALVILLE ROAD	MOORLAND	2443
Pilcher, Stephen John	399 GOODWOOD ISLAND ROAD	GOODWOOD ISLAND	2469
Plater, Joseph Roland	143 PHILLIP DRIVE	SOUTH WEST ROCKS	2431
Plummer, Brad	25 CROWDY ROAD	HARRINGTON	2427
Praja, Zoran Hermann	63 NURRAWALLEE STREET	ULLADULLA	2539
Prindable, Ronald James	54 RIVERVIEW STREET	ILUKA	2466
Puckeridge, Allen Walter	LOT 36 WISTERIA STREET	MINNIE WATER	2462
Ragno, Anthony Mauro	37 WALLIS STREET	TUNCURRY	2428
Ragno, Mauro	20 BENT STREET	TUNCURRY	2428
Ragno, Peter Anthony	18 RENNIE CRESENT	TUNCURRY	2428
Ragno, Sabino Anthony	1 BOWER PLACE	TUNCURRY	2428
Ramon, Paul Joseph	26 QUEEN LANE	ILUKA	2466
Raschilla, Salvatore Francesco	16 PANKHURST AVE	FAIRY MEADOW	2519
Raymond Francis Taylor & George Pain	RMB 743 GAN GAN RD	ANNA BAY	2316
Raymond Pearson & David Pearson	22 DARLEY STREET	SHELLHARBOUR	2529
Reed, Allan Jefferey	P O BOX 5194	CHITTAWAY BAY	2261
Reed, Stephen James	49 WARNER AVE	TUGGERAWONG	2259
Reid, William George	C/O-POST OFFICE	MINNIE WATER	2462
Richardson, David George	11 BALFOUR STREET	SOUTH TWEED HEADS	2486
Richardson, Thomas Michael	24 ANDREW CLOSE	BOAT HARBOUR VIA ANNA BAY	2316
Richardson, William Stanley	20 GRAHAM STREET	BOAT HARBOUR, ANNA BAY	2316
Ries, Peter Bruce	PO BOX 144	BYRON BAY	2481
Ripley, Adrian Clarence	39 RIGNEY STREET	SHOAL BAY	2315
Robert John Slockee & Janette Pamela Slockee	69 PHILLIP STREET	CHINDERAH	2487
Robert Seery & John Norford	55 HAWKE STREET	HUSKISSON	2540
Robinson, Glenn Raymond	16 KOOMBALA STREET	TUGUN	4224
Rossetti, Santo	34 BUNGARY ROAD	NORAH HEAD	2263
Rossetti, Santo Vincent	3 VICTORIA STREET	NORAH HEAD	2263
Rosskelly, Frank Clement	5 THE LAKESWAY	FORSTER	2428
Rosskelly, Steven	4 PANORAMA CRESENT	FORSTER	2428
Rowbotham, Kenneth Beaumont	43A BURRILL STREET	ULLADULLA	2539
Rutherford, Stephen John	363 NORTH BANK ROAD	PALMERS ISLAND	2463
Ryan, Frederick Donald	24 MIDDLE STREET	WOOMBAH	2469
Sales, Mark Wayne	66 BOYCE AVE	WYONG	2259
Saunders (Jnr), Horace Harold	RMB 516	WOOLA ROAD, TAREE	2430
Saunders Snr., Horace Harold	RMB 516	WOOLA ROAD, TAREE	2430
Saunders, Allan James	RMB 516 WOOLA ROAD	TAREE	2430
Saunders, Phillip Grahame	RMB 516 WOOLA ROAD	TAREE	2430
Saunders, Raymond Frank	4 ALBERT STREET	CUNDLETOWN	2430
Saunders, Stephen Timothy	RMB 516 WOOLA ROAD	TAREE	2430
Schaechle, Dale Russell	PO BOX 193	PORT MACQUARIE	2444
Schneider, Steven	12 MICALO STREET	ILUKA	2466
Sewell, Keith Walter	51 ARNHEIM RD	ALLAMBIE HEIGHTS	2100
Sewell, Philip Charles	LOT 82	RACECOURSE RD, BUNGWAHL	2423
Skennar, Peter Raymond	1 HIAWATHA ROAD	MINNIE WATER	2462
Smith, David William	20 FINGAL ROAD	FINGAL HEAD	2487
Smith, Kevin	7 FEDERAL AVENUE	BURRILL LAKE	2539
Smith, Rodney Cecil	7 CASUARINA CLOSE	ANNA BAY	2316
Smith, Stephen Colyn	34 BUTTABA AVENUE	BELMONT NORTH	2280
Smith, Terrence Christopher	5 FOREST WAY	WOOMBAH	2469
Sounness, Steven Wayne	20 WINDSOR STREET	TARBUCK BAY VIA TUNCURRY	2428
Sparks, Bernard James	LOT 7 WOOL ROAD	OLD EROWAL BAY	2540
Spedding, John William Ernest	12 BARELLAN DRIVE	BANORA POINT	2486
Sproule, Athol Paton	2 DALTON STREET	NELSON BAY	2315
Sproule, Douglas William	RMB 737	GAN GAN ROAD, ANNA BAY	2316
Sproule, Geoffrey Warren	50 GALOOLA DRIVE	NELSON BAY	2315
Sproule, Michael Wayne	RMB 737 GAN GAN ROAD	BOAT HARBOUR	2316
Squires, Ernest George	PO BOX 1723	PORT LINCOLN	5606
Steele, Robert Ernest	2053 BULGA ROAD	BOBIN	2429
Stephens, Ronald Peter	PO BOX 373	EDEN	2551
Stevens, Peter David	PO BOX 529	EDEN	2551
Stewart, Garry Peter	51 TRAFALGAR STREET	NELSON BAY	2315
Susanne Greenaway, Edward Allan &	87 PATRICK STREET	AVALON	2107
Sutton, Clifford Thomas	P O Box 433	MACKSVILLE	2447
Sutton, Denis Norman	13 PARTRIDGE STREET	MACKSVILLE	2447

PROPOSERS	ADDRESS		
Tammjarv, Alan	17A PACIFIC STREET	CRESCENT HEAD	2440
Tarrant, Alfred Colin	36 KERRIGAN STREET	NELSON BAY	2315
Tarrant, Eric Malcolm	21 GLENELG STREET	RAYMOND TERRACE	2324
Tarrant, Glyn Edward	58 RIGNEY STREET	SHOAL BAY	2315
Tarrant, Gregory Wayne	54 HORACE STREET	SHOAL BAY	2315
Tarrant, Michael Wayne	36 KERRIGAN STREET	NELSON BAY	2315
Tarrant, Rodney John	58 RIGNEY STREET	SHOAL BAY	2315
Tesar, Karl	699 NORTH BANK ROAD	PALMERS ISLAND	2463
The Estate Of Douglas Colin Cupit	16 YEARNIN STREET	GWANDALAN	2259
The Estate Of Jeffrey Chalkley	140 SOLDIERS POINT ROAD	SALAMANDER BAY	2317
The Estate Of Voluney Morris Stanley Nelson	15 CAMPERDOWN STREET	COFFS HARBOUR JETTY	2450
Thomas Sherlock & Garry Thomas Sherlock	94 WATT STREET	CALLALA BAY	2540
Thomas, Wayne David	46 LAKESIDE DRIVE	EDEN	2551
Thompson, Paul	129 SALAMANDER WAY	SALAMANDER BAY	2317
Thompson, Peter Gregory	189 GREEN STREET	ULLADULLA	2539
Thompson, Rodney James	129 SALAMANDER WAY	SALAMANDER	2317
Thompson, Stephen	P.O. BOX 379	NELSON BAY	2315
Thornton, Bruce Andrew	86 SETTLEMENT POINT ROAD	SETTLEMENT POINT	2444
Tisdell, Graeme Lesley	14 PARK AVENUE	CUNDLETOWN	2430
Tisdell, Rodney Clyde	76 HIGH STREET	CUNDLETOWN	2430
Toole, Lindsay John	2 FRYER PLACE	ALBION PARK	2527
Trevor William Franklin & Paul Gregory Franklin	6 OTRANTO AVENUE	ORIENT POINT	2540
Tully, Graeme Leslie	84 REARDONS ROAD	CUDGEN	2487
Tully, Ryan John	84 REARDONS ROAD	CUDGEN	2487
Usher, Gary John	83 McMAHONS ROAD	NORTH NOWRA	2541
Van Der Neut, Thomas Cornelius	177 OCEAN BEACH ROAD	WOY WOY	2256
Vidler, Leslie Wayne	1150 RIVER DRIVE	SOUTH BALLINA	2478
Virtu, Antonio	198 KEMBLA STREET	WOLLONGONG	2500
Virtu, Peter	39 MARLO STREET	TOWRADGI	2518
Vyse, Trevor	28 TRAFALGAR STREET	NELSON BAY	2315
Want, Edward Brian	29 AMOS ROAD	PALMERS CHANNEL	2463
Warren (Snr), Kevin John	P O BOX 183	EDEN	2551
Warren, Leslie James	P O BOX 227	EDEN	2551
Watson, Stephen George	6 AMAMOO CRK ROAD	AMAMOO	4570
Wetzel, Bernd	9 GEORGE ST	BERKELEY	2506
Wetzel, Detlef	9 GEORGE STREET	BERKELEY	2506
Wetzel, Hans	9 GEORGE STREET	BERKELEY	2506
Wetzel, Kurt Manfred	9 GEORGE STREET	BERKELEY	2506
Watson, Christopher Gene	135 EDINBURGH DRIVE	TAREE	2430
Wiblen, Victor Leslie	7 POST OFFICE LANE	CHATSWORTH ISLAND	2469
Witchard, Guy Alexander	30 BAY STREET	PATONGA BEACH	2256
Wm Kerr,Pm Kerr,Sd Kerr, K Kerr,Dc Kerr,Mk Kerr	26 MICALO ST	ILUKA	2466
Zaccagnini, Paul Francis	PO BOX 66	CURRARONG	2540
Zaccagnini, Phillip Ernest	PO BOX 23	CURRARONG	2540
Zangari, Rosario	9 IRENE STREET	FIVE DOCK	2046

APPENDIX A2. DUAP GUIDELINES



Department of
Urban Affairs and Planning

**Guidelines for the
Environmental Impact Assessment
of
Draft Fishery Management Strategies
for
Commercial Designated Fishing Activities**

August 2001

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FOREWORD

The Environment Impact Assessment process under the Environmental Planning and Assessment Act 1979 provides a framework for assessing the ecological sustainability of commercial fishery management strategies prepared for commercial fisheries under the Fishery Management Act 1994. The Environmental Impact Statement is an important tool as it informs proponents of likely impacts and allows for the consideration of alternative management and mitigation measures when formulating the fishery management strategy. It enables the community to review the proposed strategy, its objectives and management regimes and to provide for community input. It also informs decision makers of the likely sustainability of the proposed strategy and of the need for mitigation measures.

These guidelines outline the issues to be addressed in environmental impact statements for commercial fishery management strategies. They have been developed with input from Environment Australia, relevant State agencies, Commercial Fishery Management Advisory Committees, Fishery Advisory Councils, endorsement holders and representatives of the scientific and community organisations.

These guidelines have been issued by the Director-General under clause 230 (1)(a) of the Environmental Planning and Assessment Regulation 2000 and must be considered by NSW Fisheries or those proponents responsible for preparing an EIS to assess the likely significance of impacts of implementing a Commercial Fishery Management Strategy. The guidelines replace the general requirements for the contents of an EIS under Schedule 2 of the EP&A Regulation 2000.

The guidelines only apply to commercial fisheries including Category 1 Share Management Fisheries and Category 2 Share Management Fisheries. Other guidelines will be developed to apply to charter boat fisheries, recreational fisheries, fish stocking and shark meshing.

In addition to reference to this guideline when preparing an EIS for a fishery management strategy, NSW Fisheries or the proponent responsible for preparing the EIS must also consult the Director-General as to whether there are any additional requirements (to those in these guidelines) to be considered in the preparation of the EIS.

These guidelines have included relevant matters to meet the Commonwealth "Benchmarks and Terms of Reference for Environmental Assessment of Fisheries" and to satisfy the Commonwealth Government "Guidelines for the Ecologically Sustainable Management of Fisheries" for the purposes of Schedule 4 of the Commonwealth Wildlife Protection (Regulation of Exports and Imports) Act 1982. The guideline has also highlighted the importance of identifying if the fishery activity is likely to affect the matters of national environmental significance set out in the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act). Matters of national environmental significance includes World heritage areas, declared Ramsar wetlands, listed threatened species and ecological communities, listed migratory species, nuclear actions and the environment of the Commonwealth marine area. If fisheries are likely to affect matters of national environmental significance (including listed marine species), the Commonwealth will need to be consulted to determine whether approval is required under the EPBC Act.

I commend these guidelines to all those involved in developing or assessing commercial fishery management strategies.

Sue Holliday
Director-General

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A. Commercial Fishery Management Strategies

Overview

The Fisheries Management (FM) Act 1994 requires a management strategy to be developed for all major commercial fisheries. These strategies are to set out the management objectives and goals of each fishery, the management rules, performance indicators and monitoring regimes to determine if the strategy's objectives are being achieved. Information on the current operation and status of the fisheries, and the vision for future management of the fishery will be considered. The strategy will include all controls affecting the operation of the fishery and will focus on achieving sustainable performance objectives.

Fishery management strategies are to be prepared for the following designated fishing activities:

- Commercial fisheries
 - Category 1 Share Management Fisheries - abalone fishery and the lobster fishery
 - Category 2 Share Management Fisheries - ocean prawn trawl fishery, ocean fish trawl fishery, ocean hauling fishery, ocean trap and line fishery, the estuary general fishery and the estuary prawn trawl fishery.
- Charter boat fisheries
- Recreational fisheries
- Fish stocking
- Shark meshing, and
- Other fishing activities proclaimed by the Governor on the recommendation of the Minister for Fisheries to be designated fishing activities.

These provisions do not apply to aquaculture.

Prior to its finalisation, the draft strategy must undergo environmental assessment under the provisions of Part 5 of the Environmental Planning and Assessment (EP&A) Act 1979 to test its sustainability in terms of resource and environmental management. The environmental assessment is an examination of the environmental impacts of the fishing activities and considers biological, biophysical, economic and social issues. It must also consider the impact on the resource from other fisheries and non-fishing activities.

The environmental assessment will rely on best available information to predict impacts of the proposed activities on the environment. The assessment may highlight areas where further information should be gathered, where practices should be changed and where alternative management regimes may be required. The broader community as well as the endorsement holders, Management Advisory Committees (MACs), Advisory Councils and the Fisheries Resource Conservation and Assessment Council (FRCAC) will be given an opportunity to comment on the EIS and the draft management strategy.

Licences and authorisations issued in accordance with the strategy are exempted from having to undergo environmental assessment of the impacts of fishing under each individual licence. There is

a transitional period until 1 July 2003 exempting individual licences from the need for environmental assessment to provide NSW Fisheries time to prepare fisheries management strategies for commercial fisheries. After that time, environmental assessment will be required prior to issuing each individual license or authorisation which are not consistent with the strategy or in all fisheries where a strategy is not in place.

Purpose of a commercial fishery management strategy

A commercial fishery management strategy is a document outlining the management goals, objectives, controls and other measures for achieving the objectives, performance indicators and monitoring programs applying to a particular commercial designated fishing activity. The strategy must contain the “management tools” applying to the commercial fishery, as well as data collection protocols and triggers for the review of the strategy.

The strategy should be an informative document detailing the future vision for the management of the particular designated fishing activity – including:

- short, mid and long term vision for the fishery
- regulatory controls, management arrangements and other measures for achieving the vision including setting target effort or fishing capacity of each fishery and any restructuring program
- the framework for providing fishers and other stakeholders with greater certainty about the rules and administrative arrangements applying to the fishery.
- An information resource for the endorsement holders as well as the broader community on a particular fishery

The strategy is to be prepared in accordance with section 7E of the Fisheries Management Act and this guideline. The Minister must consult with the Fisheries Resource Conservation and Assessment Council on the preparation or revision of a fishery management strategy.

Under section 7E of the FM Act, the Fishery Management Strategy is to:

1. Describe the objectives of the Strategy
2. Describe the designated fishing activity
3. Outline any likely interaction of the designated fishing activities with other fishing activities
4. Outline the fishing regulatory controls or proposed fishing regulatory controls which apply to the designated fishing activity including:
 - (a) Provisions in the Fisheries Management Act or Regulations
 - (b) Any management plan or draft management plan
 - (c) Fishing closures under section 8 of the FM Act
 - (d) Fishing approvals
 - (e) Any determinations of the TAC Committee under Division 4 of Part 2 of the FM Act
 - (f) Policies approved by the Fisheries Minister
 - (g) Any relevant provisions in environmental planning instrument
5. Identify performance indicators to monitor whether the objectives of the strategy are being achieved
6. Describe how the designated fishery activity is to be monitored
7. Specify at what point a review of the strategy is required when a performance indicator is not being satisfied.

The fishery management plan should be described in the Fishery Management Strategy. It should outline the classes of shares and the “rights” of shareholders as set out in the FM Act. The first management plan in a Category 2 Share Management Fisheries cannot be approved until the Strategy as a whole has been assessed and a determination made under Part 5 of the Environmental Planning and Assessment (EP&A) Act 1997.

Managing a dynamic complex system with uncertainty and limited information

Those responsible for developing and implementing the strategy must deal cautiously with the risks and uncertainties associated with the exploitation of fishery resources. Estimating the level of catch that can be safely taken from a fish stock is not simple. Unlike many land-based natural resources, it is much more difficult to accurately assess how many fish there are in the estuarine and coastal waters. Moreover, a number of factors can influence the numbers of fish present, with fishing being only one.

The factors to consider in determining the size and resilience of fish stocks include:

- fecundity (the level of egg production), growth rates, rates of natural mortality and fishing mortality,
- oceanographic and climatic conditions (such as water temperature, current speed and direction, nutrient rich upwellings, rainfall, etc.), and
- habitat opportunities and constraints and the health of important habitats for the stock life cycle.

Such varying factors provide great challenges for the fishers who are trying to catch the fish, the scientists who are studying the fish, and the managers who are trying to achieve sustainable harvest levels.

Even if fishing did not take place, there can be natural variations in the abundance of some species from season to season and year to year. As a result there needs to be build into any management strategy, a monitoring program for fish stocks and triggers to adjust the level and nature of fishing activity when necessary. In addition, non-fishing activities such as disturbance of breeding areas from increasing urban development and poor water quality from poor land/catchment management including the unmanaged disturbance of acid sulfate soils, can put pressure on fisheries and their ecosystems which may reduce the ability of the natural environment to support the same level of aquatic life.

Fisheries research has traditionally focused on target species and their lifecycle with stock assessments based on the analysis of the relative abundance, the size and age of the catch, fish behaviour (eg migrations, aggregation for spawning) and reproductive cycles. However, with increasing emphasis on the conservation of biodiversity, research directions have been recently expanded to examine the effects of fishing on non-target species, ecosystem and habitat conservation issues based on bioregions.

Changing market demands, natural cycles in species abundance and availability and technological improvements mean that fishers are constantly changing the way they fish and perhaps even the species targeted. The result is a need for flexible management regimes and robust performance monitoring programs. The fisheries strategy must recognise and cater for the prospect that management rules may need to be changed from time to time in response to modify fishing activity or unpredictable conditions.

Management tools

Fisheries management involves the implementation of policies and rules that affect fisher behaviour. A range of management tools are available under the FM Act or Regulation including provisions limiting who has access to the fishery, where and when fishing can occur, input controls such as gear and boats or output controls such as the size, number and type of fish which may be taken (see Table 1). Other controls may be specified in management plans developed under the provisions of the FM Act or Regulation for share management fisheries and any associated determination made by a relevant Total Allowable Catch (TAC) Committee.

Management tools may include provisions relating to aquatic and other reserves under the FM Act or National Parks and Wildlife (NPW) Act, to marine parks under the Marine Parks Act 1997 or to an environmental planning instruments under the EP&A Act. Other legislation and polices provide environmental protection measures relevant to the management of the fisheries. These include Wildlife Protection (Regulation of Export and Imports) Act, Environment Protection and Biodiversity Conservation (EPBC) Act, NPW Act and FM Act. International conventions relating to wetland, migratory birds and whale protection also are relevant. See Appendix 1 for a list of the relevant legislation and responsible authorities.

Table 1 Management Tools

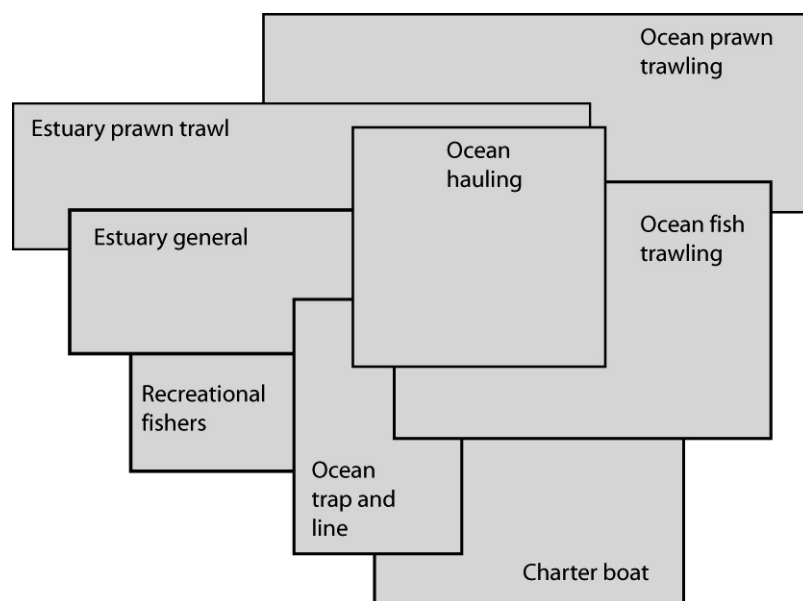
Limiting who has access	<i>Limited access regimes</i> can be used to limit entry to participants in a particular fishery or part of a fishery. They usually include eligibility rules and rules relating to the transfer of entitlements.
	<i>Restructuring programs</i> can provide a concentrated or focused change in management procedures to achieve an accelerated change in expected outcomes ¹ . These may include minimum entitlement holdings, buy back schemes and restructuring through transferability programs.
Limiting where and when the fishing can occur	<i>Fishing closures</i> which restrict commercial and/or recreational fishing for a specified period of time, any fishing or fishing for certain classes of fish in any waters or from specified waters
	<i>Recreational fishing areas</i> which are a form of fishing closure may give preferential fishing rights to recreational fishers and may partly or totally restrict commercial fishers
	<i>Recognised fishing grounds</i> are areas used regularly or intermittently for net fishing by commercial fisheries and which have been mapped and approved by the Director and where commercial net fishers are given priority under clause 105 of the FM Regulation.
Input controls limiting the equipment used to take fish	<i>Gear restrictions</i> limit the size and type of gear (in possession or that can be used to take fish) such as size and number of nets/traps/lines/etc, mesh or size configurations, gear design, and marking of gear
	<i>Boat controls</i> limit the size and engine capacity of boats
Output controls limiting the amount and type of fish able to be landed	<i>Total allowable catch</i> (TAC's) is a specified total catch for a share management fishery determined by an independent Total Allowable Catch Committee fished on a competitive basis or by people holding individual quotas.
	<i>Species size limits</i> restricts the minimum size, maximum sizes or range of sizes specified for fish of a particular species that can be landed (by measurement or weight);
	<i>Bag limit</i> is the maximum quantity of fish of a specified species or of a specified class that a person may take on any one day. – daily limit.
	<i>Possession limit</i> is the maximum quantity of fish of a specified species or specified class that a person may have in possession in any specified circumstances
	<i>Protected fish</i> are certain species of fish completely prohibited from being in a person's possession.
	<i>Protected fish from commercial fishing</i> are certain species of fish completely prohibited from commercial fishing and from taking for sale.
Protection of ecosystems	<i>Protected or threatened species, populations and ecological communities and their habitats</i> (eg fish, aquatic vegetation, marine mammals, platypus, birds etc). listed under the FM Act, NPW Act or EPBC Acts.
	<i>Marine protected areas</i> in estuarine or oceanic areas managed to conserve biodiversity and habitat. These include aquatic reserves, marine parks and marine components of national parks and nature reserves (Note: fishing restrictions may only apply in certain zones in marine parks and aquatic reserves)
	<i>Planning controls</i> in Environmental Planning Instruments (eg LEPs, SEPPs) under the EP&A Act that could limit where fishing could occur and /or protect foreshore vegetation and wetlands from disturbance or destruction.

¹ Definition extracted from Metzner, R. & Rawlinson, P. (1998) Fisheries Structural Adjustment: towards a national framework. Commonwealth Department of Primary Industries and Energy, Canberra, p.2.

Interaction between fisheries

To understand the impacts on fish stock of a particular fishery, the interaction and cumulative impacts of other fisheries on the particular stock and habitats must also be considered. The nine major commercial fisheries have been defined principally on an historical basis in a manner convenient for management of the fishers and not the management of the fish stock. As the same fish stock may be fished by a number of fisheries, changing the controls in one fishery (say in the estuary prawn trawl) will affect the stock available to be caught in another (eg ocean prawn trawl). For some species, four or more commercial fisheries as well as recreational or charter boat fishers may be catching the same species often at different stages of their development.

Figure 1 Potential interrelationship between fisheries



Because of the level of interaction between fisheries (Table 2), the development of a strategy for a particular fishery as well as the associated environmental assessment must take into consideration the potential cumulative impacts of the management strategies on target species, by-product species (which may be the target species of another fishery) and bycatch as well as the potential social and economic effects as a result of any associated changes in resource allocation.

**Table 2 Interaction between fisheries based on
NSW Fisheries 1998/1999 Status of Fisheries Resources Report**

Species	Exploitation status	No of fishers taking 90% of catch	Tonnes landed in 1997/8								
			Estuary Prawn Trawl	Ocean Prawn	Estuary General	Ocean Haul	Trap & line	Ocean Trawl	SEF C'wth	Purse Seine	Recreation Estimate
Yellowfin bream	Fully fished	225	Significant	Significant	315	115			400		
Sea mullet	Fully fished	101			1960	2442					minimal
Yellow tail	Moderately	15			Significant	Significant				473	24
Slimy Mackerel	Moderately	10			Significant	Significant				497	40
Snapper	Fully / over fished	118	Significant	Significant	Significant		271				180
King fish	Fully / over fished	50					73				50
Blue eye	Fully / over fished	25					105	100	400		10
Gem fish	Over fished /collapsed	15					105		200		10
Silver trevally	Fully / over fished	68			92		112	34	240		Very significant
Prawns	Fully fished		414	954	799						266

B. The EIA Process and Procedures

Steps in the EIA Process

The four steps below summarise steps in preparing and assessing a Commercial Fishery Management Strategy and in its review and updating.

Step 1

- NSW Fisheries assembles information— stock issues, habitat issues, current fishing practices and environmental impacts, threats and other issues to provide the basis for developing a draft FMS and for consulting on the scope of the EIS
- NSW Fisheries consults with the endorsement holders and MAC and identifies alternative management regimes and develops the first draft of the FMS
- NSW Fisheries consults with MAC and Advisory Council and develops the second draft FMS.

Step 2

- NSW Fisheries consult DUAP for the Director-General Requirements to determine if there are additional matters to those in this Guideline for the assessment of the FMS. DUAP consults with EA, FRCAC, Government agencies, MAC and other stakeholders prior to issuing any additional requirements.
- NSW Fisheries assesses the impact on the environment of the draft FMS (and the fishing activities undertaken under it) within the terms of the Environmental Assessment Guidelines and any specific requirements issued by the Director General of DUAP. NSW Fisheries consults with FRCAC, EA and key stakeholders regarding the draft strategy and environmental assessment. NSW Fisheries organises for independent peer review of key components of the draft strategy and environmental assessment.
- NSW Fisheries exhibits nationally the EIS and the draft FMS for public comment. NSW Fisheries consults with FRCAC, and notifies and /or consults with endorsement holders, relevant Advisory Council and MAC, relevant Aboriginal Land Councils and other stakeholders. FRCAC may recommend modifications to the FMS as a result comments from stakeholders.

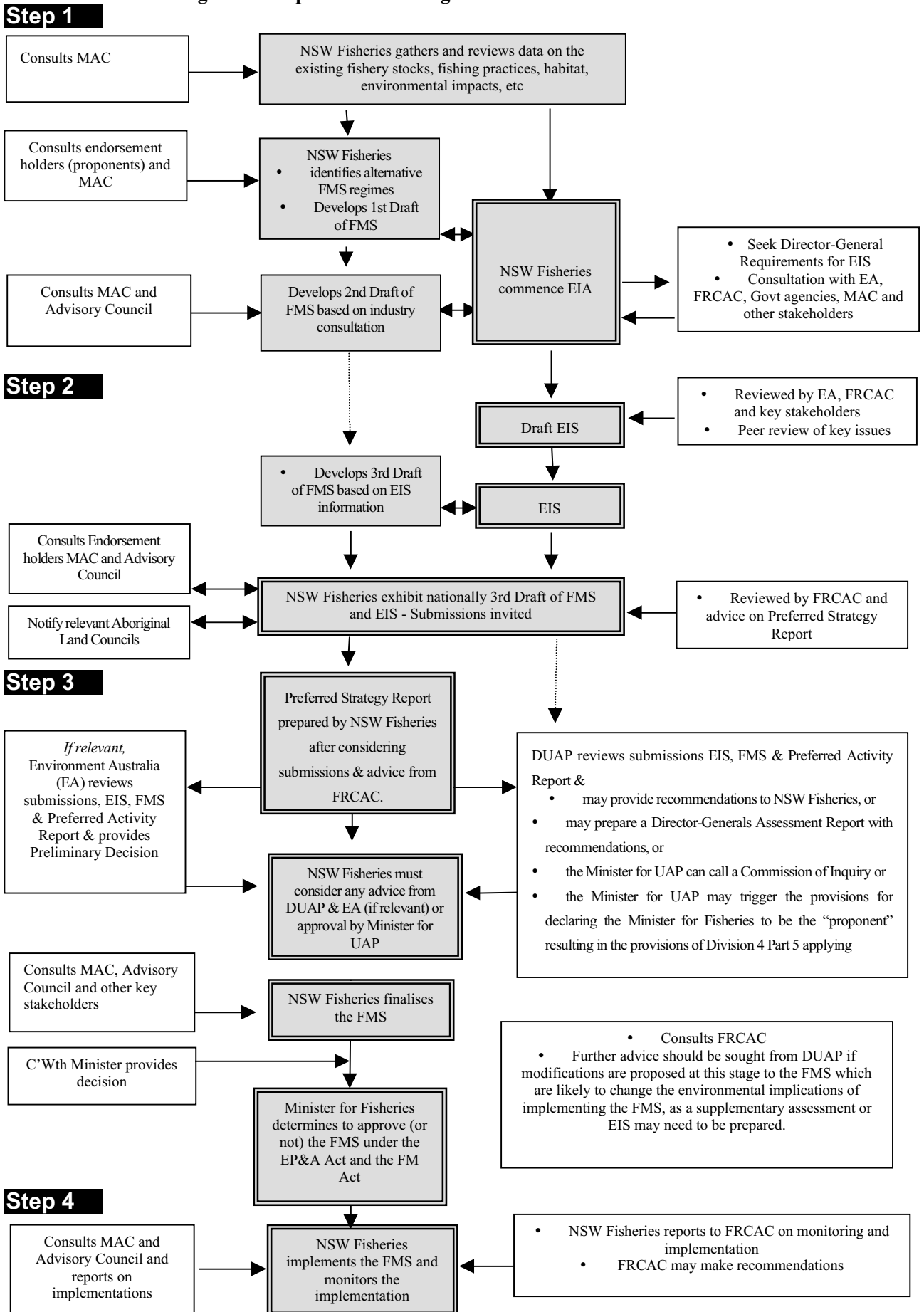
Step 3

- NSW Fisheries sends submissions received as a result of exhibition to DUAP and EA. NSW Fisheries reviews and if appropriate modifies the FMS in the light of the submissions and any advice from the FRCAC. NSW Fisheries prepares a Preferred Strategy Report outline the response to issues raised in submissions or by FRCAC and any proposed changes in the FMS as a result to improved the sustainability of the strategy
- DUAP reviews submissions, EIS, FMS and Preferred Strategy Report and may (i) provide recommendations to NSW Fisheries, (ii) prepare an Director-General's Assessment Report with recommendations or (iii) the Minister for UAP can call a Commission of Inquiry or (iv) the Minister for UAP may trigger the provisions for declaring the Minister for Fisheries to be the "proponent" resulting in the provisions of Division 4 Part 5 applying. In this case, the approval of the Minister for UAP is required for the FMS.
- If relevant, Environment Australia reviews the submissions, EIS, FMS and Preferred Strategy Report and provides a preliminary decision.
- NSW Fisheries reviews submissions and any advice received from DUAP or Environment Australia and determines whether the draft strategy should be recommended for approval. If an approval is required from the Minister for UAP or under C'wth legislation, the recommendation must be consistent with these approvals. If amendments to the FMS are proposed at this stage, NSW Fisheries may need to undertake a supplementary assessment (and approvals) if there are likely to be changes in the environmental impacts. If the changes are significant, the supplementary environmental assessment should be exhibited in accordance with Step 3.
- Commonwealth Minister makes a determination under Commonwealth legislation.
- Minister for Fisheries makes a determination under Part 5 of the EP&A Act and an approval of the finalised FMS under the Fisheries Management Act.

