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Ecological Risk Assessment for Effects of Fishing

ABRIDGED REPORT FOR THE TORRES STRAIT PRAWN FISHERY

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This fishery Ecological Risk Assessment (ERA) report should be cited as:

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Notes to this document:

This fishery ERA report document contains figures and tables with numbers that correspond to the full methodology document for the ERAEF method:

(Hobday, A. J., A. Smith, H. Webb, R. Daley, S. Wayte, C. Bulman, J. Dowdney, A. Williams, M. Sporcic, J. Dambacher, M. Fuller, T. Walker. (2006) Ecological Risk Assessment for the Effects of Fishing: Methodology. Report R04/1072 for the Australian Fisheries Management Authority, Canberra)

Thus, table and figure numbers within the fishery ERA report document are not sequential as not all are relevant to the fishery ERA report results.

Additional details on the rationale and the background to the methods development are contained in the ERAEF Final Report:

Smith, A., A. Hobday, H. Webb, R. Daley, S. Wayte, C. Bulman, J. Dowdney, A. Williams, M. Sporcic, J. Dambacher, M. Fuller, D. Furlani, T. Walker. (2006) Ecological Risk Assessment for the Effects of Fishing: Final Report R04/1072 for the Australian Fisheries Management Authority, Canberra.

Executive Summary

This assessment of the ecological impacts of the Torres Strait Prawn Fishery was undertaken using the ERAEF method version 9.2. ERAEF stands for “Ecological Risk Assessment for Effect of Fishing”, and was developed jointly by CSIRO Marine and Atmospheric Research, and the Australian Fisheries Management Authority. ERAEF provides a hierarchical framework for a comprehensive assessment of the ecological risks arising from fishing, with impacts assessed against five ecological components – target species; by-product and by-catch species; threatened, endangered and protected (TEP) species; habitats; and (ecological) communities.

ERAEF proceeds through four stages of analysis: scoping; an expert judgement based Level 1 analysis (SICA – Scale Intensity Consequence Analysis); an empirically based Level 2 analysis (PSA – Productivity Susceptibility Analysis); and a model based Level 3 analysis. This hierarchical approach provides a cost-efficient way of screening hazards, with increasing time and attention paid only to those hazards that are not eliminated at lower levels in the analysis. Risk management responses may be identified at any level in the analysis.

ERAEF provides an explicit approach to uncertainty in assessment of ecological risks from fishing. First, the approach results in progressive reductions in uncertainty at each successive level in the hierarchy, as more data and more quantitative approaches are used. Second, there is a precautionary approach to uncertainty adopted within each level in the hierarchy. For example, a “plausible worst case” approach is used in the expert judgement based Level 1 analyses. At Level 2, all risk attributes are initially assumed to be high, and are successively reduced as data and information are brought to bear. This means that ecological components will be judged to be at high risk where relevant data are missing, resulting in possible false positives (risk assessed to be high when it is low), but generally few false negatives (risk assessed to be low when it is actually high). Level 3 analyses provide explicit quantitative approaches to measurement of uncertainty and risk.

This assessment of the Torres Strait Prawn Fishery includes the following:

- Scoping
- Level 1 results for all components
- No Level 2 analysis has been conducted for the Torres Strait Prawn fishery as part of the ERAEF Stage 2 process.

Fishery Description

Gear:	Otter trawl
Area:	Torres Strait Protected Zone and ‘outside but near’ area
Depth range:	12 to 88m
Fleet size:	61 licensed vessels in 2006, but 7 are inactive in the fishery
Effort:	Average of 9,164 fishing days per annum for the years 2000-04; For 2006, a total effort cap of 9,200 fishing days (6,867 available to Australian operators and the remainder to meet PNG treaty obligations).
Landings:	Average of 1,631 tonnes per annum for the years 2000-04
Discard rate:	rate of discard of target species unknown but low; discard of bycatch 100%
Main target species:	Brown tiger, blue endeavour and red spot king prawns
Management:	Input controls
Observer program:	AFMA, industry funded observer program since 2005 season

Ecological Units Assessed

Target species:	10
By-product species:	14
Discard Species:	476
TEP species:	112
Habitats:	158 (157 benthic, 1 pelagic)
Communities:	3 (2 demersal, 1 overlying pelagic)

Level 1 Results

No ecological components were eliminated at Level 1 (there was at least one risk score of 3 – moderate – or above for all 5 component).

A number of internal hazards (fishing activities) were eliminated at Level 1 (risk scores 1 or 2). Those internal hazards remaining included:

- Fishing capture (Target, Bycatch/byproduct, TEP and Habitat components)
- Fishing without capture (Bycatch/byproduct and Habitat)
- Translocation of species (Habitat), and
- Discarding catch (Target, TEP and Habitat).

These remaining internal hazards were assessed at low confidence for the Byproduct and TEP components, but at high confidence for the Target and Habitat components. The exception was the Habitat component Translocation hazard, which was assessed at low confidence.

Three internal hazards were scored as a major hazard (consequence level 4): Habitat component Fishing capture and Translocation; and TEP component Discarding.

Significant external hazards included:

-
- Other fisheries (Bycatch/byproduct, TEP species, Habitat and Communities)
 - Other non-extractive activities (all five components)
 - Other anthropogenic activities (Bycatch/byproduct and TEP species).

Level 2 Results

Species

No Torres Strait Prawn species were assessed at Level 2 using the PSA analysis during Stage 2 of the ERA process.

Habitats

No Torres Strait Prawn habitats were assessed at Level 2 using the habitat PSA analysis during Stage 2 of the ERA process.

Communities

The community component was not assessed at Level 2, but should be considered in future assessments when the methods to do this are fully developed.

Summary

Internal risks were predominantly rated as moderate (consequence level 3). Those internal hazards rated as major or above (risk scores 4 or 5) were related to direct or indirect impacts from primary fishing operations (Habitat Fishing capture, Habitat Translocation of species, and TEP Discarding). No internal hazards were rated as severe (risk score 5).

Target

In the case of the target species, fishing (direct capture) was considered to have a moderate impact (consequence level 3) on the brown tiger prawn stocks as the current stock assessments suggest that this species was fully fished during the 1990's. In recent years (2004-05) the level of fishing effort has declined below the estimate of E_{msy} for brown tiger prawns due to a combination of low prawn prices and high fuel costs while catch rates have increased and the annual tiger prawn catch remained stable. The November 2005 reduction in allocated fishing days and voluntary surrender of allocated fishing days to give effect to the cross-boarder fishing arrangements now limits effort in the fishery to E_{msy} (9,200 days for 2006). Fishing effort by Australian operators is currently restricted to 6867 days for 2006.

Discarding of bycatch was also considered to have a moderate impact on the Target component. Discarding of bycatch occurs extensively throughout the fished region, and is known to attract predators. These predators will in turn prey upon the resident prawn population. The effects of discarding of bycatch are well documented in the TSPF.

Bycatch/byproduct

In the case of bycatch/byproduct species fishing, both capture and direct impact without capture are considered to have a moderate (consequence level 3) impact.

Elasmobranches, in general, are considered more susceptible to overfishing than bony fish, but there is likely to be a range of sensitivities among the species (Walker 1998; Stevens *et al.* 2000). Of the species recorded in the TSPF aside from pristids (sawfish), the benthic species (wobbegongs and rays) are likely to be of most concern due to their high susceptibility and little information available to estimate their recovery. The mobility of elasmobranch species also means that they may be impacted by several fisheries (Stobutzki TSFAG Prawn Workshop Report 2001). The consequence were scored as moderate as a precautionary measure although there is no data to suggest these species are impacted by trawl fishing in the TSPF. Our confidence in this assessment is low as data on these species is limited.

Sharks and rays larger than ~1m are excluded from the catch by Turtle Excluder Devices (TEDs), therefore it could be assumed that this has increased their survival rate, however this may not be the case as they may be damaged by contact with a TED. As a precautionary measure, although there is no data to suggest these species are impacted by trawl fishing, the consequence was scored as moderate. Confidence in this assessment is low as there is limited data on survival of these species after passing through the TED.

TEP

In the case of TEP species sea snakes were considered the species mostly likely to be of concern as the survival of sea snakes after trawling has been estimated as 49% (Wassenberg *et al.* 2001). The risk to these species is dependent on the relative proportion of the population taken by trawling, however this is unknown. In the research surveys conducted in Torres Strait the catch rates of sea snakes has been very low and these taxa were rarely identified to species level. The consequence was scored as moderate as a precautionary measure although the available data suggests that sea snake catch rates are low in the TSPF. The confidence in this assessment is low as data on these species is limited. The existing observer program in the TSPF should be used to obtain data on the catch rates and species of sea snakes that occur in the commercial catch.

The discarding of bycatch was assessed as a major hazard (consequence level 4) impacting the TEP Tern species through modification of behaviour and movement. Discarding of high volumes of bycatch occurs after each trawl shot, throughout the nine-month season on the fishing grounds. Scavenging behaviour by terns behind trawlers is a common activity. They are known to continuously follow trawlers to feed on these discards, and may become dependent on discarding as a food source. This in turn has the potential to impact the population dynamics of the terns, and may take some weeks after the close of the season for normal foraging behaviour to return.

Habitat

The Habitat component was assessed to be at major risk of impact by the fishing capture activity, and moderate risk without capture. The prawn trawl-gear footprint is large, and the highly localised nature of the operations may result in severe localised structural modification of susceptible epifaunal and infaunal habitats, with damage and removal

particularly of erect, rugose and inflexible octocorals associated with soft muddy substrata. Octocorals that are not removed by prawn trawl gear are also likely to encounter some degree of damage. Although inner shelf habitats may recover relatively quickly, the more structurally complex forms may take many years to recover. These habitat risks were assessed with high confidence due to the availability of data for some species within the Torres Strait region.

Addition/Movement of biological material was assessed as a moderate risk to Habitats through the hazard presented by catch discarding. Accumulation of large volumes of solid biomass, particularly in shallow waters, will alter the substrate quality via changed biogeochemical processes and sediment ecology, and further modify the habitat by the attraction of scavengers and predators. This hazard was assessed at high confidence based on documented data within the Torres Strait and tropical region (Harris and Poiner 1990, Hill and Wassenberg 1990, Wassenberg and Hill 1990)

Translocation of species, particularly through hull fouling, was assessed as a major risk (risk score 4) to Habitat structure and function. Species translocated may establish throughout the Torres Strait Prawn Fishery area, but are particularly likely to affect shallower habitats where they pose a hazard to previously compromised area, by altering pelagic and sediment processes, and displacing existing species. Fishing vessels regularly move between the TSPF and the adjacent NPF and ECOTF water. This hazard was assessed at low confidence as little data exists on the translocation of species by prawn trawlers, but the potential risk associated with this hazard has have major consequence due to the potential to alter habitat dynamics.

External hazards

There are a number of external hazards in the Torres Strait Prawn Fishery (TSPF) that are likely to be as important, or more important, than those identified from the fishery itself. Translocation of pest species or a major oil spill caused by international shipping potentially poses a greater threat to the Torres Strait environment than the activities associated with the Torres Strait Prawn Fishery. Dugong, turtle and elasmobranchs are probably the most at risk TEP species in Torres Strait. Illegal fishing by foreign fishing vessels and traditional fishing activities in Torres Strait could have a much greater impact on these species than the TSPF.

Managing identified risks

Using the results of the ecological risk assessment, the next steps for each fishery will be to consider and implement appropriate management responses to address these risks. To ensure a consistent process for responding to the ERA outcomes, AFMA has developed an Ecological Risk Management (ERM) framework.

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2.2.2 Unit of Analysis Lists (Step 2)

The units of analysis for the sub-fishery are listed by component:

- Species Components (target, byproduct/discards and TEP components). [Scoping document S2A Species]
- Habitat Component: habitat types. [Scoping document S2B Habitats]
- Community Component: community types. [Scoping document S2C Communities]

Total Ecological Units Assessed for the Torres Strait Prawn Fishery

Target species:	10
By-product species:	14
Discard Species:	476
TEP species:	112
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Scoping Document S2A Species

Each species identified during the scoping is added to the ERAEF database used to run the Level 2 analyses. A CAAB code (Code for Australian Aquatic Biota) is required to input the information. The CAAB codes for each species may be found at <http://www.marine.csiro.au/caab/>

Target species Torres Strait Prawn Fishery

List the target species of the sub- fishery. This list is obtained by reviewing all available fishery literature, including logbooks, observer reports and discussions with stakeholders. Target species are as agreed by the fishery.

ERAEF species ID	Taxa	Family name	Scientific name	Common Name	CAAB code	Role in fishery	Reference
1324	Invertebrate	Penaeidae	<i>Melicertus longistylus</i>	Redspot king prawn	28711048	TA	GENLOG
1521	Invertebrate	Penaeidae	<i>Melicertus latisulcatus</i> , <i>M. plebejus</i> & <i>M. longistylus</i>	King prawns	28711910	TA	GENLOG
1535	Invertebrate	Penaeidae	<i>Penaeus esculentus</i>	brown tiger prawn	28711044	TA	GENLOG

1537	Invertebrate	Penaeidae	<i>Melicertus latisulcatus</i>	western king prawn	28711047	TA	GENLOG
1538	Invertebrate	Penaeidae	<i>Penaeus semisulcatus</i>	grooved tiger prawn	28711053	TA	GENLOG
2185	Invertebrate	Penaeidae	<i>Penaeus esculentus, Penaeus semisulcatus, Penaeus monodon</i>	Tiger prawns	28711906	TA	GENLOG
2221	Invertebrate	Penaeidae	<i>Penaeus monodon</i>	black tiger prawn	28711051	TA	GENLOG
2222	Invertebrate	Penaeidae	<i>Metapenaeus endeavouri & Metapenaeus ensis</i>	penaeid prawns	28711902	TA	GENLOG
2745	Invertebrate	Penaeidae	<i>Metapenaeus endeavouri</i>	Blue endeavour prawn	28711026	TA	GENLOG
2746	Invertebrate	Penaeidae	<i>Metapeaeus ensis</i>	Red endeavour prawn	28711027	TA	GENLOG

Byproduct species Torres Strait Prawn Fishery

List the byproduct species of the sub- fishery. Byproduct refers to any part of the catch which is kept or sold by the fisher but which is not a target species. This list is obtained by reviewing all available fishery literature, including logbooks, observer reports and discussions with stakeholders.

ERAEF species ID	Taxa	Family name	Scientific name	Common Name	CAAB code	Role in fishery	Reference
2003	Invertebrate	Order Octopoda	Order Octopoda - undifferentiated	octopods	23650000	BP	GENLOG
1998	Invertebrate	Order Teuthoidea	Order Teuthoidea - undifferentiated	squid	23615000	BP	GENLOG
2023	Invertebrate	Scyllaridae	Scyllaridae - undifferentiated	shovel-nosed /slipper lobsters	28821000	BP	GENLOG
1996	Invertebrate	Sepiidae	Sepiidae - undifferentiated	cuttlefish	23607000	BP	GENLOG
2531	Invertebrate	Loliginidae	<i>Sepioteuthis lessoniana</i>	squid	23617904	BP	DPI&F
24	Invertebrate	Scyllaridae	<i>Thenus orientalis</i>	bug	28821008	BP	DPI&F
2529	Invertebrate	Scyllaridae	<i>Thenus indicus</i>	bug	28821007	BP	DPI&F
2537	Invertebrate	Sepiidae	<i>Sepia elliptica</i>	cuttlefish	23607003	BP	DPI&F
2538	Invertebrate	Sepiidae	<i>Sepia papuensis</i>	cuttlefish	23607007	BP	DPI&F
2539	Invertebrate	Sepiidae	<i>Sepia pharaonis</i>	cuttlefish	23607008	BP	DPI&F
2540	Invertebrate	Sepiidae	<i>Sepia smithi</i>	cuttlefish	23607013	BP	DPI&F
2543	Invertebrate	Sepiidae	<i>Metasepia pfefferi</i>	cuttlefish	23607015	BP	DPI&F
2711	Invertebrate	Loliginidae	<i>Photololigo sp3</i> – (previous: <i>Photololigo chinensis</i> or <i>Photololigo ethreridgei</i>)	squid	23617901	BP	DPI&F
2217	Invertebrate	Pectinidae	<i>Amusium pleuronectes</i>	northern saucer scallop	23270003	BP	DPI&F

Discard species Torres Strait Prawn Fishery

List the discard (bycatch) species (excluding TEP species) of the sub-fishery. Bycatch as defined in the Commonwealth Policy on Fisheries Bycatch 2000 refers to:

- that part of a fisher's catch which is returned to the sea either because it has no commercial value or because regulations preclude it being retained; and
- that part of the 'catch' that does not reach the deck but is affected by interaction with the fishing gear

However, in the ERAEF method, the part of the target or byproduct catch that is discarded is included in the assessment of the target or byproduct species. The list of bycatch species is obtained by reviewing all available fishery literature, including logbooks, observer reports and discussions with stakeholders.

ERAEF species ID	Taxa	Family name	Scientific name	Common Name	CAAB code
1100	Teleost	Antennariidae	<i>Antennarius hispidus</i>	striped anglerfish	37210008
1101	Teleost	Apistidae	<i>Apistops Caloundra</i>	[a waspfish]	37287033
1105	Teleost	Apogonidae	<i>Apogon cookie</i>	Cook's cardinalfish	37327050
1109	Teleost	Apogonidae	<i>Siphamia argyrogastrer</i>	spotted siphonfish	37327024
1400	Teleost	Balistidae	<i>Abalistes stellatus</i>	starry trigger fish	37465011
1113	Teleost	Batrachoididae	<i>Batrachomoeus trispinosus</i>	[a frogfish]	37205003
1117	Teleost	Caesionidae	<i>Dipterygonotus balteatus</i>	mottled fusilier	37346013
1118	Teleost	Caesionidae	<i>Caesio cuning</i>	yellow tail fusilier	37346018
657	Teleost	Carangidae	<i>Carangoides chrysophrys</i>	trevally	37337011
1122	Teleost	Carangidae	<i>Seriolina nigrofasciata</i>	black-banded kingfish	37337014
1129	Teleost	Carangidae	<i>Caranx kleinii</i>	razorbelly trevally	37337036
1130	Teleost	Carangidae	<i>Decapterus russelli</i>	red tailed round scad	37337023
1131	Teleost	Carangidae	<i>Megalaspis cordyla</i>	torpedo scad	37337028
3224	Teleost	Carangidae	<i>Alepes sp.</i>	A trevally	
1137	Teleost	Chaetodontidae	<i>Chelmon muelleri</i>	Muller's coralfish	37365015
1139	Teleost	Chirocentridae	<i>Chirocentrus dorab</i>	dorab wolf herring	37087001
1142	Teleost	Clupeidae	<i>Herklotsichthys koningsbergeri</i>	large-spotted herring	37085007
1144	Teleost	Cynoglossidae	<i>Cynoglossus bilineatus</i>	[a tongue sole]	37463013
1145	Teleost	Cynoglossidae	<i>Cynoglossus puncticeps</i>	[a tongue sole]	37463018
1146	Teleost	Cynoglossidae	<i>Paraplagusia bilineata</i>	four lined tongue sole	37463001

1148	Teleost	Dactylopteridae	<i>Dactyloptena orientalis</i>	[a flying gurnard]	37308004
1151	Teleost	Drepaneidae	<i>Drepane punctata</i>	spotted batfish	37362005
1152	Teleost	Echeneidae	<i>Echeneis naucrates</i>	slender suckerfish	37336001
1153	Teleost	Engraulidae	<i>Thryssa setirostris</i>	longjaw anchovy	37086004
1154	Teleost	Ephippidae	<i>Zabidius novemaculeatus</i>	nine spined batfish	37362003
1156	Teleost	Gerreidae	<i>Gerres macracanthus</i>	[a silver bidy]	37349021
3225	Teleost	Gerreidae	<i>Gerres poeti</i>	A silverbidy	
1162	Teleost	Haemulidae	<i>Pomadasys trifasciatus</i>	silver grunter	37350008
1163	Teleost	Holocentridae	<i>Myripristis murdjan</i>	white tipped squirrel fish	37261002
1169	Teleost	Labridae	<i>Choerodon venustus</i>	venus tuskfish	37384042
1172	Teleost	Leiognathidae	<i>Leiognathus equulus</i>	narrow-banded ponyfish	37341014
3226	Teleost	Leiognathidae	<i>Leiognathus sp.</i>	a ponyfish	
674	Teleost	Lethrinidae	<i>Lethrinus laticaudis</i>	Grass Emperor	37351006
721	Teleost	Lethrinidae	<i>Lethrinus ornatus</i>	emperor	37351015
679	Teleost	Lutjanidae	<i>Lutjanus johnii</i>	Golden Snapper	37346030
1380	Teleost	Lutjanidae	<i>Lutjanus sp.</i> (in Yearsley, Last & Ward, 1999) [western form]	Russell's snapper	37346012
1175	Teleost	Menidae	<i>Mene maculate</i>	razor trevally	37340001
1176	Teleost	Monacanthidae	<i>Paramonacanthus choirocephalus</i>	[a leatherjacket]	37465064
1183	Teleost	Monacanthidae	<i>Aluterus monoceros</i>	unicorn leatherjacket	37465022
1187	Teleost	Mullidae	<i>Parupeneus cyclostomus</i>	goldsaddle goatfish	37355025
1188	Teleost	Mullidae	<i>Parupeneus indicus</i>	Indian goatfish	37355005
1192	Teleost	Muraenesocidae	<i>Muraenesox cinereus</i>	dark-finned pike eel	37063002
1198	Teleost	Ostraciidae	<i>Tetrosomus gibbosus</i>	black-blotched turret fish	37466006
1202	Teleost	Paralichthyidae	<i>Pseudorhombus quinquocellatus</i>	five-eyed flounder	37460025
1205	Teleost	Paralichthyidae	<i>Pseudorhombus dupliciocellatus</i>	ocellated flounder	37460004
1214	Teleost	Platycephalidae	<i>Platycephalus arenarius</i>	northern sand flathead	37296021
1216	Teleost	Platycephalidae	<i>Kumococius rodericensis</i>	white-finned flathead	37296019
1217	Teleost	Platycephalidae	<i>Platycephalus endrachtensis</i>	yellow-tailed flathead	37296020
1220	Teleost	Polynemidae	<i>Polydactylus macrochir</i>	king threadfin	37383005
1226	Teleost	Sciaenidae	<i>Johnius laevis</i>	round-nosed croaker	37354004
1228	Teleost	Scombridae	<i>Rastrelliger kanagurta</i>	Indian mackerel	37441012
1230	Teleost	Scorpaenidae	<i>Pterois russelii</i>	[a lionfish]	37287012
440	Teleost	Serranidae	<i>Epinephelus tauvina</i>	rock cod	37311057

1231	Teleost	Siganidae	<i>Siganus puellus</i>	bluelined rabbitfish	37438011
1232	Teleost	Siganidae	<i>Siganus lineatus</i>	goldlined rabbitfish	37438010
1395	Teleost	Siganidae	<i>Siganus nebulosus</i>	dusky rabbitfish	37438001
144	Teleost	Sillaginidae	<i>Sillago lutea</i>	Mud Whiting	37330007
1235	Teleost	Sillaginidae	<i>Sillago burrus</i>	western trumpeter whiting	37330004
1236	Teleost	Soleidae	<i>Pardachirus pavoninus</i>	peacock sole	37462009
1397	Teleost	Soleidae	<i>Zebrias craticulus</i>	wicker-work sole	37462003
1399	Teleost	Soleidae	<i>Phyllichthys sclerolepis</i>	[a sole]	37462031
183	Teleost	Sphyraenidae	<i>Sphyraena obtusata</i>	Striped Seapike / Pike	37382001
614	Teleost	Sphyraenidae	<i>Sphyraena barracuda</i>	Great Barracuda	37382008
1237	Teleost	Sphyraenidae	<i>Sphyraena putnamae</i>	chevron barracuda	37382006
1244	Teleost	Synodontidae	<i>Synodus dermatogenys</i>	clearfin lizardfish	37118003
1247	Teleost	Terapontidae	<i>Terapon puta</i>	[a grunter]	37321006
1253	Teleost	Tetraodontidae	<i>Torquigener tuberculiferus</i>	[a toadfish]	37467062
1255	Teleost	Tetraodontidae	<i>Arothron stellatus</i>	dotted pufferfish	37467014
1260	Teleost	Tetrarogidae	<i>Paracentropogon vespa</i>	[a scorpionfish]	37287060
1368	Teleost	Tetrarogidae	<i>Liocranium praepositum</i>	black spot waspfish	37287015
227	Teleost	Triacanthidae	<i>Triacanthus biaculeatus</i>	short-nosed triple spine	37464002
447	Teleost	Triglidae	<i>Lepidotrigla argus</i>	gurnard	37288032
2460	Teleost		<i>Gerres macrosoma</i>	silverbiddies	
616	Teleost	Labridae	<i>Cheilinus trilobatus</i>	Maori Wrasse	37384044
678	Teleost	Lethrinidae	<i>Lethrinus sp.</i> [Carpenter, pers comm]	Spangled Emperor	37351001
1388	Teleost	Lethrinidae	<i>Lethrinus spp</i>	Emperor	37351902
620	Teleost	Scombridae	<i>Scomberomorus commerson</i>	Spanish Mackerel	37441007
622	Teleost	Scombridae	<i>Scomberomorus munroi</i>	Australian Spotted Mackerel- DoggySchol	37441015
623	Teleost	Scombridae	<i>Scomberomorus semifasciatus</i>	Broad-barred Mackerel - Grey Mack	37441018
688	Teleost	Scombridae	<i>Grammatorcynus bicarinatus</i>	Shark Mackerel	37441025
158	Teleost	Sparidae	<i>Pagrus auratus</i>	Snapper/Squirefish	37353001
599	Teleost	Lutjanidae	<i>Lutjanus sebae</i>	Red Emperor	37346004
684	Teleost	Lutjanidae	<i>Lutjanus malabaricus</i>	Scarlet Sea Perch/Large Mouth Nannygai	37346007
147	Teleost	Rachycentridae	<i>Rachycentron canadum</i>	cobia	37335001

579	Teleost	Serranidae	<i>Plectropomus leopardus</i>	Northern Cod, Leopard Coralgrouper	37311078
1765	Chondrichthyan	Multi-family group	Sharks – other	Sharks (other)	37990003
2043	Chondrichthyan	Squatinae	Squatinae - undifferentiated	angel sharks	37024000
2228	Invertebrate	Palinuridae	<i>Panulirus spp</i> except <i>P. cygnus</i>	tropical rocklobster	28820901
2018	Invertebrate	Penaeoidea & Caridea	Penaeoidea & Caridea – undifferentiated	prawns	28710000
2245	Teleost	Ariidae	<i>Arius spp</i>	catfish	37188901
2159	Teleost	Arripidae	<i>Arripis trutta</i> & <i>Arripis truttaceus</i>	Australian salmon	37344900
68	Teleost	Berycidae	<i>Centroberyx gerrardi</i>	bight redfish	37258004
919	Teleost	Gadidae	<i>Gadus morhua</i>	Cod - unspecified	37226790
1087	Teleost	Gempylidae	<i>Thyrsites atun</i>	Barracouta	37439001
1386	Teleost	Haemulidae	<i>Plectorhinchus spp.</i>	Sweetlips	37350903
615	Teleost	Labridae	<i>Achoerodus viridis</i>	Eastern Blue Groper	37384043
597	Teleost	Lutjanidae	<i>Aphareus rutilans</i>	rusty jobfish	37346001
1381	Teleost	Lutjanidae	<i>Lutjanus spp.</i>	Sea Perch	37346905
2231	Teleost	Lutjanidae	<i>Lutjanus vitta/ carponotatus/ lutjanus</i> & <i>L. quinquelineatus</i>	flagfish	37346913
592	Teleost	Ophidiidae	<i>Dannevigia tusca</i>	Australian Tusk	37228001
873	Teleost	Scombridae	<i>Scomber scombrus</i>	Atlantic mackerel	37441790
689	Teleost	Serranidae	<i>Cromileptes altivelis</i>	Humpback Grouper/Barramundi cod	37311044
2236	Teleost	Serranidae	<i>Plectropomus spp</i> & <i>Variola spp</i>	coral trout	37311905
1229	Teleost	Scombridae	<i>Scomberomorus queenslandicus</i>	school mackerel	37441014
513	Chondrichthyan	Dasyatidae	<i>Dasyatis leylandi</i>	Painted Maskray	37035013
335	Chondrichthyan	Rhinobatidae	<i>Rhynchobatus djiddensis</i>	White-spotted Guitarfish	37026001
2738	Invertebrate	Penaeidae	<i>Metapenaeopsis mogiensis</i>	prawn	28711015
2739	Invertebrate	Penaeidae	<i>Metapenaeopsis novaeguineae</i>	prawn	28711016
2740	Invertebrate	Penaeidae	<i>Metapenaeopsis palmensis</i>	prawn	28711017
2741	Invertebrate	Penaeidae	<i>Metapenaeopsis rosea</i>	prawn	28711019
2749	Invertebrate	Penaeidae	<i>Parapenaeopsis cornuta</i>	prawn	28711031
2754	Invertebrate	Penaeidae	<i>Trachypenaeus anchoralis</i>	prawn	28711054
2755	Invertebrate	Penaeidae	<i>Trachypenaeus curvirostris</i>	prawn	28711055
2756	Invertebrate	Penaeidae	<i>Trachypenaeus fulvus</i>	prawn	28711056
2758	Invertebrate	Penaeidae	<i>Trachypenaeus granulosis</i>	prawn	28711058
30	Invertebrate	Portunidae	<i>Portunus (Portunus) pelagicus</i>	blue swimmer crab	28911005

2718	Invertebrate	Squillidae	<i>Carinosquilla thailandensis</i>	mantis shrimp	28051015
2721	Invertebrate	Squillidae	<i>Erugosquilla grahami</i>	mantis shrimp	28051032
2722	Invertebrate	Squillidae	<i>Erugosquilla woodmasoni</i>	mantis shrimp	28051033
2728	Invertebrate	Squillidae	<i>Oratosquilla inornata</i>	mantis shrimp	28051051
2731	Invertebrate	Squillidae	<i>Oratosquilla quinquedentate</i>	mantis shrimp	28051054
2569	Invertebrate		<i>Lupocyclus rotundatus</i>	swimmer crab	
2573	Invertebrate		<i>Parthenope longimanus</i>	crab	
2593	Invertebrate		<i>Izanami inermis</i>	moon crab	
2643	Invertebrate		<i>Thalamita sima</i>	swimmer crab	
2646	Invertebrate		<i>Dorippe quadridens</i>	crabs	
2672	Invertebrate		<i>Sphenopus marsupialis</i>	zoanthid anemone	
2692	Invertebrate		<i>Hyastenus sp.</i>	Spider crab	
2495	Teleost	Aploactinidae	<i>Kanekonia queenslandica</i>	deep velvetfish	37290007
2424	Teleost	Apogonidae	<i>Apogon septemstriatus</i>	[a cardinal fish]	37327012
2481	Teleost	Apogonidae	<i>Apogon cavitiensis</i>	[a cardinal fish]	37327028
2482	Teleost	Apogonidae	<i>Apogon fuscomaculatus</i>	[a cardinal fish]	37327140
2483	Teleost	Apogonidae	<i>Apogon semilineatus</i>	[a cardinal fish]	37327004
2289	Teleost	Ariidae	<i>Arius thalassinus</i>	catfish	37188001
1364	Teleost	Bathysauridae	<i>Saurida grandisquamis</i>	grey lizardfish	37118016
2496	Teleost	Bregmacerotidae	<i>Bregmaceros japonicus</i>	codlet	37225004
2404	Teleost	Callionymidae	<i>Repomucenus sublaevis</i>	[a stinkfish]	37427010
654	Teleost	Carangidae	<i>Carangoides caeruleopinnatus</i>	trevally	37337021
1120	Teleost	Carangidae	<i>Alepes apercna</i>	banded scad	37337010
2405	Teleost	Carangidae	<i>Carangoides gymnostethus</i>	[a trevally]	37337022
2450	Teleost	Chaetodontidae	<i>Coradion chrysozonus</i>	butterflyfish	37365004
2441	Teleost	Clupeidae	<i>Amblygaster sirm</i>	herring	37085006
2473	Teleost	Clupeidae	<i>Sardinella albella</i>	herring	37085014
2474	Teleost	Clupeidae	<i>Herklotsichthys lippa</i>	herring	37085008
2377	Teleost	Cynoglossidae	<i>Paraplusia sinerama</i>	sole	37463022
2505	Teleost	Diodontidae	<i>Cylichthys orbicularis</i>	[a porcupinefish]	37469007
2475	Teleost	Exocoetidae	<i>Parexocoetus mento</i>	flying fish	37233003
88	Teleost	Fistulariidae	<i>Fistularia commersonii</i>	smooth flute mouth	37278001
1157	Teleost	Gerreidae	<i>Gerres oblongus</i>	[a silver biddy]	37349022

2459	Teleost	Gerreidae	<i>Gerres filamentosus</i>	[a silverbidy]	37349003
2461	Teleost	Gerreidae	<i>Gerres subfasciatus</i>	[a silverbidy]	37349005
2470	Teleost	Gobiidae	<i>Acentrogobius caninus</i>	[a goby]	37428019
2388	Teleost	Hemiramphidae	<i>Hemiramphus robustus</i>	garfish	37234013
1379	Teleost	Leiognathidae	<i>Leiognathus sp.</i> [in Sainsbury <i>et al.</i> , 1985]	slender ponyfish	37341003
2456	Teleost	Leiognathidae	<i>Leiognathus decorus</i>	[a ponyfish]	37341016
2462	Teleost	Leiognathidae	<i>Leiognathus leuciscus</i>	[a ponyfish]	37341005
2464	Teleost	Leiognathidae	<i>Leiognathus fasciatus</i>	[a ponyfish]	37341009
2466	Teleost	Leiognathidae	<i>Leiognathus moretoniensis</i>	[a ponyfish]	37341012
2467	Teleost	Leiognathidae	<i>Secutor insidiator</i>	[a ponyfish]	37341006
1546	Teleost	Lutjanidae	<i>Lutjanus russelli</i> [The eastern form]	[a tropical snapper]	37346065
2339	Teleost	Mullidae	<i>Parupeneus heptacanthus</i>	[a mullett]	37355004
2442	Teleost	Mullidae	<i>Upeneus sp. 1</i> [in Sainsbury <i>et al.</i> , 1985]	[a mullett]	37355008
2360	Teleost	Nemipteridae	<i>Pentapodus paradiseus</i>	[a threadfin bream]	37347028
2319	Teleost	Pteroidae	<i>Pterois volitans</i>	[a scorpionfish]	37287040
2335	Teleost	Scaridae	<i>Scarus ghobban</i>	[a parrotfish]	37386001
2324	Teleost	Scorpaenidae	<i>Scorpaenopsis furneauxi</i>	[a scorpionfish]	37287038
2326	Teleost	Scorpaenidae	<i>Scorpaenopsis neglecta</i>	[a scorpionfish]	37287030
2327	Teleost	Scorpaenidae	<i>Scorpaenopsis venosa</i>	[a scorpionfish]	37287086
2368	Teleost	Soleidae	<i>Zebrias cancellatus</i>	sole	37462006
2393	Teleost	Soleidae	<i>Aseraggodes melanostictus</i>	sole	37462016
2526	Teleost	Synanceiidae	<i>Minous trachycephalus</i>	stinger	37287024
1599	Teleost	Syngnathidae	<i>Hippocampus hendriki</i>	[a pipefish]	37282125
2380	Teleost	Synodontidae	<i>Synodus hoshinonis</i>	lizard fish	37118010
2384	Teleost	Tetraodontidae	<i>Arothron manilensis</i>	[a toadfish]	37467020
2303	Teleost	Tetrarogidae	<i>Paracentropogon longispinus</i>	fortesque	37287016
1099	Teleost	Antennariidae	<i>Tathicarpus butleri</i>	smooth spot anglerfish	37210003
1102	Teleost	Apistidae	<i>Apistus carinatus</i>	ocellated waspfish	37287011
1103	Teleost	Aploactinidae	<i>Adventor elongatus</i>	[a velvetfish]	37290004
1104	Teleost	Aploactinidae	<i>Paraploactis trachyderma</i>	[a velvetfish]	37290011
1106	Teleost	Apogonidae	<i>Apogon melanopus</i>	monster apogonid	37327016
1107	Teleost	Apogonidae	<i>Apogon poecilopterus</i>	pearly-finned cardinalfish	37327026
1108	Teleost	Apogonidae	<i>Siphamia roseigaster</i>	pink-breasted siphonfish	37327017

1111	Teleost	Apogonidae	<i>Apogon nigripinnis</i>	yellow ring cardinal	37327009
1112	Teleost	Apogonidae	<i>Apogon albimaculosus</i>	yellow-spot cardinalfish	37327014
1375	Teleost	Apogonidae	<i>Apogon brevicaudatus</i>	seven striped cardinalfish	37327005
1376	Teleost	Apogonidae	<i>Apogon truncates</i>	flag-fin cardinalfish	37327013
2422	Teleost	Apogonidae	<i>Apogon fasciatus</i>	[a cardinal fish]	37327158
1363	Teleost	Bathysauridae	<i>Saurida argentea</i>	shortfin lizardfish	37118005
1115	Teleost	Bothidae	<i>Arnoglossus waitei</i>	[a lefteye flounder]	37460045
1116	Teleost	Bothidae	<i>Grammatobothus polyophthalmus</i>	three-eyed flounder	37460010
1396	Teleost	Bothidae	<i>Engyprosopon grandisquamum</i>	spiny headed flounder	37460012
1119	Teleost	Callionymidae	<i>Dactylopus dactylopus</i>	fingered dragonet	37427005
1391	Teleost	Callionymidae	<i>Calliurichthys grossi</i>	[a stinkfish]	37427007
1392	Teleost	Callionymidae	<i>Orbonymus rameus</i>	high-finned dragonet	37427009
1393	Teleost	Callionymidae	<i>Repomucenus belcheri</i>	[a stinkfish]	37427011
1394	Teleost	Callionymidae	<i>Repomucenus limiceps</i>	[a stinkfish]	37427012
663	Teleost	Carangidae	<i>Gnathanodon speciosus</i>	Golden Trevally	37337012
1121	Teleost	Carangidae	<i>Parastromateus niger</i>	black pomfret	37337072
1123	Teleost	Carangidae	<i>Caranx bucculentus</i>	blue-spotted trevally	37337016
1124	Teleost	Carangidae	<i>Carangoides hedlandensis</i>	bumpnose trevally	37337042
1125	Teleost	Carangidae	<i>Carangoides humerosus</i>	dusky shoulder trevally	37337031
1126	Teleost	Carangidae	<i>Pantolabus radiatus</i>	fringe-finned trevally	37337047
1127	Teleost	Carangidae	<i>Carangoides talamparoides</i>	imposter trevally	37337043
1128	Teleost	Carangidae	<i>Selar boops</i>	oxeye scad	37337008
1132	Teleost	Carangidae	<i>Selaroides leptolepis</i>	yellowstripe scad	37337015
1377	Teleost	Carangidae	<i>Alectis indica</i>	Indian threadfin	37337038
1133	Teleost	Centriscidae	<i>Centriscus scutatus</i>	grooved razor fish	37280001
1134	Teleost	Centrogeniidae	<i>Centrogenys vaigiensis</i>	pretty-fins	37311030
1135	Teleost	Centropomidae	<i>Psammoperca waigiensis</i>	glasseye perch	37310001
1136	Teleost	Chaetodontidae	<i>Chelmon marginalis</i>	marginated coralfish	37365007
1138	Teleost	Chaetodontidae	<i>Parachaetodon ocellatus</i>	ocellated coralfish	37365003
1140	Teleost	Clupeidae	<i>Sardinella gibbosa</i>	goldstripe sardine	37085013
1141	Teleost	Clupeidae	<i>Pellona ditchela</i>	Indian pellona	37085009
1143	Teleost	Clupeidae	<i>Dussumieria elopsoides</i>	sharp nosed sprat	37085010
1147	Teleost	Cynoglossidae	<i>Cynoglossus maculipinnis</i>	spotted-fin tongue sole	37463003

1149	Teleost	Dactylopteridae	<i>Dactyloptena papilio</i>	large-spot flying gurnard	37308001
1150	Teleost	Diodontidae	<i>Tragulichthys jaculiferus</i>	three spot porcupine fish	37469004
1155	Teleost	Ephippidae	<i>Platax teira</i>	round-faced batfish	37362004
89	Teleost	Fistulariidae	<i>Fistularia petimba</i>	rough flutemouth	37278002
1158	Teleost	Gerreidae	<i>Pentaprion longimanus</i>	long-fin silver biddy	37349002
659	Teleost	Glaucosomatidae	<i>Glaucosoma magnificum</i>	pearl perch	37320002
1159	Teleost	Gobiidae	<i>Yongeichthys nebulosus</i>	[a goby]	37428001
1160	Teleost	Haemulidae	<i>Pomadasys maculatus</i>	blotched javelinfish	37350002
1161	Teleost	Haemulidae	<i>Diagramma labiosum</i>	painted sweetlip	37350003
1165	Teleost	Labridae	<i>Choerodon monostigma</i>	dark spot tusk fish	37384008
1167	Teleost	Labridae	<i>Choerodon cephalotes</i>	purple tusk fish	37384004
1389	Teleost	Labridae	<i>Choerodon sugillatum</i>	wedge-tailed wrasse	37384009
1170	Teleost	Leiognathidae	<i>Leiognathus splendens</i>	black-tipped ponyfish	37341010
1171	Teleost	Leiognathidae	<i>Leiognathus elongatus</i>	elongate pony fish	37341011
1173	Teleost	Leiognathidae	<i>Leiognathus bindus</i>	orange tipped ponyfish	37341002
1174	Teleost	Leiognathidae	<i>Gazza minuta</i>	toothed ponyfish	37341007
677	Teleost	Lethrinidae	<i>Lethrinus lentjan</i>	Red Spot Emperor	37351007
713	Teleost	Lethrinidae	<i>Lethrinus genivittatus</i>	emperor	37351002
637	Teleost	Lutjanidae	<i>Lutjanus vitta</i>	brownband seaperch	37346003
739	Teleost	Lutjanidae	<i>Lutjanus carponotatus</i>	stripey seaperch	37346011
1177	Teleost	Monacanthidae	<i>Anacanthus barbatus</i>	bearded leatherjacket	37465010
1178	Teleost	Monacanthidae	<i>Monacanthus chinensis</i>	fan-bellied leatherjacket	37465009
1179	Teleost	Monacanthidae	<i>Pseudomonacanthus elongatus</i>	four-banded leather jacket	37465029
1180	Teleost	Monacanthidae	<i>Pseudomonacanthus peroni</i>	pot bellied leatherjacket	37465020
1181	Teleost	Monacanthidae	<i>Chaetodermis penicilligera</i>	prickly leatherjacket	37465013
1182	Teleost	Monacanthidae	<i>Paramonacanthus filicauda</i>	threadfin leatherjacket	37465024
1184	Teleost	Mullidae	<i>Upeneus sundaicus</i>	dark-finned goatfish	37355013
1185	Teleost	Mullidae	<i>Upeneus asymmetricus</i>	gold band orange bar goatfish	37355010
1186	Teleost	Mullidae	<i>Upeneus moluccensis</i>	gold-band goatfish	37355003
1189	Teleost	Mullidae	<i>Upeneus luzonius</i>	saddle goatfish	37355009
1190	Teleost	Mullidae	<i>Upeneus tragula</i>	spotted goatfish	37355014
1191	Teleost	Mullidae	<i>Upeneus sulphureus</i>	yellow goatfish	37355007
1193	Teleost	Nemipteridae	<i>Nemipterus peronii</i>	notched threadfin bream	37347003

1194	Teleost	Nemipteridae	<i>Nemipterus hexodon</i>	ornate threadfin bream	37347014
1195	Teleost	Nemipteridae	<i>Nemipterus furcosus</i>	rosy threadfin bream	37347005
1196	Teleost	Nemipteridae	<i>Nemipterus nematopus</i>	yellow tipped threadfin bream	37347002
1384	Teleost	Nemipteridae	<i>Scolopsis taenioptera</i>	red spot monocle bream	37347008
1199	Teleost	Ostraciidae	<i>Lactoria cornuta</i>	cowfish	37466004
1402	Teleost	Ostraciidae	<i>Rhynchostracion nasus</i>	small nosed boxfish	37466005
221	Teleost	Paralichthyidae	<i>Pseudorhombus jenynsii</i>	small-toothed flounder	37460002
1201	Teleost	Paralichthyidae	<i>Pseudorhombus elevatus</i>	deep-bodied flounder	37460008
1203	Teleost	Paralichthyidae	<i>Pseudorhombus diplospilus</i>	four twin-spot flounder	37460015
1204	Teleost	Paralichthyidae	<i>Pseudorhombus arsius</i>	large-toothed flounder	37460009
1206	Teleost	Paralichthyidae	<i>Pseudorhombus argus</i>	peacock flounder	37460038
1207	Teleost	Paralichthyidae	<i>Pseudorhombus spinosus</i>	spiny flounder	37460011
1208	Teleost	Pegasidae	<i>Pegasus volitans</i>	slender seamoth	37309002
1210	Teleost	Pinguipedidae	<i>Parapercis nebulosa</i>	red-barred grubfish	37390005
1211	Teleost	Platycephalidae	<i>Platycephalus indicus</i>	bartail flathead	37296033
1212	Teleost	Platycephalidae	<i>Elates ransonnetii</i>	dwarf flathead	37296013
1213	Teleost	Platycephalidae	<i>Suggrundus macracanthus</i>	large-spined flathead	37296012
1215	Teleost	Platycephalidae	<i>Inegocia japonica</i>	rusty flathead	37296029
1370	Teleost	Platycephalidae	<i>Papilloculiceps nematophthalmus</i>	fringed eye flathead	37296023
1526	Teleost	Platycephalidae	<i>Sorsogona tuberculata</i>	heart-headed flathead	37296030
1218	Teleost	Plotosidae	<i>Euristhmus nudiceps</i>	naked-headed catfish	37192003
1219	Teleost	Plotosidae	<i>Plotosus lineatus</i>	striped catfish	37192002
1221	Teleost	Pomacanthidae	<i>Chaetodontoplus duboulayi</i>	scribbled angelfish	37365009
1222	Teleost	Pomacentridae	<i>Pristotis obtusirostris</i>	Gulf damsel	37372001
749	Teleost	Priacanthidae	<i>Priacanthus tayenus</i>	bigeye	37326003
1223	Teleost	Psettodidae	<i>Psettodes erumei</i>	Australian halibut	37457001
1224	Teleost	Pseudochromidae	<i>Pseudochromis quinquedentatus</i>	spotted dottyback	37313001
1225	Teleost	Samaridae	<i>Samaris cristatus</i>	cockatoo flounder	37461006
1227	Teleost	Sciaenidae	<i>Johnius borneensis</i>	sin croaker	37354007
437	Teleost	Serranidae	<i>Epinephelus sexfasciatus</i>	rock cod	37311017
577	Teleost	Serranidae	<i>Epinephelus quoyanus</i>	Honeycomb Cod / Longfin Grouper	37311040
1233	Teleost	Siganidae	<i>Siganus canaliculatus</i>	seagrass rabbitfish	37438004
1234	Teleost	Sillaginidae	<i>Sillago sihama</i>	silver whiting	37330006

226	Teleost	Soleidae	<i>Zebrias quagga</i>	zebra sole	37462004
1398	Teleost	Soleidae	<i>Brachirus muelleri</i>	tufted sole	37462007
1238	Teleost	Sphyraenidae	<i>Sphyraena flavicauda</i>	yellowtail barracuda	37382007
1240	Teleost	Synanceiidae	<i>Inimicus sinensis</i>	bearded ghoul	37287020
1241	Teleost	Synanceiidae	<i>Minous versicolor</i>	plum-striped stinger	37287021
863	Teleost	Synodontidae	<i>Saurida undosquamis</i>	brushtooth lizard fish	37118001
1245	Teleost	Synodontidae	<i>Synodus sageneus</i>	mottled lizardfish	37118004
1246	Teleost	Synodontidae	<i>Trachinocephalus myops</i>	painted saury	37118002
1248	Teleost	Terapontidae	<i>Pelates quadrilineatus</i>	eight lined grunter	37321001
1249	Teleost	Terapontidae	<i>Terapon theraps</i>	large scaled grunter	37321003
1250	Teleost	Terapontidae	<i>Pelates sexlineatus</i>	six-lined grunter-perch	37321005
1251	Teleost	Terapontidae	<i>Amniataba caudavittata</i>	yellowtail trumpeter	37321007
1252	Teleost	Tetrabrachiidae	<i>Tetrabrachium ocellatum</i>	[a frogfish]	37210010
247	Teleost	Tetraodontidae	<i>Torquigener pallimaculatus</i>	toadfish	37467009
1254	Teleost	Tetraodontidae	<i>Torquigener whitleyi</i>	[a toadfish]	37467028
1256	Teleost	Tetraodontidae	<i>Lagocephalus sceleratus</i>	giant toadfish	37467007
1257	Teleost	Tetraodontidae	<i>Lagocephalus spadiceus</i>	half smooth golden pufferfish	37467017
1258	Teleost	Tetraodontidae	<i>Lagocephalus lunaris</i>	rough golden pufferfish	37467012
1259	Teleost	Tetraodontidae	<i>Feroxodon multistriatus</i>	scribbled toadfish	37467010
1261	Teleost	Tetrarogidae	<i>Cottapistus cottoides</i>	orange-spotted waspfish	37287014
1262	Teleost	Triacanthidae	<i>Trixiphichthys weberi</i>	long nosed triple spine fish	37464001
209	Teleost	Trichiuridae	<i>Trichiurus lepturus</i>	smallhead hairtail	37440004
2094	Teleost	Carangidae	Carangidae - undifferentiated	trevallies	37337000
2077	Teleost	Hemiramphidae	Hemiramphidae - undifferentiated	garfishes	37234000
2216	Not Allocated	Pectinidae	Pectinidae – undifferentiated	scallops	23270000
2240	Not Allocated	Pteriidae	<i>Pinctada spp.</i>	pearl oyster	23236901
2710	Not Allocated	Pectinidae	<i>Annchlamys flabellate</i>	fan scallop	23270004
3227	Not Allocated		<i>Acaudina sp A</i>		
3228	Not Allocated		<i>Actinaria sp A</i>		
3229	Not Allocated		<i>Alcyonacea sp A</i>		
3230	Not Allocated		<i>Alcyonacea sp B</i>		
3231	Not Allocated		<i>Alepes vari</i>		37337067
3232	Not Allocated		<i>Alpheidae sp A</i>		