Step 4

- NSW Fisheries prepares relevant management plans and amends any existing management tools (eg regulations which are not consistent with the Strategy) necessary to give effect to the approved strategy. NSW Fisheries consults with FRCAC, relevant Advisory Councils, MACs and other stakeholders and if relevant the general community in finalising the management plans. Minister for Fisheries approves management plans.
- NSW Fisheries monitors the implementation of the Strategy and reports to FRCAC, relevant Advisory Councils, MACs and stakeholders on the resource and environmental management performance.
- NSW Fisheries reviews the Strategy or aspects of the strategy (based on triggers in the FMS).

Figure 2 Steps in undertaking Environmental Assessment



A strategic approach in the assessment of fisher activities

For each commercial fishery, the environmental impacts of issuing approvals under the provisions of the strategy are to be assessed in accordance with this guideline and the provisions of Division 5 Part 5 of the EP&A Act. The environmental assessment is to consider the impacts of the fishery as a whole rather than the impacts of individual fishers. However where there are regional/zone differences or peculiarities of particular systems such as lakes or estuaries, the impacts of the fishers within these areas should be identified and assessed.

The environmental assessment should test the sustainability of the proposed level of fishing activities authorised under the proposed fishery management strategy. This assessment must consider the cumulative implications of issuing approvals for the designated fishing activity along with interactions with the impacts of other fisheries on the fishery resources. The assessment must not only predict and consider the acceptability of the estimated impacts on target species, but must also consider effects on species taken incidentally, important habitat and the general environment. It must also consider the impact on the resource from other non-fishing related activities likely to affect the sustainability of the fishery.

The impact of commercial fishing on fish stocks (and in some cases the surrounding environment) to a lesser or greater extent depends on the management regime. The environmental assessment of the Strategy aims to identify the level of impact and the appropriate level of control of fishing activity that ensures the impact is acceptable and the fishery is sustainable. The EIS should consider the relative impact of different level and type of controls and justified the preferred approach on biophysical, social and economic grounds.

The environmental assessments must also consider along with other management rules in the strategy, the impacts of “responsive management” proposed to deal with situations when there is a need for changes in some of the “rules” in response to modified fishing activity or changed conditions eg when toxic blue green algae outbreaks in pipis. The assessment and approval of these responsive management components in the Strategy would provide for some flexibility without the need for further detailed assessment if management measures need to be changed during the life of the Strategy.

Factors to be considered when preparing an EIS

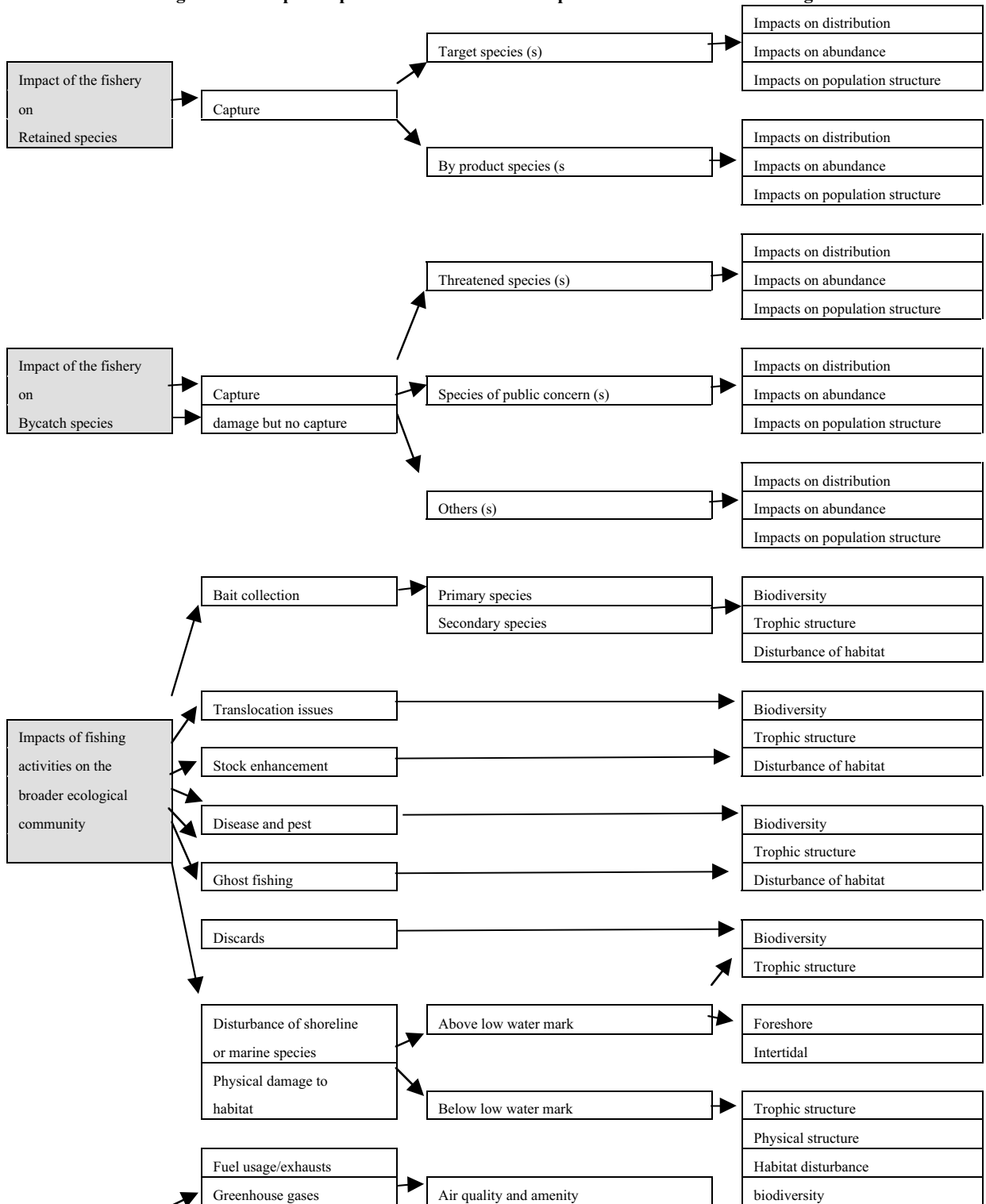
The Environmental Assessment Guidelines lists specific issues that are potentially important when assessing the impacts of the strategy and in fine-tuning management rules for the fishery. The issues listed are not exhaustive and the degree of relevance of each issue will vary with the type of commercial fishery.

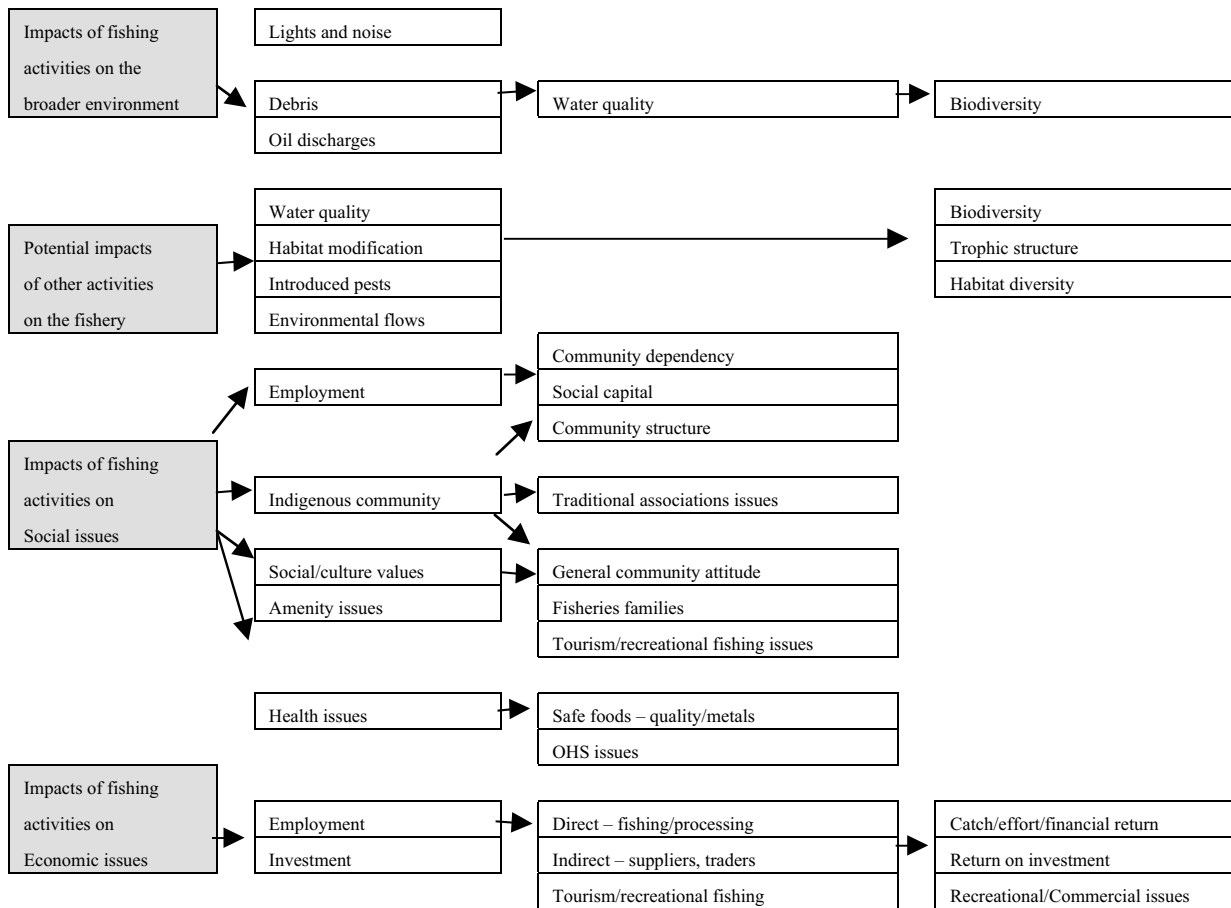
The term environment includes biophysical, economic and social aspects and hence broader issues in addition to a stock assessment must be considered in the environmental assessment. There is a general duty to consider the level of potential impacts on economic and social aspects as well as biophysical issues. The environmental assessment should deal with those issues of key importance to the particular fishery but should generally consider:

- Impacts of activation of latent effort or from effort shifts
- Bycatch reduction
- Impacts on retained, bycatch and bait species

- Impacts on the broader aquatic ecology, habitat and the environment
- Protection of key habitats and protected or threatened species
- Influences of other activities on the fishery
- Social issues associated with the fishery
- Economic issues associated with the fishery.

Figure 3 Examples of potential environmental implications of commercial fishing





The assessment should rely on the best available information to predict impacts. However where information is inadequate, the precautionary principle must be invoked and a cautious approach taken until such time as additional data collection, research and analysis can provide a sounder basis for management decision making. Nonetheless, when predicting the potential impacts, worst case scenarios should be considered as well as normal operational conditions.

General principles when undertaking assessment include:

- ◇ Available scientific information including catch and effort trends, information from any scientific study sites, estimates of the catch of user groups (where possible), and the life history, distribution and dynamics of the fished stock/s should be used in predicting likely impacts on stock/species and likely effectiveness of management tools/measures.
- ◇ Impact prediction should consider magnitude, duration, extent, direct and indirect effects, beneficial and adverse effects and whether impacts are reversible or permanent.
- ◇ The assessment should take into account regional/zone differences and seasonal effects.
- ◇ The assessment should take into consideration the potential impact on habitat, habitat fragmentation and broader biodiversity issues and any peculiarities of particular fished habitats, such as lakes or estuaries,
- ◇ Environmental risks and uncertainties in predicting impacts should be clearly stated including the levels of confidence in predictions and the likely resilience of the environment to recover from impacts
- ◇ In the absence of quantitative data, qualitative or delphic impact assessments (ie. categorisation into high, medium or low) based on best available information and uncodified expertise should be used.
- ◇ The proposed management measures for resource allocation and to mitigate impacts should be justified taking into consideration the ESD principles.

Overview of the environmental impact assessment

The following matters should be addressed in the environmental assessment of a Commercial Fishery Management Strategy (FMS) and the designated fishing activities described in the FMS:

1. Describe the existing fishery (including any existing “rules”, current management plans, historical events, seasonal patterns and marketing factors likely to affect fisher behaviour)
2. Describe the proposed regime under the FMS including its aims, objectives and proposed management rules (including any draft management plan)
3. Consider alternative regimes (including alternative aims, objectives, management rules and interactions with other fisheries)
4. Assess the impacts of implementing the FMS taking into consideration past performance of the fishery, likely future performance, interactions with other fisheries, broader environmental issues and feasible alternative regimes. For each resource or environmental issue, the following should be provided

- a description of the existing resource, habitat and environmental conditions (baseline conditions)
 - analysis of the potential impacts of implementing the strategy, indicating the level of confidence in the predicted outcomes and the resilience of the environment to change; indicate if the impacts are unknown, unpredictable, short term/long term or irreversible *Note: where the impacts are likely to be minor, qualitative analysis is adequate. With each issue, the level of detail should match the level of importance of the issue in decision-making.*
 - the measures available/proposed to mitigate impacts (eg responsive management options) and the level of confidence that the measures proposed would effectively mitigate/ manage the impacts.
 - the procedures to be used to monitor whether impacts occurring and if so, whether they are at the frequency and magnitude predicted.
5. Identify performance indicators, triggers for reviewing the FMS and the proposed monitoring regime for measuring the likelihood of the strategy meeting the objectives of the FMS, including an assessment of the adequacy or appropriateness of the indicators, triggers and monitoring regime.
 6. Justify the draft commercial FMS and its management arrangements in terms of biophysical, economic and social factors and the principles of ecological sustainable development.

C. The contents of the EIS for a Draft Commercial FMS

(A) EXECUTIVE SUMMARY

An executive summary should be provided and should be available separately for public information. The summary should give a short overview of the draft fishery management strategy and the potential environmental impacts of fishing authorised by the strategy. It should be written in non-technical language to facilitate understanding of the proposal by the general public.

(B) REVIEW OF THE EXISTING OPERATION OF THE FISHERY

1. The fish stock

Identify current fish stock parameters of the fishery including:

(a) Identify fish stock harvested and affected by the fishery –including:

- target species and by-products species – retained species
- by catch (non-retained);
- bait species

(b) Review the status of the fish stock and identify the status of the species in terms of under-fished, fully fished, over-fished/depleted or uncertain – also consider whether by-product or by-catch species are protected or threatened species or species of public concern (eg blue groper). Discuss the trends in the health of the fish stock and the major influences on these trends

(c) Identify the species that are target species of other fisheries and any existing conflicts with other fisheries.

2. Existing operational area/regions

Outline the current locational parameters of the fishery including:

(a) Identify the principal areas including any “zones” within the areas and their importance for management purposes; identify any priority fishing areas (which may be identified as recognised fishing grounds)

(b) Identify ports or locations where fishers operate from:

- ◆ identify the existing level of capital investment in on-shore support, processing or distribution facilities in particular ports/regions and its importance for the fishery;
- ◆ identify any existing fishers organisational arrangements (eg co-operatives) and their importance
- ◆ identify any current hazard issues affecting the use of the ports or locations where fishers operate

(c) Identify and discuss importance of any relevant jurisdictional issues (eg. Offshore Constitutional Settlement, interstate issues) or any areas where fishing has been restricted all or some of the time eg closures areas, reserves and marine parks (protected zones), navigation channels, naval waters, etc

- (d) Identify and discuss importance of any areas of important aquatic habitats for the fishery (life cycle related) and those vulnerable to impact by fishing methods authorised under the strategy or by land-based activities;
- (e) Identify any discrete fished habitats, such as lake systems, estuaries or specific reefs and identify any operations, environmental conditions or constraints that are peculiar to these areas.

3. Current fisher and harvest information

Outline current fisher information including:

- (a) identify the number of fishers and number and type of endorsements on a State, regional and/or sub-regional basis
- (b) identify the total employment within the fishery on a State, regional and/or sub-regional basis, including those involved in onshore handling/processing/value-adding arrangements
- (c) identify the gear, equipment or boats involved in the fishery including:
 - (i) if relevant, identify the number, size, age and characteristics of boats and on-board handling/processing arrangements;
 - (ii) identify the characteristics of fishing gear – including its use and management – cleaning, maintenance, waste management – and any innovations to minimise bycatch
 - (iii) identify current trends in capital investment in boats, gear and equipment within the fishery including any which influence the efficiency of catch or to increase the reliability of monitoring the catch (GPS, echo-sounders, VMS etc)
- (d) outline information on the current harvest on a State, regional and/or sub-regional basis:
 - (i) current catch, value and trends including:
 - ◆ species information – target species as well as species in the incidental catch which is retained (by-product) or discarded (bycatch), identify stages in the life cycle of target and incidental catch;
 - ◆ recent trends in total fishing effort and total landed value of the catch;
 - ◆ outline any processing of the catch (and benefits derived from activities)
 - (ii) seasonal and other major factors that affect how the fishery currently operates and the trends in distribution of the catch within the region and between the fishers
 - (iii) identify other commercial and recreational fisheries for which these species are target or incidental catch; outline characteristics of other fisheries and outline resource exploitation (eg. catch levels and participation of other sectors)
 - (iv) indicated the information sources of the fishery and the reliability of data and what uncertainties (if any) are associated with the data

4. Current regulatory and management measures

Outline the range of management tools currently used to limit or regulate the impacts of the fishery; such as

- (i) Limits on who has access

- (ii) Limits on where and when the fishing can occur
- (iii) Input controls limiting the equipment used to take fish
- (iv) Output controls limiting the amount and type of fish able to be landed
- (b) Describe the provisions in any existing management plans and its objectives
- (c) Comment on the strengths and weaknesses of the current management regime
- (d) Describe the current administrative arrangements for the fishery and comment on the strengths and weaknesses of the current regime including:
 - (i) enforcement and compliance
 - (ii) cost recovery,
 - (iii) community contribution payments (if a share management fishery),
 - (iv) cross-fishery consultation

5. Factors outside the fishery affecting the fishery

- (a) Interaction with other fisheries under NSW jurisdiction
- (b) Interaction with other fisheries under other State or Commonwealth jurisdiction
- (c) Environmental factors – climatic/season changes; water quality; habitat degradation; etc

(C). THE DRAFT COMMERCIAL FISHERY MANAGEMENT STRATEGY

1. Objectives of the FMS

The objectives of the management strategy should be clearly stated and include the following issues:

- (i) Maintenance of ecologically viable stock levels with acceptable levels of probability. Where stocks are overfished, the fishery will be managed to rebuild stocks to viable levels within nominated timeframes.
- (ii) Conservation of biological diversity in the ecosystem and the protected or threatened species, populations or communities and their habitats
- (iii) Protection of the ecosystem in particular key habitat areas
- (iv) Fishing operations are not a threatening process to bycatch species
- (v) Responsible stewardship in the management and harvesting of fishing resources including the accountable management of latent effort and bycatch reduction

2. Designated fishing activity

2.1 Fish stock affected by the FMS

Outline the proposed fishing parameters for the FMS, including:

(a) Identify the fish stock to be harvested and affected by the fishery –including:

- (i) target species and by-products species – retained species
- (ii) by catch (non-retained);
- (iii) bait species

Identify the status of the species in terms of under-fished, fully fished, over-fished/depleted or uncertain – also consider whether by-product or by-catch species are protected or threatened species or species of public concern.

(b) Identify if species are target species of other fisheries.

(c) Estimate future trends in harvest levels across all fisheries for key fish species based on stock trends.

2.2 Operational area/regions of the FMS

Identify the proposed operational area/regions of the FMS including:

(a) Identify the principal areas including any “zones” within the areas and their importance for management purposes (including relevant maps); identify any priority fishing areas (and whether they are or are to be identified as recognised fishing grounds)

(b) Identify ports or locations where fishers operate under the FMS will operate from

- (c) identify and discuss importance of any relevant jurisdictional issues for the FMS (eg. Offshore Constitutional Settlement)
- (d) identify any areas where fishing is to be restricted all or some of the time eg closures areas, reserves and marine parks (protected zones), navigation channels, naval waters, etc (including relevant maps).
- (e) identify and discuss the importance of any key aquatic habitat areas for the fishery (life cycle related); identify areas vulnerable to impact by fishing methods authorised under the strategy or by land-based activities; identify any measures in the FMS in relation to these areas

2.3 Proposed harvesting strategy – Resource allocation under the FMS

- (a) Describe the proposed sustainable harvest strategy including the allocation of resources within/between user groups to meet the FMS objectives, taking into consideration:
 - (i) the proposed sustainable harvest levels based on stock trends and past catch and effort trends,
 - (ii) the proposed number of endorsement holders and the proposed harvest strategy to limit catch
 - (iii) the level of resource exploitation by other commercial and recreational fishers
- (b) Outline the entitlements that are proposed to be issued in the management strategy including any classes of shares and rules relating to those shares

3. Interaction between fisheries

- (a) Identify the interaction between fisheries/fishers and the extent of interaction in terms of :
 - (i) fishers holding endorsements in more than one commercial fishery
 - (ii) target and other species taken by more than one fishery
 - (iii) key fishing areas common to more than one fishery – time and location issues
- (b) Describe any sources of conflict between fisher and outline any measures to reduce conflict between fisheries
- (c) Outline any potential for improving the management of the fishery and the sustainability of the stock by changes in arrangements between fisheries
- (d) Outline any potential for improving the management of the fishery and the sustainability of the stocks by changes in arrangements between fisheries and non-consumptive users

4. The regulatory controls and management measures to apply under the FMS

- (a) Outline management measures to be applied under the FMS relating to the following:

For *under fished* or *fully fished* stock: describe management measures required to ensure that the fishery remains sustainable

For *overfished* or *depleted* stock: describe the strategy proposed to promote recovery in overfished or depleted stock

For a stock of *uncertain status*: identify the management measures required to ensure that the fishery remains stable.

- (b) Outline the proposed management tools (see Table 1/Appendix 1) and measures to apply under the FMS to implement the harvesting strategy and achieve the objectives of the FMS. These measures may include all or some of the following:
- (i) Provisions in the Fisheries Management Act or Regulations including
 - any eligibility or transfer rules; gear specifications – number and size of gear ; protected fish; species size limits on primary species; recognised fishing grounds
 - Any management plan or draft management plan including catch limits or quotas
 - Fishing closures including time and area closures and emergency response closures; aquatic reserves, recreational fishing areas or other protected areas
 - Any determinations of the TAC Committee under Division 4 of Part 2 of the FM Act
 - (ii) Any relevant bycatch or threatened/protected species action or recovery plans
 - (iii) Any relevant provisions in environmental planning instrument
 - (iv) Quality assurance program for the harvest and management of fish, shellfish etc
 - (v) Any other State, National or International agreements relevant to the management of the fishery and its environmental impacts and the agencies responsible for administration
- (c) Outline the contingency measures, responsive management strategies or/and mitigation measures to be undertaken if:
- (i) “trigger for contingency action” are reached;
 - (ii) health issues or adverse ecological or habitat issues arise; or
 - (iii) new technology, methods or practices evolve so that some change to the management rules would be beneficial to the sustainability of the stock and associated ecosystem.
- (d) Describe the administrative mechanisms for the fishery including:
- (i) enforcement and compliance,
 - (ii) cost recovery,
 - (iii) community contribution payments (if a share management fishery),
 - (iv) cross-fishery consultation.
- (e) Describe measures to improve the environmental and resource management performance of fishers including
- (i) the development of a code of practice, education/awareness programs and /or capacity building programs
 - (ii) the strengthening of fisher reporting and monitoring

5. Monitoring and Responsive Management

- (a) Identify performance indicators to monitor whether the objectives of the strategy are being achieved and “triggers for review” of the strategy based on the performance indicators when the FMS requires review.
- (b) Identify “triggers for contingency action” (eg annual catch, size structure of catch, minimum key habitat available) for fish stock based on categories of *under-fished*, *fully fished*, *over-fished/depleted* or *uncertain* and bycatch to deal with situations when there are unusual events when additional contingency management intervention would be required to ensure that the fishery remains sustainable
- (c) Outline of monitoring programs (in place or planned) for the FMS. The monitoring program should be linked to performance indicators, triggers, management rules and the research program and include:
 - (i) Monitoring program to monitor whether:
 - the objectives of the strategy are being achieved (ie. based on the performance indicators); and
 - environmental impacts are occurring and if so, whether they are at the frequency and magnitude predicted;
 - (ii) Monitoring program specifically to monitor fish stock based on categories of under-fished, fully fished, over-fished/depleted or uncertain.
 - (iii) For a stock of uncertain status, outline the program proposed to gather sufficient information to provide a scientific reliable assessment of the status of the stock
 - (iv) Monitoring information required for research programs to provide information relevant for continuous improvement in fisheries management.

6. Proposed Research Programs

A research program must be developed as part of the Management Strategy. The program must indicate strategies to enable appropriate research to be undertaken. The program must:

- (a) Identify areas where further information is needed including improving knowledge of the stock and ecosystems upon which the fishery depends. Indicate whether the information is fishery dependent or independent.
- (b) Specify short-term and long-term aims and objectives of the research
- (c) Identify links with monitoring and continuous improvement/responsive management programs.

(D). CONSIDERATION OF ALTERNATIVE MANAGEMENT REGIMES

1. Outline feasible alternative to those proposed in the Draft FMS

Include alternative:

- (a) characterisation of the fishery, including:
 - (i) its methods of fishing,
 - (ii) target species,
 - (iii) relationship with other commercial fisheries
- (b) numbers of fishers/shares and licensing/ endorsement regimes
- (c) the objectives of the FMS
- (d) management measures proposed in the FMS
- (e) performance indicators and triggers for review
- (f) monitoring regimes
- (g) research programs

2. Assess the effectiveness of these alternatives compared to the proposal in the Draft FMS

Assess alternatives in terms of the following issues:

- (a) Maintenance of ecologically viable stock levels with acceptable levels of probability
- (b) Rebuild stocks to viable levels within nominated timeframes where stocks are overfished
- (c) Conservation of biological diversity in the ecosystem and the protected or threatened species, populations or communities and their habitats
- (d) Protection of the ecosystem in particular key habitat areas
- (e) Fishing operations not being a threatening process to bycatch species
- (f) Responsible stewardship in the management and harvesting of fishing resources including:
 - (i) the accountable management of latent effort
 - (ii) bycatch reduction

3. Justify the selection of the preferred options in the Draft FMS.

(E). IMPACT ON THE FISH RESOURCES

1. Retained species – Target and Byproduct species

- (a) Outline the current knowledge of the health of target and non-target species and dependent/associated species; identify the status of the fish stock in terms of under-fished, fully fished, over-fished/depleted or uncertain.
- (b) Provide a species stock assessment including an outline of the robustness of estimates for all parameters used in the analyses and of the reliability of the model used where possible including information on:
 - (i) stock levels and dynamics – target species and by-product species
 - (ii) population structure (eg. size and age structure) and life cycle behaviour
 - (iii) spatial and temporal distribution – location in periods of vulnerability
- (c) Describe the effect of implementation of the strategy (including the proposed fishing rules and other management measures) on the species including an outline of the robustness and reliability of estimates for all parameters used in the analyses. Indicate the potential yields and resource status
 - (i) Consider yields/resource status under the proposed harvesting strategy in the FMS compared with different harvesting strategies;
 - (ii) Outline level of confidence in predictions regarding the health of the stock;
 - (iii) Identify key factors affecting stock sustainability: Where possible include information on:
 - past management regimes for this fishery – including trends in fisher numbers and practices;
 - the cumulative historic and current catch rates by all relevant sectors: commercial, recreational and indigenous; consider the appropriateness of “catch rate” rules in achieving objectives compared with alternatives
 - the cumulative historic and current fishing effort by all relevant sectors: commercial, recreational and indigenous; efficiency in achieving the catch rate given the rules relating to type of boat, gear and other rules; consider the appropriateness of “effort” rules in achieving objectives compared with alternatives
 - historic and current locational restrictions by relevant sector; appropriateness of restricted areas or recognised fishing grounds in resource allocation and in achieving the objectives; consider the appropriateness of “locational” rules in achieving objectives compared with alternatives
 - the resilience of the stock to fishing pressure from this fishery in particular the affect of the harvest regime (methods, timing, location) at the particular stage in the species life cycle;
 - other factors such as boating activities, aquaculture, shipping activities or other urban and tourist activities affecting stock numbers and resilience.
 - (iv) Identify the likelihood of any species becoming “over exploited” under the proposed fisheries rules given the current level of fishing mortality from all commercial fisheries or

recreational fishing sectors where the same species might be harvested or affected and the likely implication for maintaining a sustainable harvest in this fishery

- (d) Assess the appropriateness of the proposed management rules or measures to allocate the resources within/between user groups in terms of achieving the strategy's objectives and in terms of ESD including:
- (i) outline eligibility criteria; transfer rules; gear specifications – number and size of gear; protected fish provisions; time and area closures - restricted fishing areas (plus closure contingencies); zoning/region arrangements; species size limits on primary species; catch limits or quotas; recognised fishing grounds.
 - (ii) consider the effectiveness of the management rules or measures under the proposed harvesting strategy in the FMS compared with alternative management rules or measures;
- (e) If stocks are fully fished or over-fished/depleted or uncertain:
- (i) assess the adequacy of the proposed stock management strategies to maintain a sustainable harvest
 - (ii) assess the adequacy of the proposed stock recovery strategies or relevant threat abatement plans or recovery plans
 - (iii) consider the likelihood of “over exploited” species recovering under the proposed fisheries rules given the interaction with other fisheries.
 - (iv) consider the adequacy of the proposed program to gather information to provide a scientifically reliable assessment of the status of the “uncertain status” stock; and to identify what triggers would be needed to specify when management intervention would be required to ensure that the fishery is sustainable.
- (f) provide a summary of the uncertainty associated with the management of target and byproduct species and analysis of the consequence
- (g) identify the precautionary management measures current/proposed to mitigate, rehabilitate and /or compensate for the ecological impacts (eg responsive management options) and the level of confidence that the measures proposed would effectively manage the impact and associated risks. In particular state any judgement about the significance and acceptability of that impact
- (h) indicate the level of confidence in achieving the predicted outcomes and the resilience of the environment to change; indicate if the impacts are unknown, unpredictable, short tem/long term or irreversible.
- (i) consider the adequacy and appropriateness (compared with feasible alternatives) of the proposed monitoring program (in particular for over exploited or fully exploited species)
- (j) consider the adequacy and appropriateness (compared with feasible alternatives) of research proposals to provide relevant information to improve the management of particular species or the fishery in general.
- (k) assess the acceptability of the proposed measures on the sustainability of the ~~harvest~~ stock. In reaching a conclusion, the cumulative impacts of other fishing and activities leading to the mortality of these species should be considered.

2. Bycatch (non retained) species

- (a) Describe by fishing gear/method type, the potential impact of the proposed fishing activity on bycatch species, in particular:
- describe the impact of direct capture (discard species, including juveniles of primary species) including, species composition, catch level and mortality rates
 - describe the impact of physical contact (not captured) including species potentially impacted and the extent of the impact and the predicted mortality rates of incidental contact
 - describe the impact of lost gear (ghost fishing) including the level of occurrence and estimate of potential catch rates
 - (i) For each of the above, predict the likely mortality/injury rates on the species
 - (ii) For each of the above, consider the level of likely mortality/injury rates on the above species from other commercial fisheries or fishing sectors (eg recreational fishing) where the same species might be harvested or affected
 - (iii) For each of the above, nominate a indicator group of bycatch species to be monitored
- (b) Identify feasible alternatives likely to reduce impacts on bycatch. Consider relevant matters in the National Policy on Fisheries Bycatch and bycatch action strategies developed under that policy
- (c) If bycatch species are fully fished or over-fished/depleted or uncertain:
- (i) assess the adequacy of the proposed bycatch reduction strategies; assess the adequacy of the proposed threat abatement plans or recovery plans
 - (ii) consider the likelihood of “over exploited” bycatch species recovering under the proposed fisheries rules given the interaction with other fisheries.
 - (iii) consider the adequacy of information to provide a scientifically reliable assessment of the status of the “uncertain status” bycatch species
- (d) provide a summary of the uncertainty associated with the management of bycatch and non-retained species and analysis of the consequence
- (e) identify the precautionary management measures current/proposed to mitigate, rehabilitate and /or compensate for the ecological impacts (eg responsive management options) and the level of confidence that the measures proposed would effectively manage the impact and associated risks. In particular state any judgement about the significance and acceptability of that impact
- (f) indicate the level of confidence in achieving the predicted outcomes and the resilience of the environment to change; indicate if the impacts are unknown, unpredictable, short tem/long term or irreversible.
- (g) Consider the effectiveness of the proposed management measures in this fishery management strategy in reducing or eliminating adverse environmental impacts and assess the acceptability of the proposed measures. In reaching a conclusion, the cumulative impacts of other fishing and other activities leading to the mortality of these species should be considered.

3. Bait resources

Outline the use of bait species in the fishery, in particular:

- (a) Identify the species and volume of bait; identify source of bait –
 - (i) for bait collected in NSW waters, assess the impact of the collection of those species on the respective stocks and the ecosystem².
 - (ii) for bait sourced from elsewhere, assess the impacts of the use of the species and the likely introduction of disease or pest species.
- (b) Identify feasible alternatives likely to reduce impacts. Consider the effectiveness of the proposed management measures in reducing or eliminating adverse impacts and assess the acceptability of the proposed measures.

4. Data requirements in relation to the assessment of the impacts on the fish resources

- (a) Provide reference to technical data and other information relied upon to assess impacts; indicated its reliability and what uncertainties (if any) are associated with the use of the data in the assessment of the FMS
- (b) Identify where there are gaps in knowledge important for the assessment of the impacts of the fishery
- (c) detail a timetable for developing the data sets important for understanding longer term resource issues.