3233	Not Allocated	<i>Apogon timorensis</i>	37327077
3234	Not Allocated	<i>Ascidia</i> sp A	
3235	Not Allocated	<i>Ascidia</i> sp B	
3236	Not Allocated	<i>Ascidia</i> sp C	
3237	Not Allocated	<i>Ascidia</i> sp E	
3238	Not Allocated	<i>Ascidia</i> sp H	
3239	Not Allocated	<i>Ascidia</i> sp K	
3240	Not Allocated	<i>Ascidia</i> sp L	
3241	Not Allocated	<i>Ascidia</i> sp M	
3242	Not Allocated	<i>Ashtoret granulosa</i>	28877001
3243	Not Allocated	<i>Asteroidae</i> sp A	
3244	Not Allocated	<i>Asteroidae</i> sp B	
3245	Not Allocated	<i>Asteroidae</i> sp C	
3246	Not Allocated	<i>Asteroidae</i> sp D	
3247	Not Allocated	<i>Asteroidae</i> sp E	
3248	Not Allocated	<i>Asteroidae</i> sp K	
3249	Not Allocated	<i>Asteroidae</i> sp L	
3250	Not Allocated	<i>Astropecten</i> sp A	
3251	Not Allocated	<i>Astropecten</i> sp B	
3252	Not Allocated	<i>Alys naucum</i>	
3253	Not Allocated	<i>Axiidae</i> sp A	
3254	Not Allocated	<i>Axiidae</i> sp B	
3255	Not Allocated	<i>Bufo</i> rana	24170002
3256	Not Allocated	<i>Calappa</i> sp A	
3257	Not Allocated	<i>Caridean</i> sp A	
3258	Not Allocated	<i>Carinosquilla spinosus</i>	
3259	Not Allocated	<i>Caulastrea</i> sp A	
3260	Not Allocated	<i>Ceriantharia</i> sp B	
3261	Not Allocated	<i>Charybdis (charybdis) callianassa</i>	28911037
3262	Not Allocated	<i>Charybdis (charybdis) yaldwyni</i>	28911081
3263	Not Allocated	<i>Charybdis (charybdis) natator</i>	28911002
3264	Not Allocated	<i>Charybdis (Goniohellenus) truncata</i>	28911015
3265	Not Allocated	<i>Charybdis(charybdis) jaubertensis</i>	28911075

3266	Not Allocated	<i>Charybdis(charybdis) orientalis</i>	28911078
3267	Not Allocated	<i>Chicoreus (Triplex) cervicornis</i>	24200020
3268	Not Allocated	<i>Choerodon sp 2</i>	
3269	Not Allocated	<i>Choerodon sp A</i>	
3270	Not Allocated	<i>Clibanarius sp B</i>	
3271	Not Allocated	<i>Clibanarius sp C</i>	
3272	Not Allocated	<i>Clypeasteridae sp A</i>	
3273	Not Allocated	<i>Clypeasteridae sp B</i>	
3274	Not Allocated	<i>Clypeasteridae sp C</i>	
3275	Not Allocated	<i>Corbulidae sp A</i>	
3276	Not Allocated	<i>Crinoid sp A</i>	
3277	Not Allocated	<i>Crinoid sp B</i>	
3278	Not Allocated	<i>Crinoid sp C</i>	
3279	Not Allocated	<i>Crinoid sp D</i>	
3280	Not Allocated	<i>Crinoid sp E</i>	
3281	Not Allocated	<i>Crinoid sp F</i>	
3282	Not Allocated	<i>Crinoid sp G</i>	
3283	Not Allocated	<i>Crinoid sp H</i>	
3284	Not Allocated	<i>Crinoid sp I</i>	
3285	Not Allocated	<i>Crinoid sp J</i>	
3286	Not Allocated	<i>Crinoid sp K</i>	
3287	Not Allocated	<i>Crinoid sp L</i>	
3288	Not Allocated	<i>Crinoid sp N</i>	
3289	Not Allocated	<i>Crinoid sp P</i>	
3290	Not Allocated	<i>Crinoid sp Q</i>	
3291	Not Allocated	<i>Cryptopodia sp A</i>	
3292	Not Allocated	<i>Cynoglossus sp A</i>	
3293	Not Allocated	<i>Cypraea subviridis</i>	24155003
3294	Not Allocated	<i>Diogenidae sp A</i>	
3295	Not Allocated	<i>Diogenidae sp B</i>	
3296	Not Allocated	<i>Diogenidae sp C</i>	
3297	Not Allocated	<i>Diogenidae sp F</i>	
3298	Not Allocated	<i>Distorsio reticulata</i>	24174001

3299	Not Allocated	<i>Dosinia altenai</i>	23380033
3300	Not Allocated	<i>Dromidiopsis australiensis</i>	28852005
3301	Not Allocated	<i>Echinoid sp A</i>	
3302	Not Allocated	<i>Echinoid sp B</i>	
3303	Not Allocated	<i>Echinoid sp F</i>	
3304	Not Allocated	<i>Echinoid sp G</i>	
3305	Not Allocated	<i>Echinoid sp H</i>	
3306	Not Allocated	<i>Encrasicolina sp. A</i>	
3307	Not Allocated	<i>Euryale asperum</i>	25170004
3308	Not Allocated	<i>Gobiidae sp A</i>	
3309	Not Allocated	<i>Halimeda sp</i>	
3310	Not Allocated	<i>Halophila spinulosa</i>	63605003
3311	Not Allocated	<i>Haustellum multiplicatus</i>	24200018
3312	Not Allocated	<i>Herpetopoma atrata</i>	24046004
3313	Not Allocated	<i>Holothuria (Metriatyla) ocellata</i>	25416030
3314	Not Allocated	<i>Holothuria sp M</i>	
3315	Not Allocated	<i>Hyastenus campbelli</i>	28880030
3316	Not Allocated	<i>Hydroid sp B</i>	
3317	Not Allocated	<i>Hydroid sp A</i>	
3318	Not Allocated	<i>Hydroid sp C</i>	
3319	Not Allocated	<i>Inimicus caledonicus</i>	37287055
3320	Not Allocated	<i>Ixa sp (poss inermis)</i>	
3321	Not Allocated	<i>Jonas leuteanus</i>	28900002
3322	Not Allocated	<i>Metapenaeopsis hilarula</i>	28711060
3323	Not Allocated	<i>Metapenaeopsis sinica</i>	28711070
3324	Not Allocated	<i>Metapenaeopsis toloensis</i>	28711072
3325	Not Allocated	<i>Murex acanthostephes</i>	24200016
3326	Not Allocated	<i>Nassarius (nassarius) coronatus</i>	24202133
3327	Not Allocated	<i>Nuculidae sp A</i>	
3328	Not Allocated	<i>Octopus exannulatus</i>	23659024
3329	Not Allocated	<i>Octopus sp J</i>	
3330	Not Allocated	<i>Octopus sp K</i>	
3331	Not Allocated	<i>Ophiocomidae sp A</i>	

3332	Not Allocated	<i>Ophuroid sp A</i>	
3333	Not Allocated	<i>Ophuroid sp B</i>	
3334	Not Allocated	<i>Ophuroid sp C</i>	
3335	Not Allocated	<i>Ophuroid sp D</i>	
3336	Not Allocated	<i>Ophuroid sp E</i>	
3337	Not Allocated	<i>Ophuroid sp F</i>	
3338	Not Allocated	<i>Ophuroid sp H</i>	
3339	Not Allocated	<i>Ophuroid sp I</i>	
3340	Not Allocated	<i>Palaemonidae sp A</i>	
3341	Not Allocated	<i>Palaemonidae sp B</i>	
3342	Not Allocated	<i>Pandalidae sp A</i>	
3343	Not Allocated	<i>Paracuadina sp A</i>	
3344	Not Allocated	<i>Paramonacanthus otisensis</i>	37465065
3345	Not Allocated	<i>Parapercis diplospilus</i>	37390014
3346	Not Allocated	<i>Paraploactis intonsa</i>	37290010
3347	Not Allocated	<i>Pennatulacea sp A</i>	
3348	Not Allocated	<i>Pennatulacea sp B</i>	
3349	Not Allocated	<i>Pennatulacea sp C</i>	
3350	Not Allocated	<i>Peristrominous dolosus</i>	37290012
3351	Not Allocated	<i>Phalangipes sp (poss longipes)</i>	
3352	Not Allocated	<i>Phalangipus australiensis</i>	28880038
3353	Not Allocated	<i>Philine angasi</i>	24322002
3354	Not Allocated	<i>Photololigo spp (damaged)</i>	
3355	Not Allocated	<i>Pinnidae sp A</i>	
3356	Not Allocated	<i>Placamen calophyllum</i>	23380023
3357	Not Allocated	<i>Platylambrus sp A</i>	
3358	Not Allocated	<i>Porcellanella triloba</i>	28843047
3359	Not Allocated	<i>Portunus (Cycloachelous) granulatus</i>	28911028
3360	Not Allocated	<i>Portunus (Lupocycloporus) gracilimanus</i>	28911027
3361	Not Allocated	<i>Portunus (Monomia) argentatus</i>	28911032
3362	Not Allocated	<i>Portunus (Monomia) rubromarginatus</i>	28911026
3363	Not Allocated	<i>Portunus (Xiphonectes) hastatoides</i>	28911030
3364	Not Allocated	<i>Portunus (Xiphonectes) rugosus</i>	28911070

3365	Not Allocated	<i>Portunus (Xiphonectes) tenuipes</i>	28911042
3366	Not Allocated	<i>Prionocidaris sp A</i>	
3367	Not Allocated	<i>Pseudocolochirus violaceus</i>	25408031
3368	Not Allocated	<i>Rubble biological</i>	
3369	Not Allocated	<i>Saurida nebulosa</i>	37118027
3370	Not Allocated	<i>Scorpaenopsis brevifrons</i>	
3371	Not Allocated	<i>Scyllarus sp 1 (CSIRO)</i>	
3372	Not Allocated	<i>Scyllarus sp 2 (CSIRO)</i>	
3373	Not Allocated	Sea Urchin II (CSIRO ref)	
3374	Not Allocated	<i>Sepia plangon</i>	23607012
3375	Not Allocated	<i>Sepiadariidae sp A</i>	
3376	Not Allocated	<i>Sepiadariidae sp B</i>	
3377	Not Allocated	<i>Sepiolidae sp A</i>	
3378	Not Allocated	<i>Sicyonia lancifera</i>	28715001
3379	Not Allocated	<i>Sillago maculata</i>	37330015
3380	Not Allocated	<i>Sillago robusta</i>	37330005
3381	Not Allocated	<i>Spatangoida sp B</i>	
3382	Not Allocated	<i>Stellaster equestris</i>	25122026
3383	Not Allocated	<i>Stichopus sp. A</i>	
3384	Not Allocated	<i>Stolephorus sp A</i>	
3385	Not Allocated	<i>Stolephorus sp B</i>	
3386	Not Allocated	<i>Strombus (Doxander) vittatus</i>	24125001
3387	Not Allocated	<i>Strongylura leiura</i>	37235003
3388	Not Allocated	<i>Sygnathidae sp A</i>	
3389	Not Allocated	<i>Tellina (Tellinella) pulcherrima</i>	23355013
3390	Not Allocated	<i>Thalamita sp. (poss spinifera)</i>	
3392	Not Allocated	<i>Tripodichthys angustifrons</i>	37464007
3393	Not Allocated	<i>Xenophora (Xenophora) solaroides</i>	24145001
3394	Not Allocated	<i>Xenophora indica</i>	24145002
1407	Not Allocated	Mixed species	37999999
			other

TEP species Torres Strait Prawn Fishery

List the TEP species that occur in the area of the sub-fishery. Highlight species that are known to interact directly with the fishery. TEP species are those species listed as Threatened, Endangered or Protected under the EPBC Act.

TEP species are often poorly listed by fisheries due to low frequency of direct interaction. Both direct (capture) and indirect (e.g. food source captured) interaction are considered in the ERAEF approach. A list of TEP species has been generated for each fishery and is included in the PSA workbook species list. This list has been generated using the DEH Search Tool from DEH home page <http://www.deh.gov.au/>

For each fishery, the list of TEP species is compiled by reviewing all available fishery literature. Species considered to have potential to interact with fishery (based on geographic range & proven/perceived susceptibility to the fishing gear/methods and examples from other similar fisheries across the globe) should also be included.

ERAEF species ID	Taxa	Family name	Scientific name	Common Name	CAAB code
1067	Chondrichthyan	Rhincodontidae	<i>Rhincodon typus</i>	whale shark	37014001
1436	Marine bird	Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	40077001
1015	Marine bird	Laridae	<i>Sterna anaethetus</i>	Bridled Tern	40128023
1025	Marine bird	Laridae	<i>Sterna sumatrana</i>	Black-naped tern	40128034
1438	Marine bird	Laridae	<i>Anous minutus</i>	Black Noddy	40128001
1580	Marine bird	Procellariidae	<i>Calonectris leucomelas</i>	streaked shearwater	40041002
1610	Marine bird		<i>Pterodroma heraldica</i>	Herald Petrel	
1439	Marine mammal	Balaenidae	<i>Balaenoptera bonaerensis</i>	Antarctic Minke Whale	41112007
262	Marine mammal	Balaenopteridae	<i>Balaenoptera edeni</i>	Bryde's Whale	41112003
265	Marine mammal	Balaenopteridae	<i>Balaenoptera musculus</i>	Blue Whale	41112004
984	Marine mammal	Balaenopteridae	<i>Megaptera novaeangliae</i>	Humpback Whale	41112006
612	Marine mammal	Delphinidae	<i>Delphinus delphis</i>	Common Dolphin	41116001
860	Marine mammal	Delphinidae	<i>Orcaella brevirostris</i>	Irrawaddy dolphin	41116010
902	Marine mammal	Delphinidae	<i>Feresa attenuata</i>	Pygmy Killer Whale	41116002
934	Marine mammal	Delphinidae	<i>Globicephala macrorhynchus</i>	Short-finned Pilot Whale	41116003
937	Marine mammal	Delphinidae	<i>Grampus griseus</i>	Risso's Dolphin	41116005
970	Marine mammal	Delphinidae	<i>Lagenodelphis hosei</i>	Fraser's Dolphin	41116006
1002	Marine mammal	Delphinidae	<i>Orcinus orca</i>	Killer Whale	41116011

1007	Marine mammal	Delphinidae	<i>Peponocephala electra</i>	Melon-headed Whale	41116012
1044	Marine mammal	Delphinidae	<i>Pseudorca crassidens</i>	False Killer Whale	41116013
1076	Marine mammal	Delphinidae	<i>Sousa chinensis</i>	Indo-Pacific Humpback Dolphin	41116014
1080	Marine mammal	Delphinidae	<i>Stenella attenuate</i>	Spotted Dolphin	41116015
1081	Marine mammal	Delphinidae	<i>Stenella coeruleoalba</i>	Striped Dolphin	41116016
1082	Marine mammal	Delphinidae	<i>Stenella longirostris</i>	Long-snouted Spinner Dolphin	41116017
1083	Marine mammal	Delphinidae	<i>Steno bredanensis</i>	Rough-toothed Dolphin	41116018
1091	Marine mammal	Delphinidae	<i>Tursiops truncatus</i>	Bottlenose Dolphin	41116019
1494	Marine mammal	Delphinidae	<i>Tursiops aduncus</i>	Indian Ocean bottlenose dolphin	41116020
813	Marine mammal	Dugongidae	<i>Dugong dugon</i>	Dugong	41206001
968	Marine mammal	Physeteridae	<i>Kogia breviceps</i>	Pygmy Sperm Whale	41119001
969	Marine mammal	Physeteridae	<i>Kogia simus</i>	Dwarf Sperm Whale	41119002
1036	Marine mammal	Physeteridae	<i>Physeter catodon</i>	Sperm Whale	41119003
986	Marine mammal	Ziphiidae	<i>Mesoplodon densirostris</i>	Blainville's Beaked Whale	41120005
1098	Marine mammal	Ziphiidae	<i>Ziphius cavirostris</i>	Cuvier's Beaked Whale	41120012
324	Marine reptile	Cheloniidae	<i>Caretta caretta</i>	Loggerhead	39020001
541	Marine reptile	Cheloniidae	<i>Chelonia mydas</i>	Green turtle	39020002
822	Marine reptile	Cheloniidae	<i>Eretmochelys imbricata</i>	Hawksbill turtle	39020003
844	Marine reptile	Cheloniidae	<i>Lepidochelys olivacea</i>	Olive Ridley turtle	39020004
857	Marine reptile	Cheloniidae	<i>Natator depressus</i>	Flatback turtle	39020005
2276	Marine reptile	Crocodylidae	<i>Crocodylus porosus</i>	saltwater crocodile	39140002
613	Marine reptile	Dermochelyidae	<i>Dermochelys coriacea</i>	Leathery turtle	39021001
254	Marine reptile	Hydrophiidae	<i>Astrotia stokesii</i>	Stokes' seasnake	39125009
957	Marine reptile	Hydrophiidae	<i>Hydrophis elegans</i>	Elegant seasnake	39125021
1005	Marine reptile	Hydrophiidae	<i>Pelamis platurus</i>	yellow-bellied seasnake	39125033
1408	Marine reptile	Hydrophiidae	<i>Acalyptophis peronii</i>	Horned Seasnake	39125001
1410	Marine reptile	Hydrophiidae	<i>Aipysurus duboisii</i>	Dubois' Seasnake	39125003
1411	Marine reptile	Hydrophiidae	<i>Aipysurus eydouxii</i>	Spine-tailed Seasnake	39125004
1414	Marine reptile	Hydrophiidae	<i>Aipysurus laevis</i>	Olive Seasnake, Golden Seasnake	39125007
1416	Marine reptile	Hydrophiidae	<i>Disteira major</i>	Olive-headed Seasnake	39125011
1418	Marine reptile	Hydrophiidae	<i>Enhydrina schistosa</i>	Beaked Seasnake	39125013
1420	Marine reptile	Hydrophiidae	<i>Hydrelaps darwiniensis</i>	Black-ringed Seasnake	39125015
1422	Marine reptile	Hydrophiidae	<i>Hydrophis mcdowelli</i>	seasnake	39125025

1423	Marine reptile	Hydrophiidae	<i>Hydrophis ornatus</i>	seasnake	39125028
1424	Marine reptile	Hydrophiidae	<i>Lapemis hardwickii</i>	Spine-bellied Seasnake	39125031
1530	Marine reptile	Hydrophiidae	<i>Disteira kingii</i>	spectacled seasnake	39125010
1681	Marine reptile	Hydrophiidae	<i>Hydrophis atriceps</i>	Black-headed seasnake	39125016
1684	Marine reptile	Hydrophiidae	<i>Hydrophis gracilis</i>	Slender seasnake	39125023
1686	Marine reptile	Hydrophiidae	<i>Hydrophis melanosoma</i>	Black-banded robust seasnake	39125027
1687	Marine reptile	Hydrophiidae	<i>Hydrophis pacificus</i>	Large-headed Seasnake	39125029
1688	Marine reptile	Hydrophiidae	<i>Hydrophis vorisi</i>	A seasnake	39125030
1679	Marine reptile	Laticaudidae	<i>Laticauda colubrina</i>	Banded wide faced Sea krait	39124001
1680	Marine reptile	Laticaudidae	<i>Laticauda laticaudata</i>	Large scaled sea krait	39124002
1074	Teleost	Solenostomidae	<i>Solenostomus cyanopterus</i>	Blue-finned Ghost Pipefish, Robust Ghost	37281001
1075	Teleost	Solenostomidae	<i>Solenostomus paradoxus</i>	Harlequin Ghost Pipefish, Ornate Ghost Pipefish	37281002
52	Teleost	Syngnathidae	<i>Corythoichthys intestinalis</i>	Australian Messmate Pipefish, Banded Pipefish	37282049
54	Teleost	Syngnathidae	<i>Halicampus brocki</i>	Brock's Pipefish	37282065
55	Teleost	Syngnathidae	<i>Doryrhamphus janssi</i>	Cleaner Pipefish, Janss' Pipefish	37282059
57	Teleost	Syngnathidae	<i>Halicampus nitidus</i>	Glittering Pipefish	37282069
114	Teleost	Syngnathidae	<i>Acentronura breviperula</i>	Hairy Pygmy Pipehorse	37282035
318	Teleost	Syngnathidae	<i>Hippocampus spinosissimus</i>	Hedgehog Seahorse	
322	Teleost	Syngnathidae	<i>Trachyrhamphus longirostris</i>	Long-nosed Pipefish, Straight Stick Pipefish	37282101
359	Teleost	Syngnathidae	<i>Halicampus dunckeri</i>	Red-hair Pipefish, Duncker's Pipefish	37282066
360	Teleost	Syngnathidae	<i>Haliichthys taeniophorus</i>	Ribboned Seadragon, Ribboned Pipefish	37282007
361	Teleost	Syngnathidae	<i>Dunckerocampus dactyliophorus</i>	Ringed Pipefish	37282057
388	Teleost	Syngnathidae	<i>Choeroichthys brachysoma</i>	Pacific Short-bodied / Short-bodied pipefish	37282042
389	Teleost	Syngnathidae	<i>Choeroichthys suillus</i>	Pig-snouted Pipefish	37282046
452	Teleost	Syngnathidae	<i>Corythoichthys schultzi</i>	Schultz's Pipefish	37282052
453	Teleost	Syngnathidae	<i>Hippocampus jugumus</i>	Spiny Seahorse	37282112
454	Teleost	Syngnathidae	<i>Halicampus spinirostris</i>	Spiny-snout Pipefish	37282070
546	Teleost	Syngnathidae	<i>Campichthys tricarinatus</i>	Three-keel Pipefish	37282040
549	Teleost	Syngnathidae	<i>Hippocampus angustus</i>	Western Spiny Seahorse	37282005
563	Teleost	Syngnathidae	<i>Corythoichthys amplexus</i>	Fijian Banded Pipefish, Brown-banded Pipefish	37282047
566	Teleost	Syngnathidae	<i>Corythoichthys conspicillatus</i>	Yellow-banded Pipefish, Network Pipefish	37282032
569	Teleost	Syngnathidae	<i>Doryrhamphus melanopleura</i>	Bluestripe Pipefish	37282058
578	Teleost	Syngnathidae	<i>Corythoichthys ocellatus</i>	Orange-spotted Pipefish, Ocellated Pipefish	37282050

904	Teleost	Syngnathidae	<i>Festucalex cinctus</i>	Girdled Pipefish	37282061
938	Teleost	Syngnathidae	<i>Halicampus grayi</i>	Mud Pipefish, Gray's Pipefish	37282030
943	Teleost	Syngnathidae	<i>Hippichthys cyanospilos</i>	Blue-speckled Pipefish, Blue-spotted Pipefish	37282072
944	Teleost	Syngnathidae	<i>Hippichthys heptagonus</i>	Madura Pipefish	37282073
945	Teleost	Syngnathidae	<i>Hippichthys penicillus</i>	Beady Pipefish, Steep-nosed Pipefish	37282075
949	Teleost	Syngnathidae	<i>Hippocampus taeniopterus</i>	Spotted Seahorse, Yellow Seahorse	37282033
951	Teleost	Syngnathidae	<i>Hippocampus planifrons</i>	Flat-face Seahorse	37282078
992	Teleost	Syngnathidae	<i>Micrognathus andersonii</i>	Anderson's Pipefish, Shortnose Pipefish	37282086
1029	Teleost	Syngnathidae	<i>Syngnathoides biaculeatus</i>	Double-ended Pipehorse, Alligator Pipefish	37282100
1071	Teleost	Syngnathidae	<i>Solegnathus sp. 1</i> [in Kuitert, 2000]	Pipehorse	37282099
1089	Teleost	Syngnathidae	<i>Trachyrhamphus bicoarctatus</i>	Bend Stick Pipefish, Short-tailed Pipefish	37282006
1583	Teleost	Syngnathidae	<i>Bulbonaricus davaoensis</i>	[a pipefish]	37282038
1584	Teleost	Syngnathidae	<i>Choeroichthys cinctus</i>	[a pipefish]	37282043
1585	Teleost	Syngnathidae	<i>Choeroichthys sculptus</i>	[a pipefish]	37282045
1587	Teleost	Syngnathidae	<i>Corythoichthys paxtoni</i>	[a pipefish]	37282051
1589	Teleost	Syngnathidae	<i>Cosmocampus maxweberi</i>	[a pipefish]	37282056
1590	Teleost	Syngnathidae	<i>Festucalex gibbsi</i>	[a pipefish]	37282062
1592	Teleost	Syngnathidae	<i>Halicampus macrorhynchus</i>	[a pipefish]	37282067
1593	Teleost	Syngnathidae	<i>Halicampus mataafae</i>	[a pipefish]	37282068
1595	Teleost	Syngnathidae	<i>Hippichthys spicifer</i>	[a pipefish]	37282076
1597	Teleost	Syngnathidae	<i>Hippocampus bargibanti</i>	pygmy seahorse	37282106
1603	Teleost	Syngnathidae	<i>Hippocampus zebra</i>	[a pipefish]	37282080
1604	Teleost	Syngnathidae	<i>Micrognathus pygmaeus</i>	[a pipefish]	37282087
1605	Teleost	Syngnathidae	<i>Micrognathus natans</i>	[a pipefish]	37282089
1606	Teleost	Syngnathidae	<i>Microphis brachyurus</i>	[a pipefish]	37282090
1607	Teleost	Syngnathidae	<i>Nannocampus lindemanensis</i>	[a pipefish]	37282093
1608	Teleost	Syngnathidae	<i>Phoxocampus diacanthus</i>	[a pipefish]	37282096
1609	Teleost	Syngnathidae	<i>Siokunichthys breviceps</i>	[a pipefish]	37282097

Scoping Document S2B1. Benthic Habitats

Risk assessment for benthic habitats considers both the seafloor structure and its attached invertebrate fauna. Because data on the types and distributions of benthic habitat in Australia's Commonwealth fisheries are generally sparse, and because there is no universally accepted benthic classification scheme, the ERAEF methodology has used the most widely available type of data – seabed imagery – classified in a similar manner to that used in bioregionalization and deep seabed mapping in Australian Commonwealth waters. Using this imagery, benthic habitats are classified based on an SGF score, using sediment, geomorphology, and fauna. Where seabed imagery is not available, a second method (Method 2) is used to develop an inferred list of potential habitat types for the fishery. For details of both methods, see Hobday *et al* (2006).

This scoping list is derived from a combination of Scoping Method 1 and 2 (ERAEF methodology), as much of the existing data for the TSF is still being processed (CMAR Cleveland), therefore relies upon image data from adjacent fisheries, and habitat types identified as occurring in similar depth ranges and nested in features of adjacent bioregions. At this stage, the list of coastal margin and inner shelf habitats was generated from limited seafloor image data of inshore fringing reefs in waters ~15-50m from the Gulf of Carpentaria (Geoscience Australia Survey 276: SS04/2005 Harris 2005), literature (Pitcher *et al.* 2004a), and expert opinion (Scoping method 1).

Sparse knowledge of the outer shelf, upper and mid slope seabed habitats in the Torres Strait meant that these habitat types are inferred using Scoping method 2 (ERAEF methodology, 2006), which uses data from a CSIRO survey of deep benthic biodiversity the western WA coast (CMAR Voyage SS10/2005), and NORFANZ data for deeper waters (Williams *et al.* 2006). Scoping method 2 consequently generates a conservatively large list, as it assumes the presence of many fine-scale habitats known from adjacent or similar fishery areas nested within the coarse-scale habitat features ('geomorphic units') identified within the NPF by GIS mapping (Harris *et al.* 2003). Additionally, where habitats are known only from description or, where no specific image exists for that fishery, a representative image associated with that habitat type (same SGF score) may be referenced from other collections/ regions (i.e the SE, WA and GAB collections) as a visual example of that habitat.

A list of the benthic habitats for the Prawn Trawl Sector of the Torres Strait Fishery. Habitats encountered by trawl effort encompass both coastal margin and (shallow) inner shelf depths (18-40m generally). Outer shelf, upper and mid slope habitats are included in the boundary of the fishery, however are not subject to demersal trawling as denoted by shading.

ERA record No.	ERA Habitat #	Sub-biome	Feature/s	ERA Habitat type	SGF Score	Depth (m)	Image available	Reference image location
3767	306	coastal margin	Shelf	mud, irregular, mixed faunal community	033	0-25	N	
3768	308	coastal margin	Shelf	mud, irregular, octocorals	035	0-25	Y	GoC Image data
3769	312	coastal margin	Shelf	mud, subcrop, small sponges	052	0-25	Y	GoC Image Data
3770	314	coastal margin	Shelf	mud, subcrop, mixed faunal community	053	0-25	N	
3771	317	coastal margin	Shelf	mud, subcrop, low encrusting mixed fauna	056	0-25	N	
3772	330	coastal margin	Shelf	Gravel, directed scour, no fauna	310	0-25	Y	GoC Image data
3773	334	coastal margin	Shelf	Gravel, irregular, no fauna	330	0-25	Y	GoC Image data
3774	340	coastal margin	Shelf	Gravel, subcrop, mixed faunal community	353	0-25	Y	GoC Image data
3775	342	coastal margin	Shelf	Gravel, subcrop, octocorals	355	0-25	Y	GoC Image data
3776	345	coastal margin	Shelf	Biogenic, subcrop, no fauna	750	0-25	Y	GoC Image Data
3777	364	coastal margin	Shelf	Biogenic, subcrop, large sponges	751	0-25	Y	GoC Image Data
3778	365	coastal margin	Shelf	Biogenic, subcrop, mixed faunal community	753	0-25	Y	GoC Image Data
3779	367	coastal margin	Shelf	Biogenic, subcrop, Octocorals	755	0-25	Y	GoC Image Data
3780	369	coastal margin	Shelf	Biogenic, subcrop, small/ low encrustors	756	0-25	Y	GoC Image Data
3781	372	coastal margin	Shelf, Fringing reef	Biogenic, low outcrop, large erect sponges	761	0-25	Y	GoC Image Data
3782	373	coastal margin	Shelf, Fringing reef	Biogenic, low outcrop, mixed faunal community	763	0-25	Y	GoC Image Data
3783	374	coastal margin	Shelf, Fringing reef	Biogenic, low outcrop, octocorals	765	0-25	Y	GoC Image Data
3784	376	coastal margin	Shelf, Fringing reef	Biogenic, low outcrop, encrustors	766	0-25	Y	GoC Image Data
3785	378	coastal margin	Shelf, Fringing reef	Biogenic, low outcrop, large sponges	771	0-25	Y	GoC Image Data
3786	380	coastal margin	Shelf, Fringing reef	Biogenic, low outcrop, mixed faunal community	773	0-25	Y	GoC Image Data
3787	382	coastal margin	Shelf, Fringing reef	Biogenic, low outcrop, octocorals	775	0-25	Y	GoC Image Data
3788	384	coastal margin	Shelf, Fringing reef	Biogenic, low outcrop, encrustors	776	0-25	Y	GoC Image Data
3789	386	coastal margin	Shelf, Fringing reef	Biogenic, low outcrop, sedentary	777	0-25	Y	GoC Image Data
3790	388	coastal margin	Shelf, Fringing reef	Biogenic, high outcrop, octocorals	785	0-25	Y	GoC Image Data
3791	391	coastal margin	Shelf, Fringing reef	Biogenic, high outcrop, mixed faunal community	787	0-25	Y	GoC Image Data

3792	394	coastal margin	Shelf	mud, directed scour, seagrass	01SG	0-25	N	f
3793	395	coastal margin	Shelf	mud, wave rippled, seagrass	02SG	0-25	N	f
3794	396	coastal margin	Shelf	mud, irregular, seagrass	03SG	0-25	N	f
3795	398	coastal margin	Shelf	mud, subcrop, bivalve beds	05BV	0-25	N	g
3796	400	coastal margin	Shelf	mud, subcrop, hard corals	05HC	0-25	N	
3797	401	coastal margin	Shelf	mud, subcrop, seagrass	05SG	0-25	N	f
3798	402	coastal margin	Shelf	fine sediments, directed scour, seagrass	11SG	0-25	N	f
3799	403	coastal margin	Shelf	fine sediments, wave rippled, seagrass	12SG	0-25	N	f
3800	405	coastal margin	Shelf	fine sediments, irregular, seagrass	13SG	0-25	N	f
3801	406	coastal margin	Shelf	fine sediments, subcrop, seagrass	15SG	0-25	N	f
3802	408	coastal margin	Shelf	coarse sediments, directed scour, seagrass	21SG	0-25	N	f
3803	409	coastal margin	Shelf	coarse sediments, wave rippled, seagrass	22SG	0-25	N	f
3804	411	coastal margin	Shelf	coarse sediments, irregular, seagrass	23SG	0-25	N	f
3805	413	coastal margin	Shelf	Coarse sediments, subcrop, bivalve beds	25BV	0-25	N	g
3806	414	coastal margin	Shelf	coarse sediments, subcrop, seagrass	25SG	0-25	N	f
3807	418	coastal margin	Shelf	Gravel, irregular, seagrass	33SG	0-25	Y	f
3808	420	coastal margin	Shelf	Gravel, subcrop, hard corals	35HC	0-25	Y	GoC Image data
3809	422	coastal margin	Shelf	Biogenic, subcrop, hard corals	75HC	0-25	Y	GoC Image Data
3810	423	coastal margin	Shelf	Biogenic, subcrop, seagrass	75SG	0-25	N	f
3811	425	coastal margin	Shelf, Fringing reef	Biogenic, low outcrop, hard corals	76HC	0-25	Y	GoC Image Data
3812	426	coastal margin	Shelf, Fringing reef	Biogenic, low outcrop, seagrass	76SG	0-25	N	f
3813	428	coastal margin	Shelf, Fringing reef	Biogenic, high outcrop, hard corals	78HC	0-25	Y	GoC Image Data
3814	429	coastal margin	Shelf, Fringing reef	Biogenic, high outcrop, seagrass	78SG	0-25	N	f
3815	432	coastal margin	Shelf	Biogenic, subcrop, bivalve beds	75BV	0-25	N	g
3816	435	coastal margin	Shelf	Biogenic, low outcrop, bivalve beds	76BV	0-25	N	g
3817	299	inner shelf	Shelf	mud, flat, no fauna	000	25- 100	N	
3818	300	inner shelf	Shelf	mud, flat, low encrusting sponges	002	25- 100	N	
3819	301	inner shelf	Shelf	mud, flat, octocorals	005	25- 100	Y	GoC Image Data
3820	302	inner shelf	Shelf	mud, flat, sedentary (eg seapens)	007	25- 100	Y	GoC Image Data
3821	303	inner shelf	Shelf	mud, directed scour, no fauna	010	25- 100	Y	GoC Image Data
3822	304	inner shelf	Shelf	mud, directed scour, mixed faunal community	013	25- 100	Y	GoC Image Data
3823	305	inner shelf	Shelf	mud, directed scour, bioturbators	019	25- 100	Y	GoC Image Data
3824	307	inner shelf	Shelf	mud, irregular, mixed faunal community	033	25- 100	Y	GoC Image Data

3825	309	inner shelf	Shelf	mud, irregular, bioturbators	039	25- 100	Y	GoC Image Data
3826	310	inner shelf	Shelf	mud, subcrop, erect sponges	051	25- 100	Y	GoC Image Data
3827	311	inner shelf	Shelf	mud, subcrop, small sponges	052	25- 100	Y	GoC Image Data
3828	313	inner shelf	Shelf	mud, subcrop, mixed faunal community	053	25- 100	Y	GoC Image Data
3829	315	inner shelf	Shelf	mud, subcrop, octocorals	055	25- 100	Y	Npf Image Data
3830	316	inner shelf	Shelf	mud, subcrop, low encrusting mixed fauna	056	25- 100	Y	GoC Image Data
3831	318	Inner shelf	shelf	fine sediments, irregular, no fauna	130	25- 100	Y	GoC Image Data
3832	092	inner shelf	shelf	fine sediments, irregular, small sponges	132	25- 100	Y	GoC Image Data
3833	319	inner shelf	shelf	fine sediments, irregular, octocorals	135	25- 100	Y	GoC Image Data
3834	320	inner shelf	shelf	fine sediments, irregular, low encrustings	136	25- 100	Y	GoC Image Data
3835	321	inner shelf	shelf	fine sediments, irregular, bioturbators	139	25- 100	Y	GoC Image Data
3836	013	inner shelf	shelf	coarse sediments, flat, large sponges	201	25- 100	Y	GoC Image Data
3837	322	inner shelf	Shelf	Coarse sediments, flat, mixed faunal community	203	25- 100	Y	GoC Image Data
3838	234	inner shelf	shelf	Coarse sediments, flat, solitary epifauna	207	25- 100	Y	GoC Image Data
3839	323	inner shelf	Shelf	coarse sediments, irregular, small sponges	232	25- 100	Y	Goc Image Data
3840	324	inner shelf	Shelf	coarse sediments, irregular, octocorals	235	25- 100	Y	Goc Image Data
3841	089	inner shelf	shelf	Coarse sediments, irregular, low encrustings	236	25- 100	Y	Goc Image Data
3842	006	inner shelf	shelf	coarse sediments, subcrop, large sponges	251	25- 100	Y	GoC Image Data
3843	282	inner shelf	shelf	Coarse sediments, subcrop, mixed faunal community	253	25- 100	Y	GoC Image Data
3844	325	inner shelf	shelf	gravel, flat, large sponges	301	25- 100	Y	GoC Image Data
3845	326	inner shelf	shelf	gravel, flat, mixed faunal community	303	25- 100	Y	GoC Image Data
3846	327	inner shelf	shelf	gravel, flat, octocorals	305	25- 100	Y	GoC Image Data
3847	328	inner shelf	shelf	gravel, flat, encrustors	306	25- 100	Y	GoC Image Data
3848	329	inner shelf	shelf	gravel, flat, sedentary	307	25- 100	Y	GoC Image Data
3849	331	inner shelf	shelf	gravel/ pebble, directed scour, large sponges	311	25- 100	Y	GoC Image data
3850	001	inner shelf	shelf	gravel/ pebble, directed scour, mixed faunal community	313	25- 100	Y	GoC Image data
3851	332	inner shelf	shelf	gravel/ pebble, directed scour, octocorals	315	25- 100	Y	GoC Image data
3852	333	inner shelf	shelf	gravel/ pebble, directed scour, sedentary	317	25- 100	Y	GoC Image data
3853	242	inner shelf	Shelf	Gravel, irregular, no fauna	330	25- 100	Y	GoC Image Data
3854	335	inner shelf	Shelf	Gravel, irregular, small sponges	332	25- 100	Y	GoC Image Data
3855	336	inner shelf	Shelf	Gravel, irregular, octocorals	335	25- 100	Y	GoC Image Data
3856	337	inner shelf	Shelf	Gravel, irregular, low encrustings	336	25- 100	Y	GoC Image Data
3857	338	inner shelf	shelf	gravel/ pebble, subcrop, large sponges	351	25- 100	Y	GoC Image Data

3858	339	inner shelf	shelf	gravel/ pebble, subcrop, mixed faunal community	353	25- 100	Y	GoC Image Data
3859	341	inner shelf	shelf	gravel/ pebble, subcrop, octocorals	355	25- 100	Y	GoC Image Data
3860	343	inner shelf	shelf	gravel/ pebble, subcrop, sedentary	357	25- 100	Y	GoC Image Data
3861	344	inner shelf	Shelf	Sedimentary rock (?), subcrop, no fauna	650	25- 100	Y	GoC Image Data
3862	345	inner shelf	Shelf	Sedimentary rock (?), Subcrop, large sponges	651	25- 100	Y	GoC Image Data
3863	346	inner shelf	Shelf	Sedimentary rock (?), subcrop, mixed faunal community	653	25- 100	Y	GoC Image Data
3864	347	inner shelf	Shelf	Sedimentary rock (?), Subcrop, Octocorals	655	25- 100	Y	GoC Image Data
3865	348	inner shelf	Shelf	Sedimentary rock (?), subcrop, small/ low encrustors	656	25- 100	Y	GoC Image Data
3866	349	inner shelf	Shelf	Sedimentary Rock (?), subcrop, sedentary	657	25- 100	Y	GoC Image Data
3867	350	inner shelf	Shelf, bioherm	Sedimentary rock (?), low outcrop, large sponges	661	25- 100	Y	GoC Image Data
3868	351	inner shelf	Shelf, bioherm	Sedimentary rock (?), low outcrop, mixed faunal community	663	25- 100	Y	GoC Image Data
3869	352	inner shelf	Shelf, bioherm	Sedimentary rock (?), low outcrop, octocorals	665	25- 100	Y	GoC Image Data
3870	353	inner shelf	Shelf, bioherm	Sedimentary rock (?), low outcrop, encrustors	666	25- 100	Y	GoC Image Data
3871	354	inner shelf	Shelf, bioherm	Sedimentary rock (?), low outcrop, sedentary	667	25- 100	Y	GoC Image Data
3872	004	inner shelf	Shelf, bioherm	Sedimentary rock (?), low outcrop, large sponges	671	25- 100	Y	GoC Image Data
3873	355	inner shelf	Shelf, bioherm	Sedimentary rock (?), low outcrop, mixed faunal community	673	25- 100	Y	GoC Image Data
3874	356	inner shelf	Shelf, bioherm	Sedimentary rock (?), low outcrop, octocorals	675	25- 100	Y	GoC Image Data
3875	357	inner shelf	Shelf, bioherm	Sedimentary rock (?), low outcrop, encrustors	676	25- 100	Y	GoC Image Data
3876	358	inner shelf	Shelf, bioherm	Sedimentary rock (?), low outcrop, sedentary	677	25- 100	Y	GoC Image Data
3877	359	inner shelf	Shelf, bioherm	Sedimentary rock (?), high outcrop, mixed faunal community	683	25- 100	Y	GoC Image Data
3878	360	inner shelf	Shelf, bioherm	Sedimentary rock (?), high outcrop, octocorals	685	25- 100	Y	GoC Image Data
3879	361	inner shelf	Shelf, bioherm	Sedimentary rock (?), high outcrop, encrustors	686	25- 100	Y	GoC Image Data
3880	003	inner shelf	Shelf, bioherm	Sedimentary rock (?), high outcrop, mixed faunal community	693	25- 100	Y	GoC Image Data
3881	362	inner shelf	Shelf, bioherm	Sedimentary rock (?), high outcrop, octocorals	695	25- 100	Y	GoC Image Data
3882	363	inner shelf	Shelf, bioherm	Sedimentary rock (?), high outcrop, encrustors	696	25- 100	Y	GoC Image Data
3883	273	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, subcrop, large sponges	751	25- 100	Y	GoC Image Data
3884	366	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, subcrop, mixed faunal community	753	25- 100	Y	GoC Image Data
3885	368	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, subcrop, octocorals	755	25- 100	Y	GoC Image Data
3886	274	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, subcrop, small/ low encrustors	756	25- 100	Y	GoC Image Data
3887	370	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, subcrop, sedentary	757	25- 100	Y	GoC Image Data
3888	371	inner shelf	Shelf, Fringing reef,	Biogenic, low outcrop, large sponges	761	25- 100	Y	GoC Image Data

			bioherm						
3889	275	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, low outcrop, mixed faunal community	763	25- 100	Y	GoC Image Data	
3890	276	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, low outcrop, octocorals	765	25- 100	Y	GoC Image Data	
3891	375	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, low outcrop, encrustors	766	25- 100	Y	GoC Image Data	
3892	377	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, low outcrop, sedentary	767	25- 100	Y	GoC Image Data	
3893	379	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, low outcrop, large sponges	771	25- 100	Y	GoC Image Data	
3894	277	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, low outcrop, mixed faunal community	773	25- 100	Y	GoC Image Data	
3895	381	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, low outcrop, octocorals	775	25- 100	Y	GoC Image Data	
3896	383	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, low outcrop, encrustors	776	25- 100	Y	GoC Image Data	
3897	385	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, low outcrop, sedentary	777	25- 100	Y	GoC Image Data	
3898	387	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, high outcrop, mixed faunal community	783	25- 100	Y	GoC Image Data	
3899	389	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, high outcrop, octocorals	785	25- 100	Y	GoC Image Data	
3900	390	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, high outcrop, encrustors	786	25- 100	Y	GoC Image Data	
3901	278	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, high outcrop, mixed faunal community	793	25- 100	Y	GoC Image Data	
3902	392	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, high outcrop, octocorals	795	25- 100	Y	GoC Image Data	
3903	393	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, high outcrop, encrustors	796	25- 100	Y	GoC Image Data	
3904	397	inner shelf	Shelf	mud, subcrop, bivalve beds	05BV	25- 100	N	g	
3905	399	inner shelf	Shelf	mud, subcrop, hard corals	05HC	25- 100	Y	Npf Image Data	
3906	404	Inner shelf	shelf	fine sediments, irregular, hard corals	13HC	25- 100	Y	GoC Image Data	
3907	407	inner shelf	Shelf	Coarse sediments, flat, hard corals	20HC	25- 100	Y	GoC Image Data	
3908	410	inner shelf	Shelf	coarse sediments, irregular, hard corals	23HC	25- 100	Y	Goc Image Data	
3909	412	inner shelf	Shelf	Coarse sediments, subcrop, bivalve beds	25BV	25- 100	N	g	
3910	415	inner shelf	shelf	gravel, flat, hard corals	30HC	25- 100	Y	GoC Image Data	
3911	416	inner shelf	shelf	gravel/ pebble, directed scour, hard corals	31HC	25- 100	Y	GoC Image data	
3912	417	inner shelf	Shelf	Gravel, irregular, Hard corals	33HC	25- 100	Y	GoC Image Data	
3913	419	inner shelf	shelf	gravel/ pebble, subcrop, hard corals	35HC	25- 100	Y	GoC Image Data	