(F). IMPACT ON THE BIOPHYSICAL ENVIRONMENT

ECOLOGICAL ISSUES

1. Biodiversity and habitat Issues

Describe the effects of the implementation of the strategy on biodiversity and their habitats, in particular:

- (a) Identify the key habitat areas and characteristics within the fishing region or subregion including important areas/features such as reefs, seamounts, channels, major seagrass beds and major underwater landscape characteristics;
 - (i) Consider the habitat importance to ecological communities and populations and aquatic flora and fauna species that may be directly or indirectly affected by the fishing activities; indicate the local and regional scarcity of these habitats. In

² If bait is collected from a major commercial fishery that is also to be assessed under Part 5 of the EP&A Act, refer to that other assessment.

- particular identify any the habitat issues associated with marine mammals and migratory birds
- (ii) identify areas of high marine biodiversity/conservation significance; if relevant identify the following, indicating their incidence in the area of the fishery:
- marine parks, aquatic reserves or closure areas protected under the Fisheries Management Act 1994, NPWS Act 1974 or Marine Parks Act 1997
 - other areas such as RAMSAR wetlands, Japan Australia Migratory Bird Agreement (JAMBA), China Australia Migratory Bird Agreement (CAMBA), World Heritage Areas or areas registered in the National Estate or State Heritage Register.
- (iii) consider the appropriateness of reserving certain additional areas of significance in the lifecycle of the fishery or of high conservation status for biodiversity conservation and identify any such areas and options for the management of these areas
- (b) identify at a regional level the degree of habitat damage from fishing methods, foreshore access and boating activities;
- (i) list and assess the likely impacts from particular fishery methods, techniques, effort levels etc on the substrate;
- (ii) consider impacts as a result of habitat destruction or disturbance on the mortality of species, by affecting species in the food chain, by changes in water quantity, quality or regime, deposition of sediments or by introducing obstructions to the free movement of species
- (iii) consider the impacts of habitat disturbance or damage in discrete fished habitats such as lake systems, estuaries or specific reefs
- (iv) assess the potential impacts on species, populations or ecological communities by changing or disturbing habitats in terms of local impacts as well as the broader context relevant for particular species,
- (c) identify and describe the benthic, ecologically related, associated or dependent species and water column communities affected by fishing operations or loss of habitat including the relationship to fishing frequency; if impacts are likely to be significant on benthic and other communities, using the best available information, map and define the level of substrate disturbance for each fishing method. Consider
- (i) what percentage of the total habitat area is likely to be affected;
- (ii) how important is the habitat to other species and why;
- (iii) how vulnerable is the species when it is associated with the habitat. Where possible, quantify the proportion of the habitat type represented in marine protected areas.
- (iv) assess the acceptability of the impacts in terms of ecologically sustainability objectives.
- (d) provide a summary of the uncertainty associated with the management of biodiversity and habitat issues and analysis of the consequence
- (e) identify the precautionary management measures current/proposed to mitigate, rehabilitate and /or compensate for the ecological impacts (eg responsive management options) and the level of confidence that the measures proposed would effectively manage the impact and

- associated risks. In particular state any judgement about the significance and acceptability of that impact
- (f) indicate the level of confidence in achieving the predicted outcomes and the resilience of the environment to change; indicate if the impacts are unknown, unpredictable, short term/long term or irreversible.
 - (g) Consider alternate management measures including contingency measures if monitoring indicates that action should be triggered. Assess the appropriateness of the mitigation measures including:
 - (i) timing of fishery activities to minimise disturbance;
 - (ii) location of fishing operations to minimise impacts on native species life-cycle, movement or migration.
 - (iii) permanent or temporary restrictions on fishing activities in key habitat areas.
 - (h) Identify where there are gaps in knowledge important for the assessment of the impacts of the fishery and detail a timetable for developing the data sets important for understanding longer term biodiversity and habitat issues.

2. Threatened and Protected Species

- (a) Identify any protected and threatened species, populations and ecological communities and their habitats listed under Threatened Species Conservation Act, Fisheries Management Act, National Parks and Wildlife Act or Environment Protection and Biodiversity Conservation Act (this may include invertebrates, fish, reptiles, birds, mammals, plants, algae, etc) which may be affected by fishing activities. Provide information on the habitats of threatened or protected species.
- (b) Assess the impact of the proposed fishing activity on the protected or threatened species, populations and ecological communities and their habitats from direct captured or from disturbance. In particular:
 - (i) provide information on incidental capture rates and mortality
 - (ii) provide information on habitat disturbance or loss
 - (iii) provide information on indirect impacts such as noise disturbance, boat strikes or disruption to behaviour
 - (iv) assess impacts of fishing on protected or threatened species, taking into account any relevant measures forming part of any recovery plan activities.
- (c) the following factors must be taken into account in deciding whether there is likely to be a significant effect on protected or threatened species, populations or ecological communities, or their habitats (*The 8 Part Test*)
 - (i) in the case of a protected or threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction,

- (ii) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised,
 - (iii) in relation to the regional distribution of the habitat of a protected or threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed,
 - (iv) whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a protected or threatened species, population or ecological community,
 - (v) whether critical habitat will be affected,
 - (vi) whether a protected or threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region,
 - (vii) whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process,
 - (viii) whether any protected or threatened species, population or ecological community is at the limit of its known distribution.
- (d) provide a summary of the uncertainty associated with the management of threatened and protected species, populations and ecological communities and analysis of the consequence.
- (e) identify the precautionary management measures current/proposed to mitigate, rehabilitate and /or compensate for the ecological impacts (eg responsive management options) and the level of confidence that the measures proposed would effectively manage the impact and associated risks. In particular, state any judgement about the significance and acceptability of that impact
- (f) indicate the level of confidence in achieving the predicted outcomes and the resilience of the environment to change; indicate if the impacts are unknown, unpredictable, short tem/long term or irreversible.
- (g) discuss the effectiveness of mitigation measures in particular of measures to protect species listed under Threatened Species Conservation Act , Fisheries Management Act or Environment Protection and Biodiversity Conservation Act (this may include invertebrates, fish, reptiles, birds, mammals, etc)

Note: The "8 Part Test" under s5A of the EP&A Act must be used by the determining authority in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities or their habitats. The 8 Part Test provides guidance on determining when a species impact statement (SIS) is required. An SIS must accompany any proposal where there is likely to be a significant effect on threatened species, populations or ecological communities or their habitats.

3. Trophic structure

Consider the effects of fishing on trophic structure (food webs) and where possible provide an ecological systems model, in particular:

- (a) identify the species that are likely to be affected directly or indirectly by the fishing activity,

- (b) identify likely productivity/flows and assess the impacts of removal of predators, prey or competitors
- (c) identify and assess food provisioning (from discards), especially for marine mammals, penguins and other birds
- (d) identify the risks and uncertainties of the fishery disrupting the trophic structure and identify the management measures to address these risks. Discuss the likely effectiveness of mitigation measures.

4. Translocation of organisms and stock enhancement

Outline any potential impacts on the environment from the translocation of organisms (transference of stock species, fouling organisms and other pests) in particular:

- (a) list the species likely to be translocated by the different gear types and associated with fishing boats – including algae
- (b) assess the risk associated with translocation
 - (i) outline the likely implications of translocation on aquaculture, other water users and the environment
 - (ii) provide details of proposed mitigation methods including information from any available pest species threat abatement plan
 - (iii) outline a contingency plan for any pest/fouling species likely to be translocated by the fishery.

5. Fish Health and Disease

Assess the potential impacts on fish health and disease from the proposed activity, in particular

- (a) assess the impacts of all gear types and fishing methods on the health of wild fish including the available knowledge on stress, injury and susceptibility to disease; outline measures to minimise impacts on the health of wild fish resources.
- (b) assess the risk to the health of wild fish from the use of imported bait to the NSW; outline measures to minimise impacts on the health of wild fish resources.
- (c) Assess the risks to the health of wild fish from any stock enhancement programs associated with the fishery; outline measures to minimise impacts on the health of wild fish resources.

PHYSICAL ISSUES

6. Water quality issues

Assess the impacts on water quality and hydrological systems from the fishing and related activities, in particular:

- (a) identify potential sources of pollutants/contaminants from the fishing operations likely to affect the water quality, outline the characteristics, magnitude and probable frequency of these events, including:
 - (i) the use of substrate treatments (antifouling agents),
 - (ii) accidental or deliberate discharge of chemicals, fuels or bilge water
 - (iii) discharge/dumping of debris (plastics, gear and general waste)
 - (iv) discharge/dumping of waste from processing on board
- (b) consider the risk to water quality from potential physical and chemical changes and the general condition or characteristics of the waterbody and the likely assimilation capacity of the receiving water under normal fishing operations and when there is an incident or abnormal conditions; in particular consider potential cumulative impacts in ports or estuaries where boats are moored, cleaned or maintained or on-shore processing is undertaken,
- (c) if impacts are likely to be significant in particular areas, a baseline study of the existing water quality and flow characteristics should be outlined and monitoring data analysed to provide the basis for changes in practices in the area.

7. Noise and light

Assess the impacts on the environment from noise made during the proposed fishing operation any likely affected residences and on bird colonies or aquatic species, in particular:

- (a) identify any potential fixed and mobile noise and light sources during operation of the fishing activity and proposed hours of operation.
 - (i) identify nearby land uses likely to be affected by noise/light and separation distances; estimate whether noise/light is likely to be an issue.
 - (ii) identify any bird, mammals or aquatic species whose behaviour (roosting, feeding grounds, migration routes etc) is likely to be significantly or permanently modified in response to noise or light from the fishery activities.
- (b) Outline measures to manage impacts to an acceptable level; assess the adequacy of mitigation and management measures, for instance alternative location of noise generating activities, alternative lighting design, alternative trawl routes, other management strategies to reduce impacts at sources

8. Air Quality

Assess the impact of the proposed activity on air quality, in particular:

- (a) outline the likely sources of odours or other air impacts;
- (b) consider the likely impact of air emissions; if significant impacts are likely, consider the conditions under which nearby dwellings and sensitive land uses are likely to be affected.
- (c) outline measures to manage impacts to an acceptable level.

9. Energy and greenhouse issues

- (a) Consider the efficiency of energy use taking into consideration issues relating to:
 - (i) boat/motor performance and energy efficiency,
 - (ii) method options and catch/effort issues.
 - (iii) potential for use of alternative power sources
- (b) Identify measures to maximise energy efficiency and minimise the emission of greenhouse gases

10. Potential impacts on the fishery

- (a) Outline potential land based activities likely to affect the environment on which the fishery relies such as
 - (i) urban foreshore development including marinas, clearing of foreshore vegetation and wetlands, reclamation,
 - (ii) stormwater and sewage outfalls,
 - (iii) disturbance/drainage of acid sulphate soils,
 - (iv) pollution from point and diffuse sources,
- (b) Outline potential water based activities likely to affect the environment on which the fishery relies such as
 - (i) vessel activities – commercial shipping, other commercial fishing activities, recreational boating,
 - (ii) dredging,
 - (iii) barriers to river flow and structural engineering works, groynes, training walls
- (c) identify dredging works necessary to maintain access necessary for the fishery activities under the strategy including the cycle of dredging necessary and the risk to boats if dredging or other works not undertaken.
- (d) outline the types of management measures necessary to limit the impacts of these external factors in terms of
 - (i) landuse planning and development controls
 - (ii) measures in the fishery management strategy with regard to fishery practices.

11. Data requirements in relation to the assessment of the impacts on the biophysical environment

- (a) Provide reference to technical data and other information relied upon to assess impacts; indicated its reliability and what uncertainties (if any) are associated with the use of the data in the assessment of the FMS
- (b) Identify where there are gaps in knowledge important for the assessment of the impacts of the fishery

- (c) detail a timetable for developing the data sets important for understanding longer term resource issues.

(G). ECONOMIC ISSUES

Assess the likely economic impacts of implementing the management strategy having regard to the following:

1. Review of the existing situation

- (a) location, structure (including interrelationships), age and investment in the fishing fleet (if relevant); consider the regional or sub-regional implications
- (b) location and condition of existing infrastructure – such as transport (water and road), berthing facilities, maintenance and repairs, cold stores if relevant, distribution and/or processing facilities; consider the regional or sub-regional implications
- (c) employment by regions and sub-regions for fishers including direct employment eg boat owners, skippers and crew and indirect employment (cold stores, traders, suppliers); identify the distribution of income including seasonality factors; identify proportion of fishers with employment in other sectors as well as fishing (where possible estimate % of income non-fisheries related for boat owners, skippers and crew) or could be considered to be semi-retired;
- (d) examine current effort levels including latent effort and the link between effort and economic performance and the viability of the commercial operations
- (e) markets for fish harvested under the strategy, eg. as domestic/export market for human food, pet/aquaculture food or other uses
- (f) the economic return from the fishery including its contribution to individual, regional, state and national income; estimate the value of the share/licence held by individual fishers within the fishery
- (g) existing economic multiplier effects – costs and benefits

2. Likely economic implications of implementing the strategy

- (a) outline market development/ trends likely to affect the fishery – export/domestic/ import replacement – including strengths and weaknesses, threats and opportunities
- (b) outline the implication of implementing the strategy on access rights and the impacts on economic viability; consider the impact on the value of any shares/licences as a result of changes in the fishery management associated with implementing the strategy; consider the impact on this value as a result of any closures as a result of recreational fisheries.
- (c) outline any feasible options for changes in the resource allocations within the fishery including:
 - (i) the likely economic impacts on particular sectors within the fishery if these options were implemented

- (ii) any likely changes to the economic multiplier effects – costs and benefits
- (iii) possible measures which could be taken to mitigate any impacts
- (d) outline any feasible options for changes in the resource allocations between fishery including between commercial fisheries and recreational fishing and non-fishing sectors including:
 - (i) the likely economic impacts on particular sectors within the fishery if these options were implemented in terms of export replacement, unemployment and retraining, alternative investment, tourism related activities
 - (ii) outline the economic implications associated with the need to upgrade any infrastructure to support existing or any changes in the fishery – such as transport (water and road), berthing facilities, maintenance and repairs, cold stores is this relevant, distribution and/or processing facilities
 - (iii) any changes to the economic multiplier effects – costs and benefits
 - (iv) possible measures which could be taken to mitigate any impacts
- (e) predict the likely economic implications of maintaining the present resource allocation rules.
 - (i) Compare these with the likely economic implications of implementing the strategy or feasible options for changes in resource allocation.
- (f) Justify the preferred approach in terms of ESD principles.

3. Data requirements in relation to the assessment of the impacts on the economic issues

- (a) Provide reference to technical data and other information relied upon to assess impacts; indicated its reliability and what uncertainties (if any) are associated with the use of the data in the assessment of the FMS
- (b) Identify where there are gaps in knowledge important for the assessment of the impacts of the fishery
- (c) detail a timetable for developing the data sets important for understanding longer term resource issues.

(H). SOCIAL ISSUES

Assess the likely social impacts of the fishing activity proposed under the management strategy having regard to the following:

1. Review of the existing situation

- (a) Describe the demographic profile of those employed in the fishery (by regions/sub-regions/fleets) – including
 - (i) direct employment eg boat owners, skippers and crew; identify those with multiple endorsements and those “part-time” fishers (eg with other sources of employment, or semi retired); and
 - (ii) indirect employment (cold stores, traders, suppliers);

- (b) Outline the community values associated with commercial fishing, in particular :
 - (i) fishers' ways of life; fishing communities and trends associated with changes in fishing technology, communications and estuary management practices
 - (ii) social capital issues; age distribution of fishers; skill base and transferability of skills; consider trends by region or sub –region affecting entry or exiting of fishers, employees or boat owners in the sector
 - (iii) community views and perceptions
- (c) Identify current interaction of commercial fishing with the community including
 - (i) other recreational activities – fishing, boating, swimming, diving, whale/seal watching and other eco-tourism activities, discuss the potential for conflicts and synergies on a regional/subregional basis through interaction with recreational fishers, eco-tourism and related activities;
 - (ii) the visual and amenity issues

2. Likely social implications of implementing the strategy

2.1 Health and safety issues

Identify health issues associated with the handling and processing of fish. This should include contingency plans for known or potential risks to product safety.

- (a) identify the any health risks associated with environment (eg algal blooms, pollution/contamination in the water/sediments, etc); identify measures for minimising the risks from these sources. eg the Biotxin Management Plans for Pipis developed by NSW Fisheries and now managed by Safefood.
- (b) outline health risks associated with the handling and processing of fish and quality control measures to minimise risks from these sources. This is a Safefood NSW production requirement.
- (c) outline the health risks to fishers and related workers from current practices/methods and measures to minimise risks. This issue relates to Workcover requirements.

2.2 Social implication for fishers of any changes in resource allocations

- (a) predict the likely social implications of maintaining the present resource allocation rules.
- (b) outline any implications on fishers, their families or any local communities from any changes in the resource allocations including the likely social impacts on particular sectors (eg in certain locations, sub-regions or regions) if changes in the resource allocations were implemented; outline any possible measures which could be taken to mitigate any impacts
- (c) Compare the social implications of implementing the strategy in the short, mid or longer term (if relevant, consider regional, sub-regional or fleet issues).

- (d) identify any existing or likely conflicts within or between communities
- (e) consider the affects on conflicts of any proposed changes in resource allocations
- (f) Identify the likely change in attitudes to compliance and the likely changes in the level of compliance
- (g) Justify the preferred approach in terms of ESD principles.

2.3 Heritage issues

- (a) Identify shipwreck sites or other sites of historic heritage that are likely to be affected by fishing activities and outline measures to minimise risk of harm to these sites.
- (b) Identify any important Aboriginal heritage sites/places used by fishers and outline protocols/ measures to be developed in consultation with representatives of the Aboriginal community to minimise risk of harm to these sites.

3. Indigenous issues

- (a) Identify the interests of Indigenous people in the resources harvested by the fishery and in habitats that may be impacted by the proposed activity.
- (b) Assess the impacts of the activities proposed to be authorised by the management strategy on Indigenous interests. In particular, assess the impacts of implementing the strategy on:
 - (i) traditional fishing, including access, participation and culture (such as places of significance – middens, totemic symbols etc.),
 - (ii) Indigenous communities' well being, including economics, employment and community viability,
 - (iii) Government policies on Indigenous fisheries issues, including the NSW Indigenous Fisheries Strategy.
- (c) Mitigation and management measures

4. Data requirements in relation to the assessment of the impacts on the social issues

- (a) Provide reference to technical data and other information relied upon to assess impacts; indicated its reliability and what uncertainties (if any) are associated with the use of the data in the assessment of the FMS
- (b) Identify where there are gaps in knowledge important for the assessment of the impacts of the fishery
- (c) detail a timetable for developing the data sets important for understanding longer term resource issues.

(I). JUSTIFICATION FOR PROPOSED COMMERCIAL FISHING ACTIVITY

- (a) Outline the need for undertaking the fishing activities as proposed under the FMS including the consequences of not undertaking the activity.
- (b) Undertake a sensitivity analysis in relation to biophysical, social and economic costs and benefits of implementing the proposed regulatory and management measures in the FMS
 - (i) alternative harvest strategies (ie. different management options, such as input vs output controls)
 - (ii) alternative resource allocation mixes within the fishery
 - (iii) alternative resource allocation mixes
 - between commercial fisheries,
 - between commercial fisheries, recreational fisheries, indigenous fisheries and conservation
 - (iv) alternative resource allocation on a regional basis, consider the resource allocation mix within a region as well as between the regions
- (c) Within the constraints of the carrying capacity of the aquatic environment, justify in terms of the principles of ESD the selection of:
 - (i) the preferred resource allocation mix; and
 - (ii) the preferred suite of “rules” in the strategy.

APPENDIX 1

Act	Relevant Authority	Regulatory provisions
NSW Legislation		
Fishery Management Act 1994	NSW Fisheries	Fishing authorisations, fishing closures, declaration and management of aquatic reserves, protection of certain fish including threatened and protected species.
Environmental Planning and Assessment Act 1979	Department of Urban Affairs and Planning (DUAP) and Local Councils	Administration of the environmental impact assessment and project approval system. Development of environmental planning instruments which may protect wetlands or certain other areas.
Marine Parks Act 1997	Marine Parks Authority	Declaration and management of marine parks
National Parks and Wildlife Act 1974 and Threatened Species Conservation Act 1995	National Parks and Wildlife Service	Declaration and management of nature reserves and national parks, protection of certain mammals, birds and foreshore species including threatened and protected species
Port Corporation and Waterways Management Act 1995	Waterways Authority or relevant Port Corporation	Use of ports, wharfs, berths, moorings etc, licensing of vessels and maintenance of safe navigation in waterways
Crown Lands Act 1989 and Rivers and Water Act 2000/ Foreshores Protection Act 1948	Department of Land and Water Conservation	Use of Crown land for wharfs, berths or moorings and protection of river, estuary and coastal foreshores.
Food Production (safety) Act 1998	SafeFood	Fish products safe for human consumption
Commonwealth Legislation		
Wildlife Protection (Regulation of Export and Imports) Act 1982	Agriculture, Forestry and Fisheries Australia and Environment Australia	Licence to export protected wildlife
Environment Protection and Biodiversity Conservation (EPBC) Act 1999	Environment Australia	Environmental Assessment of matters of National Significance including those affecting protected or threatened species, Ramsar wetlands, bird and mammal species protected under international agreements

GLOSSARY

Associated and/or dependent species	species associated with or dependent upon harvested species, for example species which are predator or prey of the harvested species.
Biological diversity, biodiversity	the variability among living organisms from all sources (including marine and other aquatic ecosystems and the ecological complexes of which they are part). Includes 1) diversity within species and between species; and 2) diversity of ecosystems.
Bycatch	species that are discarded from the catch or retained for scientific purposes, and that part of the “catch” that is not landed but is killed as a result of interaction with fishing gear. This includes discards of commercially valuable species.
By-product	Are not target species but are species that are retained because they are commercially valuable
Designated fishing activities	As defined in the Fishery Management Act, are: <ul style="list-style-type: none"> • Category 1 Share Management Fisheries including abalone fishery and the lobster fishery • Category 2 Share Management Fisheries including ocean prawn trawl fishery, ocean fish trawl fishery, ocean hauling fishery, ocean trap and line fishery, the estuary general fishery and the estuary prawn trawl fishery. • Charter boat fisheries • Recreational fisheries • Fish stocking • Shark meshing, and • Other fishing activities proclaimed by the Governor on the recommendation of the Minister for Fisheries to be designated fishing activities.
Discards	Are those components of a fish stock thrown back after capture. Normally, most of the discards can be assumed not to survive
Ecologically sustainable development, ESD	<p>Ecologically sustainable development, ESD, is using, conserving and enhancing the community’s resources so that the ecological processes, on which life depends, are maintained and the total quality of life now and in the future, can be increased (National Strategy for ESD, Council of Australian Governments 1992).</p> <p>Ecologically sustainable use of natural resources means the use of components of biological diversity in a way and at a rate that does not lead to the long term decline of biological diversity and to sustain natural processes within their capacity while maintaining the life-support systems of nature thereby maintaining their potential to meet the needs and aspirations of future generations.</p> <p>A sustainable fishery is consistent with ESD if that fishery conserves and enhances the community’s resources so that the ecological processes, on which life depends, are maintained and the total quality of life now and in the future, can be increased</p> <p>Principles of Ecologically Sustainable Development (Intergovernmental Agreement on the Environment)</p> <p>1 The precautionary principle— Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should</p>

be guided by:

- (a) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
 - (b) an assessment of the risk-weighted consequences of various options.
- 2 Intergenerational equity— the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
 - 3 Conservation of biological diversity and ecological integrity— conservation of biological diversity and ecological integrity should be a fundamental consideration.
 - 4 Improved valuation, pricing and incentive mechanisms—
 - (a) environmental factors should be included in the valuation of assets and services,
 - (b) polluter pays— those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
 - (c) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
 - (d) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

Ecologically related species	species which, while not associated with or dependent upon a harvested species, nevertheless are affected by the fishing operation.
Ecologically viable stock	ecological viable stock has a general rather than a specific meaning. It refers to the maintenance of the exploited population at high levels of abundance designed to maintain productivity, provide margins of safety for error and uncertainty and maintain yields over the long term in a way that conserves the stocks role and function in the ecosystem.
Ecosystem	the biotic (living) community and its abiotic (non-living) environment.
Fish	Fish are marine, estuarine or freshwater fish or other aquatic animal life at any stage of their life history (whether alive or dead) and include oysters and other aquatic molluscs, crustaceans, endinoderms, and beach works and other aquatic polychaetes. Fish does not include whales, mammals, reptiles, birds or amphibians.
Fish stock/resources	Means the living resources in the community or population from which catches are taken in a fishery. Fish stock may include one or several species of fish but may also include commercial invertebrates and plants. Recruits to a stock are the young fish entering the exploited component of the stock for the first time.
Fishery	A unit determined by an authority or other entity that is engaged in raising and /or harvesting fish. Under the Fisheries Management Act 1994, fishery is a class of fishing activity identified by reference to any one or more of the following: species or class of fish, area of water or seabed, method of fishing, class of boats, class of persons and purpose of activities.
Management Advisory Committee (MAC)	MACs have been established for each share management or restricted fishery. Members are elected by the commercial fishers of the fishery or appointed by the Minister. The MAC advises the Minister on the fishery matters including the preparation of regulations or management strategy, monitors their implementation and assists in reviewing the regulations or strategy.
Fishing activity	Fishing activity is the activity of taking fish and includes: searching for fish, any activity likely to result in locating, aggregating or taking of fish or carrying fish by boat from the places where they are taken to the place where they are to be landed.

Fishing effort	Represents the amount of fishing gear of the specific type used on the fishing grounds over a given unit of time eg hours trawled per day, number of hooks set per day or number of hauls of a beach seine per day
FRCAC	The Fisheries Resource Conservation and Assessment Council is a statutory body appointed by the Minister for Fisheries that will advise on the preparation, review and assessment of fishery management strategies.
Management regime	In this document, refers to the policies, plans, action plans, strategic research plans, and all documentation that relates to the operations and management of the fishery.
Ministerial Advisory Council	Ministerial Advisory Councils for commercial, recreational, research and aquaculture sectors are appointed by the Minister to advise him on any matter relating to the sector for which the council has been established.
Overfishing	<p>can be defined in two ways which can act independently or concurrently:</p> <p>“recruitment overfishing”, where fishing activities are causing a reduction in recruitment in succeeding years and cause the mortality of too many fish in total, too many pre-productive fish, or too many fish that have only spawned a few times. The end result is that the stock can no longer replenish itself adequately.</p> <p>“growth overfishing”: where fishing activities lead to a reduction in the size of the individuals of a species, as a consequence of which few specimens grow to the size for optimum yield.</p>
Precautionary recovery strategy	management and operational strategy, designed to increase numbers within the stock, that incorporates the precautionary approach and includes mechanisms to avoid or mitigate adverse ecosystem effects.
Protected species	are species protected under the NSW legislation (FM Act or NPW Act) or Commonwealth legislation (Wildlife Protection (Regulation of Export and Imports) Act or Environment Protection and Biodiversity Conservation (EPBC) Act)
Productivity	when applied to fish stocks the term productivity gives an indication of the birth, growth and death rates of a stock.
Stock	In the strict sense, a distinct, reproductively isolated population. In practice, a group of individuals of a species in a defined spatial range that is regarded as having a relatively low rate of exchange with others of the species.
Threatened species, populations or ecological communities	Are listed as vulnerable, endangered or presumed extinct under the FM Act 1993 or Threatened Species Conservation Act 1995 or Environment Protection and Biodiversity Conservation (EPBC) Act).

APPENDIX A3. DUAP GUIDELINES / EIS CHECKLIST

Section	DUAP Guideline	Applicable EIS Section	Guideline Addressed?	Comment
A	EXECUTIVE SUMMARY	Chapter A	Yes	
B	REVIEW OF EXISTING OPERATION OF FISHERY	Chapter B		
1	Fish stock			
	a Identify harvested stocks	B1a, B1b, B1c	yes	
	b Status of fish stock	E1a, C6e	yes	
	c Interactions with other fisheries	B6b	partial	Adjoining jurisdictions with significant catches only
2	Existing operational area/regions			
	a Fishing areas	B2a, C6c, C6l(ix) & (xv)	yes	
	b Operational areas	B2a, B6c(vi) & (vii), B6e	yes	
	c Jurisdictional issues	B5b(x), B6b(iii), B6d(vii), App. B2, C4, C6c, C6l(x)	yes	
	d Important habitats	B6d(i)&(iv)&(v), F1a	yes	
	e Fished habitats	F1a	yes	
3	Current fisher and harvest information			
	a Fishers and endorsements	B5b(ii) & (iii), C6a(i), C6l(ii) & (iii)	yes	
	b Total employment	G	yes	
	c Fishing gear and boats	B3a-d, C6d, G	yes	
	d Catch, value and effort trends	B4a&c, B6b, App.B1	yes	
4	Current regulatory and management measures			
	a Management tools	B2a, B5b, B5f	yes	
	b Existing management plans	C1d, C6a(ii)	yes	
	c Strengths and weaknesses	B7	yes	
	d Administrative arrangements	B5c, B5e, C6j	yes	
5	Factors outside the fishery affecting the fishery			
	a Other NSW fisheries	B6b(ii)	yes	
	b Commonwealth or other state fisheries	B6(iii)	yes	
	c Environmental factors	B6d, App.B1	yes	
C	DRAFT COMMERCIAL FMS	Chapter C		
1	Objectives	C4	yes	
2	Designated fishing activity			
2.1	Affected fish stock			
	a Identify species	C6e, App. C1, E1&2	yes	
	b Target species of other fisheries	B6c	partial	Adjoining jurisdictions with significant catches only
	c Estimate future harvest levels	C5	partial	Acceptable estimates presented through trigger points
2.2	Operational areas of FMS			
	a Principal areas	C6c, C6l(ix)&(xv)&(xvi)	yes	
	b Operational areas	C6c, G(?)	yes	
	c Jurisdictional issues	B6b, B7e, C3e,	yes	
	d Restricted areas	B5b(ix), B6d(vii), App. B2, C6l(ix)	yes	
	e Important habitats	F1a, B6d	yes	
2.3	Resource allocation under the FMS			
	a Harvest strategy	C5, C6(i)	yes	
	b Entitlements and shares	C6b, C6(i)	yes	
3	Interaction between fisheries			
	a Common factors between fisheries	B6a-c	yes	
	b Conflict	B6b, C4, C6l(xvi)	yes	In particular, goal 4 in C4

Section		DUAP Guideline	Applicable EIS Section	Guideline Addressed?	Comment	
C	3	c	Improving arrangements between fisheries	C4b		In particular, goal 4 in C4
		d	Improving arrangements between fisheries and non-consumptive users	C4b		In particular, goal 4 in C4
	4		Regulatory controls and management measures			
		a	Stocks	C6e, C4b, C5	yes	
		b	Harvesting strategy	C6	yes	
		c	Contingency measures	C5,	yes	
		d	Administrative mechanisms	C4b, C6h, C6j	yes	
		e	Fisher improvements	C3d, C4b	yes	In particular, goals 1 & 7 in C4
	5		Monitoring and responsive management			
		a	Performance indicators	C5f	yes	
		b	Triggers for contingency action	C5f	yes	
		c	Monitoring programs	C5f(i), C5h, C5l	yes	
	6		Proposed research programs			
		a	Research needs	C3f, C6g	yes	
		b	Short and long-term objectives	C6g, C4	yes	
		c	Links with monitoring management programs	C5	yes	
D			ALTERNATIVE MANAGEMENT REGIMES	Chapter D		
	1		Feasible alternatives			
		a	Fishery characterisation	D1b	yes	
		b	Fisher/share numbers and regimes	D1b	partial	Only to a point that is considered feasible
		c	Objectives	D1a	partial	Discussion is presented on why this is not feasible
		d	Management measures	D1a	yes	
		e	Performance indicators and triggers	D1a	partial	Discussion is presented on why this is not feasible
		f	Monitoring regimes	D1g	yes	
		g	Research programs	D1g	yes	
	2		Effectiveness of alternatives			
		a	Viable stock levels	D1c(i)	yes	
		b	Rebuild overfished stocks	D1c(iii)	yes	
		c	Conservation of ecosystem	D1b	yes	
		d	Key habitat protection	D1b	yes	
		e	Threat to bycatch species	D1b	yes	
		f	Responsible stewardship	D1	yes	
	3		Justify preferred FMS options	D3		
E			IMPACT ON FISH RESOURCES	Chapter E		
	1		Retained Species			
		a	Status of target and non-target species	E1a	partial	Provided for the 16 target species (representing 97% of species caught by weight)
		b	Species stock assessment	E1a, App. B1	partial	Provided for 8 of the 16 target species
		c	Resource status and sustainability	E1a,b	yes	
		d	Allocation of resources	B3, B5, C3, Chap. D	partial	Detailed alternatives not assessed
		e	Adequacy of stock management/recovery programs	E1b	yes	

Section		DUAP Guideline	Applicable EIS Section	Guideline Addressed?	Comment
E	1	f Management of target and by-product species	E1b	yes	
		g Precautionary management measures	E1b	yes	
		h Confidence in predicted outcomes	E1b	yes	
		i Adequacy of proposed monitoring program	E4a	yes	
		j Adequacy of research proposals	E4a	yes	
		k Acceptability of proposed sustainability measures	E4a,b	yes	
	2	Bycatch species			
		a Impact on bycatch species	E2a	yes	
		b Alternatives to reduce bycatch	E2b	yes	
		c Adequacy of bycatch management/recovery programs	E2c(i)	yes	
		d Uncertainty of management of bycatch and non-retained species	E2c(ii)	yes	
		e Precautionary management measures	E2c(iii)	yes	
		f Confidence in predicted outcomes	E2c(iv)	yes	
		g Reduction of adverse environmental impacts	E2c	yes	
	3	Bait resources			
		a Source, species and volume of bait	E3a	partial	No data available
		b Alternatives to reduce impacts	E3b	partial	No data available
	4	Data requirements for assessment			
		a Reliability of technical data	E4a	yes	
		b Gaps in knowledge	E4a	yes	
		c Research timeframes	C6g	partial	No alternative timeframes provided
F		IMPACT ON THE BIOPHYSICAL ENVIRONMENT	Chapter F		
	1	Biodiversity and habitat			
		a Key habitat areas	F1a	partial	Habitat type, distribution and dominant fauna and flora described but data not available on the importance to ecological communities
		b Habitat disturbance	F1a	partial	Data does not exist to provide a complete regional assessment. Areal extent of beaches closed to beach-based methods is provided as a surrogate
		c Impact of fishing	F1a	partial	No data specific to fishery or methods - extrapolations from studies of other methods
		d Uncertainty associated with management	F1a	yes	
		e Precautionary management measures	F1a	yes	
		f Confidence in predicted outcomes	F1a	yes	
		g Alternate management measures	F1a,c	yes	
		h Gaps in knowledge	F1b	yes	
	2	Threatened and protected species			
		a Identify species and habitats	F2a, App. F1	yes	
		b Impact of fishing	F2b	yes	

Section		DUAP Guideline	Applicable EIS Section	Guideline Addressed?	Comment	
F	2	c	The eight-part test	F2b, App. F2	yes	
		d	Uncertainty associated with management	F2b	yes	
		e	Precautionary management	F2b	yes	
		f	Confidence in predicted outcomes	F2b	yes	
		g	Effectiveness of mitigation	F2b	yes	
	3		Trophic structure			
		a	Identify species likely to be affected	F3a	partial	No data specific to ocean beaches, nearshore waters and methods of this fishery
		b	Productivity flows	F3a, F1aii	yes	
		c	Provision of food	F3b	yes	
		d	Effectiveness of mitigation	F3c	yes	
	4		Translocation and stock enhancement			
		a	Species likely to be translocated	F4a,b	yes	
		b	Associated risk and contingency plan	F4c,d,e,f	yes	
	5		Fish Health and Disease			
		a	Impacts of gear type and fishing methods	F5a	yes	
		b	Risk from imported bait	F5b	yes	
		c	Stock enhancement risks	F5c	yes	
	6		Water quality issues			
		a	Pollutants/contaminants from fishing operations	F6a	yes	
		b	Risk to water quality under normal/abnormal conditions	F6b	yes	
		c	Baseline study	F6b	yes	Considered insignificant in F6b and thus no baseline study is required
	7		Noise and light			
		a	Affect of noise/light on land uses and species	F7a,b,c,e,f	yes	
		b	Adequacy of management	F7d,g	yes	
	8		Air quality			
		a	Sources of air impacts	F8	yes	
		b	Impact of air emissions	F8	yes	
		c	Acceptable management measures	F8	yes	
	9		Energy and greenhouse issues			
		a	Energy efficiency issues	F9a	yes	
		b	Measures to minimise greenhouse gas emissions	F9b	yes	
	10		Potential impacts on the fishery			
		a	Land based activities	F10a	yes	
		b	Water based activities	F10a	yes	
		c	Necessary dredging works	F10a	yes	
		d	Necessary management measures	F10b	yes	
	11		Data requirements for assessment			
		a	Reliability of technical data	F11a	yes	
		b	Gaps in knowledge	F11a,b	yes	
		c	Research timeframes	F11c	yes	

Section	DUAP Guideline	Applicable EIS Section	Guideline Addressed?	Comment
G	ECONOMIC ISSUES	Chapter G		
1	Existing situation			
	a Fishing fleet	G1, App. CG1	yes	
	b Infrastructure	G1, App. CG1	yes	
	c Employment and income	G1, App. CG1	yes	
	d Effort levels	G1, App. CG1	yes	
	e Markets	G1, App. CG1	yes	
	f Economic return	G1, App. CG1	yes	
	g Costs and benefits	G1, App. CG1	yes	
2	Likely economic implications			
	a Market trends	G2, App. CG1	yes	
	b Economic viability	G2, App. CG1	yes	
	c Resource allocation options within the fishery	G2, App. CG1	yes	
	d Resource allocation options between fisheries	G2, App. CG1	yes	
	e Implications of maintaining present resource allocation	G2, App. CG1	yes	
	f Justification of preferred approach	G3	yes	
3	Data requirements for assessment			
	a Reliability of technical data	G4a	yes	
	b Gaps in knowledge	G4b	yes	
	c Research timeframes	G4c	yes	
H	SOCIAL ISSUES	Chapter H		
1	Existing situation			
	a Demographic profile of employees	H1, App. CH1	yes	
	b Community values	H1, App. CH1	yes	
	c Interaction between commercial fishing and community	H1, App. CH1	yes	
2	Likely social implications			
2.1	Health and safety			
	a Environmental health risks	H4a	yes	
	b Quality control measures	H4b	yes	
	c Health risks to fishers	H4c	yes	
2.2	Changes in resource allocation			
	a Implications of maintaining present resource allocation	App. CH1	yes	
	b Implications of any changes on local	App. CH1	yes	
	c Existing or likely conflicts	App. CH1	yes	
	d Compliance	App. CH1	yes	
	e Justification of preferred approach	H2, H3	yes	
2.3	Heritage issues			
	a Historic sites	H5a	yes	
	b Aboriginal sites	H5b	yes	
3	Indigenous issues	H6	yes	
	a Interests in harvested resources and habitats	H6a, App. CH2	yes	
	b Impacts on Indigenous interests	H6a,b, App. CH2	yes	
	c Mitigation and management measures	H6b,c	yes	
4	Data requirements for assessment			
	a Reliability of technical data	H7a	yes	
	b Gaps in knowledge	H7b	yes	
	c Research timeframes	H7c	yes	
I	JUSTIFICATION FOR PROPOSED FISHING ACTIVITY	Chapter I		
	a Need for proposed activities	I1	yes	
	b Sensitivity analysis	I2	yes	
	c Preferences in terms of ESD principles	I3	yes	

APPENDIX A4. GLOSSARY

Please note: there is an extensive list of additional definitions, please refer to the Glossary within the DUAP Guidelines in Appendix A2.

Conditional Target Species: non-target species, when taken by the method where they are listed in Schedule 1, that are allowed as target species for compliance purposes only. That is, they are exempt from the rules that specify the proportion of a catch of a net that must be made of target species. These are species that are sometimes encountered by the methods used in ocean hauling. The intention is that these species may be taken when encountered but will be monitored as part of the non-target catch and subject to the annual byproduct limits.

Endorsement: an endorsement is specified on a commercial fishing licence and authorises the holder of the licence to take fish for sale in a restricted or share management fishery.

Entitlement: where an applicant (natural; person or otherwise) satisfies the eligibility criteria (as defined in the *Fisheries Management (General) Regulation 1995*) for entry into a restricted fishery, the applicant may be issued an entitlement to that restricted fishery. An entitlement does not authorise the taking of fish for sale. Entitlements remain in force unless revoked by the Director or replaced by the issue of another entitlement.

Fishing Business: a business that the Director of Fisheries determines to be a separate and identifiable fishing business.

Licence condition: a commercial fishing licence is subject to conditions as prescribed by the regulations or specified on the licence. Contravention of a licence condition is an offence.

Nominated Fisher: a person nominated in accordance with clause 212X of the *Fisheries Management (General) Regulation 1995* to take fish for sale in a restricted fishery or share management fishery on behalf of the fishing business.

Recognised Fishing Ground: an area identified (in accordance with Division 1 of Part 5 of the *Fisheries Management (General) Regulation 1995*) as a recognised fishing ground on a map deposited at an office of NSW Fisheries.

Regional Liaison Committee: a committee formed in 1995, chaired by NSW Fisheries and comprised of representatives from a broad range of sectors in local communities considering local issues particularly relating to commercial ocean hauling along beaches in NSW.

APPENDIX B

APPENDIX B1. THE MOST PROMINENT SPECIES IN THE OCEAN HAULING FISHERY

This section provides an overview of selected target species, which constitute in excess of 90% of the total landed weight taken in the Ocean Hauling Fishery. The following descriptions of each of these species includes four graphs showing catch trends, seasonal trends, catch between other commercial fisheries and the main gear types used in harvesting each of these species.

The information in the following section has been extracted from a variety of sources including Kailola *et al.* (1993), Yearsley *et al.* (1999), Pease and Grinberg (1995), Fletcher and McVea (2000), and the NSW Fisheries Catch Statistics Database.

For a full description of the species and historic catch and effort trends, refer to NSW Fisheries' 1998/99 *Status of Fisheries Resources* by Fletcher and McVea (2000), which can be found on the NSW Fisheries website: www.fisheries.nsw.gov.au.

Information relating to prices for the species was obtained from Sydney Fish Market records, and other marketing information was obtained from fish wholesalers or exporters in NSW.

Sea mullet (*Mugil cephalus*)

The following overview is based on information provided in SPCC (1981), Kailola *et al.* (1993), Pollard and Grown (1993), Pease and Grinberg (1995), Virgona *et al.* (1998) Gibbs (1997), Yearsley *et al.* (1999), Fletcher and McVea (2000), and the NSW Fisheries catch statistics database.

The sea, bully or striped mullet (*Mugil cephalus*) occurs around much of the Australian coastline, as well as in many temperate and subtropical areas worldwide. In NSW Waters, sea mullet are found primarily within estuaries and inshore waters, although they also occur within the freshwater reaches of coastal rivers. Within estuaries, sea mullet are found in association with shallow weed beds and bare substrates. They mostly eat microscopic plants (e.g. blue-green algae, filamentous green algae and diatoms), macroalgae (e.g. the green sea lettuce *Ulva lactuca*) and detritus, and often ingest large amounts of substrate in the process.

Spawning occurs in surface waters at sea, typically during autumn to early winter. The larvae enter estuaries and the small juveniles subsequently live in sheltered shallow water habitats. Many sea mullet travel into freshwaters, where they may reside for long periods, particularly if denied passage back to the estuary. Sea mullet grow quite quickly, taking about four years to reach 440 mm in length. Maximum length is approximately 750 mm. Between late summer and early winter, adult sea mullet (two or more years of age) leave estuaries in large schools that then travel northward along the open coastline on their way to spawning grounds. This behaviour appears to be triggered by strong westerly winds and falling water temperatures. Shorter migrations by so-called 'hard-gut' (sub-adult) also occur periodically, possibly in response to heavy flooding and consequent loss of food resources.

Sea mullet are targeted in the Ocean Hauling Fishery during the annual pre-spawning run. Fish travelling in large aggregations can result in large catches from single hauls on ocean beaches. Migrations commence earlier on the south coast than on the north coast of NSW. Hence, the beach haul fishery for sea mullet commences and finishes earlier on the south coast each year. The stock is shared with the sea mullet fishery in southern Queensland.

Pre-spawning females are mainly sold directly to processors, where the roe is extracted and exported to South-East Asia. Males are sold through the Sydney Fish Market or sold direct to processors. Some males are exported whole by processors to the Middle East. Males and females are sold locally for human consumption and for bait.

When sold as whole fish through the Sydney Fish Market, sea mullet attracted an average wholesale price of \$1.78/kg for the period 1995/96 to 1999/2000. Females with a high roe content (10-12% of body weight) attract the highest prices. In 1997/98 and 1998/99, processors paid \$2.50 to \$3.50/kg for females caught between April and July.

Annual landings progressively increased after 1984/85 and peaked at 5,560 t in 1993/94. Landings remained relatively high, between 4,000 and 5,000 t, until 1997/98. These trends reflected an increase in ocean landings, which occurred in response to the development of an export market for roe. Throughout this period, estuary landings were relatively stable. After 1997/98, landings declined significantly. This decline has been most dramatic in the ocean fishery, but estuary landings have also declined slightly. The recent decline in landings almost certainly reflects a decrease in abundance of stock, although the cause is unclear. The decline in abundance may be an effect of over harvesting by the ocean fishery, but could also be a natural fluctuation due to recruitment variability.

Sea mullet (*Mugil cephalus*)

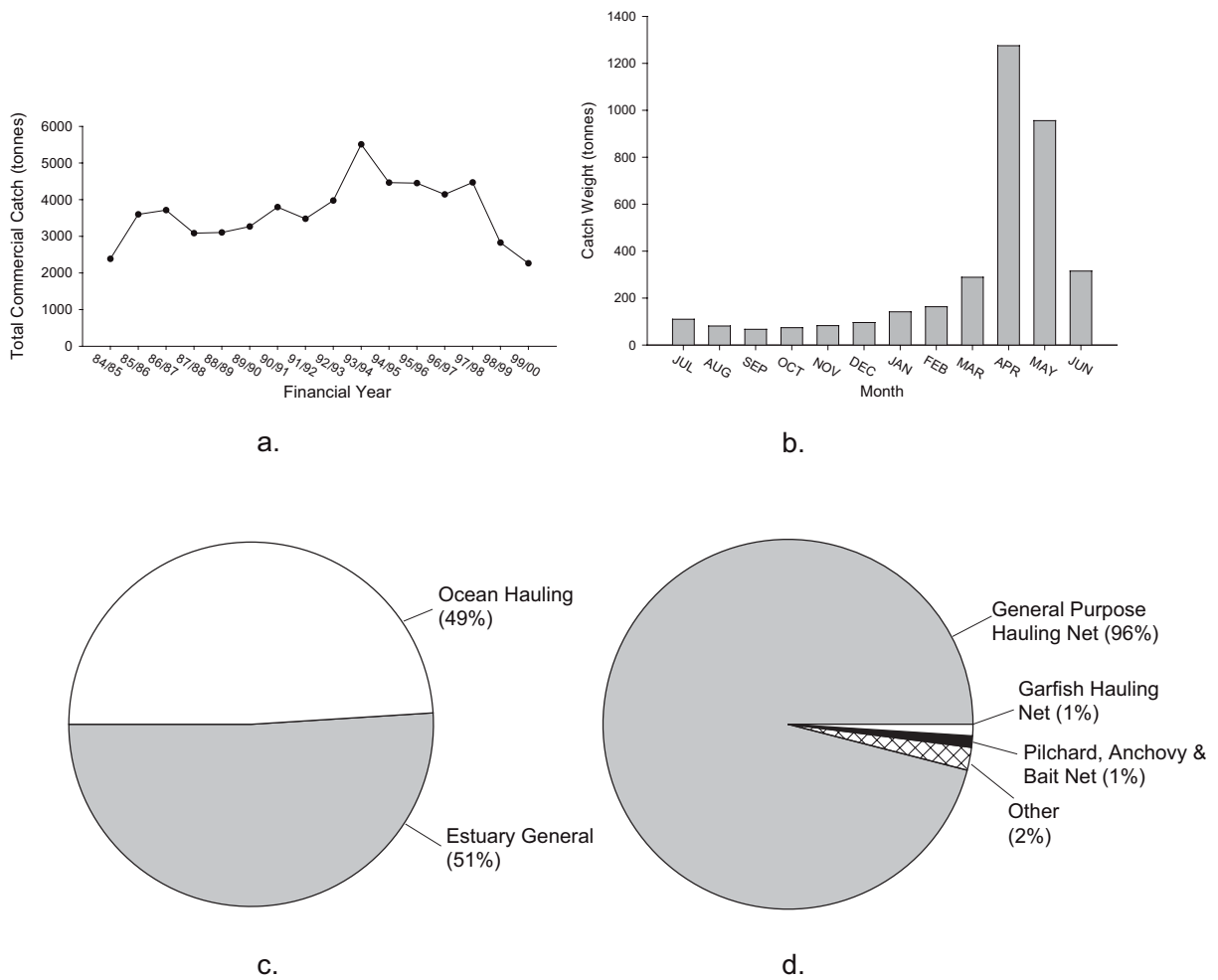


Figure 1a. The total reported commercial catch of sea mullet in NSW for the period of 1984/85 to 1999/2000.

Figure 1b. The average reported catch per month of sea mullet in the Ocean Hauling Fishery for the period of 1997/98 and 1998/99.

Figure 1c. The average percentage of reported catch of sea mullet between commercial fisheries for the period of 1997/98 and 1998/99.

Figure 1d. The average percentage of reported catch of sea mullet by gear types in the Ocean Hauling Fishery for the period 1997/98 and 1998/99.

Australian salmon (*Arripis trutta*)

Eastern Australian salmon occur in continental shelf waters and in estuaries of NSW, Victoria and Tasmania. Juveniles occur in sheltered coastal waters and estuaries. Fish mature at approximately four years old and 39 cm fork length.

Australian salmon are primarily caught by haul nets in the Ocean Hauling Fishery, although small quantities are also caught by purse seining. Catches occur throughout the year. Highest annual landings have tended to occur south of Sydney.

Australian salmon have historically been targeted on the far south coast of NSW, where fish aggregate at various times of year. Fish aggregate to spawn in coastal waters between Lakes Entrance and Bermagui, from November to February. Spawning occurs in the surf zone. Fish disperse north and south after spawning. Some fish also appear to aggregate on the far south coast during winter. Fishers believe that these 'over-wintering' fish migrate northward from Victoria and Tasmania during autumn. Historically, highest catches in June on the south coast may reflect this behaviour.

More recently, since 1995, highest catches on the south coast have been in April-May and in October. This suggests that south coast fishers target fish as they migrate to i) over-wintering locations and ii) spawning locations. Since the mid-1990s, some relatively high catches have also been taken in central and northern NSW (particularly zones 4 and 5) from August to December.

In August 2001, ocean waters north of Barrenjoey Headland were closed to the commercial targeting of Australian salmon in nets. A bycatch of 100 kg of Australian salmon per person per day is in place for northern NSW waters, while the species may still be taken by net fishing south of Barrenjoey Headland. Australian salmon are predators of several important target species in the Ocean Hauling Fishery, including sea garfish and pilchards. Consequently, Australian salmon are sometimes caught when targeting these species.

When sold as whole fish through the Sydney Fish Market, Australian salmon attracted an average wholesale price of \$0.97/kg for the period 1995/96 to 1999/2000. The market for Australian salmon was reduced after the closure of a south coast cannery (processing factory) in 1999. Relatively low landings in recent years probably result from reduced targeting by fishers due to a limited market, rather than a decrease in stock abundance.

NSW fishers target the same genetic stock as occurs in, and is targeted in, Victoria and Tasmania. In Victoria and Tasmania, there is an overlap in distribution between eastern and western Australian salmon – these are similar species in the same family. Australian salmon caught on the west Australian coast are the western species (*Arripis truttaceus*), which is not caught in NSW.

Australian salmon (*Arripis trutta*)

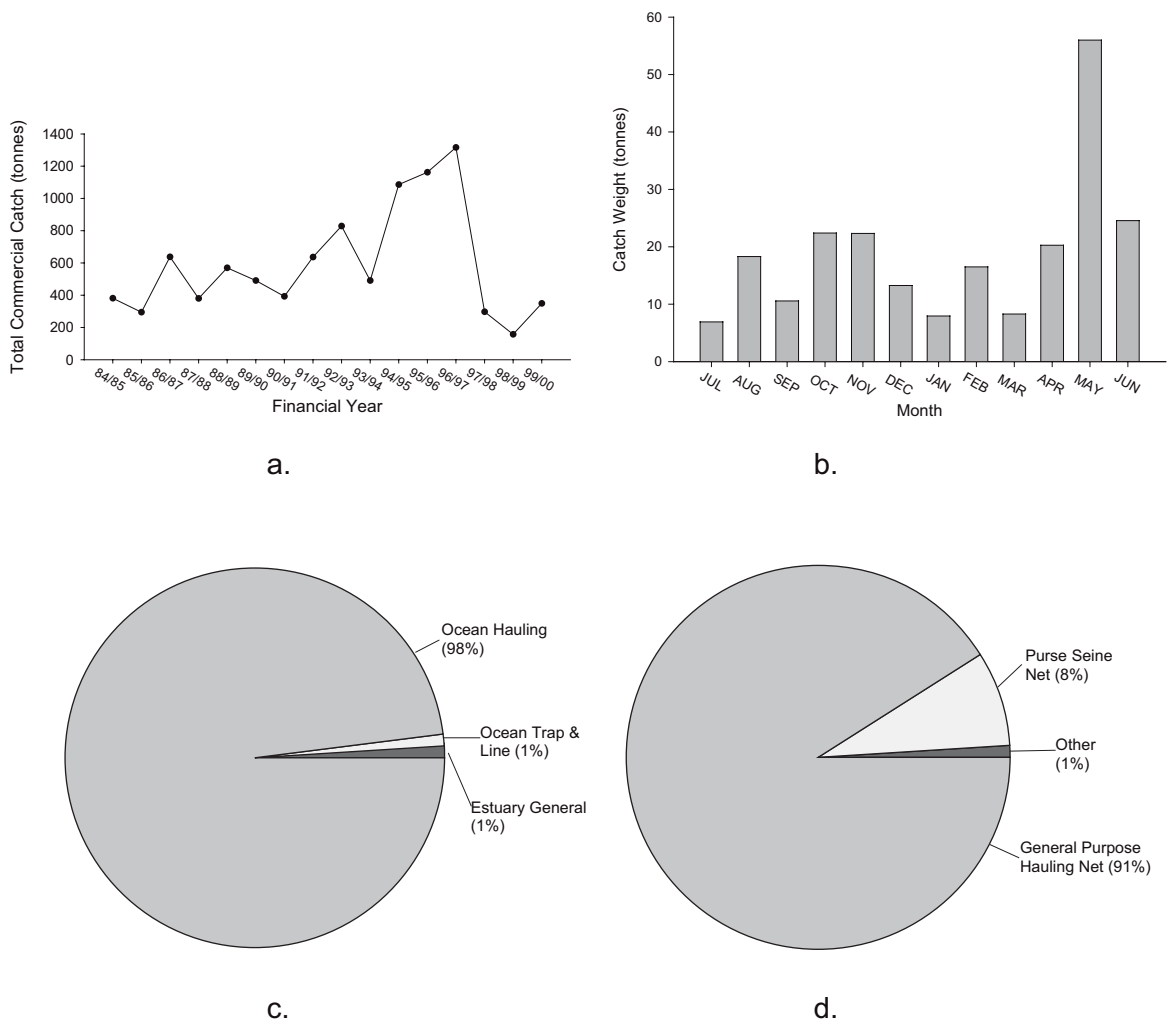


Figure 2a. The total reported commercial catch of Australian salmon in NSW for the period of 1984/85 to 1999/2000.

Figure 2b. The average reported catch per month of Australian salmon in the Ocean Hauling Fishery for the period of 1997/98 and 1998/99.

Figure 2c. The average percentage of reported catch of Australian salmon between commercial fisheries for the period of 1997/98 and 1998/99.

Figure 2d. The average percentage of reported catch of Australian salmon by gear types in the Ocean Hauling Fishery for the period 1997/98 and 1998/99.

Yellowfin bream (*Acanthopagrus australis*)

The following overview is based on information provided in Pease *et al.* (1981c), Kailola *et al.* (1993), Pollard and Growns (1993), Pease and Grinberg (1995), Gibbs (1997), Yearsley *et al.* (1999), Fletcher and McVea (2000), Gray *et al.* (2000) and the NSW Fisheries catch statistics database.

The yellowfin bream (*Acanthopagrus australis*) is endemic to Australia and occurs from Townsville in Queensland to the Gippsland lakes in Victoria. In NSW Waters, yellowfin bream are found primarily within estuaries and along nearshore beaches and rocky reefs, although they also occur within the lower freshwater reaches of coastal rivers. Within estuaries, yellowfin bream are found in association with all types of habitat, including seagrass beds, mangroves, bare substrates and rocky reefs. They eat a wide variety of foods, including small fish, molluscs, crustaceans and worms.

Spawning occurs in surf zones near estuary entrances, typically during winter. The larvae enter estuaries and the small juveniles subsequently live in sheltered shallow water habitats (particularly seagrass beds and mangrove channels). Larger juveniles occur in slightly deeper waters, and are particularly common around estuarine reefs. Yellowfin bream grow slowly, taking about five years to reach 230 mm (fork length). They mature at around 220 mm and appear to undertake extensive pre-spawning migrations. Maximum length is about 660 mm (total length). Adults usually return to estuarine waters after spawning.

The majority of bream taken in the Ocean Hauling Fishery are caught in general purpose hauling nets. The highest commercial catches of bream occur in autumn and winter. Yellowfin bream are also taken in large quantities by recreational fishers.

Reported landings of bream have declined over the past seven years. Reductions in the past three years may be partly attributed to phasing out of the use of pound nets in Port Stephens and adjoining coastal waters but could also be attributable to general declines in reported estuarine fishing effort. Declines in landings could also be attributed to environmental conditions and the availability of fish in the Ocean Hauling Fishery. Despite the recent reductions in reported landings, the age compositions of catches have remained relatively stable, indicating no declines in older fish. The absence of a reliable index of stock abundance casts much uncertainty over the status of the bream stock.

Bream are a popular table fish with the majority sold fresh on the domestic market. When sold as whole fish through the Sydney Fish Market, bream attracted an average wholesale price of \$8.68/kg for the period 1995/96 to 1999/2000. Yellowfin bream should not be confused with morwong, which are often sold under the marketing name of 'bream' or 'sea bream'.

Black bream are a similar species to yellowfin bream and are found in estuarine waters on the NSW coast south of Myall Lakes. They are almost exclusively found in estuarine waters, and generally only enter ocean waters after periods of flood. Black bream are often reported as yellowfin bream during catch reporting as distinguishing the difference between the species by visual examination can be very difficult. The differentiation between the species is made more difficult through a percentage of hybrids that exist as a result of the two species interbreeding. Black bream only constitute a small component (less than 5%) of overall estuarine bream catches.

The species of black and yellowfin bream are required to be recorded under the same species on monthly catch returns. The presence of black bream in ocean hauling landings is very rare and landings of black bream by ocean hauling fishers are considered to be nil.

Yellowfin bream (*Acanthopagrus australis*)

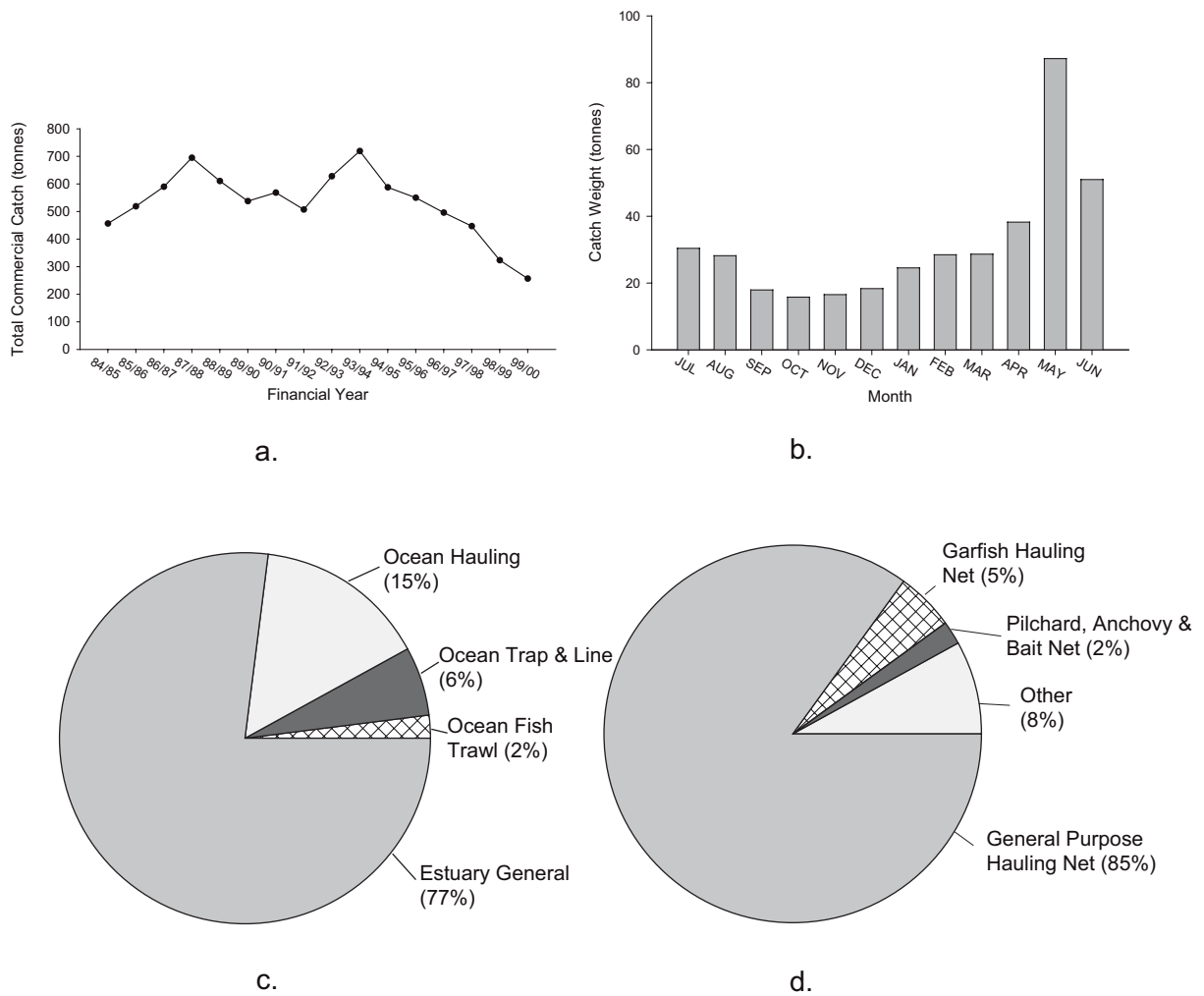


Figure 3a. The total reported commercial catch of bream (black and yellowfin) in NSW for the period of 1984/85 to 1999/2000.

Figure 3b. The average reported catch per month of bream (black and yellowfin) in the Ocean Hauling Fishery for the period of 1997/98 and 1998/99.

Figure 3c. The average percentage of reported catch of bream (black and yellowfin) between commercial fisheries for the period of 1997/98 and 1998/99.

Figure 3d. The average percentage of reported catch of bream (black and yellowfin) by gear types in the Ocean Hauling Fishery for the period 1997/98 and 1998/99.

Sea garfish (*Hyporhamphus australis*)

Sea garfish are found in ocean waters of Queensland, NSW and Victoria, and also Lord Howe and Norfolk Islands. They are also found in the lower reaches of estuaries. The life history is poorly understood. Juveniles are known to occur in estuaries and spawning most likely occurs in coastal waters.

In NSW, virtually all sea garfish are caught by the Ocean Hauling Fishery during summer and autumn. Most catches are in hauling nets, with small quantities caught in bullringing nets.

Historically, the largest catches have been made by boat-based hauling to the south of Sydney, while smaller catches from beach-based hauling occurred to the north. In recent years, northern landings (particularly around Port Stephens) have increased due to an increase in boat-based activities. Boats are a more efficient method by which to target garfish.

In general, marked increases in annual landings of sea garfish were associated with the development of an export market to Japan during the early 1990s. A significant decline in NSW landings since the mid-1990s has prompted concerns that this stock is overfished. Sea garfish catch-per-unit-effort by beach and boat-based fishers decreased over this period, strongly suggesting a decline in stock abundance.

When sold as whole fish through the Sydney Fish Market, sea garfish attracted an average wholesale price of \$4.06/kg for the period 1995/96 to 1999/2000. The highest returns are attained for garfish that are sold directly to processors for export. Only large fish are exported. Large and medium sized fish are sold for local consumption, and small fish are also used locally for bait.