3914	421	inner shelf	Shelf	Sedimentary Rock (?), subcrop, hard corals	65HC	25- 100	Y	GoC Image Data
3915	424	inner shelf	Shelf, bioherm	Sedimentary rock (?), low outcrop, hard corals	66HC	25- 100	Y	GoC Image Data
3916	427	inner shelf	Shelf, bioherm	Sedimentary rock (?), high outcrop, hard corals	68HC	25- 100	Y	GoC Image Data
3917	430	inner shelf	Shelf, bioherm	Sedimentary rock (?), high outcrop, hard corals	69HC	25- 100	Y	GoC Image Data
3918	431	inner shelf	Shelf	Biogenic, subcrop, bivalve beds	75BV	25- 100	N	g
3919	433	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, subcrop, hard corals	75HC	25- 100	Y	GoC Image Data
3920	434	inner shelf	Shelf	Biogenic, low outcrop, bivalve beds	76BV	25- 100	N	g
3921	436	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, low outcrop, hard corals	76HC	25- 100	Y	GoC Image Data
3922	437	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, high outcrop, hard corals	78HC	25- 100	Y	GoC Image Data
3923	438	inner shelf	Shelf, Fringing reef, bioherm	Biogenic, high outcrop, hard corals	79HC	25- 100	Y	GoC Image Data
3924	017	outer shelf	shelf	fine sediments, subcrop, large sponges	151	100- 200	Y	SE Image Collection
3925	018	outer shelf	shelf	Sedimentary rock, outcrop, encrustors	696	100- 200	Y	SE Image Collection
3926	019	outer shelf	Terrace, Shelf	coarse sediments, subcrop, large sponges	251	100- 200	Y	SE Image Collection
3927	020	outer shelf	shelf	cobble, outcrop, crinoids	464	100- 200	Y	SE Image Collection
3928	022	outer shelf	shelf	Sedimentary rock, subcrop, mixed faunal community	653	100- 200	Y	SE Image Collection
3929	023	outer shelf	shelf	Sedimentary rock, outcrop, large sponges	671	100- 200	Y	SE Image Collection
3930	024	outer shelf	shelf	gravel, irregular, encrustors	336	100- 200	Y	SE Image Collection
3931	025	outer shelf	shelf	coarse sediments, wave rippled, no fauna	220	100- 200	Y	SE Image Collection
3932	026	outer shelf	shelf	coarse sediments, unrippled, encrustors	206	100- 200	Y	SE Image Collection
3933	027	outer shelf	shelf	coarse sediments, current rippled, no fauna	210	100- 200	Y	SE Image Collection
3934	028	outer shelf	shelf	cobble, unrippled, large sponges	401	100- 200	Y	SE Image Collection
3935	029	outer shelf	shelf	coarse sediments, irregular, large sponges	231	100- 200	Y	SE Image Collection
3936	030	outer shelf	shelf	coarse sediments, unrippled, mixed faunal community	203	100- 200	Y	SE Image Collection
3937	032	outer shelf	shelf	cobble, subcrop, crinoids	454	100- 200	Y	SE Image Collection
3938	065	outer shelf	canyon	Sedimentary rock, outcrop, small sponges	672	100- 200	Y	SE Image Collection
3939	100	outer shelf	Shelf	Mud, flat, sedentary (eg seapens)	007	100- 200	2	WA Image Collection
3940	101	outer shelf	shelf	coarse sediments, subcrop, small sponges	252	100- 200	N	SE Image Collection
3941	102	outer shelf	shelf	coarse sediments, wave rippled, encrustors	226	100- 200	N	SE Image Collection
3942	103	outer shelf	shelf	coarse sediments, wave rippled, small sponges	222	100- 200	N	SE Image Collection
3943	104	outer shelf	shelf	fine sediments, current rippled, bioturbators	119	100- 200	Y	SE Image Collection
3944	105	outer shelf	shelf	fine sediments, irregular, large sponges	131	100- 200	N	SE Image Collection

3945	106	outer shelf	shelf	fine sediments, irregular, no fauna	130	100- 200	N	SE Image Collection
3946	107	outer shelf	shelf	fine sediments, irregular, small sponges	132	100- 200	N	SE Image Collection
3947	108	outer shelf	shelf	fine sediments, subcrop, mixed faunal community	153	100- 200	N	SE Image Collection
3948	109	outer shelf	shelf	fine sediments, subcrop, small sponges	152	100- 200	Y	SE Image Collection
3949	110	outer shelf	shelf	fine sediments, unrippled, bioturbators	109	100- 200	Y	SE Image Collection
3950	111	outer shelf	Shelf	Fine sediments, unrippled, large/ erect sponges	101	100- 200	3	WA Image Collection
3951	112	outer shelf	shelf	fine sediments, unrippled, no fauna	100	100- 200	Y	SE Image Collection
3952	113	outer shelf	shelf	Fine sediments, unrippled, small sponges	102	100- 200	Y	Norfanz Image Collection
3953	114	outer shelf	shelf	fine sediments, wave rippled, bioturbators	129	100- 200	Y	SE Image Collection
3954	115	outer shelf	shelf	fine sediments, wave rippled, encrustors	126	100- 200	N	SE Image Collection
3955	116	outer shelf	shelf	fine sediments, wave rippled, large sponges	121	100- 200	N	SE Image Collection
3956	117	outer shelf	shelf	fine sediments, wave rippled, no fauna	120	100- 200	N	SE Image Collection
3957	118	outer shelf	shelf	fine sediments, wave rippled, sedentary	127	100- 200	N	SE Image Collection
3958	119	outer shelf	shelf	fine sediments, wave rippled, small sponges	122	100- 200	N	SE Image Collection
3959	120	outer shelf	shelf	gravel, current rippled, bioturbators	319	100- 200	N	SE Image Collection
3960	121	outer shelf	shelf	gravel, wave rippled, bioturbators	329	100- 200	Y	SE Image Collection
3961	122	outer shelf	shelf	gravel, wave rippled, encrustors	326	100- 200	N	SE Image Collection
3962	123	outer shelf	shelf	gravel, wave rippled, large sponges	321	100- 200	N	SE Image Collection
3963	124	outer shelf	shelf	gravel, wave rippled, no fauna	320	100- 200	N	SE Image Collection
3964	125	outer shelf	shelf	mud, subcrop, small sponges	052	100- 200	Y	SE Image Collection
3965	126	outer shelf	shelf	Sedimentary rock, Subcrop, large sponges	651	100- 200	Y	GAB Image Collection
3966	127	outer shelf	shelf	Sedimentary rock, subcrop, small sponges	652	100- 200	Y	SE Image Collection
3967	166	outer shelf	shelf-break	Bryozoan based communities	xx6	100- 200, 200- 700	N	SE Image Collection
3968	167	outer shelf	shelf-break	fine sediments, irregular, bioturbators	139	100- 200, 200- 700	N	SE Image Collection
3969	168	outer shelf	shelf-break	fine sediments, irregular, small sponges	132	100- 200, 200- 700	N	SE Image Collection
3970	169	outer shelf	shelf-break	fine sediments, unrippled, bioturbators	109	100- 200, 200- 700	N	SE Image Collection
3971	170	outer shelf	shelf-break	fine sediments, unrippled, no fauna	100	100- 200, 200- 700	N	SE Image Collection
3972	171	outer shelf	shelf-break	fine sediments, unrippled, octocorals	105	100- 200, 200- 700	N	SE Image Collection
3973	172	outer shelf	shelf-break	Igneous rock, high outcrop, no fauna	590	100- 200, 200- 700	N	SE Image Collection
3974	173	outer shelf	shelf-break	mud, unrippled, no fauna	000	100- 200, 200- 700	N	SE Image Collection
3975	174	outer shelf	shelf-break	mud, unrippled, sedentary	007	100- 200, 200- 700	N	SE Image Collection
3976	175	outer shelf	shelf-break	Sedimentary rock, subcrop, crinoids	654	100- 200, 200- 700	N	SE Image Collection
3977	176	outer shelf	shelf-break	Sedimentary rock, subcrop, small sponges	652	100- 200, 200- 700	N	SE Image Collection

3978	177	outer shelf	shelf	mud, unrippled, low encrusting sponges	002	100- 200	N	SE Image Collection
3979	178	outer shelf	shelf	mud, unrippled, bioturbators	009	100- 200	N	SE Image Collection
3980	179	outer shelf	shelf	mud, subcrop, erect sponges	051	100- 200	N	SE Image Collection
3981	180	outer shelf	shelf	mud, subcrop, low encrusting mixed fauna	056	100- 200	N	SE Image Collection
3982	181	outer shelf	shelf	fine sediments, unrippled, encrustors	106	100- 200	N	SE Image Collection
3983	183	outer shelf	shelf	fine sediments, current rippled, no fauna	110	100- 200	N	SE Image Collection
3984	184	outer shelf	shelf	fine sediments, current rippled, low/ encrusting sponges	112	100- 200	N	SE Image Collection
3985	185	outer shelf	shelf	fine sediments, irregular, low encrusting mixed fauna	136	100- 200	N	SE Image Collection
3986	187	outer shelf	shelf	fine sediments, irregular, bioturbators	139	100- 200	N	SE Image Collection
3987	188	outer shelf	shelf	fine sediments, rubble banks, low encrusting sponges	142	100- 200	N	SE Image Collection
3988	189	outer shelf	shelf	fine sediments, subcrop, mixed low fauna	156	100- 200	N	SE Image Collection
3989	190	outer shelf	shelf	coarse sediments, unrippled, no fauna	200	100- 200	N	SE Image Collection
3990	192	outer shelf	shelf	gravel/ pebble, current rippled, large sponges	311	100- 200	N	SE Image Collection
3991	193	outer shelf	shelf	gravel/ pebble, current rippled, mixed low fauna	316	100- 200	N	SE Image Collection
3992	194	outer shelf	shelf	gravel/ pebble, wave rippled, low encrusting sponges	322	100- 200	N	SE Image Collection
3993	195	outer shelf	shelf	gravel, wave rippled, encrustors	326	100- 200	N	SE Image Collection
3994	196	outer shelf	shelf	gravel, wave rippled, encrustors	346	100- 200	N	SE Image Collection
3995	197	outer shelf	shelf	cobble, unrippled, low/ encrusting mixed fauna	406	100- 200	N	SE Image Collection
3996	198	outer shelf	shelf	cobble, current rippled, low/ encrusting mixed fauna	416	100- 200	N	SE Image Collection
3997	209	Outer shelf	Terrace	Coarse sediments, Subcrop, Mixed faunal community	253	100- 200	Y	GAB Image Collection
3998	219	outer shelf	Shelf	mud, unrippled, small or large sponges	001	100- 200	Y	WA Image Collection
3999	220	outer shelf	Shelf	Mud, flat, octocorals	005	100- 200	Y	WA Image Collection
4000	223	outer shelf	Shelf	mud, current rippled, bioturbators	019	100- 200	Y	WA Image Collection
4001	224	outer shelf	Shelf	mud, wave rippled, no fauna	020	100- 200	Y	WA Image Collection
4002	225	outer shelf	Shelf	Mud, irregular, bioturbators	039	100- 200	Y	WA Image Collection
4003	226	outer shelf	Shelf	Mud, subcrop, mixed faunal community	053	100- 200	Y	WA Image Collection
4004	233	outer shelf	Shelf	Coarse sediments, unrippled, octocoral/ and bryozoans??	205	100- 200	Y	WA Image Collection
4005	246	outer shelf	Shelf	cobble/boulder (slab), outcrop, mixed low encrustors	466	100- 200	Y	WA Image Collection
4006	254	outer shelf	Shelf	Sedimentary rock (?), low outcrop, large erect sponges	661	100- 201	Y	WA Image Collection
4007	255	outer shelf	Shelf	Sedimentary rock (?) low outcrop, mixed faunal community	663	100- 200	Y	WA Image Collection
4008	258	outer shelf	Shelf	Sedimentary rock (?), low outcrop, mixed faunal community	673	100- 200	Y	WA Image Collection
4009	259	outer shelf	Shelf	Rock (sedimentary?), outcrop (low, holes and cracks etc), encrustors	676	100- 200	Y	WA Image Collection

4010	260	outer shelf	Shelf	Rock (sedimentary?), outcrop, solitary	677	100- 200	Y	WA Image Collection
4011	263	outer shelf	Shelf	Rock (sedimentary?), high outcrop, ?small sponges	682	100- 200	Y	WA Image Collection
4012	266	outer shelf	Shelf	Rock (sedimentary?), high outcrop, large sponges	691	100- 200	Y	WA Image Collection
4013	268	outer shelf	Shelf	Sedimentary rock (?), high outcrop, mixed faunal community	693	100- 200	Y	WA Image Collection
4014	279	outer shelf	Shelf	mud, current rippled, no fauna	010	100- 200	Y	WA Image Collection
4015	280	outer shelf	Shelf	Rock (sedimentary?), high outcrop, solitary	681	100- 201	Y	WA Image Collection
4016	281	outer shelf	Shelf	Rock/ biogenic matrix, low outcrop, mixed faunal community	763	100-200	Y	WA Image Collection
4017	033	upper slope	slope	Sedimentary rock, subcrop, mixed faunal community	653	200- 700	Y	SE Image Collection
4018	034	upper slope	slope	Sedimentary rock, outcrop, encrustors	696	200- 700	Y	SE Image Collection
4019	035	upper slope	slope	Sedimentary rock, outcrop, encrustors	666	200- 700	Y	SE Image Collection
4020	036	upper slope	Slope	Sedimentary, subcrop, small encrustors (hydroids?)	656	200- 700	Y	WA Image Collection
4021	039	upper slope	slope	Sedimentary rock, outcrop, crinoids	684	200- 700	Y	SE Image Collection
4022	040	upper slope	slope	fine sediments, subcrop, sedentary	157	200- 700	Y	SE Image Collection
4023	041	upper slope	Slope	fine, irregular, bioturbators	139	200- 700	3	WA Image Collection
4024	043	upper slope	slope	coarse sediments, unrippled, low mixed encrustors	206	200- 700	Y	SE Image Collection
4025	044	upper slope	slope, canyon, Terrace	fine sediments, unrippled, bioturbators	109	200- 700	Y	SE Image Collection
4026	045	upper slope	slope	coarse sediments, unrippled, sedentary	207	200- 700	Y	SE Image Collection
4027	046	upper slope	slope	fine sediments, unrippled, no fauna	100	200- 700	Y	SE Image Collection
4028	066	upper slope	canyon	Sedimentary rock, outcrop, crinoids	694	200- 700	Y	SE Image Collection
4029	067	upper slope	canyon, slope	Sedimentary rock, subcrop, large sponges	651	200- 700	Y	SE Image Collection
4030	069	upper slope	canyon	cobble, outcrop, crinoids	464	200- 700	Y	SE Image Collection
4031	070	upper slope	canyon	Sedimentary rock, subcrop, small sponges	652	200- 700	Y	SE Image Collection
4032	071	upper slope	Shelf break, Canyon	Sedimentary, low outcrop, small encrustors	676	200- 700	3	WA Image Collection
4033	072	upper slope	Slope, Canyon	coarse sediments, irregular, bioturbators Fine sediments, irregular, Small encrustors / erect forms (including bryozoans)	239	200- 700	Y	SE Image Collection
4034	073	upper slope	Terrace, canyon		136	200-700	Y	GAB Image Collection
4035	076	upper slope	canyon, slope	coarse sediments, irregular, low mixed encrustors	236	200- 700	Y	SE Image Collection
4036	077	upper slope	canyon, slope	fine sediments, subcrop, small sponges	152	200- 700	Y	SE Image Collection
4037	078	upper slope	Slope, canyon, Terrace	Fine sediments, unrippled, Solitary epifauna	107	200- 700	2	WA Image Collection
4038	128	upper slope	slope	Bryozoan based communities	xx6	200- 700	N	SE Image Collection
4039	129	upper slope	slope	cobble, debris flow, encrustors	446	200- 700	Y	SE Image Collection
4040	130	upper slope	slope	cobble, debris flow, no fauna	440	200- 700	Y	SE Image Collection
4041	131	upper slope	slope	cobble, debris flow, octocorals	445	200- 700	N	SE Image Collection

4042	132	upper slope	slope	cobble, debris flow, small sponges	442	200- 700	Y	SE Image Collection
4043	133	upper slope	Slope	Fine, current rippled, no fauna	110	200- 700	Y	WA Image Collection
4044	134	upper slope	slope	fine sediments, subcrop, large sponges	151	200- 700	N	SE Image Collection
4045	136	upper slope	slope	fine sediments, unrippled, encrustors	106	200- 700	Y	SE Image Collection
4046	137	upper slope	slope	Fine sediments, unrippled, small sponges	102	200- 700	Y	Norfanz Image Collection
4047	138	upper slope	slope	gravel, debris flow, encrustors	346	200- 700	Y	SE Image Collection
4048	139	upper slope	slope	gravel, debris flow, no fauna	340	200- 700	N	SE Image Collection
4049	140	upper slope	slope	mud, irregular, bioturbators	039	200- 700	Y	SE Image Collection
4050	141	upper slope	Slope	mud, unrippled, distinct infaunal bioturbators	009	200- 700	Y	WA Image Collection
4051	142	upper slope	slope	mud, unrippled, encrustors	006	200- 700	Y	SE Image Collection
4052	143	upper slope	slope	mud, unrippled, large sponges	001	200- 700	N	SE Image Collection
4053	144	upper slope	slope, Canyon	mud, unrippled, sedentary	007	200- 700	Y	SE Image Collection
4054	145	upper slope	slope, Canyon	Sedimentary, low outcrops on steep slope, large sponges	671	200- 700	2	WA Image Collection
4055	146	upper slope	slope	Sedimentary rock, low outcrop, small sponges	672	200- 700	Y	SE Image Collection
4056	148	upper slope	Terrace, slope	Sedimentary rock, Subcrop, Octocorals (gold corals / seawhips)	655	200-700	Y	GAB Image Collection
4057	202	upper slope	Terrace	Mud, Unrippled, No fauna	000	200-700	Y	GAB Image Collection
4058	216	upper slope	Canyon	Sedimentary rock, low outcrop, Octocorals (gold corals / seawhips)	675	200-700	Y	GAB Image Collection
4059	217	upper slope	Canyon	Sedimentary rock, High Outcrop, Small encrustors / erect forms (including bryozoans)	686	200-700	Y	GAB Image Collection
4060	218	upper slope	Canyon	Sedimentary rock, High Outcrop, Sedentary: e.g. seapens	687	200-700	Y	GAB Image Collection
4061	227	upper slope	Slope	Fine sediments, unrippled, sponges	101	200- 700	Y	WA Image Collection
4062	231	upper slope	Slope	Fine sediments, irregular, glass sponge (stalked)	137	200- 700	Y	WA Image Collection
4063	235	upper slope	Slope	Coarse sediments, rippled, no fauna	210	200- 700	Y	WA Image Collection
4064	236	upper slope	Slope	Coarse sand, rippled, solitary epifauna	217	200- 700	Y	WA Image Collection
4065	237	upper slope	Slope	Coarse sand, wave rippled, bryozoan turf	226	200- 700	Y	WA Image Collection
4066	238	upper slope	Slope	Coarse sediments, irregular, octocorals (matrix of solsomalia – dead corals)	235	200- 700	Y	WA Image Collection
4067	239	upper slope	Slope	Coarse sediments, subcrop, large (?) sponges	251	200- 700	Y	WA Image Collection
4068	240	upper slope	Slope	Sedimentary, subcrop, octocorals	255	200- 700	Y	WA Image Collection
4069	241	upper slope	Slope	Coarse sediments, subcrop, low encrusting community (ascidians)	256	200- 700	Y	WA Image Collection
4070	247	upper slope	slope	Boulders, low outcrop, no fauna	470	200- 700	Y	Norfanz Image Collection
4071	251	upper slope	Slope	Sedimentary, subcrop, no fauna	650	200- 700	Y	WA Image Collection
4072	256	upper slope	Slope	Sedimentary, outcrop, octocorals	665	200- 700	Y	WA Image Collection

4073	257	upper slope	Shelf break	Sedimentary, low outcrop, no fauna	670	200- 700	3	WA Image Collection
4074	261	upper slope	Slope	Sedimentary, outcrop, sedentary (anemones)	677	200- 700	Y	WA Image Collection
4075	264	upper slope	Slope	Sedimentary, high outcrop, octocoral	683	200- 700	Y	WA Image Collection
4076	265	upper slope	Slope	Sedimentary rock (mudstone?), high outcrop, no fauna	690	200- 700	3	WA Image Collection
4077	267	upper slope	Slope	Sedimentary rock (mudstone?), high outcrop, small sponges	692	200- 700	Y	WA Image Collection
4078	269	upper slope	Slope	Sedimentary, outcrop, octocorals	695	200- 700	Y	WA Image Collection
4079	270	upper slope	Slope	Sedimentary, high outcrop, solitary epifauna	697	200- 700	Y	WA Image Collection
4080	284	upper slope	slope	Coarse sediments, unrippled, large sponges	201	200- 700	Y	Norfanz Image Collection
4081	285	upper slope	slope	Coarse sediments, unrippled, octocorals	205	200- 700	Y	Norfanz Image Collection
4082	286	upper slope	slope	Cobble/ boulder, debris, sedentary	447	200- 700	Y	Norfanz Image Collection
4083	287	upper slope	slope	slabs and boulders, low outcrop, octocorals	475	200- 700	Y	Norfanz Image Collection
4084	288	upper slope	slope	Igneous Rock (?), low outcrop, octocorals	565	200- 700	Y	Norfanz Image Collection
4085	289	upper slope	slope	Igneous Rock (?), low outcrop, mixed faunal community	573	200- 700	Y	Norfanz Image Collection
4086	290	upper slope	slope	Igneous Rock (?), high outcrop, no fauna	590	200- 700	Y	Norfanz Image Collection
4087	291	upper slope	slope	Igneous Rock (?), high outcrop, mixed faunal community	593	200- 700	Y	Norfanz Image Collection
4088	292	upper slope	slope	Sedimentary Rock, subcrop, sedentary	657	200- 700	Y	Norfanz Image Collection
4089	293	upper slope	slope	Rock/ biogenic matrix, low outcrop, mixed faunal community	763	200- 700	Y	Norfanz Image Collection
4090	049	mid-slope	slope	Igneous rock, high outcrop, crinoids	594	700- 1500	Y	SE Image Collection
4091	050	mid-slope	slope	cobble, debris flow, encrustors	446	700- 1500	Y	SE Image Collection
4092	051	mid-slope	slope	cobble, outcrop, no fauna	460	700- 1500	Y	SE Image Collection
4093	052	mid-slope	slope	Sedimentary rock, outcrop, octocorals	675	700- 1500	Y	SE Image Collection
4094	053	mid-slope	slope	Igneous rock, low outcrop, sedentary	567	700- 1500	Y	SE Image Collection
4095	054	mid-slope	slope	Sedimentary rock, outcrop, crinoids	694	700- 1500	Y	SE Image Collection
4096	055	mid-slope	slope	Sedimentary rock, unrippled, sedentary	607	700- 1500	Y	SE Image Collection
4097	056	mid-slope	slope, canyons, seamounts	Sedimentary rock, outcrop, mixed faunal community	673	700- 1500	Y	SE Image Collection
4098	057	mid-slope	slope	fine sediments, subcrop, bioturbators	150	700- 1500	Y	SE Image Collection
4099	058	mid-slope	slope	cobble, unrippled, small sponges	402	700- 1500	Y	SE Image Collection
4100	059	mid-slope	Seamount, Slope	coarse sediments, irregular, low encrusting	236	700- 1500	Y	SE Image Collection
4101	060	mid-slope	slope	cobble, outcrop, crinoids	464	700- 1500	Y	SE Image Collection
4102	061	mid-slope	slope	fine sediments, irregular, bioturbators	139	700- 1500	Y	SE Image Collection
4103	062	mid-slope	slope	coarse sediments, unrippled, octocorals	205	700- 1500	Y	SE Image Collection
4104	063	mid-slope	slope	fine sediments, unrippled, octocorals	105	700- 1500	Y	SE Image Collection

4105	064	mid-slope	slope	Sedimentary slab and mud boulders, outcrop, crinoids	464	700- 1500	Y	SE Image Collection
4106	080	mid-slope	seamount, Terrace	Sedimentary rock, outcrop, encrustors	676	700- 1500	Y	SE Image Collection
4107	081	mid-slope	seamount	Sedimentary rock, unrippled, no fauna	600	700- 1500	Y	SE Image Collection
4108	084	mid-slope	seamount, canyon	Sedimentary rock, outcrop, sedentary	677	700- 1500	Y	SE Image Collection
4109	085	mid-slope	seamount	Sedimentary rock, unrippled, encrustors	606	700- 1500	Y	SE Image Collection
4110	150	mid-slope	slope	coarse sediments, current rippled, no fauna	210	700- 1500	N	SE Image Collection
4111	151	mid-slope	slope	coarse sediments, current rippled, octocorals	215	700- 1500	N	SE Image Collection
4112	152	mid-slope	slope	coarse sediments, current rippled, sedentary	217	700- 1500	N	SE Image Collection
4113	153	mid-slope	slope	coarse sediments, unrippled, no fauna	200	700- 1500	N	SE Image Collection
4114	154	mid-slope	slope	cobble, debris flow, crinoids	444	700- 1500	N	SE Image Collection
4115	155	mid-slope	slope	slabs/ boulders, debris flow, octocorals	445	700- 1500	Y	SE Image Collection
4116	156	mid-slope	Slope	Fine, unrippled, no obvious fauna	100	700-1500	Y	WA Image Collection
4117	156	mid-slope	Terrace	Fine sediments, Unrippled, No fauna	100	700-1500	Y	GAB Image Collection
4118	157	mid-slope	Slope	Igneous rock, high outcrop, octocoral	595	700-1500	Y	WA Image Collection
4119	158	mid-slope	slope	mud, current rippled, bioturbators	019	700- 1500	N	SE Image Collection
4120	159	mid-slope	Slope	Mud, irregular, bioturbators	039	700-1500	Y	WA Image Collection
4121	160	mid-slope	slope	mud, irregular, sedentary	037	700- 1500	N	SE Image Collection
4122	161	mid-slope	slope	mud, unrippled, small sponges	002	700- 1500	N	SE Image Collection
4123	162	mid-slope	slope	Sedimentary rock, debris flow, crinoids	644	700- 1500	N	SE Image Collection
4124	163	mid-slope	Terrace	Sedimentary rock, High Outcrop, Octocorals	695	700-1500	Y	GAB Image Collection
4125	164	mid-slope	slope	Sedimentary rock, subcrop, crinoids	654	700- 1500	Y	SE Image Collection
4126	207	mid-slope	Terrace	Coarse sediments, directed scour, Small encrustors / erect forms (including bryozoans)	216	700-1500	Y	GAB Image Collection
4127	208	mid-slope	Seamount	Coarse sediments, Highly irregular, Mixed faunal community Cobble/ boulder, Debris flow / rubble banks, Sedentary: e.g. seapens	233	700-1500	Y	GAB Image Collection
4128	210	mid-slope	Seamount	Igneous / metamorphic rock, Subcrop, Small encrustors	447	700-1500	Y	GAB Image Collection
4129	211	mid-slope	Seamount	Igneous / metamorphic rock, Subcrop, Sedentary: e.g. seapens	556	700-1500	Y	GAB Image Collection
4130	212	mid-slope	Seamount	Igneous / metamorphic rock, Subcrop, Sedentary: e.g. seapens	557	700-1500	Y	GAB Image Collection
4131	213	mid-slope	Seamount	Igneous / metamorphic rock, Low Outcrop, Octocorals	575	700-1500	Y	GAB Image Collection
4132	214	mid-slope	Seamount	Igneous / metamorphic rock, Low Outcrop, Small encrustors	576	700-1500	Y	GAB Image Collection
4133	215	mid-slope	Seamount	Igneous / metamorphic rock, Low Outcrop, Sedentary	577	700-1500	Y	GAB Image Collection
4134	221	mid-slope	Slope	Mud, irregular, crinoids	005	700-1500	Y	WA Image Collection
4135	222	mid-slope	Slope	Mud, flat, solitary	007	700-1500	Y	WA Image Collection
4136	228	mid-slope	Slope	Fine, unrippled, solitary	107	700-1500	Y	WA Image Collection