Sea garfish (*Hyporhamphus australis*)

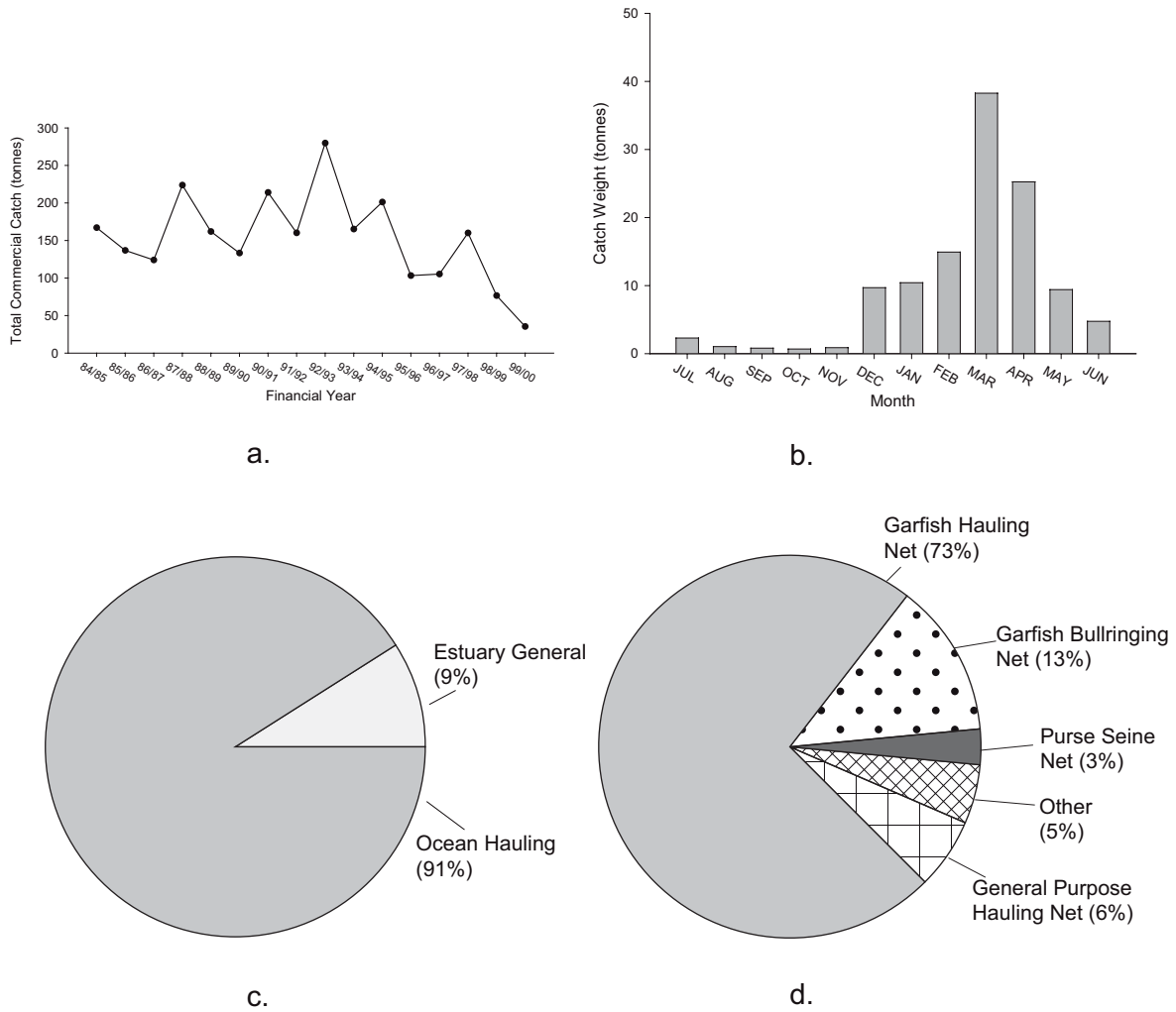


Figure 4a. The total reported commercial catch of sea garfish in NSW for the period of 1984/85 to 1999/2000.

Figure 4b. The average reported catch per month of sea garfish in the Ocean Hauling Fishery for the period of 1997/98 and 1998/99.

Figure 4c. The average percentage of reported catch of sea garfish between commercial fisheries for the period of 1997/98 and 1998/99.

Figure 4d. The average percentage of reported catch of sea garfish by gear types in the Ocean Hauling Fishery for the period 1997/98 and 1998/99.

Luderick (*Girella tricuspidata*)

The following overview is based on information provided in Pease *et al.* (1981c), Kailola *et al.* (1993), Pollard and Growns (1993), Pease and Grinberg (1995), Gibbs (1997), Yearsley *et al.* (1999), Fletcher and McVea (2000), and the NSW Fisheries catch statistics database.

The luderick (*Girella tricuspidata*) occurs from Noosa in Queensland to Tasmania and South Australia and is also found in New Zealand. In NSW Waters, luderick are found primarily within estuaries and around nearshore rocky reefs. Within estuaries, luderick are mainly found in association with 'weedy' habitats such as seagrass beds and rocky reefs. They are primarily herbivorous, preferring certain species of green macroalgae; although other foods (particularly small invertebrates) also form part of their diet.

Spawning occurs in surf zones near estuary entrances, typically during winter. The larvae enter estuaries and the small juveniles subsequently live in sheltered shallow water habitats (particularly seagrass beds and mangrove channels). Larger juveniles occur in slightly deeper waters, and are particularly common around estuarine reefs. Luderick grow fairly slowly, taking approximately five years to reach 270 mm (fork length). They mature at around 250 mm and undertake a northerly migration along the NSW coast prior to spawning. Maximum length is approximately 700 mm (total length). Adults usually return to estuarine waters after spawning.

Luderick taken in the Ocean Hauling Fishery are caught in general purpose hauling nets. The highest commercial catches of luderick occur in autumn and winter.

When sold as whole fish through the Sydney Fish Market, luderick attracted an average wholesale price of \$1.42/kg for the period 1995/96 to 1999/2000. A higher price is generally obtained in the Melbourne Fish Market, so many fishers on the south coast send luderick to markets in Melbourne rather than Sydney. A proportion of luderick is salted and used for bait in the commercial rock lobster fishery, although estimates are not recorded.

Luderick (*Girella tricuspidata*)

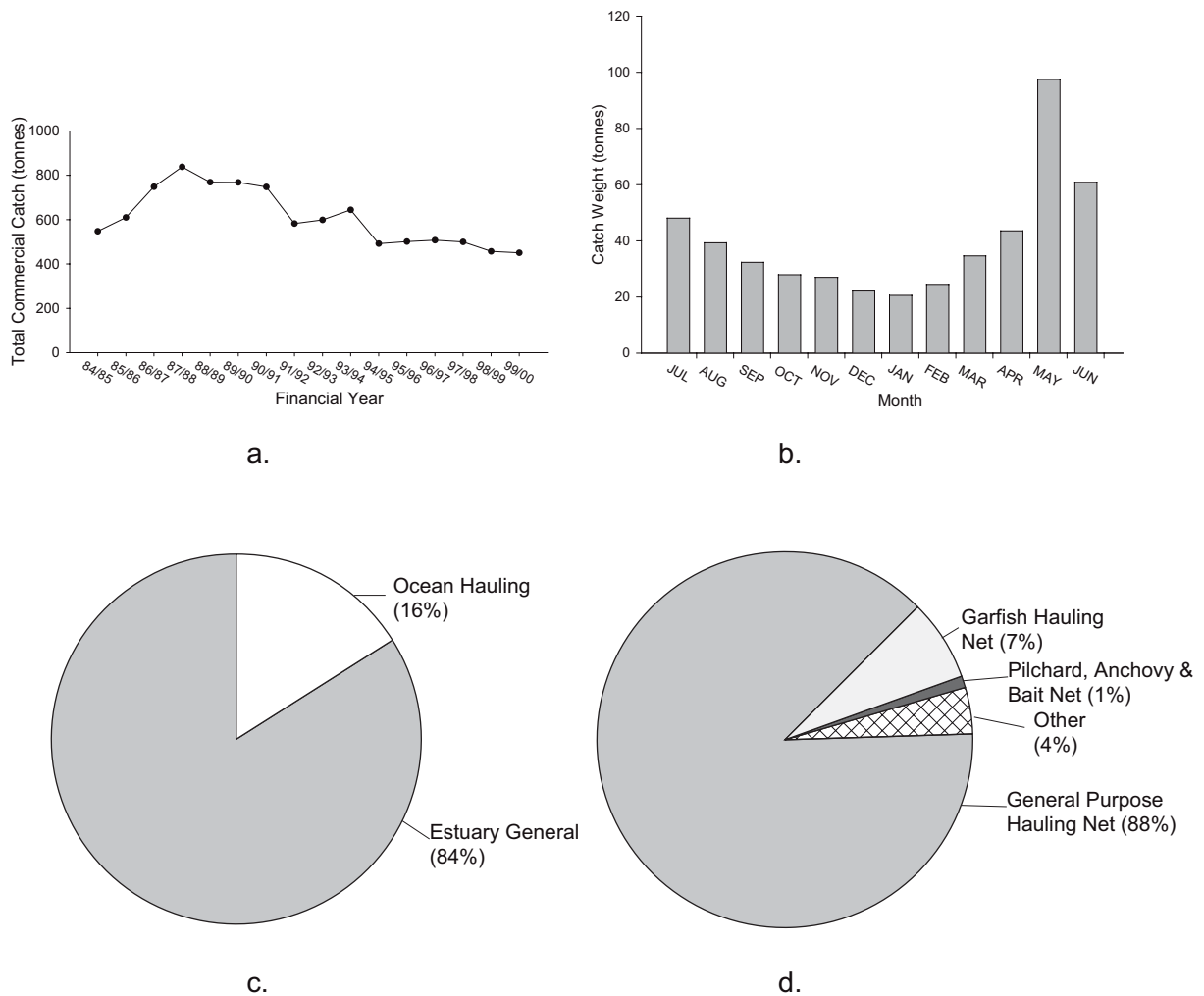


Figure 5a. The total reported commercial catch of luderick in NSW for the period of 1984/85 to 1999/2000.

Figure 5b. The average reported catch per month of luderick in the Ocean Hauling Fishery for the period of 1997/98 and 1998/99.

Figure 5c. The average percentage of reported catch of luderick between commercial fisheries for the period of 1997/98 and 1998/99.

Figure 5d. The average percentage of reported catch of luderick by gear types in the Ocean Hauling Fishery for the period 1997/98 and 1998/99.

Sand whiting (*Sillago ciliata*)

The following overview is based on information provided in Pease *et al.* (1981b), Hutchins and Swainston (1986), Kailola *et al.* (1993), Pollard and Grown (1993), West (1993) Pease and Grinberg (1995), Gibbs (1997), Yearsley *et al.* (1999), Fletcher and McVea (2000), and the NSW Fisheries catch statistics database.

The sand whiting (*Sillago ciliata*) occurs along the entire eastern coastline of Australia, from Cape York (Queensland) down to eastern Tasmania. It is also found in New Caledonia and Papua New Guinea. In NSW waters, sand whiting are found within estuaries and in coastal waters off ocean beaches. Within estuaries, the favoured habitat is bare sandy substrate. Sand whiting eat bottom-dwelling invertebrates, particularly polychaete worms, crustaceans and molluscs taken by fossicking through the sand.

Spawning occurs near river mouths, typically during summer. Many of the larvae enter estuaries, with the small juveniles preferring shallow water (particularly along sandy shores, but also in and around seagrasses and mangroves). Sand whiting grow fairly slowly, taking about five years to reach 290 mm (fork length). They mature at around 240 mm (males) to 260 mm (females). Maximum length is about 500 mm (total length). After spawning, adults may either enter estuarine waters or remain along ocean beaches.

Sand whiting are caught by ocean haul fishers when they move out of estuaries to spawn at estuary mouths and in surf zones. Catches by Ocean Hauling Fishery are low relatively to catches by estuary general fishers.

The majority of sand whiting taken by the Ocean Hauling Fishery are caught in general purpose hauling nets throughout the year but catches are higher in summer and autumn. When sold as whole fish through the Sydney Fish Market, sand whiting attracted an average wholesale price of \$9.27/kg for the period 1995/96 to 1999/2000.

The average total catch of sand whiting in the Ocean Hauling Fishery for the years 1997/98 and 1998/99, was 8,231 kg.

Sand whiting (*Sillago ciliata*)

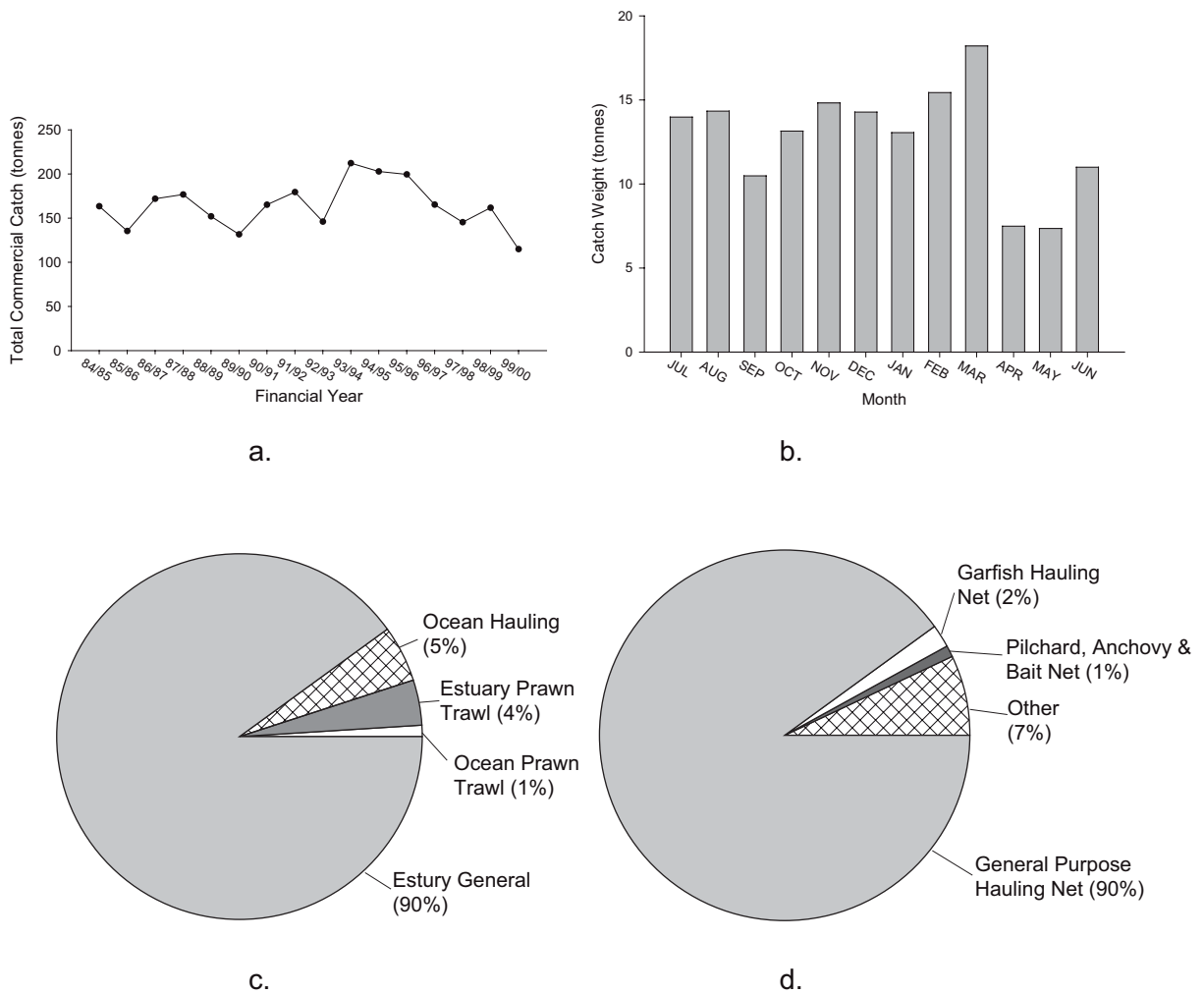


Figure 6a. The total reported commercial catch of sand whiting in NSW for the period of 1984/85 to 1999/2000.

Figure 6b. The average reported catch per month of sand whiting in the Ocean Hauling Fishery for the period of 1997/98 and 1998/99.

Figure 6c. The average percentage of reported catch of sand whiting between commercial fisheries for the period of 1997/98 and 1998/99.

Figure 6d. The average percentage of reported catch of sand whiting by gear types in the Ocean Hauling Fishery for the period 1997/98 and 1998/99.

Pilchards (*Sardinops neopilchardus*)

Pilchards occur in many temperate regions of the world, including all states of Australia except the Northern Territory. Pilchards inhabit continental shelf waters and the lower reaches of estuaries. Spawning occurs in summer and autumn in NSW waters. Fish mature at one to three years old and 7-13 cm fork length.

Pilchards are mainly caught by the Ocean Hauling Fishery in purse seine nets and bait nets (which are modified hauling nets). Catches of pilchards by lift nets for bait were 4,570kg in the 1999/2000 financial year. Smaller quantities are also taken in general purpose hauling nets. Highest catches occur in winter and spring in this fishery, although some catches are taken throughout the year.

Mass mortality of pilchards occurred in 1995 and 1998 throughout Western Australia, South Australia, Victoria and NSW, apparently caused by a herpes virus. Closures were put in place during these periods preventing commercial catches of pilchards, contributing to the lower level of catch taken in these years. Very low annual landings since these events suggest that stock levels are yet to recover.

Pilchards are sold for bait, pet food and for human consumption, either canned or fresh. Pilchards are an important prey item for many fish, including other target species in the Ocean Hauling Fishery. When sold as whole fish through the Sydney Fish Market, pilchards attracted an average wholesale price of \$2.46 per kilogram for the period 1995/96 to 1999/2000.

The average total catch of pilchards in the fishery for the years 1997/98 and 1998/99, was 239, 639 kg.

Pilchards (*Sardinops neopilchardus*)

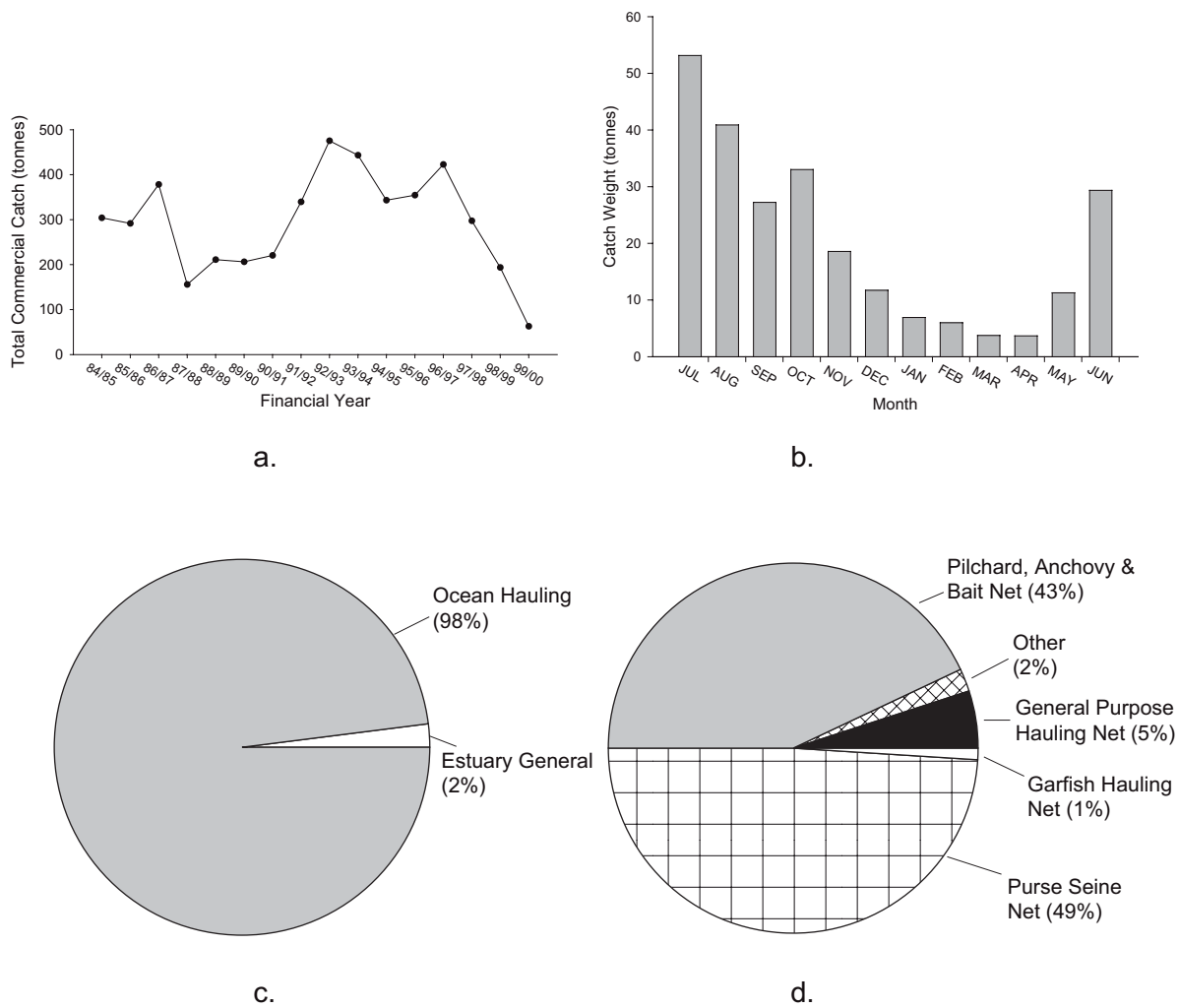


Figure 7a. The total reported commercial catch of pilchards in NSW for the period of 1984/85 to 1999/2000.

Figure 7b. The average reported catch per month of pilchards in the Ocean Hauling Fishery for the period of 1997/98 and 1998/99.

Figure 7c. The average percentage of reported catch of pilchards between commercial fisheries for the period of 1997/98 and 1998/99.

Figure 7d. The average percentage of reported catch of pilchards by gear types in the Ocean Hauling Fishery for the period 1997/98 and 1998/99.

Yellowtail (*Trachurus novaezelandiae*)

Yellowtail occur in all States of Australia except the Northern Territory. The species inhabits coastal waters and the lower reaches of estuaries. Adults are associated with rocky reefs, while juveniles occur over shallow, soft substrate. Spawning occurs in summer and autumn in NSW waters. Fish mature at approximately three years old and 20-22 cm fork length.

Yellowtail are relative long lived, reaching 28 years in New Zealand, and at least 15 years in NSW. The Ocean Hauling Fishery may exploit relatively young fish. Fish from the NSW stock also occur offshore, beyond state waters, and may be targeted by Commonwealth licensed purse seine fishers.

Yellowtail are mainly caught by the Ocean Hauling Fishery in purse seine nets. Smaller quantities are also taken in bait nets (which are modified hauling nets) and general purpose hauling nets. Catches are taken throughout the year, with slightly higher catches in summer and autumn. Catches of yellowtail by lifts net for bait were 14,011 kg and 18,738 kg in 1997/1998 and 1998/1999, respectively.

The trend of increasing catches is probably a result of a growing demand for the yellowtail for use as bait in other commercial and recreational fishing activities, predominantly fishing for tuna. The trend may also partly reflect recent improvements in the reporting of baitfish landings. Bait caught for own use may not have been fully reported in earlier years.

Most yellowtail are sold for human consumption or for bait. When sold as whole fish through the Sydney Fish Market, yellowtail attracted an average wholesale price of \$1.43 / kilogram for the period 1995/96 to 1999/2000.

Yellowtail (*Trachurus novaezelandiae*)

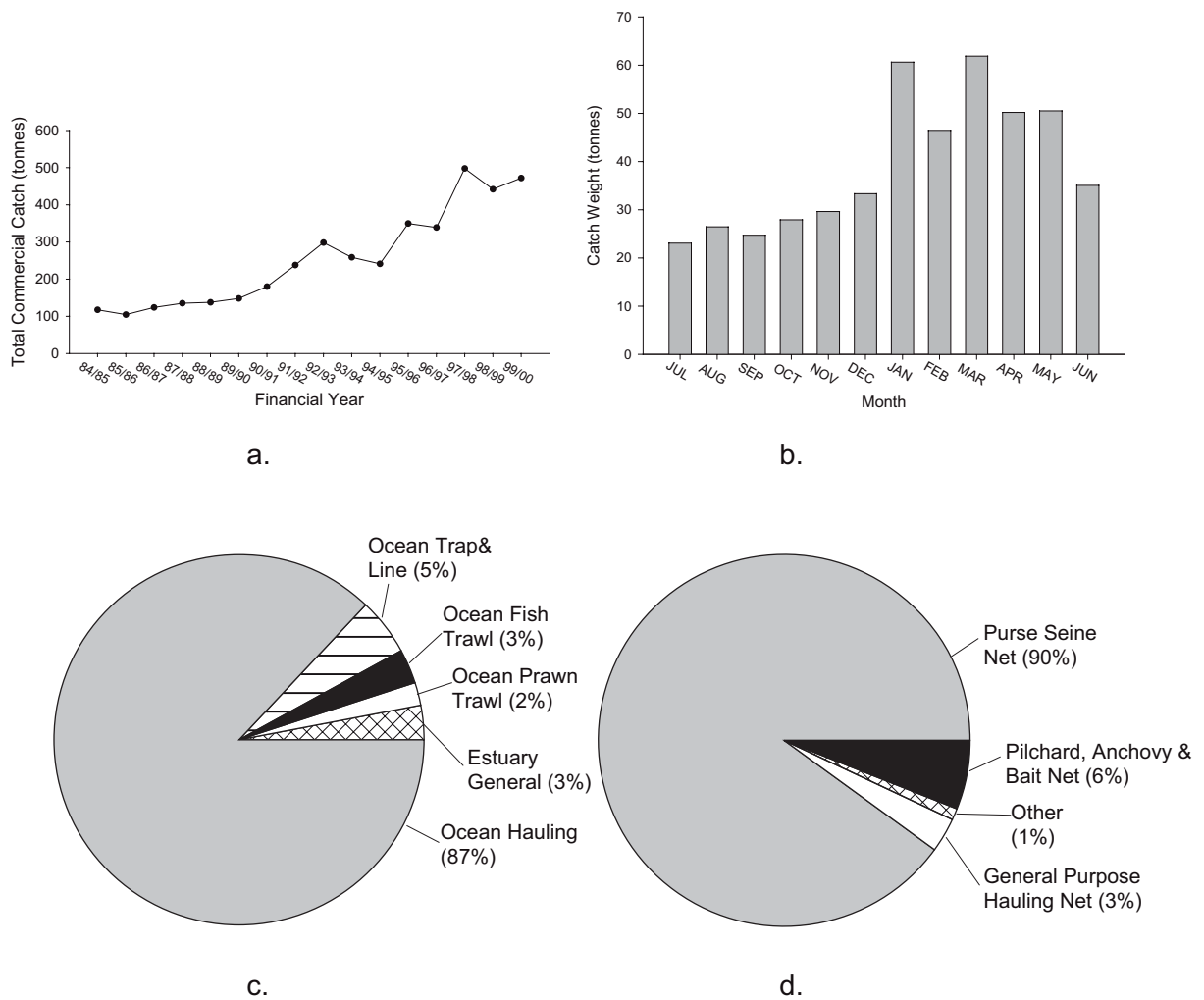


Figure 8a. The total reported commercial catch of yellowtail in NSW for the period of 1984/85 to 1999/2000.

Figure 8b. The average reported catch per month of yellowtail in the Ocean Hauling Fishery for the period of 1997/98 and 1998/99.

Figure 8c. The average percentage of reported catch of yellowtail between commercial fisheries for the period of 1997/98 and 1998/99.

Figure 8d. The average percentage of reported catch of yellowtail by gear types in the Ocean Hauling Fishery for the period 1997/98 and 1998/99.

Blue mackerel (*Scomber australasicus*)

Blue mackerel occur in all states of Australia except the Northern Territory. The species inhabits estuarine and continental shelf waters, with older fish occurring further offshore. Spawning occurs in summer. The life history is poorly understood.

Blue mackerel grow relatively quickly, reaching approximately 25 cm after one year. The Ocean Hauling Fishery exploits relatively young fish. The oldest fish from the NSW stock occur offshore, beyond state waters, and are probably targeted by Commonwealth licensed purse seine fishers.

Blue mackerel are mainly caught by the Ocean Hauling Fishery in purse seine nets. Smaller quantities are also taken in bait nets (which are modified hauling nets) and general purpose hauling nets. Similar catch levels occur in all months of the year. Catches of blue mackerel by lift nets for bait were 10,926 kg and 9,833 kg in 1997/1998 and 1998/1999 (respectively).

The long term catch trend for blue mackerel is stable, although considerable fluctuations have occurred. These fluctuations are likely to reflect changes in stock availability due to recruitment variability, and may also reflect changes in the distribution of fish due to oceanographic factors.

Most blue mackerel are sold for human consumption or for bait. When sold as whole fish through the Sydney Fish Market, blue mackerel attracted an average wholesale price of \$1.44 per kilogram for the period 1995/96 to 1999/2000.

Blue mackerel (*Scomber australasicus*)

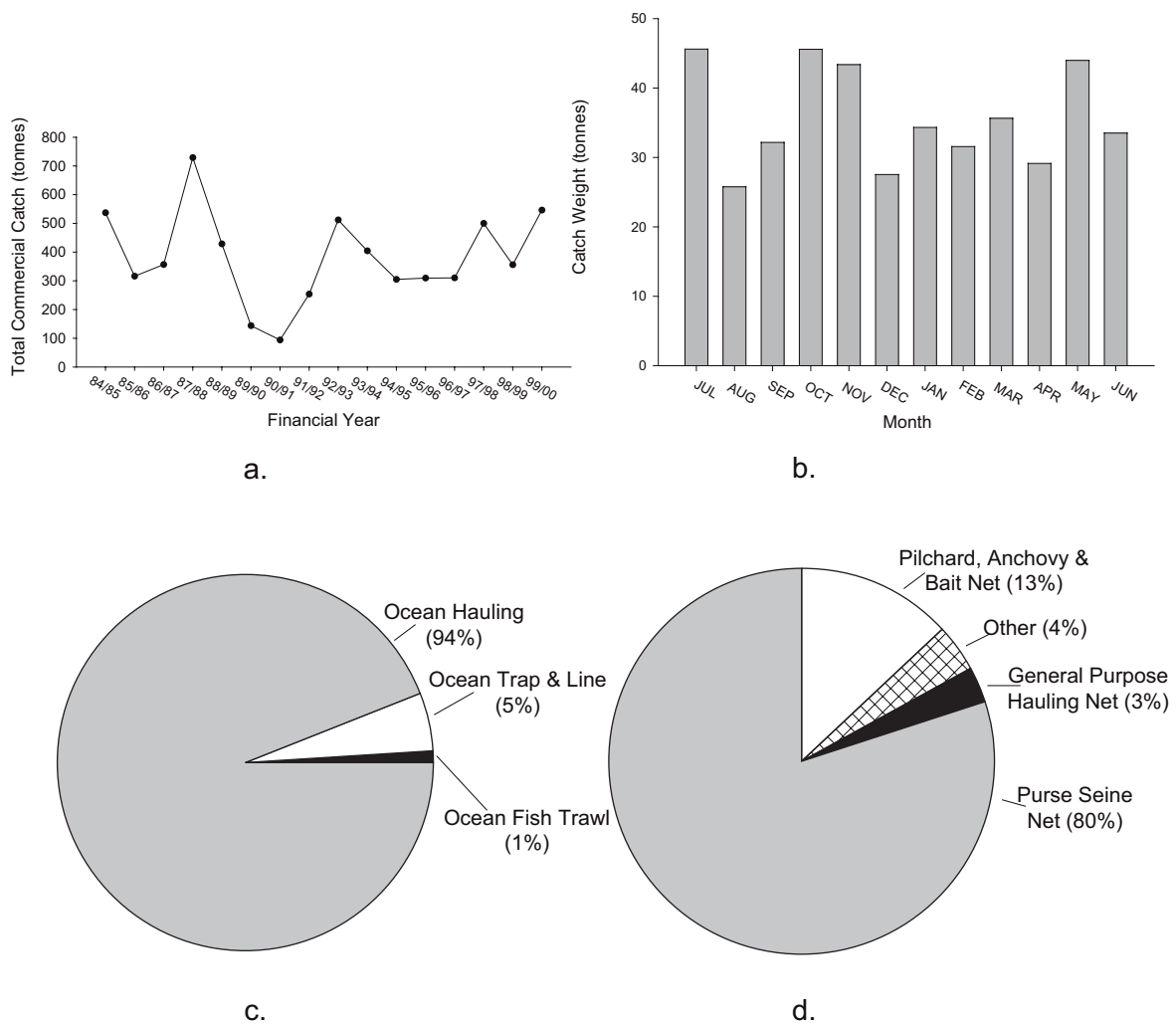


Figure 9a. The total reported commercial catch of blue mackerel in NSW for the period of 1984/85 to 1999/2000.

Figure 9b. The average reported catch per month of blue mackerel in the Ocean Hauling Fishery for the period of 1997/98 and 1998/99.

Figure 9c. The average percentage of reported catch of blue mackerel between commercial fisheries for the period of 1997/98 and 1998/99.

Figure 9d. The average percentage of reported catch of blue mackerel by gear types in the Ocean Hauling Fishery for the period 1997/98 and 1998/99.

Sweep (*Scorpius lineolatus*)

Silver sweep are most abundant in NSW waters but also occur in southern Queensland, Victoria and Tasmania. Adults and juveniles are associated with coastal and estuarine reefs. The biology of this species is poorly understood. Spawning times and locations are unknown. The age and size at maturity is also unknown. Sweep are relatively long-lived and may reach a maximum age over 40 years (D. Ferrell, NSW Fisheries, unpubl. data). Preliminary evidence suggests that the average age of sweep caught by recreational fishers is approximately 25 years. The longevity and slow growth of this species may make it particularly vulnerable to over-harvesting.

In NSW, approximately two thirds of sweep commercial landings are by fish traps within the Ocean Trap and Line Fishery, with the remaining catch taken by purse seine nets within the Ocean Hauling Fishery. Trap landings are highest during spring and summer months, whereas purse seine landings tend to be higher during autumn.

Between 1990/91 and 1992/93, reported landings of this species increased from about 70 t to 150 t. Peak landings of 157 t occurred in 1995/96. Between 1997/98 and 1999/2000, reported landings declined rapidly from 143 t to 48 t. Preliminary data suggests that this decline continued in 2000/01, with unverified commercial landings of approximately 27 t. Such significant fluctuations in landings are of concern, given the minimal information regarding stock structure and general life history that is available for this species.

When sold as whole fish through the Sydney Fish Market, sweep attracted an average wholesale price of \$1.91/kg for the period 1995/96 to 1999/2000. Price increased steadily over this period and averaged \$2.71 in 1999/00. Sweep is a relatively new product for human consumption in NSW, and price is expected to continue to increase as markets develop.

Other species of sweep, which are common to the north and south of NSW but also occasionally occur within NSW, may form part of commercial sweep landings in NSW. However, the extent to which this occurs is unclear.

The average total catch of sweep in the fishery for the years 1997/98 and 1998/99, was 40,717 kg.

Sweep (*Scorpius lineolatus*)

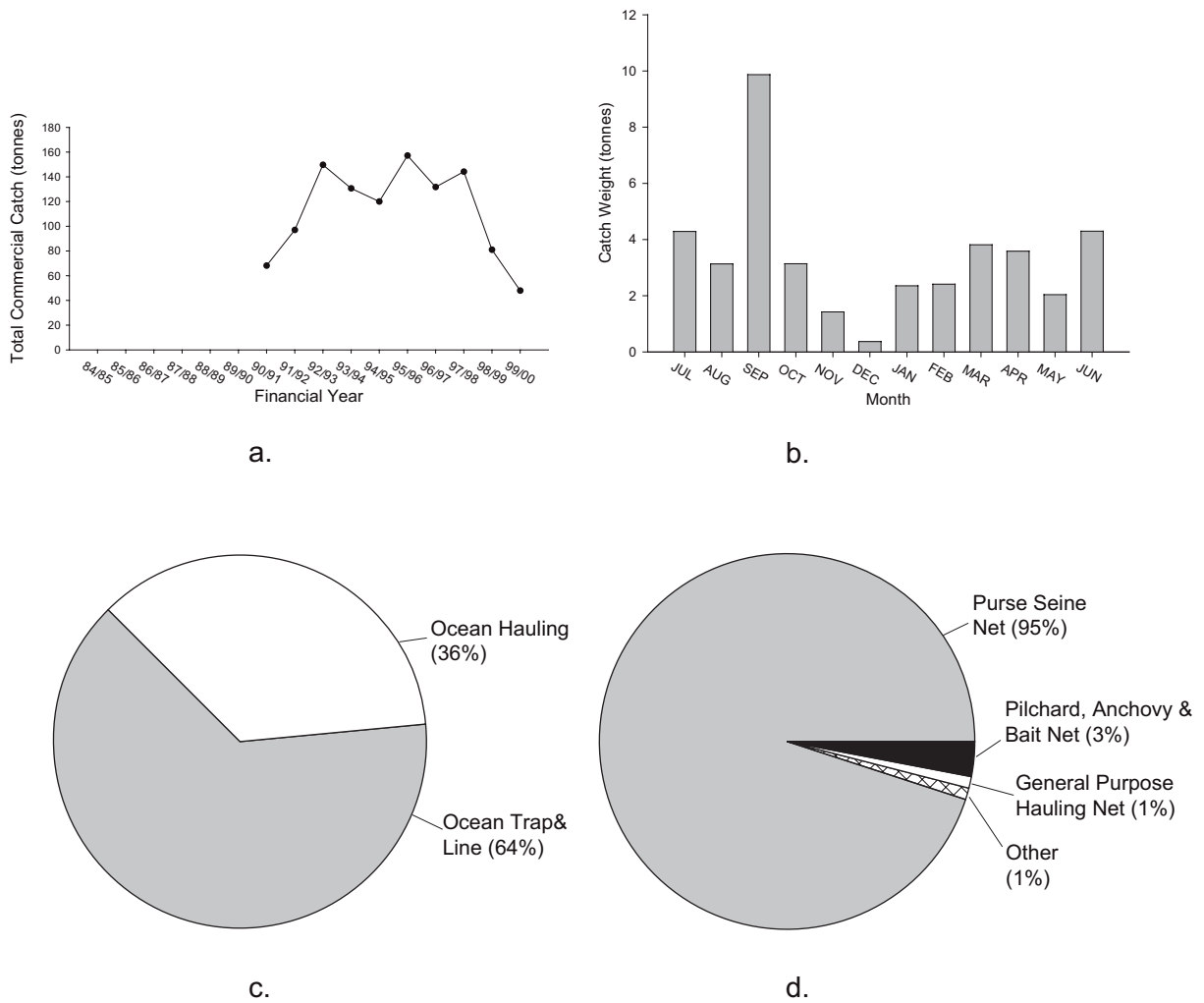


Figure 10a. The total reported commercial catch of sweep in NSW for the period of 1984/85 to 1999/2000 (**Note:** sweep were not recorded on commercial catch returns prior to 1990).

Figure 10b. The average reported catch per month of sweep in the Ocean Hauling Fishery for the period of 1997/98 and 1998/99.

Figure 10c. The average percentage of reported catch of sweep between commercial fisheries for the period of 1997/98 and 1998/99.

Figure 10d. The average percentage of reported catch of sweep by gear types in the Ocean Hauling Fishery for the period 1997/98 and 1998/99.

Silver trevally (*Pseudocaranx dentex*)

The following overview is based on information provided in Pease *et al.* (1981b), Kailola *et al.* (1993), Fletcher and McVea (2000), Neira *et al.* (1998), Rowling and Raines (2000), and the NSW Fisheries catch statistics database.

Silver trevally (*Pseudocaranx dentex*) occur in estuarine and coastal waters of all Australian states, and around northern New Zealand. Most of the Australian catch is taken in NSW and eastern Victoria. It is possible that catches from waters west of Bass Strait are comprised mainly of a different (but almost identical) species (*Pseudocaranx wrighti*). Silver trevally is a schooling species, which inhabits mainly sandy substrates. They feed on benthic invertebrates, including worms and molluscs, and also on benthic and planktonic crustaceans.

Female silver trevally have moderate fecundity (50,000–200,000 eggs) and spawn during an extended period from spring to autumn. Larvae occur in coastal waters throughout this period, and may enter estuaries before settling out as juveniles. Fish less than 10 cm in length were found in samples from Botany Bay between December and August, however the life history of juvenile trevally is poorly known. Maturation occurs between 18 and 25 cm in length. Although mature fish occur most often in ocean waters, they do enter estuaries at certain times.

Silver trevally is a relatively long lived, slow growing species, attaining a maximum age in excess of 25 years. In NSW coastal waters trevally reach a maximum size of about 65 cm fork length and weight of about 4 kg. Since the 1980s, the average size of silver trevally in catches has declined considerably and in recent years fish greater than about 35 cm in length (or 0.75 kg in weight) have been very poorly represented in catches. Commercial catches are dominated by young fish, less than about five years of age.

In estuarine waters, the main commercial catches of trevally are taken in the late summer and early autumn. The bulk of the catch is taken by haul nets in the large estuaries in the Sydney area. Significant catches of trevally are also taken by commercial fish trawl and trap fishers in ocean waters, and the species is very popular amongst recreational fishers in both estuarine and ocean waters. In the mid 1990s the annual catch of silver trevally from ocean waters by recreational fishers was estimated to be at least 130 tonnes.

There has been a significant decline in commercial landings of silver trevally since the mid 1980s, from about 1000 t per annum to around 300 t per annum. Most trevally are sold fresh at the Sydney and Melbourne fish markets where the species receives moderate prices (\$1.50 – \$2.50 per kg) depending on the quality of handling after capture. High quality ‘ice slurried’ trevally are also exported, receiving higher prices (\$3.50 - \$5.00 per kg).

Silver trevally (*Pseudocaranx dentex*)

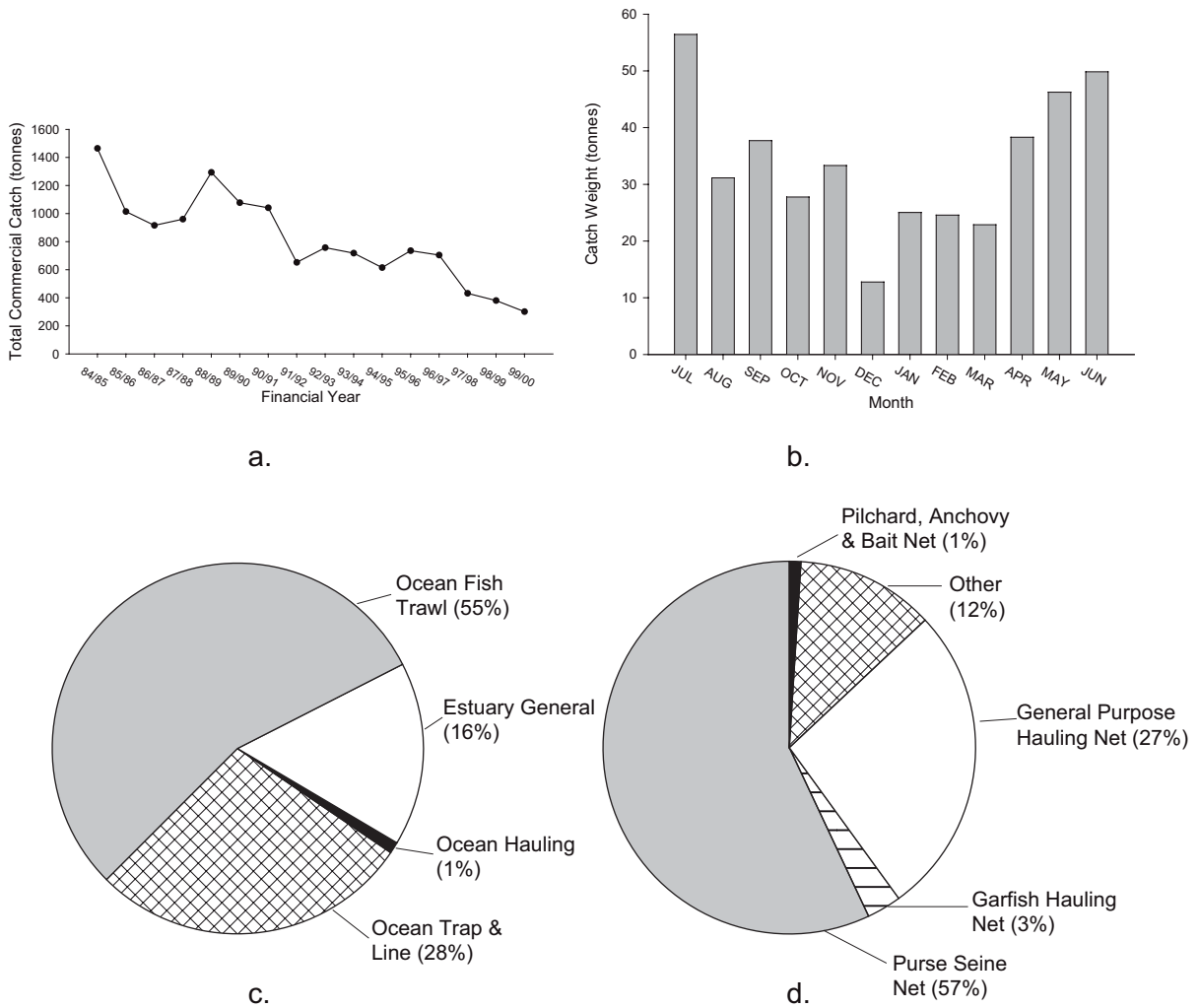


Figure 11a. The total reported commercial catch of silver trevally in NSW for the period of 1984/85 to 1999/2000.

Figure 11b. The average reported catch per month of silver trevally in the Ocean Hauling Fishery for the period of 1997/98 and 1998/99.

Figure 11c. The average percentage of reported catch of silver trevally between commercial fisheries for the period of 1997/98 and 1998/99.

Figure 11d. The average percentage of reported catch of silver trevally by gear types in the Ocean Hauling Fishery for the period 1997/98 and 1998/99.

APPENDIX B2. CLOSURES AFFECTING OCEAN HAULING OPERATIONS

Table 1. Beach Closures

The following table is one section 8 closure under the Regulation covering beach closures in the Ocean Hauling Fishery first implemented 21 February 1997.

Region	Closed Beaches	Period of Closure
Region 1 <i>That part of NSW lying generally between the border between QLD and NSW and the parallel 29° 15' south latitude</i>	All beaches bounded by Point Danger at Tweed Heads south of Goanna Headland (Evans Headland)	From 8 am Easter Friday to 12 midnight on Easter Sunday in each of the years 2002-2006
Region 2 <i>That part of NSW lying generally between the parallel 29° 15' south latitude and the parallel 29° 45' south latitude</i>	Bluff Beach (Iluka) All beaches bounded by the southern breakwall of the Clarence River at Yamba, south to the vehicle access point at Pipi Beach, Yamba, with the exclusion of Convent Beach All beaches bounded by Angourie Point south to Rock Point (Entrance to Lake Arragan)	From 1 December each of the years 2002-2005, to 31 January in each succeeding year From 1 March in each of the years 2002-2005, to the last day in February in each succeeding year
Region 3 <i>That part of NSW lying generally between the parallel 29° 45' south latitude and the parallel 31° 44' south latitude</i>	Station Creek Beach (North of Red Rock) Main Beach (Nambucca Heads) Grassy Beach bounded by Grassy Head and Middle Head Smokey Cape- Lagers Point south to a point due west of Black Rocks (approx. 3000 m south of Smokey Cape) Town Beach (Port Macquarie) Flynn's Beach Shelley Beach Miners Beach Lighthouse Beach- That part from the southern extremity of Taking Point south to Watonga Rock Grants Beach (North Haven Beach)- That part from the northern breakwall to Camden Haven Inlet for a distance of 1000 m Hat Head Beach- that portion of Hat Head Beach for a distance of approx. 100 m from Korogoro Creek mouth north to pedestrian access No. 6	From 1 October in each of the years 2002-2005 to the last day in February in each succeeding year From 1 December in each of the years 2002-2005, to 31 January in each succeeding year Between official sunrise and sunset in the period from 15 December in each of the years 2002-2005 to 31 January in each succeeding year

Table 1 (cont.)

Region	Closed Beaches	Period of Closure
Region 4 <i>That part of NSW lying generally between the parallel 31° 44' south latitude and the parallel 33° 25' south latitude</i>	Main Beach (Forster) Pebbly Beach Boomerang Beach (Pacific Palms) Blueys Beach Koolgardie Beach All beaches bounded by Nobby's Head and the southern extremity of Dudley Beach Gravelly Beach Moonee Beach	From 1 March 2002 to 28 February 2005
Region 5 <i>That part of NSW lying generally between the parallel 33° 25' south latitude and the parallel 34° 20' south latitude</i>	Whale Beach Avalon Beach Bilgola Beach Bungan Beach Basin Beach Mona Vale Beach Warriewood Beach Turimetta Beach Narrabeen Beach Collaroy Beach Dee Why Beach Manly Beach All ocean beaches bounded by South Head to Cape Banks	From 1 November in each of the years 2002-2005 to the last day in February in each succeeding year
Region 6 <i>That part of NSW lying generally between the parallel 34° 20' south latitude and the parallel 35° 25' south latitude</i>	Coalcliff Beach Scarborough Beach Wombarra Beach Austinmer Beach Boyds Beach Grenfield Beach Culburra Beach All beaches bounded by the northern extremity of Cudmirrah Beach to the northern extremity of Monument Beach	From 1 March 2002 to 28 February
Region 7 <i>That part of NSW lying generally between the parallel 35° 25' south latitude and the border between the States of New South Wales and Victoria</i>	All beaches bounded by the southern extremity of Wimbie Beach and the northern extremity of Rosedale Beach All beaches bounded by Tanrandore Point south to Tuross Head All beaches bounded by Mummaga Head (Dalmeny) south to Duesburys Point All beaches bounded by the southern extremity of Kianga Beach at the entrance of Kianga Lake, to Glasshouse Rocks (Narooma) Armonds Bay Beach Bunga Beach bounded by Goallen Head and Bunga Head All beaches bounded by Bengunnu Point and the northern extremity of Picnic Beach Merimbula Beach-That part from the northern extremity of Merimbula Beach generally southerly for a distance of 200 m	From 1 March 2002 to 28 February 2005

Table 2. Additional Closures

The following table includes additional section 8 or section 11 closures under the Regulation affecting ocean hauling operations

Method	Waters	Time	Period
By means of nets of every description, except the dip or scoop net and the landing net prescribed by Regulation	The whole of the waters of that part of Front Beach, Trial Bay, extending from the western most extremity of the beach generally easterly for 800 m	From 20 December to 31 January each year	For a period of five years from 21 January 2000
By means of nets of every description, except the dip or scoop net, hand hauled prawn net and the landing net prescribed by Regulation	Includes the waters of the South Pacific Ocean, south of a line drawn from the National Parks and Wildlife sign "Hat Head Beach" 119 degrees to the northern point of Little Nobby	Total	For a period of five years from 6 August 1999
By means of nets of every description	Waters of that part of the South Pacific Ocean adjacent to Airforce Beach, enclosed by a line drawn from the most northerly point of the northern breakwall, north to the vehicle access to the beach (approximately 100 m north of the Evans Head Surf Club)	From 1 November in each of the years 1997 to 2002, to 31 January in each succeeding year	From 1997 to 2002
All methods	All waters from mean high water mark of Cook Island to a boundary defined by five marker buoys (co-ordinates outlined in notification)	Total	From 2 July 1999
All methods	Jones Point, North Solitary Island, North Solitary Island, North West Rock, North West Solitary Island (sanctuary zones for each area)	From 7 January 2000 to official sunrise 1 July 2002	N/A
By means of nets of every description, except the dip or scoop net, hand hauled prawn net, push or scissors net, hoop or lift net and the landing net prescribed by Regulation	The whole of the waters of that part of Byron Bay, South Pacific Ocean, situated south-west of Cape Byron and known as Little Beach (or Wategos Beach)	During the period of 1 April to 30 June in each year	For five years from 29 October 1999
By means of nets of every description, except the landing net prescribed by Regulation	The whole of the waters of that part of the South Pacific Ocean adjoining Brooms Head Beach at Brooms Head extending out 183 m from the high-water mark between Cakora Point or Brooms Head and line being the north-easterly prolongation of the north-western boundary of the sub-division at Brooms Head	From 15 December to 15 January each ensuing year	For five years from 29 October 1999
By means of nets of every description, except the landing net, as prescribed by the Regulation	The whole of the waters enclosed by a line from the eastern extremity of the southern breakwater at Forster, generally southeast to a point on highwater mark adjacent to the northern end of Boundary Street, Forster. *Conditions for use of garfish net (south of Haydens Rock) outlined in notification	Total	For a period of five years from 30 October 1998

Table 2 (cont.)

Method	Waters	Time	Period
Nets of every description	Little Coogee Bay, Clovelly	Total	From 11 January 2002 to 10 January 2007
By means of all spears, spear guns and similar devices, and net of every description, except the dip or scoop net and landing net, as prescribed by the Regulation	Lord Howe Island. The whole of the waters of the western side of Lord Howe Island between the coral reef and the mainland of the said island and being the waters known as the Lagoon, including the bays, inlets and creeks of the said lagoon	Total	For a period of five years from 23 March 2001
Nets of every description, other than by certain recreational nets	Certain waters of Port Hacking (Hungry Pt to Bass & Flinders)	6am on Saturday to 6am on Monday and from 6 am to 6pm on any weekday or public holiday	For a period of five years from 17 September 1999
General purpose haul nets	Sydney Harbour entrance waters	From noon on Saturday of each week to 8 am Monday and public holidays	For a period of five years from 11 December 1998
All nets except a landing net as prescribed in the Regulation	Shell Harbour (for that area extending into ocean waters)	Total	For a period of five years from 6 August 1999
All nets except a landing net as prescribed in the Regulation	Port Kembla and Outer Harbour	Total	For a period of five years from 13 August 1999
All nets except a landing net as prescribed in the Regulation	Merimbula and Tathra Platforms	Total	For a period of five years from 10 December 1999
Purse seine nets	Black Road Bait Ground (North Narrabeen)	Total	For a period of five years from 9 June 2000

Table 3. General additional closures affecting the Ocean Hauling Fishery

The following table includes general Section 8 or Section 11 closures under the Regulation that may affect ocean hauling operations

Closure	Period
Taking of invertebrates from Intertidal Protected Areas	Until 31 December 2001
All commercial fishing without holding an endorsement	Continuous from 21 July 2000
Shark finning	Continuous from 4 June 1999
The taking of great white sharks	Continuous from 24 January 1997
Commercial fishing from boats in offshore waters without appropriate endorsements	For a period of 5 years from 8 October 1999
Powered fishing vessel restriction	For a period of 5 years from 28 February 2002
Taking Australian salmon and tailor by nets	For a period of 5 years from midnight 31 August 2001

APPENDIX B3. OCEAN HAULING FISHERY OCEAN BEACH HAUL CODE OF CONDUCT FOR THE 2001/02 SEASON

1.0 GENERAL

- 1.1 Endorsed fishers will comply with local Council and NSW National Parks and Wildlife Services (NPWS) by laws. Endorsed fishers must comply with the codes of conduct for fishers prepared by these organisations where these codes have been tabled before the Management Advisory Committee.
- 1.2 Endorsed fishers will not undertake any activity that brings the industry into disrepute or breaches any local arrangements agreed by the Management Advisory Committee.
- 1.3 Endorsed fishers will maintain public liability insurance policies to a minimum value of \$5 million while endorsed to operate in this fishery.

2.0 ACCESS TO BEACHES

- 2.1 Endorsed fishers will only use local Council or NPWS approved access points. Endorsed fishers will not make their own access tracks and will comply with any periodic closures of access points by these authorities.
- 2.2 Endorsed fishers will work with local Councils to signpost entry and exit points used by licensed fishers as well as the traditional hauling grounds agreed by the Management Advisory Committee.
- 2.3 Endorsed fishers will cooperate with a system of locked gates where appropriate and will safeguard keys issued to them.

3.0 VEHICLE USE

- 3.1 Endorsed fishers will obtain 4WD vehicle permits from local Councils or NPWS if required by that authority.
- 3.2 Endorsed fishers will drive in a safe manner at all times. Endorsed fishers will abide by a general limit of 30 km/hr on beaches. Endorsement holders will not drive on a beach in excess of five km/hr in flagged areas or when passing within 10 metres of other beach users. Endorsed fishers may travel at 50 km/hr on particular beaches agreed with local Councils or NPWS.
- 3.3 Endorsed fishers will operate flashing lights or hazard lights on their vehicles while travelling along a beach.
- 3.4 Endorsed fishers, when travelling on beaches or engaging in fishing operations, will display clearly and legibly in letters and numerals at least 150 mm in height on each side of their vehicles: the number corresponding with their endorsed region in a circle followed by the letters LFB and the number of their boat (or the boat licence number of the skipper of the crew if they do not own a LFB) the information notice supplied by NSW Fisheries This information will be affixed to the vehicle itself or boards displayed on the sides of the vehicle.
- 3.5 Endorsed fishers will minimise, as far as possible, the number of vehicles parked on beaches and will not exceed the number of vehicles agreed with the local Council for specific beaches.

3.6 Endorsed fishers will use only vehicles registered by the Road Traffic Authority in fishing operations or while travelling on beaches.

3.7 Endorsed fishers will not drive their vehicles on frontal sand dunes and will minimise, as far as possible, their impact on the landscape.

4.0 HANDLING OF FISH

4.1 Endorsed fishers will leave the beach clean at all times removing any litter as they leave the beach.

4.2 Endorsed fishers will deploy their gear in a way to minimise capture of prohibited size fish. The priority is to remove such fish first and release them in the water with the least possible harm. If a large number of prohibited size fish are killed the local Fisheries Office must be contacted within 3 hours of the incident.

4.3 Endorsed fishers will not target Tailor using gear prescribed for use within the ocean haul fishery.

4.4 Endorsed fishers will not bury fish in the dune system.

4.5 Endorsed fishers will comply with the instructions of local NSW Fisheries Officers about the handling of fish and, in particular, ice and storage requirements.

5.0 RELATIONS WITH OTHER BEACH USERS

5.1 Endorsed fishers will not allow any person to assist in any way in the operation of their nets unless they are a licensed commercial fisher holding an ocean haul endorsement in the same region where the hauling operations are taking place. Other persons may assist in the removal of the fish from the net provided that they are not the holder of a commercial fishing licence.

5.2 Endorsed fishers will not conduct a shot of a net within 100 m of flagged bathing areas.

5.3 Endorsed fishers will cooperate with dune care and environment groups.

5.4 Endorsed fishers will not use lights, other than hand held torches, to locate or land fish except on the traditional hauling grounds agreed with the Management Advisory Committee and identified in the public notices published in the NSW Government Gazette.

5.5 Endorsed fishers will provide, on request, their photographic identification cards to any person who requests identification.

5.6 Endorsed fishers will keep a copy of the 2001/02 Code of Conduct in their vehicle and make this copy available to members of the public upon request.

6.0 PRIORITY RIGHTS

6.1 Endorsed fishers will recognise and abide by priority rights of all other fishers as specified in the Act and Regulations.

6.2 Endorsed fishers will produce photographic identification cards to other fishers to ensure the required number of endorsed fishers for priority of shots are present.

APPENDIX C

APPENDIX C1. DESCRIPTION OF OCEAN HAULING GEAR

General conditions

(i) Variation to the ocean waters boundary occurs along the coast. Please refer to the Fisheries Management (General) Regulation 1995 for a detailed definition of ocean waters along the NSW coast.

(ii) Variations to regulated ocean hauling activities may occur in waters deemed as marine protected areas, aquatic reserves or Intertidal Protected Areas.

(iii) Species identified as threatened species, endangered species or vulnerable species under Schedules 4 and 5 of the *Fisheries Management Act 1994* cannot be taken in ocean hauling operations.

(iv) Where Australian salmon is listed as a target species, it may only be targeted south of Barrenjoey headland.

(v) Species with a prohibited size limit may be taken in a general purpose hauling net, however, only when greater than the applicable size limit.

Table 1. Hauling net (General Purpose)

Parameters	Current regulated definition	Recommended amendments to regulated
Area	Ocean waters and sea beaches	Ocean waters and sea beaches
Time		24 hour operations subject to seasonal and weekend closures
General Description	Includes hauling lines The length of each hauling line does not exceed total length of the net to which it is attached	Includes hauling lines The length of each hauling line does not exceed total length of the net to which it is attached
Total Length	1 March to 31 July each year- maximum 400 m	1 March to 31 July each year- maximum 400 m
Mesh size, Bunt or Wings	1 August to 28 February Mesh of wings > 80 mm Mesh of Bunt > 50 mm Bunt not > 1/3 total net length 1 March to 31 July each year Mesh of wings 65 to 86 mm Mesh of bunt 50 to 65 mm Bunt not > 1/3 total net length	1 August to 28 February Mesh of wings < 80 mm Mesh of Bunt < 50 mm Bunt not > 1/3 total net length 1 March to 31 July each year Mesh of wings 65 to 86 mm Mesh of bunt 50 to 65 mm Bunt not > 1/3 total net length
Rings ?		No Rings
Method of Use	The net is used only by the method of hauling The hauling net, once shot (any part other than the hauling line) is continued without interruption or delay until completed upon which any fish are immediately removed	To be shot from to the beach and retrieved to the beach The net is used only by the method of hauling The hauling net, once shot (any part other than the hauling line) is continued without interruption or delay until completed upon which any fish are immediately removed
Relationship to Boat		
Target Species	All species	Sea mullet, Australian salmon , luderick, yellowfin bream, unspecified mullet, dart, blue mackerel, sand whiting
Conditional Target Species		Leadennall (frigate mackerel), fantail mullet, mackerel tuna, mulloway, northern bluefin tuna, tarwhine, bonito, silver trevally, diamond fish, yellowfin tuna, sweep, spanish mackerel, bigeye tuna
Byproduct Limit		In each region for each method (net type), no more than 5% of the annual landed catch must be comprised of by-product species (all other species). On a shot-by-shot basis, not more than 20% of the catch can be by-product species. However, the total weight of any conditional target species may exceed 20% in a given shot
Minimal No. of Fishers Required	The net is operated by at least two commercial fishers	The net is operated by at least two appropriately endorsed commercial fishers
Additional Conditions	The net has a bunt in the centre and two wings of equal length OR the bunt is located between the end of the net first cast or shot and the centre of the net.	The net has a bunt in the centre and two wings of equal length OR the bunt is located between the end of the net first cast or shot and the centre of the net.

Table 2. Hauling net (General Purpose) in Jervis Bay

Parameters	Current regulated definition	Recommended amendments to regulated definition
Area	All other waters (except inland waters)- includes Jervis Bay	Jervis Bay
Time		24 hour operations subject to seasonal and weekend closures
General Description	Includes hauling lines	Includes hauling lines
Total Length	Maximum length- 375 m	1 August to 28 February Maximum length- 375 m 1 March to 31 July Maximum length- 400 m
Mesh size, Bunt or Wings	Bunt does not exceed 90m or 1/4 of total length of net (whichever is lesser) centre piece not >50 m nor <25 m in length Mesh- not >50 m in length Remainder of bunt- not >50 m, mesh not <50 mm Mesh of wings- not <80 mm	1 August to 28 February Bunt does not exceed 90 m or 1/4 of total length of net (whichever is lesser) centre piece not >50 m nor <25 m in length Mesh- not >50 m in length Remainder of bunt- not >50 m, mesh not <50 mm Mesh of wings- not <80 mm 1 March to 31 July each year Mesh of wings 65 to 86 mm Mesh of bunt 50 to 65 mm Bunt not >1/3 total net length
Rings ?		No rings
Method of Use	The net is used only by the method of hauling. The hauling net, once shot (any part other than the hauling line) is continued without interruption or delay until completed upon which any fish are immediately removed	To be shot from to the beach and retrieved to the beach The net is used only by the method of hauling. The hauling net, once shot (any part other than the hauling line) is continued without interruption or delay until completed upon which any fish are immediately removed
Relationship to Boat		
Target Species	All species	Sea mullet, Australian salmon , luderick, yellowfin bream, unspecified mullet, dart, blue mackerel, sand whiting
Conditional Target Species		Leadenall (frigate mackerel), fantail mullet, mackerel tuna, mulloway, northern bluefin tuna, tarwhine, bonito, silver trevally, diamond fish, yellowfin tuna, sweep, spanish mackerel, bigeye tuna
Byproduct Limit		In each region for each method (net type), no more than 5% of the annual landed catch can be by-product species (all other species). On a shot-by-shot basis, not more than 20% of the catch can be by-product or conditional target species
Minimal No. of Fishers Required	The net is operated by at least two commercial fishers	The net is operated by at least two appropriately endorsed commercial fishers
Additional Conditions	The net has a bunt in the centre and two wings of equal length	The net has a bunt in the centre and two wings of equal length

Table 3. Garfish Net (Bullringing)

Parameters	Current regulated definition	Recommended amendments to regulated definition
Area	All other waters (excluding inland)	The Ocean Hauling MAC have recommended that this net be restricted to estuary waters only and become solely a part of the Estuary General Fishery
Time		
General Description		
Total Length	Maximum length- 275 m	
Mesh size, Bunt or Rings ?	Mesh throughout- not < 28 mm nor >36 mm	
Method of Use	The net must be cast in a circle, immediately splashing the water in the vicinity, then picking up the net, all of which is to be completed in a continuous operation	
Relationship to Boat		
Target	Garfish	
Byproduct		
Minimal No. of Fishers		
Additional Conditions	The net is used between 1 February and 1 November each year	

Table 4. Garfish Net (Hauling)

Parameters	Current regulated definition	Recommended amendments to regulated
Area	All other waters (excluding inland)	All other waters (excluding inland)
Time		
General Description		
Total Length		Maximum length- 300 m with rope not > 300 m
Mesh size, Bunt or Wings	Mesh throughout- not < 28 mm nor > 85 mm	Mesh throughout- not < 28 mm nor > 85 mm No mesh size tolerance
Rings ?		No rings
Method of Use	The net is used only by the method of hauling In offshore ocean waters the net is not landed by any method other than onto the tray of a boat	For beach based- shot and hauled to and from the shoreline The net is used only by the method of hauling For boat based-shot & hauled to and from a boat In offshore ocean waters the net is not landed by any method other than onto the tray of a boat
Relationship to Boat		Only one boat to be used in the operation of the net
Target Species	Garfish	Sea garfish
Byproduct Limit	All other fish besides prohibited size fish taken while taking garfish	In each region for each method (net type), no more than 5% of the annual landed catch can be by-product species (all other species). On a shot-by-shot basis, not more than 20% of the catch can be by-product species Any species of fish with a prohibited size limit cannot be landed
Minimal No. of Fishers Required		The net is to be operated by at least two appropriately endorsed commercial fishers
Additional Conditions		Once shot, the net must be retrieved in a continuous motion

Table 5. Garfish Net (Hauling) in Jervis Bay

Parameters	Current regulated definition	Recommended amendments to regulated definition
Area	That part of Jervis Bay within NSW, together with all the bays and beaches of that part, generally westerly from a line drawn between Point Perpendicular & Bowen Island	That part of Jervis Bay within NSW, together with all the bays and beaches of that part, generally westerly from a line drawn between Point Perpendicular & Bowen Island
Time		
General Description		
Total Length		Maximum length- 300 m with rope that's not > 300 m
Mesh size, Bunt or Wings	Mesh throughout- not < 28 mm nor > 36 mm	Mesh throughout- not < 28 mm nor > 36 mm
Rings ?		No rings
Method of Use	The net is used only by the method of hauling	For boat based - shot & hauled to and from a boat. For beach based - shot and hauled to and from the shoreline
Relationship to Boat		Only one boat to be used in the operation Cannot haul from a boat whilst it is under power
Target Species	Garfish	Sea garfish
Byproduct Limit	All other fish besides prohibited size fish taken while taking garfish	In each region for each method (net type), no more than 5% of the annual landed catch can be by-product species (all other species). On a shot-by-shot basis, not more than 20% of the catch can be by-product species Any species of fish with a prohibited size limit cannot be landed
Minimal No. of Fishers Required		The net is operated by at least two appropriately endorsed commercial fishers
Additional Conditions		Once shot, the net must be retrieved in a continuous motion