4137	230	mid-slope	Slope	fine sediments, irregular, no fauna	130	700-1500	Y	WA Image Collection
4138	232	mid-slope	Slope	Fine sediments, subcrop, octocorals	155	700-1500	Y	WA Image Collection
4139	243	mid-slope	Slope	Gravel, irregular, low encrustings	336	700-1500	2	WA Image Collection
4140	244	mid-slope	Slope	Igneous rock/boulder, rubble bank, none	440	700-1500	Y	WA Image Collection
4141	245	mid-slope	Slope	boulders and slabs, subcropping, octocorals	455	700-1500	Y	WA Image Collection
4142	248	mid-slope	Slope	Igneous rock, rubble bank, no fauna	540	700-1500	Y	WA Image Collection
4143	249	mid-slope	Seamount	Igneous rock, rubble bank, octocorals	545	700-1500	Y	WA Image Collection
4144	250	mid-slope	Seamount	Igneous rock, low outcrop, no fauna	570	700-1500	Y	WA Image Collection
4145	252	mid-slope	Slope	Sedimentary, subcrop, small encrustors	656	700-1500	2	WA Image Collection
4146	253	mid-slope	Slope	rock (conglomerate/sedimentary), subcrop, bioturbators	659	700-1500	Y	WA Image Collection
4147	262	mid-slope	Slope	sedimentary/mudstone, high outcrop, no fauna	680	700-1500	Y	WA Image Collection
4148	294	mid-slope	slope	Fine sediments, unrippled, bioturbators	109	700- 1500	Y	Norfanz Image Collection
4149	295	mid-slope	slope	Fine sediments, subcrop, encrustors	156	700- 1500	Y	Norfanz Image Collection
4150	296	mid-slope	slope	Coarse sediments, irregular, no fauna	230	700- 1500	Y	Norfanz Image Collection
4151	297	mid-slope	slope	Coarse sediments, subcrop, no fauna	250	700- 1500	Y	Norfanz Image Collection
4152	298	mid-slope	slope	Coarse sediments, low outcrop, no fauna	260	700- 1500	Y	Norfanz Image Collection

Scoping Document S2B2. Pelagic Habitats

A list of the pelagic habitats for the Prawn trawl Sector of the Torres Strait Fishery. Shading denotes habitats occurring within the jurisdictional boundary of the fishery that are not subject to effort from demersal trawling.

ERAEF Habitat Number	Pelagic Habitat type	Depth (m)	Comments	Reference
P4	North Eastern Pelagic Province - Oceanic	0 – > 600	this is a compilation of the range covered by Oceanic Community (1) and (2)	dow167A1, A2, A4
P5	Northern Pelagic Province - Coastal	0 – 200		dow167A1, A2, A4
P14	North Eastern Pelagic Province - Coastal	0 – 200		dow167A1, A2, A4

Plateau 0 – 110m																			
Plateau 110- 250m ⁹																			
Plateau 250 – 565m ⁹																			
Plateau 565 – 820m																			
Plateau 820 – 1100m																			

¹ Four inner shelf communities occur in the Timor Transition (Arafura, Groote, Cape York and Gulf of Carpentaria) and three inner shelf communities occur in the Southern (Eyre, Eucla and South West Coast). At Macquarie Is: ²inner & outer shelves, and ³upper and midslope communities combined. At Heard/McDonald Is: ⁴outer shelf and upper slope combined (100-500m), ⁵mid and upper slopes combined into 3 trough and southern slope communities (500-100m), ⁹plateaux equivalent to Shell and Western Banks (100-500m) and ⁶ 3 groups at Heard Is: Deep Shell Bank (>1000m), Southern and North East Lower slope/Abyssal, ⁷Great Barrier Reef in the North Eastern Province and Transition and ⁸ Rowley Shoals in North Western Transition.

Scoping Document S2C2. Pelagic Communities

Pelagic communities that overlie demersal communities occurring within the jurisdictional area of the Torres Strait Prawn Fishery (indicated by x) although fishing activity may not necessarily occur in all. Shaded cells indicate all communities that exist in the province.

Pelagic community	North Eastern	Eastern	Southern	Western	Northern	North Western	Heard and McDonald Is ²	Macquarie Is
Coastal pelagic 0-200 m ¹					X			
Oceanic (1) 0 – 600m								
Oceanic (2) >600m								
Seamount oceanic (1) 0 – 600m								
Seamount oceanic (2) >600m								
Oceanic (1) 0 – 200m								
Oceanic (2) 200-600m								
Oceanic (3) >600m								
Seamount oceanic (1) 0 – 200m								
Seamount oceanic (2) 200 – 600m								
Seamount oceanic (3) >600m								
Oceanic (1) 0-400m								
Oceanic (2) >400m								
Oceanic (1) 0-800m								
Oceanic (2) >800m								
Plateau (1) 0-600m								
Plateau (2) >600m								
Heard Plateau 0-1000m								
Oceanic (1) 0-1000m								
Oceanic (2) >1000m								
Oceanic (1) 0-1600m								
Oceanic (2) >1600m								

¹ Northern Province has five coastal pelagic zones (NWS, Bonaparte, Arafura, Gulf and East Cape York). ² Coastal pelagic zone at Heard and McDonald Is broadened to cover entire plateau to maximum of 1000m.

Level 1 Scale, Intensity and Consequence Analysis (SICA)

Level 1 aims to identify which hazards lead to a significant impact on any species, habitat or community. Analysis at Level 1 is for whole components (target; bycatch and byproduct; TEP species; habitat; and communities), not individual sub-components. Since Level 1 is used mainly as a rapid screening tool, a “worst case” approach is used to ensure that elements screened out as low risk (either activities or components) are genuinely low risk. Analysis at Level 1 for each component is accomplished by considering the most vulnerable sub-component and the most vulnerable unit of analysis (e.g. most vulnerable species, habitat type or community). This is known as credible scenario evaluation (Richard Stocklosa e-systems Pty Ltd (March 2003) Review of CSIRO Risk Assessment Methodology: ecological risk assessment for the effects of fishing) in conventional risk assessment. In addition, where judgments about risk are uncertain, the highest level of risk that is still regarded as plausible is chosen. For this reason, the measures of risk produced at Level 1 cannot be regarded as absolute.

At Level 1 each fishery/sub-fishery is assessed using a scale, intensity and consequence analysis (SICA). SICA is applied to the component as a whole by choosing the most vulnerable sub-component (linked to an operational objective) and most vulnerable unit of analysis. The rationale for these choices must be documented in detail. These steps are outlined below. Scale, intensity, and consequence analysis (SICA) consists of thirteen steps. The first ten steps are performed for each activity and component, and correspond to the columns of the SICA table. The final three steps summarise the results for each component.

- Step 1: Record the hazard identification score (absence (0) presence (1) scores) identified at step 3 at the scoping level (Scoping Document S3) onto the SICA table
- Step 2: Score spatial scale of the activity
- Step 3: Score temporal scale of the activity
- Step 4: Choose the sub-component most likely to be affected by activity
- Step 5: Choose the most vulnerable unit of analysis for the component e.g. species, habitat type or community assemblage
- Step 6: Select the most appropriate operational objective
- Step 7: Score the intensity of the activity for that sub-component
- Step 8: Score the consequence resulting from the intensity for that sub-component
- Step 9: Record confidence/uncertainty for the consequence scores
- Step 10: Document rationale for each of the above steps
- Step 11: Summary of SICA results
- Step 12: Evaluation/discussion of Level 1
- Step 13: Components to be examined at Level 2

2.3.1 Record the hazard identification score (absence (0) presence (1) scores) identified at step 3 in the scoping level onto the SICA Document (Step 1)

Record the hazard identification score absence (0) presence (1) identified at Step 3 at the scoping level onto the SICA sheet. A separate sheet will be required for each

component (target, bycatch and byproduct, and TEP species, habitat, and communities). Only those activities that scored a 1 (presence) will be analysed at Level 1

2.3.2 Score spatial scale of activity (Step 2)

The greatest spatial extent must be used for determining the spatial scale score for each identified hazard. For example, if fishing (e.g. capture by longline) takes place within an area of 200 nm by 300 nm, then the spatial scale is scored as 4. The score is then recorded onto the SICA Document and the rationale documented.

Spatial scale score of activity

<1 nm:	1-10 nm:	10-100 nm:	100-500 nm:	500-1000 nm:	>1000 nm:
1	2	3	4	5	6

Maps and graphs may be used to supplement the information (e.g. sketches of the distribution of the activity relative to the distribution of the component) and additional notes describing the nature of the activity should be provided. The spatial scale score at Step 2 is not used directly, but the analysis is used in making judgments about level of intensity at Step. Obviously, two activities can score the same with regard to spatial scale, but the intensity of each can differ vastly. The reasons for the score are recorded in the rationale column of the SICA spreadsheet.

2.3.3 Score temporal scale of activity (Step 3)

The highest frequency must be used for determining the temporal scale score for each identified hazard. If the fishing activity occurs daily, the temporal scale is scored as 6. If oil spillage occurs about once per year, then the temporal scale of that hazard scores a 3. The score is then recorded onto the SICA Document and the rationale documented.

Temporal scale score of activity

Decadal (1 day every 10 years or so)	Every several years (1 day every several years)	Annual (1-100 days per year)	Quarterly (100-200 days per year)	Weekly (200-300 days per year)	Daily (300-365 days per year)
1	2	3	4	5	6

It may be more logical for some activities to consider the aggregate number of days that an activity occurs. For example, if the activity “fishing” was undertaken by 10 boats during the same 150 days of the year, the score is 3. If the same 10 boats each spend 30 non-overlapping days fishing, the temporal scale of the activity is a sum of 300 days, indicating that a score of 6 is appropriate. In the case where the activity occurs over many days, but only every 10 years, the number of days by the number of years in the cycle is used to determine the score. For example, 100 days of an activity every 10 years averages to 10 days every year, so that a score of 3 is appropriate.

The temporal scale score at Step 3 is not used directly, but the analysis is used in making judgments about level of intensity at Step 7. Obviously, two activities can score

the same with regard to temporal scale, but the intensity of each can differ vastly. The reasons for the score are recorded in the rationale column.

2.3.4 Choose the sub-component most likely to be affected by activity (Step 4)

The most vulnerable sub-component must be used for analysis of each identified hazard. This selection must be made on the basis of expected highest potential risk for each 'direct impact of fishing' and 'fishing activity' combination, and recorded in the 'sub-component' column of the SICA Document. The justification is recorded in the rationale column.

2.3.5 Choose the unit of analysis most likely to be affected by activity and to have highest consequence score (Step 5)

The most vulnerable 'unit of analysis' (i.e. most vulnerable species, habitat type or community) must be used for analysis of each identified hazard. The species, habitats, or communities (depending on which component is being analysed) are selected from **Scoping Document S2 (A – C)**. This selection must be made on the basis of expected highest potential risk for each 'direct impact of fishing' and 'fishing activity' combination, and recorded in the 'unit of analysis' column of the SICA Document. The justification is recorded in the rationale column.

2.3.6 Select the most appropriate operational objective (Step 6)

To provide linkage between the SICA consequence score and the management objectives, the most appropriate operational objective for each sub-component is chosen. The most relevant operational objective code from **Scoping Document S3** is recorded in the 'operational objective' column in the SICA document. Note that SICA can only be performed on operational objectives agreed as important for the (sub) fishery during scoping and contained in **Scoping Document S3**. If the SICA process identifies reasons to include sub-components or operational objectives that were previously not included/eliminated then these sub-components or operational objectives must be re-instated.

2.3.7 Score the intensity of the activity for the component (Step 7)

The score for intensity of an activity considers the direct impacts in line with the categories shown in the conceptual model (**Figure 11**) (capture, direct impact without capture, addition/movement of biological material, addition of non-biological material, disturbance to physical processes, external hazards). The intensity of the activity is judged based on the scale of the activity, its nature and extent. Activities are scored as per intensity scores below.

Intensity score of activity (Modified from Fletcher *et al.* 2002)

Level	Score	Description
Negligible	1	remote likelihood of detection at any spatial or temporal scale
Minor	2	occurs rarely or in few restricted locations and detectability even at these scales is rare
Moderate	3	moderate at broader spatial scale, or severe but local
Major	4	severe and occurs reasonably often at broad spatial scale
Severe	5	occasional but very severe and localized or less severe but widespread and frequent
Catastrophic	6	local to regional severity or continual and widespread

This score is then recorded on the **Level 1 (SICA) Document** and the rationale documented.

2.3.8 Score the consequence of intensity for that component (Step 8)

The consequence of the activity is a measure of the likelihood of not achieving the operational objective for the selected sub-component and unit of analysis. It considers the flow on effects of the direct impacts from Step 7 for the relevant indicator (e.g. decline in biomass below the selected threshold due to direct capture). Activities are scored as per consequence scores below. A more detailed description of the consequences at each level for each component (target, bycatch and byproduct, TEP species, habitats, and communities) is provided as a guide for scoring the consequences of the activities in the description of consequences table (see **Table 5, Appendix B**).

Consequence score for ERAEF activities (Modified from Fletcher *et al.* 2002).

Level	Score	Description
Negligible	1	Impact unlikely to be detectable at the scale of the stock/habitat/community
Minor	2	Minimal impact on stock/habitat/community structure or dynamics
Moderate	3	Maximum impact that still meets an objective (e.g. sustainable level of impact such as full exploitation rate for a target species).
Major	4	Wider and longer term impacts (e.g. long-term decline in CPUE)
Severe	5	Very serious impacts now occurring, with relatively long time period likely to be needed to restore to an acceptable level (e.g. serious decline in spawning biomass limiting population increase).
Intolerable	6	Widespread and permanent/irreversible damage or loss will occur-unlikely to ever be fixed (e.g. extinction)

The score should be based on existing information and/or the expertise of the risk assessment group. The rationale for assigning each consequence score must be documented. The conceptual model may be used to link impact to consequence by showing the pathway that was considered. In the absence of agreement or information, the highest score (worst case scenario) considered plausible is applied to the activity.

2.3.9 Record confidence/uncertainty for the consequence scores (Step 9)

The information used at this level is qualitative and each step is based on expert (fishers, managers, conservationists, scientists) judgment. The confidence rating for the consequence score is rated as 1 (low confidence) or 2 (high confidence) for the activity/component. The score is recorded on the SICA Document and the rationale

documented. The confidence will reflect the levels of uncertainty for each score at steps 2, 3, 7 and 8.

Description of Confidence scores for Consequences. The confidence score appropriate to the rationale is used, and documented on the SICA Document.

Confidence	Score	Rationale for the confidence score
Low	1	Data exists, but is considered poor or conflicting No data exists Disagreement between experts
High	2	Data exists and is considered sound Consensus between experts Consequence is constrained by logical consideration

2.3.10 Document rationale for each of the above steps (Step 10)

The rationale forms a logical pathway to the consequence score. It is provided for each choice at each step of the SICA analysis.

Level 1 (SICA) Documents L1.1 - Target Species Component; L1.2 - Byproduct and Bycatch Component; L1.3 - TEP Species Component; L1.4 - Habitat Component; L1.5 - Community Component

SICA steps 1-10. Tables of descriptions of consequences for each component and each sub component provide a guide for scoring the level of consequence (see Table5, Appendix B)

2.3.1 Level 1 (SICA) Documents L1.1 - Target Species Component;

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
Capture	Bait collection	0									Does not occur	I
	Fishing	1	3	5	population size	tiger prawn	1.2	3	3	2	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year. Population size likely to be affected before major changes in other sub-components; tiger prawns are the primary target species due to their higher commercial value =>intensity moderate as fishing is generally focused on suitable habitat over a broader spatial scale =>consequence moderate as the tiger prawn stock is considered fully fished so may be the most vulnerable target species =>confidence high as we have good biomass estimates and stock assessment models	I
	Incidental behaviour	1	3	5	population size	tiger prawn	1.2	1	1	2	Occasional line fishing by crew while at anchor during the day. Population size likely to be affected before major changes in other sub-components; tiger prawns are the primary target species due to their higher commercial value =>intensity negligible as hand-lining occurs in only a few anchoring locations =>consequence negligible as hand-lining by crew is expected to have a negligible impact on prawns as they are not known to be caught by line =>confidence high as it is extremely unlikely that incidental behaviour will affect tiger prawn population size.	I
Direct impact without capture	Bait collection	0									Does not occur	I
	Fishing	1	3	5	population size	tiger prawn	1.2	2	2	2	Small commercial prawn species may be damaged or died as a result of passing through the meshes of the net. Juvenile tiger prawns most at risk as tiger prawns are the primary target species due to their higher commercial value. Population size likely to be affected before major changes in other sub-components =>intensity minor as most fishing occurs in areas that harbour adult prawns that	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											are fully retained by the net mesh =>consequence minor; capture of the adult stock is the major impact of fishing on the population size, with minimal damage expected to juveniles in contact with the nets =>confidence high as we have good data on the size and migration of tiger prawns in the TSPF.	
	Incidental behaviour	1	3	5	population size	tiger prawn	1.2	1	1	2	Occasional line fishing by crew while at anchor during the day. Population size likely to be affected before major changes in other sub-components; tiger prawns are the primary target species due to their higher commercial value => intensity negligible as hand-lining occurs in only a few anchoring locations =>consequence negligible as hand-lining by crew is expected to have a negligible impact on prawns as they are not known to be caught by line =>confidence high as it is extremely unlikely that incidental behaviour without capture will affect tiger prawn population size.	I
	Gear loss	1	3	5	population size	tiger prawn	1.2	1	1	2	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year. Population size likely to be affected before major changes in other sub-components; tiger prawns are the primary target species due to their higher commercial value =>Intensity negligible as gear loss is rare and interaction of Brown tiger prawn with gear remote =>consequence negligible as impact unlikely to be measurable =>Confidence high as it is known that very little gear is lost, and interaction with Brown tiger prawn is considered unlikely.	I
	Anchoring/ mooring	1	3	5	population size	tiger prawn	1.2	1	1	2	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year. Population size likely to be affected before major changes in other sub-components; tiger prawns are the primary target species due to their higher commercial value =>intensity negligible, although anchoring occurs daily it generally occurs at anchorages adjacent to island or reefs. There is only occasional anchoring on the trawl grounds during good weather =>consequence negligible as the spatial scale of the impact of an anchor on the trawl grounds is negligible =>Confidence high as it is unlikely that tiger prawns would be negatively affected by anchoring/mooring.	I
	Navigation/ steaming	1	3	5	population size	tiger prawn	1.2	3	1	2	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year. Population size likely to be affected before major changes in other sub-components; tiger prawns are the primary target species due to their higher commercial value =>intensity moderate as vessels are trawling and steaming all night and often part of the day. =>consequence negligible as prawns	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											are demersal therefore negligible chance of direct impact =>confidence high was we know that tiger prawns are demersal are rarely if ever found near the surface of the water	
Addition/movement of biological material	Translocation of species	1	3	5	population size	tiger prawn	1.2	1	1	1	Translocation of species could impact the tiger prawn population by introducing a prawn disease or a new species to the Torres Strait prawn habitat that could impact on tiger prawn stocks through competition or predation =>intensity negligible although fishing vessels regularly move between the TSPF and the adjacent NPF and ECOTF they do not carry ballast water =>consequence negligible as the adjacent fisheries have similar habitats and species and international shipping more likely to result in translocation of species than fishing vessels =>Confidence low as little data exists on the translocation of species by prawn trawlers in the TSPF, NPF and ECOT fisheries.	I
	On board processing	1	3	5	population size	tiger prawn	1.2	1	1	2	Prawns are frozen whole on Australian TSPF vessels, while PNG vessels do head some of their prawn product but to date only conduct very limited level of fishing in PNG waters of the TSPZ =>intensity negligible =>consequence negligible as any prawn predators (sharks & dolphins) attracted by the discarded heads follow the vessel on the surface rather than the nets on the sea bed =>confidence high as it is logical that the impact on prawn stocks would be low due to the low level of onboard processing.	I
	Discarding catch	1	3	5	population size	tiger prawn	1.2	3	3	2	Discarding of bycatch occurs extensively throughout the fished region => most likely to affect population size of tiger prawns if scavengers and predators (e.g. sharks and trevally) are attracted to prawn habitat and in turn prey upon prawns =>Intensity and consequence moderate as discarding is widespread and prawn predators (e.g. sharks trevallies) are known to be attracted to discards =>Confidence scored as high as the effects of discarding of bycatch is well documented in the TSPF.	I
	Stock enhancement	0									Does not occur	I
	Provisioning	0									Does not occur	I
	Organic waste disposal	1	3	5	behaviour/movement	tiger prawn	6.1	1	1	2	Disposal of organic waste material (food scraps, sewage) is most likely to impact on the behaviour and movement of prawns (e.g. attracted to food scraps) =>intensity negligible as there are only small number of vessels over a large spatial area =>consequence negligible as these events are small, localised and scattered =>confidence high as the consequence is constrained by logical consideration	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
Addition of non-biological material	Debris	1	3	5	behaviour/movement	tiger prawn	6.1	1	1	2	Debris could impact the movement/ behaviour of tiger prawns =>intensity negligible as fishing vessels are under MARPOL convention and required to store and return all non-biological waste to port or unload it to supply vessels =>consequence negligible as interaction with debris from fishing vessels is highly unlikely =>confidence high consequence is constrained by logical consideration.	I
	Chemical pollution	1	3	5	population size	tiger prawn	1.2	1	2	1	Chemical pollution for fishing vessels occurs as oil spills, for anti-fouling, clean chemicals etc; Chemical pollution poses greatest potential risk for the population of brown tiger prawn if the seagrass areas are affected =>Intensity negligible as boats operating under MARPOL =>consequences minor as oil spills could impact the seagrass beds used by tiger prawns which would impact on recruitment but oil spills from fishing vessels would be fairly limited and localised =>confidence low as limited data effects of chemicals	I
	Exhaust	1	3	5	behaviour/movement	tiger prawn	6.1	1	1	2	Exhaust from running engines occurs over a large range/scale =>intensity negligible because exhaust considered to have low impact on target species, more likely to have a short term impact air quality =>consequence negligible as target species are on the sea bed so their behaviour/movement are unlikely to be impacted =>Confidence high as the consequence is constrained by logical consideration	I
	Gear loss	1	3	5	behaviour/movement	tiger prawn	6.1	1	1	2	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year. Population size likely to be affected before major changes in other sub-components; tiger prawns are the primary target species due to their higher commercial value =>Intensity negligible as gear loss is rare and interaction of Brown tiger prawn with gear remote =>consequence negligible as impact unlikely to be measurable =>Confidence high as it is known that very little gear is lost, and interaction with Brown tiger prawn is considered unlikely.	I
	Navigation/steaming	1	3	5	behaviour/movement	tiger prawn	6.1	1	1	2	Navigation / steaming occurs over a large range / scale and introduces noise and visual stimuli into the environment =>intensity negligible as it is unlikely to have a measurable/ detectable impact on target species =>consequences negligible because unlikely to impact on the behaviour / movement of target species =>confidence high as considered unlikely that navigation / steaming would impact on the behaviour/movement of demersal prawns	I
	Activity/ presence on water	1	3	5	behaviour/movement	tiger prawn	6.1	1	1	2	Activity/ presence occurs over a large range / scale and introduces noise and visual stimuli into the environment =>intensity negligible as it is unlikely to have a measurable/ detectable impact on target species =>consequences negligible	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											because unlikely to impact on the behaviour / movement of target species =>confidence high as considered unlikely that activity/ presence would impact on the behaviour/movement of demersal prawns	
Disturb physical processes	Bait collection	0									Does not occur	I
	Fishing	1	3	5	behaviour/movement	tiger prawn	6.1	2	2	1	The trawl gear interacts with the sea bed. Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year =>intensity minor, although the fishing gear does disturb the sea bed and sediment this disturbance would be small compared with the disturbance to sediments created by the strong tidal currents the prevail in TS =>consequences minor as disturbance of sediment not likely to affect behaviour /movements =>confidence low as little available data on changes in prawn behaviour due to sea bed disturbance	I
	Boat launching	0										I
	Anchoring/ mooring	1	3	5	behaviour/movement	tiger prawn	6.1	1	1	2	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year =>intensity negligible as the spatial scale of the impact of an anchor on the sea bed is negligible, although anchoring occurs daily it generally occurs at anchorages adjacent to island or reefs. There is only occasional anchoring on the trawl grounds during good weather =>consequence negligible as is considered unlikely that anchor disturbance would impact on the behaviour/movement of prawns =>Confidence high by logical constraint	I
	Navigation/steaming	1	3	5	population size	tiger prawn	1.2	1	2	1	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year =>intensity negligible as physical impacts of steaming would only occur in very shallow waters i.e. sediment disturbance =>consequence minor as disturbance of sediment not likely to affect population size =>confidence low as no available data	I
External Impacts (specify the particular example within each activity area)	Other fisheries	1	4	6	population size	tiger prawn	1.2	3	1	2	Other fisheries occur in the area (TRL, BDM, pearl shell etc) these fisheries are largely dive and lines fisheries therefore would have little impact on tiger prawn stocks =>intensity moderate as there is regular effort through the area of the fishery =>consequence negligible as these fisheries do not capture prawns as bycatch =>confidence high as it is considered unlikely that dive and line fisheries could impact on prawn stocks	E
	Aquaculture	1	3	6	population size	tiger prawn	1.2	1	1	2	There are pearl farms in TS but not within the area of prawn trawling. Sponge farming is being investigated and proposed for reefs close to inhabited islands =>intensity negligible as activities are small and localised =>consequences	E

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											negligible as in is consider unlikely that these activities would impact on brown tiger prawn stocks =>confidence high as there is no obvious way that pearl farming or sponge aquaculture could impact prawn stocks	
	Coastal development	1	4	6	population size	tiger prawn	1.2	1	1	1	No coastline within the fishery and only limited developed on inhabited islands within the fishery =>intensity negligible as only limited and localised possibility of impacts from sewage discharge and dumping of rubbish =>consequences negligible as unlikely to affect target species populations =>confidence low as there is no data	E
	Other extractive activities	0									Does not occur	E
	Other non-extractive activities	1	4	6	population size	tiger prawn	1.2	3	3	1	Torres Strait has major international shipping lanes through the fishery - possibility of oil spills and introduced pest =>intensity moderate as it a high risk area for shipping with a high traffic level =>consequences moderate as oil spills could impact the seagrass beds used by tiger prawns which would impact on recruitment =>confidence low as there is limited data no the long term impacts of oil spills or introduced pests no tiger prawn stocks	E
	Other anthropogenic activities	1	4	6	population size	tiger prawn	1.2	2	1	2	Recreational / traditional fishing and boating could impact the environment =>intensity minor as current level of this activity are low and impacts would be localised =>consequences negligible as it is unlikely that these activities would impact tiger prawn stocks =>confidence high the impact of recreational fishing on prawn populations is constrained by logical considerations	E

L1.2 - Byproduct and Bycatch Component;

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
Capture	Bait collection	0									Does not occur	I
	Fishing	1	3	5	population size	Sharks & rays (small)	1.2	3	3	1	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year. Elasmobranchs in general are more susceptible to overfishing than boney fishes. Elasmobranch bycatch has generally been reported as “multi-family grouping” or “Squatinae-undifferentiated”. Of the elasmobranch species recorded in the TSPF saw sharks (TEP species), wobbegongs and rays are likely to be of most concern due to their high susceptibility and little information is available to estimate their recovery. =>intensity moderate; fishing is generally focused on suitable habitat over a broader spatial scale => consequence moderate as a precautionary measure although there is no data to suggest these species are impacted by trawl fishing in the TSPF =>confidence low as data on these species is limited	I
	Incidental behaviour	1	3	5	population size	Reef fish e.g. coral trout	1.2	1	1	2	Occasional line fishing by crew while at anchor during the day; some of the species they take e.g. coral trout, may be at risk of overfishing in TS =>intensity negligible as hand-lining occurs in only a few anchoring locations =>consequence negligible as the amount of finfish that can be on board the vessel is restricted 20 kg and there are generally 2 weeks between unloads, this level of catch would have a negligible impact on fin fish stocks =>confidence high due to the restrictions on catch levels which are checked by the Boating and Fisheries Patrol	I
Direct impact without capture	Bait collection	0									Does not occur	I
	Fishing	1	3	5	population size	Sharks & rays (large)	1.2	3	3	1	Sharks and rays larger than ~1m were known to be caught during prawn fishing and are now exclude from the catch by the use of TEDs. It is assumed that this has increased their survival rate, but no data is available to confirm this. =>intensity moderate; fishing is generally focused on suitable habitat over a broader spatial scale. =>consequence moderate as a precautionary measure although there is no data to suggest these species are impacted by trawl fishing in the TSPF =>confidence low as there is limited data on survival of these species after passing through the TED. Video footage of TED in operation would be required to confidently assess this risk.	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
	Incidental behaviour	1	3	5	population size	Sharks	1.2	1	1	1	Occasional line fishing by crew while at anchor during the day; sharks are often take the line and break off or are cut off with hooks remaining in there mouth; this could lead to death and impact the shark populations =>intensity negligible as hand-lining occurs in only a few anchoring locations =>consequence negligible as it is considered unlikely that this activity will result in significant shark mortality =>confidence low is there is no data on the effect of this activity on shark mortality	I
	Gear loss	1	3	5	population size	Sharks & rays	1.2	1	1	2	Sharks and rays may tangle in the gear resulting in mortality =>Intensity negligible as gear loss is rare =>consequence negligible as lost nets will be largely buried in the sediment and have little ghost fishing impact as the mesh size is small, therefore impact unlikely to be detectable at the scale of the stock =>Confidence high as it is known that very little gear is lost	I
	Anchoring/ mooring	1	3	5	behaviour/ movement	Small sharks & rays	6.1	1	1	2	Anchoring/ mooring could impact behaviour/ movement =>intensity negligible, although anchoring occurs daily it generally occurs at anchorages adjacent to island or reefs. There is only occasional anchoring on the trawl grounds during good weather =>consequence negligible as the spatial scale of the impact of an anchor on the trawl grounds is negligible =>Confidence high as it is unlikely that any product or bycatch species would be negatively affected by anchoring/mooring.	I
	Navigation/ steaming	1	3	5	behaviour/ movement	Sharks & rays	6.1	3	1	2	Behaviour/ movement may be impacted =>intensity moderate as vessels are trawling and steaming all night and often part of the day =>consequence negligible as just steaming/ navigation are unlikely to affect shark behaviour =>confidence high as we know that sharks are mainly attracted to fishing vessels by discards	I
Addition/ movement of biological material	Translocation of species	1	3	5	population size	Sharks & rays	1.2	1	1	1	Translocation of species could impact some of the byproduct / bycatch populations through introduction of competing species / diseases =>intensity negligible although fishing vessels regularly move between the TSPF and the adjacent NPF and ECOTF they do not carry ballast water =>consequence negligible as the adjacent fisheries have similar habitats and species and international shipping more likely to result in translocation of introduced species than fishing vessels =>Confidence low as little data exists on the translocation of species by prawn trawlers in the TSPF, NPF and ECOT fisheries.	I
	On board processing	1	3	5	behaviour/ movement	Sharks	6.1	1	1	2	Impacts behaviour/ movement of sharks as they are attracted to feed on the discards =>intensity negligible prawns are frozen whole on Australian TSPF	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											vessels, PNG vessels do head some of their prawn product but to date have only conduct very a limited level of fishing in PNG waters of the TSPZ =>consequence negligible as impacts are localised and temporary =>confidence high as sharks are observed leaving the vessels when discarding has finished	
	Discarding catch	1	3	5	population size	Sharks	1.2	2	1	2	Sharks are attracted to feed on the discards, on rare occasions there is shark mortality from striking the propeller =>intensity minor as these occurrences are rare. =>consequence negligible as impacts on population unlikely to be detectable at the scale of the stock =>confidence high as this is type of impact is known to be rare.	I
	Stock enhancement	0									Does not occur	I
	Provisioning	0									Does not occur	I
	Organic waste disposal	1	3	5	behaviour/movement	Sharks	6.1	1	1	2	Disposal of organic waste material (food scraps, sewage) is most likely to impact on the behaviour and movement of pelagic animals species close to the fishing vessels (e.g. attracted to food scraps) =>intensity negligible as there are only small number of vessels over a large spatial area =>consequence negligible as these events are small, localised and scattered =>confidence high as the consequence is constrained by logical consideration	I
Addition of non-biological material	Debris	1	3	5	population size	Sharks & rays	1.2	1	2	2	Debris could impact the survival of some species through entanglement or ingestion =>intensity negligible as fishing vessels are under MARPOL convention and required to store and return all non-biological waste to port or unload it to supply vessels =>consequence minor as interaction with debris from fishing vessels is highly unlikely => confidence high consequence is constrained by logical consideration.	I
	Chemical pollution	1	3	5	population size	Sharks & rays	1.2	1	2	1	Chemical pollution for fishing vessels occurs as oil spills, for anti-fouling, clean chemicals etc. Chemical pollution poses greatest potential risk for the population of elasmobranchs =>Intensity negligible as boats operating under MARPOL =>consequences minor as chemical pollution from fishing vessels could result in additional mortality in populations already at risk but would be fairly limited and localised =>confidence low as limited data on effects of chemicals on survival of pelagic animals	I
	Exhaust	1	3	5	population size	Sharks & rays	1.2	1	1	2	Exhaust from running engines occurs over a large range/scale =>intensity negligible because exhaust considered to have low impact on marine species, more likely to have a short term impact on air quality =>consequence negligible as target species are on the sea bed so their behaviour/movement are unlikely to	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											be impacted =>Confidence high as the consequence is constrained by logical consideration	
	Gear loss	1	3	5	population size	Sharks & rays	1.2	1	1	2	Population size likely to be affected before major changes in other sub-components =>Intensity negligible as gear loss is rare. =>consequence negligible as impact unlikely to be detectable at the scale of the stock =>Confidence high as it is known that very little gear is lost.	I
	Navigation/ steaming	1	3	5	behaviour/ movement	Sharks & rays	6.2	3	1	2	Behaviour/ movement may be impacted due to sounders/sonar =>intensity moderate as vessels are trawling and steaming all night and often part of the day =>consequence negligible as it is considered unlikely that sounders/sonar would affect shark behaviour =>confidence high as we know that shark behaviour is influence more by other activities e.g. discarding	I
	Activity/ presence on water	1	3	5	behaviour/ movement	Sharks & rays	6.2	1	1	2	Activity/ presence occurs over a large range / scale and introduces noise and visual stimuli into the environment =>intensity negligible as it is unlikely to have a measurable/ detectable impact on sharks =>consequences negligible because unlikely to impact on the behaviour / movement =>confidence high as considered unlikely that activity/ presence would impact on the behaviour/movement of sharks	I
Disturb physical processes	Bait collection	0									Does not occur	I
	Fishing	1	3	5	behaviour/ movement	Sharks & rays	6.2	2	2	1	The trawl gear interacts with the sea bed. Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year =>intensity minor, although the fishing gear does disturb the sea bed and sediment this disturbance would be small compared with the disturbance to sediments created by the strong tidal currents the prevail in TS =>consequences minor as disturbance of sediment not likely to affect behaviour /movements =>confidence low as little available data on changes in elasmobranch behaviour due to sea bed disturbance	I
	Boat launching	0									Does not occur	I
	Anchoring/ mooring	1	3	5	behaviour/ movement	Sharks & rays	6.2	1	1	2	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year =>intensity negligible as the spatial scale of the impact of an anchor on the sea bed is negligible, although anchoring occurs daily it generally occurs at anchorages adjacent to island or reefs. There is only occasional anchoring on the trawl grounds during good weather =>consequence negligible as is considered unlikely that anchor disturbance would impact on the	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											behaviour/movement of elasmobranchs =>Confidence high by logical constraint	
	Navigation/steaming	1	3	5	population size	Sharks & rays	6.2	1	2	1	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year =>intensity negligible as physical impacts of steaming would only occur in very shallow waters i.e. sediment disturbance =>consequence minor as disturbance of sediment not likely to affect population size =>confidence low as no available data	I
External Impacts (specify the particular example within each activity area)	Other fisheries	1	4	6	population size	Sharks & rays	1.2	3	3	1	Other fisheries occur in the area (TRL, BDM, pearl shell etc). These fisheries are largely dive and lines fisheries, the line fisheries may be taking elasmobranchs as product or discards therefore could be impacting the populations =>intensity moderate as there is regular effort through the area of the fishery =>consequence moderate as there is the potential for other fisheries to have a cumulative impact on elasmobranch stocks =>confidence low - limited data on impacts of other fisheries in TS	E
	Aquaculture	1	3	6	population size	Sharks & rays	1.2	1	1	2	There are pearl farms in TS but not within the area of prawn trawling. Sponge farming is being investigated and proposed for reefs close to inhabited islands =>intensity negligible as activities are small and localised =>consequences negligible as in is consider unlikely that these activities would impact on elasmobranch stocks =>confidence high as there is no obvious way that pearl farming or sponge aquaculture could impact elasmobranch stocks	E
	Coastal development	1	4	6	population size	Sharks & rays	1.2	1	1	1	No coastline within the fishery and only limited developed on inhabited islands within the fishery =>intensity negligible as only limited and localised possibility of impacts from sewage discharge and dumping of rubbish =>consequences negligible as unlikely to elasmobranch populations =>confidence low as there is no data	E
	Other extractive activities	0									Does not occur	E
	Other non-extractive activities	1	4	6	population size	Sharks & rays	1.2	3	3	1	Torres Strait has major international shipping lanes through the fishery - possibility of oil spills and introduced pest =>intensity moderate as is a high risk area for shipping with a high traffic level =>consequences moderate as oil spills	E

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											and introduced species may impact the mortality of elasmobranchs =>confidence low as there is limited data no the long term impacts of oil spills or introduced pests on elasmobranchs	
	Other anthropogenic activities	1	4	6	population size	Sharks & rays	1.2	2	3	1	Recreational / traditional fishing and boating could impact the environment =>intensity minor as current level of this activity are low and impacts would be localised =>consequences scored as moderate as these activities could impact elasmobranch stocks =>confidence low due to lack of data	E

L1.3 - TEP Species Component;

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
Capture	Bait collection	0									does not occur	I
	Fishing	1	3	5	population size	sea snakes	1.2	3	3	1	Sea snakes and syngnathids populations are likely to be of most concern, survival of sea snakes after trawling has been estimated as 49%, these taxa were rarely identified to species level and catch rates were very low in the research surveys conducted to date, the risk to these species is dependent on the relative proportions of the populations taken by trawling, however this is unknown => intensity moderate as fishing occurs in 20% of the designated management area of the TSPF for about 9 months => consequence moderate as a precautionary measure although the available data suggests that catch rates are low in the TSPF =>confidence low as data on these species is limited	I
	Incidental behaviour	1	3	5	population size	sea snakes	1.2	1	1	2	Occasional line fishing by crew while at anchor during the day; they may accidentally catch a TEP species => intensity negligible as hand-lining occurs in only a few anchoring locations => consequence negligible as it is unlikely a TEP species (e.g. sea snake, turtle, dugong) would be caught on a handline =>confidence high as a logically constrained	I
Direct impact without capture	Bait collection	0									Does not occur	I
	Fishing	1	3	5	population size	turtles	1.2	2	1	2	Turtles may be damaged by the TED => intensity minor as data from the period prior to TEDs indicates that catch rates were low relative to the level of trawling activity => consequences negligible as data from the period prior to TEDs indicates high mortality rate for landed turtles, and that in the TSPF 66% were flatbacks which have a higher survival, there are no indications that the TED damage the turtle =>confidence high as there is good data on turtles and TED effectiveness	I
	Incidental behaviour	1	3	5	population size	sea snakes	1.2	1	1	2	Occasional line fishing by crew while at anchor during the day => intensity negligible as hand-lining occurs in only a few anchoring locations => consequence negligible as it is considered unlikely that this activity will result in any interaction with TEP species =>confidence high as a logically constrained	I
	Gear loss	1	3	5	population size	turtles	1.2	1	1	2	turtles may tangle in the gear resulting in mortality => Intensity negligible as gear loss is rare => consequence negligible as interaction with lost gear highly unlikely therefore impact unlikely to be measurable => Confidence high as it is known that very little gear is lost	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
	Anchoring/ mooring	1	3	5	behaviour/ movement	turtles	6.2	1	1	2	Anchoring/ mooring could impact behaviour/ movement turtle behaviour => intensity negligible, although anchoring occurs daily there are only a small number of vessels over a large spatial scale =>consequence negligible as anchoring is not considered to impact on turtle behaviour =>Confidence high as it is logically constrained	I
	Navigation/ steaming	1	3	5	population size	turtles	1.2	1	1	2	Steaming / trawling vessels could strike a turtle causing mortality => intensity negligible as fishing vessels are generally moving relatively slowly therefore probability of boat strike is low => consequence negligible as the impact of boat strikes on population is unlikely to be detectable as other sources of mortality are much higher => confidence high as logically constrained, and no evidence of turtle boat-strikes by trawlers	I
Addition/ movement of biological material	Translocation of species	1	3	5	population size	turtles	1.2	1	1	1	Translocation of species could impact some of the TEP populations through introduction of competing species / diseases => intensity negligible although fishing vessels regularly move between the TSPF and the adjacent NPF and ECOTF they do not carry ballast water => consequence negligible as the adjacent fisheries have similar habitats and species and international shipping more likely to result in translocation of introduced species than fishing vessels => Confidence low as little data exists on the translocation of species by prawn trawlers in the TSPF, NPF and ECOT fisheries.	I
	On board processing	1	3	5	behaviour/ movement	dolphins	6.2	1	1	2	Dolphins attracted to feed =>Intensity negligible prawns are frozen whole on Australian TSPF vessels, PNG vessels do head some of their prawn product but to date have only conduct very limited level of fishing in PNG waters of the TSPZ =>consequence negligible as dolphins tend to leave the vicinity of the fishing vessels once discarding has finished =>confidence high as the level of on board processing is known to be low	I
	Discarding catch	1	3	5	behaviour/ movement	Terns	6.2	3	4	2	Discarding is common after each shot throughout the fishery; most likely to affect behaviour /movement of tern =>Intensity moderate as discarding of high volumes of bycatch occurs throughout the season on the trawl grounds =>Consequence major as the terns continuously follow trawlers to feed on discards and may become dependent on trawlers for food. This has the potential to impact the tern population dynamics, and may take some weeks to return to normal behaviour at the close of the fishing season=>Confidence high as scavenging by terns behind trawlers is common, and the activity is extended over the 9-month season.	I
	Stock enhancement	0										Does not occur

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
	Provisioning	0									Does not occur	I
	Organic waste disposal	1	3	5	behaviour/movement	dolphins	6.2	1	1	2	Disposal of organic waste material (food scraps, sewage) is most likely to impact on the behaviour and movement of pelagic animals species close to the fishing vessels (e.g. attracted to food scraps) => intensity negligible as there are only small number of vessels over a large spatial area => consequence negligible as these events are small, localised and scattered => confidence high as the consequence is constrained by logical consideration	I
Addition of non-biological material	Debris	1	3	5	population size	dolphins	1.2	1	2	2	Debris could impact the survival of some species through entanglement or ingestion => intensity negligible as fishing vessels are under MARPOL convention and required to store and return all non-biological waste to port or unload it to supply vessels => consequence minor as interaction with debris from fishing vessels is highly unlikely => confidence high consequence is constrained by logical consideration.	I
	Chemical pollution	1	3	5	population size	dugong	1.2	1	2	1	Chemical pollution for fishing vessels occurs as oil spills, for anti-fouling, clean chemicals etc. Chemical pollution poses greatest potential risk for the population of dugong if the seagrass areas are affected => Intensity negligible as boats operating under MARPOL => consequences minor as oil spills could impact the seagrass beds used by dugong which would impact on the population but oil spills from fishing vessels would be fairly limited and localised => confidence low as limited data effects of chemicals	I
	Exhaust	1	3	5	population size	dolphins	6.2	1	1	2	Exhaust from running engines occurs over a large range/scale => intensity negligible because exhaust considered to have low impact on marine species, more likely to have a short term impact on air quality => consequence negligible as exhaust unlikely to cause mortality therefore impact unlikely to be detectable at the scale of the stock => Confidence high as the consequence is constrained by logical consideration	I
	Gear loss	1	3	5	population size	turtles	1.2	1	1	2	Population size likely to be affected before major changes in other sub-components. => Intensity negligible as gear loss is rare. => consequence negligible as impact unlikely to be detectable at the scale of the stock => Confidence high as it is known that very little gear is lost.	I
	Navigation/steaming	1	3	5	behaviour/movement	dolphins	6.2	3	1	2	Behaviour/ movement may be impacted => intensity moderate as vessels are trawling and steaming all night and often part of the day => consequence negligible as just steaming/ navigation are unlikely to impact on dolphin behaviour => confidence high as we know that dolphins are mainly attracted to	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											fishing vessels by discards	
	Activity/ presence on water	1	3	5	behaviour/ movement	dolphins	6.2	1	1	2	Activity/ presence occurs over a large range / scale and introduces noise and visual stimuli into the environment => intensity negligible as it is unlikely to have a measurable/ detectable impact on dolphins => consequences negligible because unlikely to impact on the behaviour / movement => confidence high as considered unlikely that activity/ presence would impact on the behaviour/movement of dolphins	I
Disturb physical processes	Bait collection	0									Does not occur	I
	Fishing	1	3	5	behaviour/ movement	sea snakes	6.2	1	1	1	The trawl gear interacts with the sea bed. Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year => intensity negligible, although the fishing gear does disturb the sea bed and sediment this disturbance would be small compared with the disturbance to sediments created by the strong tidal currents the prevail in TS => consequences negligible as sediment disturbance not likely to affect behaviour /movements => confidence low as little available data on changes in sea snake behaviour due to sea bed disturbance	I
	Boat launching	0									Does not occur	I
	Anchoring/ mooring	1	3	5	behaviour/ movement	turtles	6.2	1	1	2	Anchoring/ mooring could impact behaviour/ movement turtle behaviour => intensity negligible, although anchoring occurs daily it there are only a small number of vessels over a large spatial scale => consequence negligible as anchoring is not considered to impact on turtle behaviour => Confidence high as it is logically constrained	I
	Navigation/steaming	1	3	5	behaviour/ movement	dolphins	6.2	3	1	2	Behaviour/ movement may be impacted due to sounders/sonar => intensity moderate as vessels are trawling and steaming all night and often part of the day => consequence negligible as it is considered unlikely that sounders/sonar would negatively affect dolphin behaviour => confidence high as we know that shark behaviour is influence more by other activities e.g. discarding	I
External Impacts (specify the particular example within each activity area)	Other fisheries	1	4	6	population size	dugong	1.2	3	4	2	Dugong are taken by traditional hunting => intensity moderate as there is regular effort through the area of the fishery => consequences major as overfishing of dugong is a current concern => confidence high - as there is good data on dugong stocks	E
	Aquaculture	1	3	6	population size	dugong	1.2	1	1	2	There are pearl farms in TS but not within the area of prawn trawling. Sponge	E