Table 6. Pilchard, Anchovy and Bait Net

Parameters	Current regulated definition	Recommended amendments to regulated definition
Area	Ocean waters and sea beaches	Ocean waters and sea beaches
Time		24 hour operations subject to seasonal and weekend closures
General Description	Includes hauling lines	Includes hauling lines with maximum length 500 m each
Total Length		Maximum length- 300 m
Mesh size, Bunt or Wings	Mesh throughout- not < 13 mm	Mesh throughout- not < 13 mm
Rings ?		No rings
Method of Use	The net is used only by the method of hauling	The net is used only by the method of hauling For boat based- shot & hauled to and from a boat For beach based- shot and hauled to and from the shoreline
Relationship to Boat		Cannot haul from a boat whilst it is under power
Target Species	Pilchards, anchovies, slimy mackerel	Pilchard, sandy sprat (whitebait & glass fish), blue mackerel, yellowtail, anchovy
Byproduct Limit	All other fish besides prohibited size class of fish, garfish or prawns	In each region for each method (net type), no more than 5% of the annual landed catch can be by-product species (all other species). On a shot-by-shot basis, not more than 20% of the catch can be by-product species Garfish, prawns or any species of fish with a prohibited size limit cannot be landed
Minimal No. of Fishers Required		The net is to be operated by at least two appropriately endorsed commercial fishers
Additional Conditions		Once shot, the net must be retrieved in a continuous motion

Table 7. Purse Seine Net

Parameters	Current regulated definition	Recommended amendments to regulated
Area	Ocean waters	Ocean waters
Time		24 hour operations subject to time and area
General Description		Any net with rings or purse rope is deemed to be a purse seine net A purse seine net is a net with a cork line and leadline with rings attached to the leadline
Total Length		Either maximum length- 1000 m or as prescribed by the net registration (whichever is less)
Mesh size, Bunt or Wings	Mesh throughout- not > 150 mm	Mesh throughout- not > 150 mm
Rings ?		Along the length of the leadline
Method of Use		To be shot and retrieved to the same vessel, continuous shot
Relationship to Boat		Net must be shot from a boat and retrieved to a boat
Target Species		Blue mackerel, yellowtail, pilchard, sweep, jack mackerel, Australian salmon, anchovy, sandy sprat (whitebait and glass fish), silver trevally, bonito
Byproduct Limit	All fish other than prohibited size class of fish, garfish, kingfish, tuna or prawns	No more than 5% of the annual landed catch can be by-product species (all other species). On a shot-by-shot basis, not more than 20% of the catch can be by-product species Garfish, kingfish, tuna, prawns or any species of fish with a prohibited size limit cannot be landed
Minimal No. of Fishers Required		
Additional Conditions		

Table 8. Purse Seine Net in Jervis Bay and Twofold Bay

Parameters	Current regulated definition	Recommended amendments to regulated definition
Area	Twofold Bay & Jervis Bay	Twofold Bay & Jervis Bay
Time		24 hour operations subject to time and area closures
General Description		Any net with rings or purse rope is deemed to be a purse seine net A purse seine net is a net with a cork line and leadline with rings attached to the leadline
Total Length	Maximum length- 275 m	Maximum length- 275 m
Mesh size, Bunt or Wings		Mesh throughout- not > 150 mm
Rings ?		Along the length of the leadline
Method of Use		To be shot and retrieved to the same vessel, continuous shot
Relationship to Boat		Net must be shot from a boat and retrieved to a boat
Target Species	All fish other than prohibited size class of fish, garfish, kingfish, tuna or prawns	Blue mackerel, yellowtail, pilchard, sweep, jack mackerel, Australian salmon, anchovy, sandy sprat (whitebait and glass fish), silver trevally, bonito
Byproduct Limit		No more than 5% of the annual landed catch can be by-product species (all other species). On a shot-by-shot basis, not more than 20% of the catch can be by-product species Garfish, kingfish, tuna, prawns or any species of fish with a prohibited size limit, cannot be landed
Minimal No. of Fishers Required		
Additional Conditions		

Additional Gear Managed by the Ocean Hauling Fishery

Table 9. Purse Seine Net (Section 37 Permit)

Parameters	Current regulated definition	Recommended amendments to regulated definition
Area	Ocean waters	Ocean waters only
Time	Permit issued for a year, must renew to continue	Permit issued for a year, must renew to continue
General Description	Must use registered purse seine net	Any net with rings or purse rope is deemed to be a purse seine net A purse seine net is a net with a cork line and leadline with rings attached to the leadline Must use registered purse seine net (registered in NSW)
Total Length		
Mesh size, Bunt or Wings	Mesh throughout- not >150 mm	Mesh throughout- not >150 mm
Rings ?		Along the length of the leadline
Method of Use		To be shot and retrieved to the same vessel, continuous shot
Relationship to Boat	May only be used from vessel specified on permit	May only be used from vessel specified on permit and that vessel must be licensed in NSW
Target Species	Pilchards (only where specified on permit), yellowtail, blue mackerel	Pilchards (only where specified on permit), yellowtail, blue mackerel
By-product Limit	None	None
Minimal No. of Fishers Required		
Additional Conditions	Permit is only current whilst holding Commonwealth permit Cannot take fish for sale Copy of permit must be carried at all times Yellowtail and blue mackerel may be retained and frozen for later use Pilchards may only be taken if on permit, and then only used as live bait for poling	Can only use whilst holding a current State permit State permit is only current whilst holding a current Commonwealth permit Cannot take fish for sale Copy of permit must be carried at all times Yellowtail and blue mackerel may be retained and frozen for later use Pilchards may only be taken if on permit, and then only used as live bait for poling Must submit monthly catch return form recording bait taken in NSW waters

Table 10. Submersible Lift Net (Bait)

Parameters	Current regulated definition	Recommended amendments to regulated
Area	Ocean waters	Ocean waters
Time		
General Description		
Total Length	Maximum- 15 m length, 15 m width	Maximum- 15 m length, 15 m width
Mesh size, Bunt or Wings	Mesh throughout- not <13 mm nor >25 mm	Mesh throughout- not <13 mm nor >25 mm
Rings ?		
Method of Relationship to Boat		
Target Species	Blue mackerel, yellowtail and pilchards	Blue mackerel, yellowtail and pilchards
By-product Limit	None	None
Minimal No. of Fishers Required		
Additional Conditions	Only for the use as bait in the taking of tuna Not within 300 m from Park Beach bombora (153°9'08", 30°17'82") or within 200 m of Cook Island, Merimbula fishing platform and Tathra wharf	Only for the use as bait in the taking of tuna Not within 300 m from Park Beach bombora (153°9'08", 30°17'82") or within 200 m of Cook Island, Merimbula fishing platform and Tathra wharf

Table 11. Submersible Lift Net (Bait) in Jervis Bay and Twofold Bay

Parameters	Current regulated definition	Recommended amendments to regulated definition
Area	Twofold Bay & Jervis Bay	Twofold Bay & Jervis Bay
Time		
General Description	Not within Twofold Bay west of a line between Snug Cove and Cattle Bay	Not within Twofold Bay west of a line between Snug Cove and Cattle Bay
Total Length	Maximum- 15 m length, 15 m width	Maximum-15 m length, 15 m width
Mesh size, Bunt or Wings	Mesh throughout- not <13 mm nor >25 mm	Mesh throughout- not <13 mm nor >25 mm
Rings ?		
Method of Use		
Relationship to Boat		
Target Species	Blue mackerel, yellowtail and pilchards	Blue mackerel, yellowtail and pilchards
By-product Limit	None	None
Minimal No. of Fishers Required		
Additional Conditions	Only for the use as bait in the taking of tuna	Only for the use as bait in the taking of tuna

APPENDIX F

APPENDIX F1. PROFILES OF THREATENED SPECIES

a) Fisheries Management Act 1994

i) Endangered species

Green sawfish (*Pristis zijsron*)

The following information was taken from the NSW Fisheries Scientific Committee's website (www.fsc.nsw.gov.au), which provides profiles of species listed in the FM Act. Green sawfish have been recorded in the tropical Indo-West Pacific from eastern Australia and Papua New Guinea through to western India, with a disjunct population off Mozambique and eastern South Africa. In Australia, the species occurs mainly in the tropics from Broome to southern Queensland, with individuals found as far south as Sydney and a single record from Glenelg, South Australia. In NSW, specimens have been collected from Byron Bay in the north to Parramatta River in the south, plus an unofficial record from Jervis Bay. The species is thought to grow to approximately 7.3 m in length and has been reliably recorded at 5 m, with males maturing by 4.3 m. This is a species with low fecundity and it is thought that they may have up to 20 young. They feed on fishes and benthic invertebrates, using the saw as a club to stun schooling fishes such as mullet, and as a shovel to uncover benthic animals (Allen 1989). Green sawfish have suffered a serious population decline in NSW. Prior to 1972, the species was regularly found in the shallow waters at the mouths of the Tweed, Clarence and Richmond Rivers and on outside ocean beaches such as Yamba. The last specimen from the Sydney region was taken in 1926. The causes of this decline are thought likely to include:

- bycatch in shallow water prawn trawling, and other netting methods in shallow water, as they would rarely have been returned to the water alive
- targeted harvest for flesh, fins and saws. The fins command a high price in the shark fin trade and the saws are used in traditional medicine and were sold as curios
- habitat degradation.

Sawfish are also listed as vulnerable under the EPBC Act.

Grey nurse shark (*Carcharias taurus*)

Grey nurse sharks are found around the world in inshore waters, primarily in sub-tropical and temperate regions around the main continental landmasses, with the exception of the eastern coast of North and South America and Antarctica. Known key sites for grey nurse sharks or major aggregations of the species in NSW can be found at reefs off Port Stephens, Seal Rocks, Forster, Laurieton, Batemans Bay and South West Rocks. Relatively little is known about the migratory habits of Australian grey nurse sharks. There is evidence from Australian data that suggests migrational movement, probably in response to water temperatures, up and down the coast. At certain times of the year, grey nurse sharks aggregate according to sex. Males are predominant in southern Queensland during July to October, while a high proportion of sharks off central NSW at the same time of year is composed of females. Grey nurse sharks are often observed just above the seabed in or near deep sandy-bottomed gutters or rocky caves, in the vicinity of inshore rocky reefs and islands, generally between 15 m and 25 m. They have also been recorded in the surf zone, around coral reefs, and to

depths of around 200 metres on the continental shelf. The diet of the adult grey nurse shark consists of a wide range of fish, other sharks, squids, crabs and lobsters, and some observations also suggest that schools of grey nurse sharks can feed cooperatively by concentrating schooling prey before feeding on them (Environment Australia, 2000a).

In Australia, two populations are thought to exist, one on the east coast and one on the west. The east coast population has been recorded from as far north as Mackay and extends south around the greater part of the southern half of the continent. On the west coast, the population extends as far north as the North West Shelf. They are still found within this general historical range, but the east coast population is thought to have declined considerably. During the 1960s and 1970s, spearfishers took large numbers of grey nurse sharks and reduced the population to a low level. Setlining by commercial fishers also continues to take a small number each year, and the beach meshing program was also responsible for catching large numbers of grey nurse sharks up until 1975. Despite protection since 1984 in NSW waters, the species has not shown an increase in population size. Current research (quarterly surveys from November 1998) indicates a much lower adult population size than when the species was recommended to be listed as a vulnerable species in NSW (early 1999), and the status of juvenile numbers in the sampled population is uncertain (www.fsc.nsw.gov.au, 1999). These factors were also largely responsible for its listing as a vulnerable species under the EPBC Act.

ii) Vulnerable species

Black cod (*Epinephelus daemeli*)

Black cod are found on estuarine and inshore reefs and deeper offshore reefs in temperate and subtropical waters of the southeastern Pacific. In Australia, they are found from Queensland to Kangaroo Island, although they are rare and probably only represented by non-breeding migrants in more southern areas. Hence, they are found along the entire NSW coastline, which is also the centre of the species' Australian mainland distribution (Heemstra and Randall 1993; Pogonoski *et al.*, In prep). Their maximum size is 1 - 2 metres in length, but are commonly only found up to 0.8 m (Hutchins and Swainston 1986). Smaller fish are females, which change sex to become male at around 1 m in length (Pollard unpublished). They are an aggressive, highly territorial species, and are usually found in association with caves, ledges or large underwater structures such as bridge pylons that they may occupy for life (Gill and Reader 1992; Henrisson and Smith 1994). Their numbers are reported to have declined significantly as a result of spearfishing pressure in the 1970s (Pogonoski *et al.*, In prep.). Lincoln Smith *et al.* (1989) reported that 137 black cod were caught in spearfishing competitions in NSW in 1976 alone. Their territorial and curious nature, combined with their slow movement, is thought to have made them an easy target and a prize catch by both line and spearfishers, although they are no longer thought to be targeted by either group of fishers. Commercial fishers still report occasional captures, particularly from deeper offshore reefs. Historical, anecdotal evidence suggests that a decline in abundance in the Sydney region occurred around 1900 when coastal towns became populous and fishing and shipping pressures increased (Roughley, 1916). Their slow growth and territoriality probably also prevents rapid recovery from decreases in population. Despite protection in NSW waters since 1983, there is no evidence of an increase in their abundance.

Great white shark (*Carcharodon carcharias*)

White sharks are found worldwide in temperate, coastal waters but are rare in tropical waters. In Australia, they have been recorded from southern Queensland to northwestern Western Australia. There are no reliable estimates of the number of white sharks in Australian waters, but it is thought

that the numbers of fish are decreasing (Environment Australia, 2000b). Based on data sets from the region between Port Stephens and Wollongong, great whites appear to have suffered a population decline in NSW, with a reported decreases in annual catches in beach meshing from 1950s to 1990s, and less compelling evidence of decline from game-fishing landings (www.fsc.nsw.gov.au, 1998).

In many places around the world the white shark is a protected species. This happened first in South Africa in 1992, then in Namibia, the Maldives, and in Florida and California. This species is now protected in all Australian states and territorial waters. It is believed that a white shark of 5 - 6m in length is likely to be 15 - 25 years old, and the most commonly encountered white sharks are between 3 - 4 m in length. Females mature at 4.5 - 5 m in length and males at probably less than 4 m, and as the fish matures, its diet changes. Fishes to about 2 metres normally eat squid and other fishes such as stingrays and other sharks. Adults eat seals, sea lions, dolphins and dead whales, although some will continue to eat fishes such as snapper. They have also been known to eat elephant seals, sea otters, turtles and sea birds. They are also listed as vulnerable under the EPBC Act.

iii) Protected species - Section 19 (totally protected)

Estuary cod (*Epinephelus coioides*)

Estuary cod are found in Africa, India, Singapore, Hong Kong, Taiwan, Philippines, and Reunion, Mauritius and Andaman Islands. In Australian waters, they are most common in Queensland, Northern Territory and Western Australian waters. In NSW, they are found on estuarine and inshore reefs from about Sydney northwards (Heemstra and Randall, 1993; Pogonoski *et al.*, In prep.). They are reasonably territorial, but have been found in a wide variety of estuarine and marine habitats but are most common in lower estuaries and around protected silty reef habitats. Adults are usually found along the bases of small drop-offs, or in caves or shipwrecks (Pogonoski *et al.*, In prep.). Estuary cod grow to about 1 metre in length (Kuitert, 1993), and although they were probably never abundant in NSW estuaries, are considered vulnerable to a variety of fishing pressures including demand for the live fish trade (Pogonoski *et al.*, In prep.). Consequently, they are totally protected in NSW waters.

Queensland groper (*Epinephelus lanceolatus*)

The Queensland groper is fairly similar to the estuary cod, and has a similar range and habitat preference within NSW (Pogonoski *et al.*, In prep). They do, however, grow to a much larger size of up to 3 metres (Kuitert, 1993). Queensland groper is totally protected within NSW waters for similar reasons to those applicable to the estuary cod.

Weedy seadragon (*Phyllopteryx taeniolatus*)

Seadragons are a member of the family Syngnathidae, which also includes seahorses and pipefishes. An unusual feature of this family of small fishes is that the male broods the young, which leave the brood pouch at a relatively advanced stage (Kuitert, 1993). Weedy seadragons are found on estuarine and inshore reefs along the NSW coastline north to about Port Stephens (Hutchins and Swainston, 1986). Their preferred habitat appears to be the interface between kelp beds and sand (Kuitert, 1993). Their maximum size is about 45 cm (Kuitert, 1993). The species is quite common in its preferred habitat and population numbers are not thought to have declined (Pogonoski *et al.*, In prep.), however, due to its vulnerability to over-collecting for the aquarium trade, it is totally protected within NSW waters.

iv) Protected species - Section 20 (protected from commercial fishing)

Blue groper (*Achoerodus viridis*)

The blue groper is a marine fish that inhabit inshore rocky reefs along the entire NSW coastline (Kuitert, 1993). Their young recruit to sheltered habitats that provide physical structure, including estuarine seagrass beds (Gillanders, 1999). Larger juveniles are common around sheltered rocky reefs within the lower reaches of marine-dominated estuaries, and appear to gradually move out to inshore reefs as they grow (Gillanders, 1999). They are a popular angling species, attaining at least 1.2 metres in length (Kuitert, 1993). Populations appeared to decline sharply in the 1960s because of fishing pressure, and although significant recovery has occurred in recent years, the species remains protected from spearfishing and commercial exploitation within NSW in view of its curious behaviour and popularity with SCUBA divers (Smith *et al.*, 1996).

b) Threatened Species Conservation Act 1995

Unless otherwise specifically referenced, the following species profiles were obtained from the website of the NSW National Parks and Wildlife Service, at www.npws.nsw.gov.au/2001. The profiles for marine turtles and dolphins were obtained from the website of Environment Australia, at www.environment.gov.au, respectively.

i) Endangered species

Birds

Beach stone-curlew (*Esacus magnirostris*)

Beach stone-curlews are exclusively coastal and have been recorded around the north coast of Australia and associated islands from Onslow in Western Australia to the Nambucca River in NSW, and rarely southwards to Forster (Marchant and Higgins, 1993). They have largely disappeared from the southeastern part of its former range and are now rarely recorded on ocean beaches in NSW. They prefer open, undisturbed beaches, islands, reefs and estuarine intertidal sandflats and mudflats with mangroves nearby. They also frequent river mouths, offshore sandbars associated with coral atolls, reefs and rock platforms and coastal lagoons. They forage at low tide in search of crabs and other marine invertebrates. Threats to the species include loss of habitat due to residential and industrial development, human disturbance through beach-combing, boating and 4WD vehicles, predation by raptors, cats and dogs, nest destruction by pigs or high tides, and nest desertion.

Gould's petrel (*Pterodroma leucoptera leucoptera*)

Gould's petrel is a member of the gadfly group of petrels. All members of the group are pelagic, soaring erratically on narrow wings and feed on surface fish, squid and krill. The non-breeding range and feeding areas are unknown, but it is thought to forage predominantly within the Tasman Sea. Gould's petrel breed primarily on Cabbage Tree Island and to a lesser extent on Boondelbah Island, offshore from the entrance to Port Stephens. Adult birds begin arriving on Cabbage Tree Island from mid to late September, and the fledglings depart the island from late March to early May, and are thought to then remain at sea for several years. Threats to the species include: nesting habitat degradation by rabbits; the subsequent proliferation of bird-lime trees, the sticky fruits of which entangle the birds; and predation by currawongs and ravens. A recovery plan and program has been implemented and seen a reduction of these threats and corresponding increase in population

numbers and survival. The recovery plan also recommends that Cabbage Tree Island be declared Critical Habitat under the TSC Act (NPWS, 2000c).

Hooded plover (*Thinornis rubricollis*)

Hooded plover occur on sandy beaches and inland saltlakes of southeastern and southwestern Australia. They are endemic to southern Australia and are found along the coast from Jarvis Bay to the western Eyre Peninsula in South Australia, along the coast of Tasmania, the Bass Strait Islands and from 30°S on the Western Australia coast to the western edge of the Great Australian Bight. Occasional strays are recorded as far north as Sydney, but the most important sites for the species are on the south coast. Sussex Inlet, particularly on Bhewerre and Cudmirrah Beaches, is thought to support the highest density of hooded plovers, followed by the coastline between Lake Conjola and Lake Tabourie (Carter, 1995). A survey in 1988 suggested the NSW population might be as low as 62 individuals of a total population of approximately 5000 (Marchant and Higgins, 1993). Hooded plover are found most often on long stretches of sandy shore, backed by tussock or dunes covered in creeping plants with nearby inland lakes. Preferred habitat has a wide wave-wash zone with beachcast seaweed for feeding, backed by sparsely vegetated sand dunes for shelter and nesting. Their diet includes polychaete worms, molluscs, crustaceans, insects, waterplants and seeds. Threats to the species include artificially high populations of silver gulls around human settlements leading to increased predation, predation by foxes and raptors, loss of habitat due to development for housing and recreation, human disturbance during the summer breeding season, particularly four-wheel driving along sand dunes and beaches, and destruction of nests by stock.

Little tern (*Sterna albifrons*)

Little terns are migratory or partly migratory seabirds. They occur from Shark Bay in Western Australia, around northern and eastern Australia, to the east coast of Tasmania and around to the Gulf of St Vincent in South Australia. In NSW, a second population of the subspecies *sinensis* predominantly occurs, which is migratory, breeding in the spring and summer along the entire east coast from Tasmania to northern Queensland. The other population of the subspecies breeds in Asia and migrates to Australia in summer, masking the size of the threatened, eastern Australian population. Little terns have been recorded nesting at 70 sites along the NSW coast, but at only 31 since 1987 and 11 in 1998/99. Since 1995, the largest, most successful colonies have been at Sawtell, Harrington, Botany Bay, Lake Wollumboola and more recently Farquhar Inlet (formerly known as Old Bar) (NPWS, 2000b). In NSW, the species is strictly coastal. Most of the nesting sites are sand-spits, sand islands or beaches within or adjacent to the mouths of rivers, creeks and coastal lakes. Nesting also occurs at some sites on ocean beaches well away from estuaries, but often with a large coastal lake nearby. Little terns in NSW feed predominantly, perhaps exclusively, on fish less than 10 cm long and often generally referred to as whitebait. They include perchlets (*Ambassis* spp.), surfsardines (*Iso rhotophilus*) and sprats (Clupeidae), but may also include juvenile mullet, gudgeons, tailor and whiting. Most feeding occurs inside or at the mouths of estuaries and up to 500 m offshore. There are numerous threats to the species, and human disturbance has been identified as a major, and often the most important factor leading to poor breeding success and abandonment of nest sites. Human disturbance can range from the extreme of 4WD and trail-bike use through to walking or simply sitting or fishing on the beach, all of which may keep the terns off nests. Others include adverse weather conditions, nesting at locations prone to flooding, predation by foxes, dogs, cats, rats and a variety of birds, coastal development, availability of food, damage to estuarine habitats and pollution (NPWS, 2000b). It is also listed as endangered under the EPBC Act.

Wandering albatross (*Diomedea exulans*)

Wandering albatross are circumpolar in distribution, occurring over pelagic waters of the Southern Ocean, including around South America, New Zealand, Australia, South Africa and Antarctica. In the Australasian region, they occur inshore, offshore and in pelagic waters, regularly feeding in sheltered harbours and straits, and have been recorded as gathering at sewage outfalls. They feed mostly on cephalopods and fish by scavenging, seizing food from the surface, shallow plunging or pursuit plunging, and do most of their hunting at night. They have also been recorded following schools of dolphins, southern right whales (*Balaena glacialis*), pilot whales (*Globiocephala* spp.) and southern right whale dolphins (*Lissodelphis peronii*). They breed on subantarctic and Antarctic Islands in the Indian Ocean, Atlantic Ocean and seas south of New Zealand. They nest on coastal or inland ridges, slopes, plateaus and plains, often on marshy ground, and prefer open or patchy vegetation for easy access, near exposed ridges or hillocks for take-off. In NSW, they are most abundant from mid-June to mid-September. Historical threats to the species include accidental and deliberate killings at commercial fishing grounds adjacent to breeding islands, egg collecting and end nest predation. Current threats are thought to be primarily long-line fishing operations and possibly trawling (Marchant and Higgins, 1993).

Marine mammals

Blue whale (*Balaenoptera musculus*)

Blue whales are distributed worldwide in oceanic waters, but are not necessarily restricted to deeper waters. They undergo extensive migrations between warm water (low latitude) breeding grounds and cold water (high latitude) feeding grounds, although the exact breeding ground locations are unknown. Feeding is restricted to colder, i.e. Antarctic waters, almost exclusively on *Euphausia superba*, and they are generally characterised as swallows or gulpers. The migration paths are also widespread and do not necessarily follow coastlines or oceanographic features. In the Southern Hemisphere, they are generally found between 20°S and 60 – 70°S, and have been recorded from all Australian states, particularly Western Australia. Past threats include over-hunting in commercial whaling operations, leading to a drastic reduction in population numbers to only a small remnant of original, e.g. in southern hemisphere from approximately 200,000 to perhaps fewer than 1,000. Current threats are thought to include direct disturbance from:

- seismic operations
- collision with large vessels
- entanglement in fishing gear
- defence operations
- pollution, including increasing amounts of plastic debris at sea, oil spills and dumping of industrial wastes into waterways and the sea, leading to accumulation of toxic substances in body tissues.

Blue whales are also classified as endangered under the EPBC Act.

ii) Endangered populations

Little penguins (*Eudyptula minor*) at Manly, Sydney Harbour

Little penguins, only found in Australia and New Zealand, once ranged from Swan River in Western Australia through Tasmania and up to Moreton Bay in Queensland, and may still occasionally venture that far. They are relatively common in the waters of southern Australia, breeding mainly on offshore islands. They generally breed from south of Port Stephens in NSW, including the Sydney region, along the coast through Victoria, South Australia, Tasmania and as far as Fremantle in Western Australia. In 1986, it was estimated that the total breeding population in eighteen known colonies in NSW consisted of 17,000 pairs, most at the large colonies on Montague, Tollgate and Brush Islands. It is now believed to be closer to 49,000 birds at 22 known sites, however, the population in North Harbour/Manly is the only population known to breed on mainland NSW, and consists of only approximately 50 breeding pairs.

Little penguin nesting habitat normally consists of burrows built in sand dunes, rockpiles, sea caves, and occasionally under buildings. At Manly, a range of nest types are utilised, including under rocks on the foreshore, rock falls under seaside houses, garages, under stairs, in wood piles and under overhanging vegetation. Male penguins return to their colonies between June and August to reconstruct or dig new burrows and to attract females. About 3 months later, fledglings leave the nest and only return annually to moult until they are about 3 - 4 years old, when they return to breed.

Little penguins appear to be opportunistic feeders, foraging in relatively shallow waters. Their diet consists mainly of small schooling fish, like anchovies (*Engraulis australis*), pilchards (*Sardinops neopilchardus*), squid (Order Teuthida) and to a lesser extent, krill (Euphausiids). The population of penguins on Lion Island, in the Hawkesbury River, is also known to feed on blue sprats (*Spratelloides robustus*), small-mouthed hardyheads (*Atherinosoma microstoma*) and Ogilby's hardyheads (*Atherinomorus ogilbyi*).

The major threat to the Manly population is the loss of suitable habitat. Past development has greatly reduced available habitat in the area. Disturbance of little penguins and their habitat is also a major threat to the population. Predators such as dogs, cats, and foxes are known to take penguins from shallow burrows and as they move between the water and their nesting habitat. Commercial fishing has also been listed in the threat abatement plan as a threatening process, although there is currently no data to support the claim and fishing is not listed in the Act as a Key Threatening Process. Fishing, primarily hauling in this area, provides competition for food resources, disturbance due to noise outside burrows and may obstruct penguins from returning to their nests (NPWS, 2000a).

iii) Vulnerable species

Reptiles

Green turtle (*Chelonia mydas*)

Green turtles occur worldwide and are found in tropical and subtropical waters. They inhabit seagrass beds and coral reefs with a good cover of seaweed. Adult turtles are herbivores, feeding on seaweeds and seagrasses, whereas immature turtles feed on jellyfish, small molluscs, crustaceans and sponges. Green turtles grow to an average of about 1 metre and are sexually mature generally between 91.5–122.5 cm CCL. They may migrate up to 3000 km from feeding grounds in Indonesia, Papua New Guinea, New Caledonia, Fiji, Queensland, Northern Territory and Western Australia to breed and

nest in southern and northern Great Barrier Reef, northwest Northern Territory, Gulf of Carpentaria, Western Australia, Coral Sea and Ashmore Reef. Nesting generally occurs from late November to January and earlier in the Northern Territory from July to December. They recruit from the pelagic phase as immature turtles (CCL = 40-50 cm) to inhabit subtidal and intertidal coral and rocky reefs and seagrass meadows of the continental shelf. While they are most abundant within 1000 km of their nesting beaches, they live year round in coastal waters from central Western Australia, through Northern Territory and Queensland to central New South Wales, continuing to feed in waters as cool as 15°C. Green turtles are also listed as vulnerable under EPBC Act.

Leatherback turtle (*Dermochelys coriacea*)

Leatherback turtles are the largest of the marine turtles, with shells averaging 1.6 metres in length and with a total weight of up to 500 kg. They are so named because of their leathery shell, which is black with lighter spots and has five ridges. They inhabit tropical and warmer temperate waters, feeding on jellyfish and other soft bodied invertebrates. Unlike other marine turtles, leatherbacks spend almost their entire life feeding within the water column and are generally regarded as an oceanic species. Leatherback turtles do not nest in Australia in any numbers. Only a small population of leatherback turtles has been found breeding and nesting in eastern Australia, mainly from December to January. In Queensland, 1-3 females per year nest on Wreck Rock and adjacent beaches, and sporadic nesting occurs at other widely scattered sites in Queensland, New South Wales and the Northern Territory. In Western Australia, there are 2-6 sightings off the mid-west coast per year. The major breeding and nesting sites in the Asia/Pacific occur in Indonesia, Malaysia, Papua New Guinea and the Solomon Islands. They are listed as vulnerable under EPBC Act.

Loggerhead turtle (*Caretta caretta*)

Loggerhead turtles are found worldwide, inhabiting tropical and warmer temperate waters such as coral reefs, bays and estuaries. While they are most abundant within 1000 km of their nesting beaches, they live year round in coastal waters from southern Western Australia, through the Northern Territory and Queensland to southern New South Wales. The southern Great Barrier Reef and adjacent mainland near Bundaberg is the breeding centre of the eastern Australian population. Breeding is centred on Dirk Hartog Island (Shark Bay), Muiron Islands, Ningaloo and the North West Cape area for the western population. Loggerhead turtles eat shellfish, crabs, sea urchins and jellyfish. They reach sexual maturity at about 30 years or more and grow to an average of 1 metre in size. Loggerhead turtles migrate from feeding grounds in the Northern Territory, New South Wales and Queensland to the above nesting sites on the eastern and western Australian coastlines. Mating occurs from late October to early December, followed by nesting from late October to early March. They recruit from the pelagic phase as immature turtles (CCL = 70-80 cm, >10 years) to inhabit subtidal and intertidal coral and rocky reefs and seagrass meadows as well as deeper soft-bottomed habitats of the continental shelf. They are listed as endangered under EPBC Act.

Birds

Black-browed albatross (*Diomedea melanophris*)

Black-browed albatross are circumpolar in distribution, occurring over pelagic waters of the Southern Ocean, including around South America, New Zealand, Australia, South Africa and Antarctica. In Australia, they occur along the east coast from Stradbroke Island in Queensland, along the entire south coast of the continent to Western Australia. They regularly migrate to waters off the continental shelf from May to November and are regularly recorded off the coast of NSW during this

time. Black-browed albatross feed on fish, crustaceans, cephalopods and offal, and often forages in flocks with other seabirds. Prey are usually seized from the surface while swimming or landing, as well as by submerging themselves to capture prey underwater and by scavenging behind fishing vessels. The latter technique, particularly related to long-line vessels, is one of the processes threatening the species, along with disturbance to nesting colonies by introduced predators.

Black-tailed godwit (*Limosa limosa*)

Godwits are migratory wading birds that breed in Mongolia and Siberia, and visit Australia during the summer, arriving in August and leaving in March. They are most common between Weipa and Darwin, but is also found in small numbers along much of the Queensland coast south of Cairns, south of Derby in Western Australia, the southeast of South Australia, and mainly around Port Phillip Bay in Victoria. In NSW, they have been regularly recorded only on Kooragang Island (Hunter River), with scattered sightings from both coastal and inland areas. Inland records, particularly within the Murray-Darling Basin, indicate that a regular inland passage is used. Godwits are primarily found along the coast on sand spits, lagoons and mudflats, and inland on mudflats of lakes and swamps. They have also been recorded in meadows and sewage treatment works. Their diet includes a variety of invertebrates such as insects and larvae, earthworms, crustaceans, molluscs, spiders, spawn and tadpoles of frogs and fish eggs. Threats to the species include hydrological changes to inland lakes and tourism or agricultural developments reducing coastal and inland habitat areas.

Black-winged petrel (*Pterodroma nigripennis*)

Black-winged petrels are marine, pelagic seabirds of the subtropical and tropical southwest and central Pacific Ocean. They frequent the north Tasman Sea and areas extending eastwards into the central southern Pacific Ocean. Within Australia, the species has been sighted in scattered areas along the southern Queensland and NSW coastline. In NSW, they have been observed ashore at Muttonbird Island, Byron Bay, Lord Howe Island, Norfolk Island, Newcastle, Cronulla, Batemans Bay, Solitary Island, Wollongong and Eden. They are thought to feed on squid and prawns, which they catch seizing from the surface or shallow diving. While at sea, it is usually solitary, although it does form loose groups of up to 20 when feeding. They also nest in colonies on subtropical and tropical islands and inlets in the southwestern Pacific Ocean. Breeding grounds are usually on vegetated coastal slopes or rugged terrain inland. Nests are generally located on higher ground in burrows or rock crevices, with the entrance hidden by scrub, tussocks and grasses. Threats to the species include predation by cats, rats, pigs and goats.

Broad-billed sandpiper (*Limicola falcinellus* subsp. *sibirica*)

This subspecies of sandpiper are migratory wading birds that breed in north and northeastern Soviet Union, and visit India, southeast Asia and Australia during the summer. In Australia, they are most common along the northern coasts, particularly the northwest, with occasional birds seen on the southern coasts and very few inland. In NSW, the main site for the species is the Hunter River, with records along the coast south to Shoalhaven River. They are known to favour estuarine sand- and mudflats, particularly areas of soft mud on the seaward side of mangroves, saltmarshes and reefs as feeding and roosting habitat. They have also been recorded in shallow freshwater lagoons and sewerage treatment works. Their diet includes insects, worms, crustaceans, molluscs and seeds. Threats to the species include hydrological changes to inland lakes (for individuals that remain in Australia over winter) and development of coastal estuaries, mudflats and saltmarshes.

Fleshy-footed shearwater (*Puffinus carneipes*)

The flesh-footed shearwater is a pelagic, trans-equatorial migrant, widely distributed across the southern Indian Ocean and southeastern Pacific Ocean in the breeding season. They are a breeding and non-breeding visitor to the coastal and pelagic waters of southern Australia, where they are locally common in all months of the year. Breeding is from late August to December. Offshore of northeastern NSW, the species is predominantly recorded from September to May, with breeding birds foraging around Lord Howe Island from August to May. Nests are made in burrows on gentle to steep slopes, with moderate vegetation and adjacent elevated areas for take-off. They feed on fish and squid by seizing prey from the surface, as well as surface plunging and pursuit diving to 4 m. They also scavenge for food. They have been recorded taking offal from behind fishing boats and running among gulls to seize offal from beaches. They feed during the day, flying out to sea before sunrise and returning in the late afternoon. Threats to the species include native and introduced predators, disturbance of nesting sites by humans, and historical killing for food, feathers and oil.

Great knot (*Calidris tenuirostris*)

Knots are migratory wading birds that breed in Siberia and migrate to Australia in large numbers from late August, leaving in March and April. Some individuals may stay over winter. They occur throughout Australia, including the coastal islands of Tasmania, but is most common and abundant in the north, and uncommon to rare further south. In NSW, they have been recorded in scattered sites along the coast to about Narooma, and are primarily found within sheltered, coastal habitats containing large intertidal sand- and mudflats, including in inlets, bays, harbours, estuaries and lagoons. They have also been recorded on exposed reefs or rock platforms. Their diet includes bivalve molluscs, gastropods, polychaete worms and crustaceans. Threats to the species include hydrological changes to inland lakes (for those that remain over winter) and tourism or agricultural developments reducing coastal and inland habitat areas.

Greater sand plover (*Charadrius leschenaultii*)

Sand plovers are migratory wading birds that breed in central Asia and migrate to Australia in summer. The species is commonly recorded on the west coast, but is apparently rare on the east coast. In NSW, they have been recorded in coastal areas from the northern rivers region south to Shoalhaven Heads, with the majority of birds recorded in the Clarence and Richmond Rivers. They forage on intertidal sand- and mudflats in estuaries, and roost during high tide on sandy beaches or rocky shores. They have also been recorded on inshore reefs, rock platforms, and small rocky islands and sand cays on coral reefs. Their diet includes insects, molluscs and crustaceans. Threats to the species include hydrological changes to the Clarence and Richmond Rivers and tourism or agricultural developments reducing coastal and inland habitat areas.

Grey ternlet (*Procelsterna cerulea*)

The grey ternlet occurs through much of the tropical Pacific Ocean from Australia east to Hawaii and San Felix and San Ambrosio Islands off the east coast of Chile. In Australia, the species occurs off the east coast between the Tropic of Capricorn and Bass Strait and is occasionally beachcast during stormy weather. Individuals are usually recorded off the east coast soon after breeding season between December and March, and it is thought that some individuals may disperse to the east coast of Australia from breeding grounds on Lord Howe and Norfolk Islands. They feed during the day on small crustaceans, fish and squid by fluttering above the water surface before dropping down to seize their prey. They feed inshore and occasionally offshore of the tropical and subtropical islands on

which they breed and roost. Threats to the species include intensive fishing operations in feeding grounds, cyclonic weather and urban development on Lord Howe and Norfolk Islands.

Kermadec petrel (*Pterodroma neglecta*)

Kermadec petrels are marine, pelagic seabirds that occur in subtropical seas between 20 and 35°S. Breeding colonies are located in the South Pacific Ocean, 25-35°S, from Lord Howe Island to Juan Fernandez Island. Non-breeding petrels migrate trans-equatorially, with individuals recorded as far north as 28°N in the central Pacific Ocean and 21°N in the eastern Pacific Ocean. The species is usually present around Kermadec Island throughout the year and is a vagrant to the east coast of Australia. Only sporadic records exist for the NSW coastline: Kingscliff in 1974; Tuggerah Beach in 1976; Steamers Beach (Jervis Bay) in 1976; and an unconfirmed record from Wollongong in 1990. Very little is known about the diet of Kermadec petrels, but specimens have contained squid and crustaceans, which they are thought to capture by seizing from the surface and dipping. Threats to the species include predation by cats, coatis and rats; harvesting by humans; and destruction of nest sites by goats and rabbits.

Lesser sand plover (*Charadrius mongolus*)

Lesser sand plovers are migratory wading birds that breed in eastern Siberia, southern Mongolia, western China and the Himalayas and migrate to the coasts of eastern and southern Africa, the Middle East, India, Southeast Asia and Australia in summer. The species occurs around the entire coastline of Australia but is most abundant in the Gulf of Carpentaria and along the east coast of Queensland and northern NSW. They are rarely recorded south of Shoalhaven River. They favour beaches, sandflats, mudflats and mangroves within estuaries, and roost during high tide on sandy beaches or rocky shores. In NSW, important sites for them include Port Stephens, Harrington Inlet and the Clarence and Richmond Rivers. Their diet includes crustaceans, molluscs, insects and polychaete worms. Threats to the species include hydrological changes to the Clarence and Richmond Rivers and tourism or agricultural developments reducing coastal and inland habitat areas.

Little shearwater (*Puffinus assimilis*)

The circumpolar range extends from the Atlantic Ocean, generally between 40°N and the Atlantic Convergence, to the Pacific and southern Indian Oceans. The species ranges in seas off southwestern and southeastern Australia, the Kermadec Islands and far southeastern New Zealand, from Bounty to Antipodes and Auckland Islands. In NSW, the little shearwater has been recorded along the coast and in breeding colonies on Lord Howe Island. They nest in burrows located amongst tussock grasslands, shrublands, and woodlands and under mats of succulents (e.g. *Atriplex* spp., *Carpobrotus* spp.). They feed primarily on squid, krill and small fish by plunge diving, surface seizing and pattering across the surface with wings raised above the back. They have also been observed feeding with dolphins. Threats to the species include loss of nesting habitat due to development of resorts and erosion of dunes, disturbance by humans of nesting islands, and predation by rats, cats and dogs.

Osprey (*Pandion haliaetus*)

Ospreys have a disjunct distribution around the Australian coastline, occurring in the north from Broome in WA to the south coast of NSW, in the south from Kangaroo Island to the Great Australian Bight, and from Esperance to Cape Keraudren in the west (Marchant and Higgins, 1993). In NSW, the osprey occurs primarily along the coast, south to about Womboyn Lake and is found in

greater numbers in the north of the state (Marchant and Higgins, 1993). They require extensive areas of clear, open water for fishing, often ranging up into freshwaters of larger rivers. They are found on offshore islands, littoral habitats, terrestrial wetlands and coastal lands of tropical and temperate Australia (Marchant and Higgins, 1993). They nest in prominent positions near the ocean or large waterbodies, on rocky headlands, stacks, cliffs, palm trees, in tall dead trees, and on artificial platforms (Marchant and Higgins, 1993). More recently, particularly on the north coast of NSW, ospreys have been nesting on electrical supply poles as they provide the type of vantage points of their former natural habitat. The NPWS and NorthPower have been working together to customise these poles to avoid electrocution and to provide stable nesting platforms. They feed mostly on fish, clutching them from the surface of the water or diving to less than 1 m, and are able to eat toxic (Diodontidae, Tetraodontidae) and spiny fishes (Balistidae and Acanthuridae). They also feed on terrestrial vertebrates, seabirds and crustaceans (Marchant and Higgins, 1993). Osprey are tolerant of human activity, often nesting within or adjacent to urban areas, but over clearing and degradation of water quality are likely to have an adverse impact on their nesting and feeding habitat (Marchant and Higgins, 1993).

Pied oystercatcher (*Haematopus longirostris*)

The pied oystercatcher is distributed along the entire Australian coastline and offshore islands, with most key sites located in the southeast. These include The Coorong in SA, Derwent River in Tasmania and Corner Inlet in Victoria (Marchant and Higgins, 1993). They roost and forage on sandy beaches, mudflats, sandbanks and rocky shores, and occasionally roost in mangroves. They also forage on oyster leases, but are more common at the low water mark on beaches where they probe soft substrata for molluscs, worms and crabs and sometimes take small fish from shallow water. They nest on sandy beaches, sandbars and along estuaries, immediately above the high water mark, as well as on sand dunes or saltmarshes and mudflats (Marchant and Higgins, 1993). Threats to the species include alteration of habitat, human disturbance, destruction of nests and predation by foxes.

Providence petrel (*Pterodroma solandri*)

The providence petrel has a pelagic distribution, particularly during the non-breeding season. The species is mainly subtropical in the southwest Pacific Ocean, including the Tasman Sea, however some birds migrate to the north Pacific and Bering Seas. During the breeding season, the species can be found in the waters off the eastern Australian coast. They are also observed in the non-breeding season, although it is generally rare or absent from December to February. In NSW, the species occurs along the entire coast, however, it has been recorded most often off the north coast, with Lord Howe Island a popular breeding site for the species. On Lord Howe Island, the species nests in burrows or rock crevices on forested, upper slopes and summits of mountains. They feed on fish, squid, crustaceans and offal, and favoured feeding grounds are located within the Tasman Sea and along the edge of the continental shelf off the east coast of Australia. They have also been recorded feeding near humpback whales and near fishing boats. Threats to the species include predation by cats, nest and habitat disturbance by pigs and goats, and settlers of offshore islands ate them.

Sanderling (*Calidris alba*)

Sanderlings are an uncommon to locally common migrant from Siberia and other breeding grounds within the Arctic. They generally spend the summer in coastal areas of northern and eastern Australia and some individuals remain over winter. Sanderling prefer open sandy beaches exposed to open sea-swell, exposed sand bars and spits, and are also found in coastal areas on low beaches of firm

sand, near reefs and inlets, along tidal mudflats and bare coastal lagoons. In NSW, important sites for them include Harrington Inlet and Old Bar at the mouth of Manning River. They forage at the edge of the water in the wave-washed zone and sometimes among rotting kelp, as well as at the edges of shallow pools on sandspits and mudflats. Their diet consists of insects and their larvae, crustaceans, jellyfish, fish, spiders, worms, plants and seeds, and larger molluscs and crustaceans are also taken as carrion. Threats to the species include hydrological changes to estuaries and similar waterbodies that may modify or remove habitat, and tourism or agricultural developments reducing coastal and inland habitat areas.

Shy albatross (*Diomedea cauta*)

The shy albatross is circumpolar in distribution, occurring widely in the southern oceans around South America, New Zealand, Australia and South Africa. Islands off Australia and New Zealand provide breeding habitat, which takes place between September and December on rocky islets with little vegetation and soil. Nests are usually located on the sheltered sides of islands and consist of a mound of mud, bones, plant matter and rocks. They feed on fish, squid, crustaceans and offal by a variety of techniques, including seizing prey from the surface while swimming or landing on top of it, diving, and scavenging behind fishing vessels. Scavenging, particularly behind long-line vessels, is one of the threats to the species, along with disturbance by introduced predators, pollution and historical feather collection.

Sooty oystercatcher (*Haematopus fuliginosus*)

Sooty oystercatchers are endemic to Australia and are widespread along the east, west and south coasts, with scattered records from northern Australia. There are thought to be only small numbers of birds in NSW distributed evenly along the coast (Marchant and Higgins, 1993), although the coastline between Lake Conjola and Lake Tabourie is thought to support more than 1% of the Australian population (Carter, 1995). They are a strictly marine coastal species, preferring rocky intertidal shorelines with a minimal cover of foliose algae, coral reefs or sandy beaches near intertidal mudflats. They also occasionally forage on oyster leases, but are more common on intertidal rock platforms where they feed on molluscs, crustaceans, ascidians, echinoderms and small fish. When feeding on beaches, they take worms, larvae of seaweed flies and sandhoppers. They nest on offshore islands and rock stacks, often close to rocky coasts, and sometimes on remote headlands, promontories or steep beaches (Marchant and Higgins, 1993).

Sooty tern (*Sterna fuscata*)

Sooty terns have been observed within the tropical and subtropical waters and islands of the Indian, Pacific and Atlantic Oceans. In Australia, individuals are widespread in the tropics and occasional sightings occur along the west and east coasts, from Perth in Western Australia to Bermagui on the south coast of NSW, although they are more common off the north coast. Breeding colonies of up to 1,000,000 pairs have been recorded on Lord Howe Island, where they nest on coral cays, atolls, sandbars, rock stacks, cliffs or offshore islets. They are active during day and night, mainly feeding on fish, squid, crustaceans and hydrozoans taken from the surface. Food may also be scavenged from aerial pursuits of other birds and by hawking for cicadas over forests. Threats to the species include: disturbance of breeding colonies; egg collecting; predation of eggs and chicks by cats, rats and other birds; and ticks.

Terek sandpiper (*Xenus cinereus*)

The Terek sandpiper is a non-breeding migratory visitor to Australia's west, north and east coasts. In NSW, the species has been recorded from the Northern Rivers region south to Lake Wollumboola. The two main sites are the Hunter and Richmond Rivers, with the Hunter identified as nationally and internationally important for the species. They prefer muddy beaches near mangroves, coastal mudflats, lagoons, creeks and estuaries, but have been observed on rocky pools and coral reefs and occasionally up to 10 km inland around brackish pools. Their diet consists of polychaete worms, crustaceans, small shellfish, beetles, waterbugs, and the adults and larvae of various flies. Threats to the species include hydrological changes to estuaries that may modify or remove habitat, tourism or agricultural developments reducing coastal and inland habitat areas, urban and industrial development, and disturbance by recreational activities.

White tern (*Gygis alba*)

White terns occur transglobally throughout tropical and sub-tropical oceans and islands. Individuals may occasionally visit the east coast of Australia between Cape York Peninsula and Sydney, generally only coming ashore as a result of stormy weather. Within NSW, they are regularly recorded off the coast at Ballina and occasionally off Sydney and Wollongong. They are present on Lord Howe Island from September to June, dispersing when the winter gale arrives. White terns are diurnal, although dusk and dawn are probably important feeding times. Individuals feed both inshore and offshore, generally dipping their bill to catch prey at or near the surface and can catch five or six fish in succession before returning to trees to eat them. Their diet generally consists of fish and other small aquatic animals. Threats to the species include stochastic events impacting upon small colonies; strong winds dislodging eggs from branches; predation by cats, kestrels, owls and currawongs; and the introduced black ant.

Marine mammals

Humpback whale (*Megaptera novaeangliae*)

Humpbacks have a worldwide distribution, but spend the summer months feeding in pelagic waters of Antarctica, generally between 60–70°S. In winter and spring, they migrate to warmer breeding grounds, 15–20°S, and are recorded in coastal waters off all states of except for the Northern Territory. There is distinct Northern and Southern Hemisphere populations based on temporal migration separation, and there are thought to be at least six Southern Hemisphere populations. Two of these populations are recorded off Australia's coastline, one off the west coast and the other off the east coast. There is thought to be a sex ratio bias towards males in east coast migration, and a possibility that not all females migrate north each year. Key localities within Australian waters include: Cape Naturaliste/Geographe Bay, north of Rottnest Island, Shark Bay, North West Cape, off Dampier Archipelago and coastal islands off Kimberley in Western Australia; southern coast, off Coffs Harbour and Cape Byron in New South Wales; Stradbroke Island, Hervey Bay, and islands in Great Barrier Reef, especially Whitsunday Passage area off Queensland. The exact locations of breeding grounds are unknown, although breeding occurs in central Great Barrier Reef area and there is probably a wide range of opportunity for breeding over several degrees of latitude on both the east and west coasts. Humpbacks feed mainly in Antarctic waters almost exclusively on krill (*Euphausia superba*). Elsewhere they feed on small shoaling fish and occasionally benthic organisms, and there is some evidence of feeding on fish and plankton swarms in warmer waters, e.g. off Eden and on larval *Munida gregaria* during their southern migration off New Zealand. Catches in the subtropics off

northwest Western Australia and eastern Australia showed almost no evidence of local feeding. They feed by variety of methods, generally determined by their location. In the Southern Hemisphere, they feed by swallowing large volumes of prey and water or by disturbing the water, creating a washing machine effect. In the Northern Hemisphere, they feed by lunging and bubble feeding, which involves production of a bubble net formed by exhalation under water, concentrating prey. Humpbacks were heavily exploited by commercial operations until about 1970, and estimates suggest the population may have been reduced to 5% of its initial size by 1963. Despite international protection since then, recovery seems to have been delayed until mid-1970s, possibly mainly through continued illegal catches until about 1970. Current threats are thought to include direct disturbance on migration path and in breeding areas by:

- whale watching and research vessels/aircraft, pleasure craft, swimmers and divers;
- coastal seismic operations
- defence operations
- collision with large vessels
- entanglement in fishing gear/shark nets
- pollution, including increasing amounts of plastic debris at sea, oil spills and dumping of industrial wastes into waterways and the sea, leading to accumulation of toxic substances in body tissues, although this is likely to be minimal given that it rarely feeds in low latitudes (Bannister *et al.*, 1996).

Humpback whales are also classified as vulnerable under the EPBC Act.

Indo-Pacific humpbacked dolphin (*Sousa chinensis*)

Occurs in southern China, through the Indo–Malay Archipelago to northern and northeastern Australia, where it is most regularly recorded in Western Australia (north of 24°S), Northern Territory and Queensland, with occasional strandings reported in New South Wales (mostly north of 29°S). They are primarily a coastal species, occurring in estuaries and rivers of tropical and subtropical climates. They occur close to the coast, in less than 20 m depth, although aerial surveys in the Great Barrier Reef region may have located them in waters between the outer reef and the mainland, further from shore than has been previously reported in the literature. Key localities for the species in Australia include Moreton Bay, Tin Can Inlet and Great Sandy Strait in Queensland. Their diet consists of a variety of species of fish, some cephalopods and crustaceans. They have been known to feed in association with prawn trawlers in Moreton Bay, and presumably elsewhere throughout their range in Australia. There is no reliable data on mortality rates or on abundance. In Moreton Bay, 36% of dolphins show evidence of shark attack, suggesting mortality from sharks may be significant. In South Africa, many animals also have very high levels of organochlorines, probably sufficiently high to kill a female's first calf, and it is possible that similar high pollutant loads occur in dolphins of Moreton Bay, but no data are available at present. Threats to the species are thought to include habitat destruction and degradation, noise pollution, harassment or disturbance (particularly close to major cities as in Moreton Bay), incidental capture in shark nets and trawl-nets, illegal killing, and overfishing of prey species. They are also prone to live capture for display purposes, in Queensland (permits granted for up to 12 per year at present) and northern NSW. Other potential threats include pollution and mass mortalities induced by pathogens.

Long-snouted spinner dolphin (*Stenella longirostris*)

Spinner dolphins are found in tropical, subtropical and occasionally temperate waters of both the northern and southern hemispheres from the Indian, Pacific and Atlantic Oceans. In Australia, they have been recorded from Western Australia (as far south as Bunbury), Northern Territory, Queensland and New South Wales. They are primarily pelagic but can be neritic in some regions. They commonly associate during feeding with tuna, pan-tropical spotted dolphin and sea birds under certain oceanographic conditions, i.e. well defined, shallow, 100 m deep pelagic habitats in restricted areas. Along the west coast of Australia, its presence in southern localities may be associated with the Leeuwin Current. They feed on mesopelagic fish, mostly myctophids, squids and shrimps at depths greater than 250 m, although they have also been known to feed on reef-living and benthic organisms. They are known to congregate in groups of over 1000 animals, but generally group size is less than 250 and there is some segregation by age and sex. Very few strandings have been recorded in Australia. Predators are sharks and possibly killer whales, false killer whales, pygmy killer whales and pilot whales. High levels of mercury (natural contamination) and DDT, dieldrin and PCB have been recorded for *S. longirostris* from outside Australian waters. Parasitism is believed to be a major factor in the natural mortality of this dolphin. In eastern tropical Pacific Ocean, numbers declined to about 44% of their former number as a result of incidental catch in purse seine nets. Purse seines and gillnetting in the Arafura and Timor seas were historically major threats to the species. More current threats include: Taiwan's gillnet shark fishery, which operates just outside Australian waters and is a serious problem for incidental catches of small cetaceans; illegal catches within Australian EEZ; occasionally reported as incidental captures in shark nets in Queensland; the Philippines gillnet fishery; small cetacean fishery in the Solomon Islands; and Thai shrimp trawls. Potential threats are thought to include entanglement in driftnets set outside the Australian EEZ and in lost or discarded netting, and pollution leading to accumulation of toxic substances in body tissues (Bannister *et al.*, 1996). Long-snouted spinner dolphins are classified as 'insufficiently known' under the EPBC Act.

Sei whale (*Balaenoptera borealis*)

Sei whales are distributed worldwide in oceanic waters, undertaking long migrations between warm water breeding grounds and colder water feeding grounds. In the Southern Hemisphere, they do not migrate as far south as other baleen whales except Bryde's whales. They also prefer deeper water than their close relative, Bryde's whale, and are not often found near coasts. They are infrequently recorded in Australian waters, with scattered records from Western Australia, eastern Great Australian Bight, Tasmania and Queensland, and some sighting records may be confused with Bryde's whales. Sei whales feed mainly on pelagic copepods (*Calanus* spp.), and occasionally euphausiids and amphipods. They feed by skimming, which entails swimming through plankton swarms with open mouths, but can also feed by gulping. They can be found in large concentrations on feeding grounds, otherwise generally in small groups of up to about six. Historically, in the Southern Hemisphere, they were only caught in large numbers as numbers of blue and fin whales declined, particularly from the 1960s, but stocks soon reduced until their protection in 1977. Current threats are thought to include direct disturbance by:

- seismic operations
- collision with large vessels
- entanglement in fishing gear

- pollution, including increasing amounts of plastic debris at sea, oil spills, and dumping of industrial wastes into waterways and the sea, leading to accumulation of toxic substances in body tissues (Bannister *et al.*, 1996).

Sei whales are also classified as vulnerable under the EPBC Act.

Southern right whale (*Eubalaena australis*)

Southern right whales are circumpolar and only found in the southern hemisphere between approximately 30° and 60°S. They move from pelagic waters of higher latitudes where feeding occurs in summer, to warmer, lower latitudes for breeding in winter, when they approach close to the coast. In Australia, they are distributed around the southern coastline from Perth, WA to Sydney, NSW, including Tasmania. Their range is possibly extending, with recent sightings from Shark Bay and North West Cape, WA and north of Sydney to Cape Byron, NSW. Adult females are sighted most frequently close to coast, coming inshore to give birth on a mainly three-year cycle. Little is known about the diet of southern rights, but observations, lack of suitable prey and whaling data imply that they do not feed near the coast in winter, with calving females effectively fasting for at least four months. Prey is thought to be mainly pelagic larval crustaceans, particularly *Munida gregaria* and copepods. They are taken primarily during summer in the open ocean, south of about 40°S. Threats to the species are thought to include historical gross exploitation at least into the late 1960s, and despite international protection, is likely to have prevented significant recovery until recently. More recent threats are thought to include direct disturbance, particularly in near-shore concentration/calving areas, from:

- whale watching and research vessels/aircraft, pleasure craft, swimmers and divers
- low-flying aircraft
- coastal industrial activity, e.g. seismic, drilling, sandmining and shipping operations
- defence operations
- collision with large vessels, particularly on shipping routes on eastern seaboard, in Bass Strait and across the Great Australian Bight
- entanglement in fishing gear.

Potential threats are thought to include increased whale watching pressure, industrial activity and pollution levels, and these may all be compounded by an increase in right whale numbers. The latter will also affect availability of suitable coastal calving habitat (Bannister *et al.*, 1996). Southern right whales are also classified as vulnerable under the EPBC Act.

APPENDIX F2. THE EIGHT PART TEST

The various pieces of legislation under which this assessment is being done require the determination of whether there is likely to be a significant effect of the Ocean Hauling Fishery on any threatened species, populations or ecological communities or their habitats. This requires consideration of the matters listed in s5A of the EP&A Act, generally referred to as the Eight Part Test and itemised in italics below. If the test reveals that a significant impact is likely then a Species Impact Statement (SIS) will be required, or the FMS may be modified such that a significant effect is unlikely. Further, a SIS would have to be prepared if the strategy incorporated land or water that was declared as critical habitat.

a) Part 1 — Life cycle of threatened species

In the case of a life cycle of threatened species, whether the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

The Ocean Hauling Fishery is highly unlikely to place any species, at a State or regional level, at risk of extinction by interrupting their life cycle. In other words, the fishery does not impact on species such that they can neither breed, feed, roost, migrate nor otherwise disperse.

b) Part 2 — Endangered population.

In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

The endangered population of little penguins in North Harbour Aquatic Reserve is the only endangered population that could be affected by the fishery, however, it is unlikely to be directly affected by the methods in the Ocean Hauling Fishery. The capture of bait species in nearshore coastal waters, however, would provide competition for food resources, particularly during breeding when they are thought to have shorter foraging ranges.

Dayton *et al.* (1995) highlighted the problem of catching aggregated prey, particularly baitfish, and were concerned that it could be a significant, but unstudied problem in Australia. A study in Port Phillip Bay, Victoria, suggested that adult little penguins had died from starvation because fishing had depleted stocks of anchovies and pilchards (Harrigan, 1992). A later study reported that weather patterns, particularly related to the El Nino – Southern Oscillation phenomenon, caused dramatic shifts in baitfish recruitment, schooling behaviour, abundances and distributions, such that penguins were probably unable to catch sufficient food, irrespective of fishing practices (Hoedt *et al.*, 1995).

There is potential that during periods of low abundance, fishers may take a significant proportion of the available fish, severely limiting the resources available to the penguins, but it is unknown whether or not this occurs or the degree to which it is likely to compromise the population. Monitoring fluctuating catch levels, as detailed in the recovery plan for the endangered population of little penguins at Manly, may not necessarily provide any information about the impact of fishing unless there is some indication of the stock levels of baitfish and the feeding requirements of the penguins. Chapter E (Volume 2) suggests that adequate stock assessments of baitfish are not yet available, although they are proposed under the draft FMS. The NPWS is currently researching the feeding requirements and feeding ranges of the little penguin population. The combination of such

research may provide some indication of the effects of this fishery, and the Estuary General Fishery, on the little penguin population at Manly.

With the exception of the fatalities due to attacks largely by domestic animals, the population has been relatively stable at Manly, and it is thought that increasing the available nesting area could increase the number of birds. This would suggest that, in the absence of more reliable information about the effects of the Ocean Hauling Fishery on baitfish stocks, the fishery is unlikely to significantly compromise the little penguin population.

c) Part 3 — Regional distribution of habitat.

In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.

The literature review for this assessment found little or no data about the effects of the fishery on habitats of sandy beaches, reefs or islands in which the fishery takes place.

The threatened species of fish considered in this assessment are marine species that primarily inhabit rocky reef, as well as a couple of species that utilise sandy beaches, particularly when they contain deep gutters or reefs. Given the extent of this type of habitat along the coast, and the limited scope for the techniques used in the fishery to affect this type of habitat, the fishery is considered unlikely to modify or remove a significant area of rocky reef. The fishery is unlikely to significantly modify the habitats of sandy beaches and the draft FMS proposes to significantly reduce the area that can be fished, reducing the potential extent of any impacts.

The fishery would not modify or remove a significant area of habitat for turtles, whales or dolphins.

The little penguin population at Manly, by definition, is likely to have a significant area of known habitat affected by the fishery, but this is unlikely to occur to the extent that it modifies or removes any habitat.

Of the other birds, primary areas of habitat for most species are found within or adjacent to estuaries, with occasional use of sandy beaches. Little terns, hooded plovers, pied oystercatchers, sooty oystercatchers and beach stone-curlews are some species that would regularly use sandy beaches of the open coast. The prime breeding sites of little tern have been identified by NPWS and strategies put in place to minimise harm or disturbance. Those measures, and those proposed in the draft FMS, should ensure that the fishery does not modify a significant area of their preferred habitat.

There is currently very little known about the distribution and abundance of hooded plover, but studies would suggest that it is extremely limited in both extent and number. The coastal beaches between St Georges Head and Brush Island, particularly Cudmirrah Beach on the South Coast appear to be the most important sites for this species. Cudmirrah Beach is closed to the fishery, preventing the modification of a significant area of habitat for the species.

Pied and sooty oystercatchers are widely distributed along the NSW coast, and at this stage there is no information about significant areas of habitat for these species. The use of sandy beaches and rocky shores by both of these species makes them susceptible to direct or indirect effects due to the fishery, but the methods are highly unlikely to result in the modification or removal of habitat for these species.

Very little is known about the distribution of beach stone-curlews, but they are thought to prefer extensive areas of open beaches and are generally restricted to beaches north of Nambucca Heads. The fishery could cause temporary disturbance of the species, but is unlikely to result in the modification or removal of any of its preferred habitat.

d) Part 4 — Isolated habitat.

Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The Ocean Hauling Fishery will not isolate any areas of habitats, nor will it fragment them such that they could become progressively isolated. Further, the connectivity of marine systems is such that reproductive isolation is almost impossible, especially in terms of the techniques used in the fishery.

The penguin population at North Harbour has not become isolated because of commercial fishing, nor is it causing an incremental isolation. Expanding urban development and a natural geographic formation are largely responsible for the isolation of the population. The fishery is also unlikely to prevent any possible further expansion of the area utilised by the population.

e) Part 5 — Critical habitat

Whether critical habitat will be affected.

Critical habitats have not been defined for any of the species considered in this assessment. Irrespective of this, a precautionary approach would suggest that the habitats occupied by the little penguin population are critical to their survival, and this is demonstrated in a recent proposal by the recovery team for the population to list parts of North Harbour as Critical Habitat (NPWS, 2001). As stated above, however, the fishery is unlikely to modify or remove the habitats, or restrict their distribution. As such, there will be few or no effects on those habitats. Should the proposal be approved and the area be gazetted as Critical Habitat, activities in the area will be part of a separate review process, information for which was being gathered at the time of this report.

f) Part 6 — Adequate representation in conservation areas.

Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

It is important to note that very little is known about the distribution of most of the threatened species of fish. Furthermore, this part of the test (and most of it for that matter) is designed to examine whether affecting a small area of habitat (usually terrestrial) or small number of a species might be offset by their occurrence in protected areas. Very little is known about the biodiversity of our marine protected areas, and even less of threatened species, so it is impossible to assess whether the species or their habitats are adequately represented in conservation reserves or the like.

Numerous conservation reserves along the coast provide habitats for the various threatened species considered in this assessment. The endangered population of little penguins occurs in an Aquatic Reserve and representative habitats of most of the other species occur adjacent to National Parks, Nature Reserves or areas closed to commercial fishing. Estuary cod, black cod and Queensland groper are known to occur in Solitary Islands Marine Park, Julian Rocks Aquatic Reserve and Cook

Islands Aquatic Reserve. Weedy seadragons are known to occur in Fly Point Aquatic Reserve and Jervis Bay Marine Park.

g) Part 7 — Threatening processes.

Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.

There are currently no declared threatening processes under the FM Act, nor is commercial fishing listed as a threatening process under the TSC Act. Further, the activities undertaken in this proposal are considered highly unlikely to exacerbate existing threatening processes under the TSC Act.

The recovery plan for little penguins at North Harbour does recognise commercial fishing as a threatening process to the colony, and as such this assessment accepts that there is potential for it to constitute a threatening process under the TSC Act in future. At this stage, the fishery does not appear to be adversely affecting two or more threatened species, one of the criteria necessary for an activity to be declared a threatening process.

The only processes related to fishing under the EPBC Act are the incidental catch (bycatch) of sea turtle during coastal otter-trawling operations within Australian waters north of 28° South, and the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations. Neither of these techniques applies to the Ocean Hauling Fishery.

h) Part 8 — Limit of known distribution.

Whether any threatened species, population or ecological community is at the limit of its known distribution.

The endangered population of little penguins at North Harbour must be at the limit of its distribution. The proposal will not reduce or affect the ability of the population to expand its range. Other birds whose distribution limits are likely to occur in NSW include beach stone-curlew, hooded plover, Gould's petrel, broad-billed sandpiper, fleshy-footed shearwater, great knot, grey ternlet, providence petrel, wandering albatross, shy albatross, sooty tern and white tern.

Green sawfish are more common in the north of eastern Australia, and the north coast region probably represents the southern limits for these species. Other species of fish that are thought to be at the limit of their distribution within NSW include eastern blue devil, elegant wrasse, estuary cod, Queensland groper and weedy seadragon.

i) Conclusion

This assessment has considered the eight factors under s5A of the EP&A Act in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities or their habitats. The assessment was based on a review of biological information derived from the various agencies responsible for those species, from published literature and from personal communications. The assessment has found that the proposal will not have a significant effect on any threatened species, populations or ecological communities or their habitats, and as such a Species Impact Statement is not required for the Ocean Hauling Fishery.