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											farming is being investigated and proposed for reefs close to inhabited islands => intensity negligible as activities are small and localised => consequences negligible as in is consider unlikely that these activities would impact on any TEP species => confidence high as there is no obvious way that pearl farming or sponge aquaculture would impact TEP species	
	Coastal development	1	4	6	population size	dugong	1.2	1	1	1	No coastline within the fishery and only limited developed on inhabited islands within the fishery => intensity negligible as only limited and localised possibility of impacts from sewage discharge and dumping of rubbish => consequences negligible as unlikely to impact TEP populations => confidence low as there is no data	E
	Other extractive activities	0									Does not occur	E
	Other non-extractive activities	1	4	6	population size	dugong	1.2	3	3	1	Torres Strait has major international shipping lanes through the fishery - possibility of oil spills and introduced pest => intensity moderate as it a high risk area for shipping with a high traffic level. => consequences moderate as oil spills and introduced species may impact the mortality of TEP species => confidence low as there is limited data no the long term impacts of oil spills or introduced pests on TEP species	E
	Other anthropogenic activities	1	4	6	population size	dugong	1.2	2	3	1	Recreational / traditional fishing and boating could impact the environment => intensity minor as current level of this activity are low and impacts would be localised => consequences scored as moderate as these activities could impact TEP species => confidence low due to lack of data	E

L1.4 - Habitat Component;

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
Capture	Bait collection	0									Does not occur	I
	Fishing	1	3	5	Habitat structure and function	fine sediments, irregular, octocorals, inner shelf	5.1	3	4	2	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year. Trawling at night in waters generally 18-40m deep. Shot length is 2.5 -4 hours and relative gear selectivity creates bycatch issues in this fishery. Gear footprint is large, due to relatively large, heavy nets with high mobility.=> Intensity moderate, highly localised fishing over suitable prawn habitat (generally muddy sediments) may result in severe localised structural modification of susceptible epifaunal and infaunal habitats. =>Consequence major for some habitats in these depths, as encounter with demersal trawl gears will result in removal and damage of erect, rugose and inflexible octocorals associated with soft muddy substrata. Regeneration times of fauna will vary between species, however in inner shelf depths (25-100m), may be reasonably rapid as fauna are likely to be well adapted to frequent and considerable disturbance regimes (e.g. strong currents, runoff, cyclones). More structurally complex forms/ communities may take many years-decades to recover. =>Confidence high. Data on resilience and recovery rates available for some species from this region.	I
	Incidental behaviour	1	3	5	Habitat structure and function	coarse sediments, irregular, hard corals, inner shelf	5.1	2	1	2	Crew often line fish for reef fish when anchored, occurs daily throughout the fishery. =>Intensity minor, anchoring may occur in few restricted locations, however effect of incidental behavior on benthos expected to be low intensity. =>Consequence Incidental behavior considered to have negligible impact on seafloor habitat structure directly. =>Confidence high, constrained by logic.	I
Direct impact	Bait collection	0									Does not occur	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
without capture	Fishing	1	3	5	Habitat structure and function	fine sediments, irregular, octocorals, inner shelf	5.1	3	3	2	Octocorals which survive passing of a Prawn Trawl shot, due to their apparent flexibility or strong subsurface attachment, are likely to sustain some degree of damage to contacted polyps. =>Intensity moderate - shots 2.5-4 hours, highly localised interannually. =>Consequence moderate. Post encounter fate of fauna unknown, regeneration times of damaged tissues will vary between species, however in inner shelf depths (25-100m), can be expected to be reasonably rapid as fauna are likely to be well adapted to frequent and considerable disturbance regimes (e.g. strong currents, runoff, cyclones). More structurally complex forms/ communities may take > 1 year to recover. =>Confidence high. Data on resilience and recovery rates available for some species from this region.	I
	Incidental behaviour	1	3	5	Habitat structure and function	coarse sediments, irregular, hard corals, inner shelf	5.1	2	1	2	Crew often line fish for reef fish when anchored, occurs daily throughout the fishery. =>Intensity minor, anchoring may occur in few restricted locations, however effect of incidental behavior on benthos expected to be low intensity. =>Consequence Incidental behavior considered to have negligible impact on seafloor habitat structure directly. =>Confidence high, constrained by logic.	I
	Gear loss	1	3	5	Habitat structure and function	Biogenic, low outcrop, hard corals, coastal margin	5.1	1	1	2	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year Gear loss rare, but may lost bits. Trawling over low relief muddy sediments interspersed with patches of biogenic encrusted/ coral outcrops and wonky holes but snagging unlikely if terrain known and hard patches avoided. =>Intensity negligible across the spatial scale of the fishery, lost gear is most likely highly localised. =>Consequence negligible. Attempted retrieval may lead to damage of fragile or erect faunas. Lost gear may change habitat structure by virtue of creating new structure, which remains to eventually become habitat, impact unlikely to be measurable. =>Confidence high as it is known that very little gear is lost.	I

Direct impact of fishing	Fishing Activity	Presence (1) / Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
	Anchoring/ mooring	1	3	5	Habitat structure and function	coarse sediments, irregular, hard corals, coastal margin depths	5.1	1	2	1	Anchoring occurs regularly throughout the fishery, over a 9 month period, mainly in <25m depths. Anchoring may occur on sandy substratum or coral reefs. Attached/ sessile fauna may be damaged by physical contact with anchor, during anchoring and retrieval. =>Intensity negligible across scale of fishery. =>Consequence minor over scale of fishery, considered to affect only a very small percentage of the area of the habitat overall, however may be potentially severe at localised scales if fishers anchor in same reef locations. =>Confidence low as unknown effect on NPF habitat caused by Anchoring/ mooring.	I
	Navigation/ steaming	1	3	5	Water quality	Northern Coastal pelagic provinces.	1.1	1	1	2	Navigation/ steaming associated with fishing activity occurs in 20% of the designated management area of the TSPF for about 9 months each year. Navigation/steaming considered to influence water quality by disrupting the water column. =>Intensity Negligible, considered unlikely that there would be detectable impacts on pelagic habitat water quality. =>Consequence therefore Negligible. =>Confidence high because negative interactions between Navigation/steaming and pelagic habitat were considered unlikely to be detectable.	I
Addition/ movement of biological material	Translocation of species	1	3	5	Habitat structure and function	Biogenic, low outcrop, seagrass, coastal margin	5.1	1	4	1	Translocation of species may occur throughout the TSPF, through ballast water or hull fouling, and more likely to establish in shallower waters. Translocated species most likely to affect compromised habitats in terms of structure and function, by altering pelagic and sediment processes, and displacing species. =>Intensity negligible at present, although fishing vessels regularly move between the TSPF and the adjacent NPF and ECOTF they do not carry ballast water. =>Consequence major as there is the potential for impacts to alter habitat dynamics. =>Confidence low as little data exists on the translocation of species by prawn trawlers in the TSPF, NPF and ECOT fisheries.	I
	On board processing	1	3	5	Substrate quality	muddy sediments, bioturbators, inner shelf	3.1	1	1	2	Onboard processing occurs after each shot throughout the fishery, although high grading minimal due to freezer capacity. Prawns are frozen whole on Australian TSPF vessels, PNG	I

Direct impact of fishing	Fishing Activity	Presence (1) / Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											vessels do head some of their prawn product but to date have only a limited level of fishing in PNG waters of the TSPZ. Discarding from processing most likely to affect substrate quality if discarded material reaches and accumulates on benthos. =>Intensity negligible, on board processing occurs, but no impact on habitat. =>Consequence negligible as there is generally low volumes of discarding from processing. =>Confidence high, known low rate of discarding associated with on board processing.	
	Discarding catch	1	3	5	Substrate quality	mud, directed scour, bioturbators, coastal margin	3.1	3	3	2	Discarding of catch (mainly bycatch and small amounts of undersized target and byproduct species) throughout the fishery. Large volumes of solid biomass dumped in shallow waters may accumulate over fine sediments, altering substrate quality via changed biogeochemical processes and sediment ecology. Habitat ecology will be modified by the attraction of scavengers and predators. =>intensity moderate as discarding occurs for extended period over each evening of fishing and over the extent of the fished area. =>Consequence moderate, fishery discards high volumes of diverse bycatch in localised accumulations which may take long periods to breakdown. => Confidence: high. Australian based Refs on fate of discards include: Wassenberg and Hill (1990), Harris and Poiner (1990), Hill and Wassenberg (1990)	I
	Stock enhancement	0										I
	Provisioning	0										I
	Organic waste disposal	1	3	5	Water quality	Northern Coastal pelagic provinces.	1.1	2	1	2	Fishing occurs throughout the TSPF for about 9 months each year so organic waste disposal possible over this scale. Disposal of organic waste poses greatest potential threat to the water quality of the Northern Coastal pelagic habitats. =>Intensity minor, each disposal event probably only of low volume and considered to affect a small area. =>Consequence negligible as impact likely to be undetectable within hours as scavenging species expected to rapidly take up waste. =>Confidence high,	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											constrained by logic.	
Addition of non-biological material	Debris	1	3	5	Habitat structure and function	Northern Coastal pelagic provinces, and all benthic habitats.	5.1	2	2	2	Addition of debris possible over the scale of the fishery. Debris poses greatest risk to the structure and function of all pelagic and benthic habitats of the Torres Strait coastal zone habitats. =>Intensity difficult to predict however, minor if MARPOL rules strictly adhered to, and overall volume of debris is small (greatest volumes of debris within these zones likely to come from all sources outside of this fishery e.g. foreign fishing vessels, gillnetters, other fishers in TSPF grounds). =>Consequence minor, habitat quality compromised. =>Confidence in the consequence was high, constrained by logic.	I
	Chemical pollution	1	3	5	Water quality	Northern Coastal pelagic provinces.	1.1	2	1	1	Fishing occurs throughout the TSPF for about 9 months each year so chemical pollution, such as oil spills, for anti-fouling, cleaning chemicals etc possible over this scale. Chemical pollution poses greatest potential threat to the water quality of the Northern coastal pelagic habitats. =>Intensity minor because although the hazard could occur over a large range/scale, pollution considered to only impact a small area. =>Consequence negligible as the effects of chemical pollution are likely to be rapidly undetectable if volume small, and affect surface conditions briefly until winds, waves action dissipate chemical pollution. =>Confidence low. Chemical pollution was considered to occur inadvertently but frequency and volumes unknown	I
	Exhaust	1	3	5	Water quality	Northern Coastal pelagic provinces.	1.1	1	2	1	Exhaust emissions possible over the entire scale of the fishery. Exhaust emissions impact the water quality of the Northern coastal pelagic habitats, floating pollutants such as oil may remain at the surface posing greatest threat to sea snakes, turtles and seabirds. =>Intensity negligible because although the hazard could occur over a large range/scale, exhaust considered to only impact a small localised area. =>Consequence minor as exhaust is unlikely to have a significant impact on the pelagos for long.	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											=>Confidence low as the effects of exhaust on seasnakes, turtles and seabirds is unknown.	
	Gear loss	1	3	5	Habitat structure and function	Biogenic, low outcrop, hard corals, inner shelf	5.1	1	1	2	Gear lost infrequently over 9 month fishing season. Retrieval is usually attempted and possible in shallow depths, if contact with sediments (i.e. wonky holes), less likely if snag on hard grounds. Lost gear may change habitat structure by virtue of creating new structure, which remains to eventually become habitat. =>Intensity gear loss negligible across the spatial scale of the fishery, therefore alteration of habitat structure from lost gear conceivably minimal. =>Consequence negligible, impact unlikely to be measurable. =>Confidence high, large volumes of gear lost infrequently.	I
	Navigation/ steaming	1	3	5	Water quality	Northern Coastal pelagic provinces.	1.1	1	1	1	Navigation/ steaming occurs throughout the TSPF for about 9 months each year. Noise and visual stimuli introduced into the environment because of steaming likely to alter the pelagic habitat for the duration of the vessel presence. Stimuli cease with cessation of activities. =>Intensity negligible because it occurs over a large range and detection of impact unlikely. =>Consequence negligible impacts unlikely to be measurable for pelagic species interactions. =>Confidence scored low as effect on pelagic habitats of noise and visual stimuli not known.	I
	Activity/ presence on water	1	3	5	Water quality	Northern Coastal pelagic provinces.	1.1	3	2	1	The TSPF pelagic environment will be impacted by noise and visual stimuli associated with activity/presence of fishing vessels throughout the TS for about 9 months each year. Noise, light, and water column disturbance associated with fishing operations likely to reduce the pelagic habitat quality for the duration of the shot. Stimuli cease with cessation of activities. =>Intensity moderate as there may be aggregation of fishing vessels targeting Prawns. =>Consequence minor since additions (e.g. noise, boat movements) will disperse rapidly upon cessation. =>Confidence scored as low because the effects of activity/presence on pelagic habitats unknown.	I
Disturb	Bait collection	0									Does not occur	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
physical processes	Fishing	1	3	5	Substrate quality	fine sediments, irregular, mixed faunal community, inner shelf	3.1	2	2	1	Substratum processes of fine sediment based habitats will be most disturbed by contact with Prawn trawl gear. Silty sediments in particular will be resuspended in water column, with threat of translocation in strong current zones, alteration of sediment architecture for shallow infaunal species by mechanical action of gear on seafloor, and smothering of suspension feeding communities within the range of the gear activity. =>Intensity minor, highly localised effects, resettlement may take hours to days. =>Consequence minor, area prone to greater effects by natural disturbance phenomena. Length of recovery time for infaunal habitat may depend on depth of disturbance, and intrinsic resilience to natural disturbance. Recovery times of processes from substratum disturbance will vary between sediment habitats and associated species, however may be expected to be < annual in TS waters. =>Confidence low, data required.	I
	Boat launching	0									Does not occur	I
	Anchoring/ mooring	1	3	5	Habitat structure and function	Biogenic, subcrop, mixed faunal community, coastal margin	5.1	2	2	1	Anchoring/ mooring possible over the spatial and temporal scale of the TSPF. Physical contact with anchor may disturb substratum in the process and damage biogenic reef forms in a more persistent way, particularly in frequently used sites. Risk of sediment suspension low as likely to anchor on 'hard' structures or coarse sands. =>Intensity minor, anchoring over relatively short timeframes. =>Consequence minor as anchoring considered to affect only a very small percentage of the area of the habitat that is likely to have a reasonably rapid regenerative capacity. =>Confidence low because it is unknown to what degree Anchoring/ mooring has affected physical processes in mooring grounds of the TS.	I
	Navigation/steaming	1	3	5	Water quality	Northern Coastal pelagic provinces.	1.1	1	1	1	Navigation/ steaming associated with searching for Prawns in the TSPF occurs over 9 months each year. =>Intensity negligible, activity occurs over a large range and detection of impact on pelagos unlikely. =>Consequence negligible. Water	I

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											quality altered by turbulence unlikely to sustain measurable or persistent change. Stimuli cease with cessation of activities. =>Confidence low, effects of water column disturbance on pelagic habitats not known.	
External Impacts (specify the particular example within each activity area)	Other fisheries	1	4	6	Habitat structure and function	Biogenic, subcrop, mixed faunal community, coastal margin	5.1	3	3	1	Other fisheries operating within the TSPF managed region with potential to impact benthic habitats include mainly dive and line fisheries; TSRL, trochus, BDM, pearl, Mackeral, Reef Line. =>Intensity moderate as there is regular effort through the area of the fishery, and other methods interact to varying degrees with substratum and faunal communities. =>Consequence moderate as both hard and soft grounds are targeted, degree of habitat impact not quantified, nor enough known about habitat potential to recover given frequent anthropogenic disturbance. Cumulative effects on Habitat structure and function are a concern for all habitats, particularly those which may possess long-lived, fragile and endemic species. =>Confidence low, requires data on cumulative effects in TSPF.	E
	Aquaculture	1	3	6	Habitat structure and function	fine sediments, irregular, seagrass, coastal margin	5.1	1	1	1	There are pearl farms in TS but not within the area of prawn trawling. Sponge farming is being investigated and proposed for reefs close to inhabited islands. =>intensity negligible as activities are small and localised. =>Consequences negligible at this stage, depending on species used (i.e. native to area?), but this would need to be monitored closely if using introduced species. =>Confidence low as unclear how this will impact habitats at current stage.	E
	Coastal development	1	4	6	Habitat structure and function	coarse sediments, irregular, seagrass, coastal margin	5.1	1	2	1	No coastline within the fishery and only limited developed on inhabited islands within the fishery. Most susceptible habitats likely to be seagrass communities. =>Intensity negligible as only limited and localised possibility of impacts from sewage discharge and dumping of rubbish. =>Consequences minor if seagrass distributions known and managed. =>Confidence low as there is no data regarding effects of current level of coastal development.	E
	Other extractive	0									Does not occur	E

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
	activities											
	Other non-extractive activities	1	4	6	Habitat structure and function	Northern Coastal pelagic provinces.	5.1	3	3	2	Torres Strait has major international shipping lanes through the fishery, shipping occurs throughout the year throughout the TSPF. Possibility of oil spills, introduced pests, collision with slow moving surface dependent species (e.g. turtles, dugongs). Greatest threat to pelagic habitat function, as slow moving species may collide with vessels (turtles). =>Intensity moderate as shipping occurs throughout the TSPF at high traffic level, and is concentrated in a number of ports. =>Consequence moderate for species such as dugong as impact of collision results in injury which may lead to mortality in threatened population. =>Confidence high in frequency of this occurrence is reasonably high.	E
	Other anthropogenic activities	1	4	6	Habitat structure and function	coarse sediments, irregular, hard corals, coastal margin depths	5.1	3	2	1	Recreational / traditional boating, fishing and commercial tourism occurs throughout the year in the TSPF. Greatest potential risk of damage/ removal for the fragile, erect faunal communities associated with productive fishing grounds (e.g. seagrass, hard corals, etc), which become popular recreational locations in waters < 25m. =>Intensity moderate as boating occurs throughout the TSPF and is likely to be concentrated around a number of locations. =>Consequence minor as most interactions of this nature likely to be pelagic. =>Confidence low as it may be difficult to measure the extent of recreational activity impact against a background of natural variation e.g. seasonal disturbance.	E

L1.5 - Community Component

Direct impact of fishing	Fishing Activity	Presence (1) Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
Capture	Bait collection	0										I
	Fishing	1	3	5	Species composition	North Eastern Transition Inner Shelf	1.1	3	2	1	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year; tiger prawns are primary target species however large amounts of bycatch fish species are also caught therefore impacting overall composition of community. =>intensity moderate as fishing is generally focused on suitable prawn habitat over a broader spatial scale =>consequence minor; the level effort in this fishery is lower than that in the NPF where Stobutzki <i>et al</i> (2003) were unable to detect differences in species composition or relative abundances of bycatch species between closed and open areas of Groote community, Current CRC Task 1.5 obtaining similar results for TS =>confidence low - no data on community composition	I
	Incidental behaviour	1	3	5	Species composition	North Eastern Transition Inner Shelf	1.1	1	1	2	Occasional line fishing by crew while at anchor during the day. =>intensity negligible as hand-lining occurs in only a few anchoring locations =>consequence negligible as hand-lining by crew is expected to have a negligible impact community composition =>confidence high - logical consideration	I
Direct impact without capture	Bait collection	0									does not occur	I
	Fishing	1	3	5	Species composition	North Eastern Transition Inner Shelf	1.1	2	2	1	Bycatch is high & diverse - escapement of fish through meshes might lower post-capture survival therefore overall species composition might be affected particularly in certain size ranges. =>Intensity minor =>consequence minor - Stobutzki <i>et al</i> (2002) unable to detect differences in species composition or relative abundances of bycatch species between closed and open areas of Groote community as a direct of indirect result of fishing. =>confidence low as data unavailable for direct impacts without capture	I
	Incidental behaviour	1	3	5	Species composition	North Eastern Transition Inner Shelf	1.1	1	1	2	Occasional line fishing by crew while at anchor during the day. =>intensity negligible as hand-lining occurs in only a few anchoring locations =>consequence negligible as hand-lining by crew is expected to have a negligible impact community composition =>confidence high - logical consideration	I

Direct impact of fishing	Fishing Activity	Presence (1) / Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
	Gear loss	1	3	5	Species composition	North Eastern Transition Inner Shelf	1.1	1	1	2	Gear loss is rare but might entangle fish and ghost fish =>Intensity negligible =>consequence negligible as lost nets will be largely buried in the sediment and have little ghost fishing impact as the mesh size is small, therefore impact unlikely to be detectable at the scale of the stock =>Confidence high as it is known that very little gear is lost	I
	Anchoring/ mooring	1	3	5	Species composition	North Eastern Transition Inner Shelf	1.1	1	1	2	Although anchoring occurs daily it generally occurs at anchorages adjacent to island or reefs. There is only occasional anchoring on the trawl grounds during good weather =>Intensity negligible, =>Consequence negligible as the spatial scale of the impact of an anchor on the trawl grounds is negligible =>Confidence high as it is unlikely that community species would be negatively affected by anchoring/mooring.	I
	Navigation/ steaming	1	3	5	Species composition	Northern - Coastal East Cape York	1.1	1	1	1	No impacts by pelagic community members with vessels are recorded. =>intensity negligible =>consequence negligible =>confidence low, no data	I
Addition/ movement of biological material	Translocation of species	1	3	5	Species composition	North Eastern Transition Inner Shelf	1.1	1	1	1	Translocation of species could impact species composition of the community by introducing a disease or a new species to the Torres Strait prawn habitat that could impact on tiger prawn stocks or other fish stocks through competition or predation =>intensity negligible although fishing vessels regularly move between the TSPF and the adjacent NPF and ECOTF they do not carry ballast water =>consequence negligible as the adjacent fisheries have similar habitats and species and international shipping more likely to result in translocation of species than fishing vessels =>Confidence low as little data exists on the translocation of species by prawn trawlers in the TSPF, NPF and ECOT fisheries.	I
	On board processing	1	3	5	Distribution of community	North Eastern Transition Inner Shelf	3.1	1	1	2	Prawn predators (sharks & dolphins) attracted by discarded heads follow the vessel however prawns are frozen whole on Australian TSPF vessels, PNG vessels do head some of their prawn product but to date have only conduct very a limited level of fishing in PNG waters of the TSPZ =>intensity negligible =>consequence negligible as any effects on distribution will be temporary =>confidence high -logical	I
	Discarding catch	1	3	5	Distribution of community	Northern - Coastal East Cape York	3.1	3	2	2	Discarding of catch (mainly bycatch and small amounts of undersized target and byproduct species) attracts scavengers (mainly sharks and dolphins) =>intensity moderate as discarding occurs for extended period over each evening of fishing and over the extent of the fished area	I

Direct impact of fishing	Fishing Activity	Presence (1) / Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
											=>consequences minor discarding occurs while the vessel is steaming or the vessel is trawling and scavengers feed on or near the surface immediately behind the vessel and changes are temporary =>confidence high as the effects of discarding are well documented	
	Stock enhancement	0									Does not occur	I
	Provisioning	0									Does not occur	I
	Organic waste disposal	1	3	5	Distribution of community	Northern - Coastal East Cape York	3.1	1	1	2	Disposal of organic waste material (food scraps, sewage) is most likely to impact on the distribution of community members e.g. scavengers =>intensity negligible as there are only small number of vessels over a large spatial area =>consequence negligible as these events are small, localised and scattered and effects on distribution are temporary =>confidence high -logical consideration	I
Addition of non-biological material	Debris	1	3	5	Species composition	Northern - Coastal East Cape York	1.1	1	1	2	Debris could impact the species composition if community members ingested debris causing death =>intensity negligible as fishing vessels are under MARPOL convention and required to store and return all non-biological waste to port or unload it to supply vessels =>consequence negligible as interaction with debris from fishing vessels is highly unlikely =>confidence high consequence is constrained by logical consideration.	I
	Chemical pollution	1	3	5	Species composition	Northern - Coastal East Cape York	1.1	1	1	1	Chemical pollution for fishing vessels occurs as oil spills, for anti-fouling, clean chemicals etc. Chemical pollution poses greatest potential risk for the species composition if causes death by ingestion =>Intensity negligible as boats operating under MARPOL and oil spills from fishing vessels would be fairly limited and localised =>consequences negligible =>confidence low as limited data effects of chemicals and reported incidences of chemical spills unknown	I
	Exhaust	1	3	5	Distribution of community	Northern - Coastal East Cape York	3.1	1	1	2	Exhaust from running engines occurs over a large range/scale =>intensity negligible because exhaust considered to have low impact on to have a short term impact air quality =>consequence negligible as birds only potential species likely to be impacted and their mobility reduces likelihood =>Confidence high as the consequence is constrained by logical consideration	I
	Gear loss	1	3	5	Distribution of community	North Eastern	3.1	1	1	2	Gear loss is rare but lost nets will be largely buried in the sediment causing habitat changes and possibly distribution of community.	I

Direct impact of fishing	Fishing Activity	Presence (1) / Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
						Transition Inner Shelf					=>Intensity negligible. =>consequence negligible as impact unlikely to be measurable =>Confidence high, it is known that little gear loss occurs.	
	Navigation/ steaming	1	3	5	Distribution of community	Northern - Coastal East Cape York	3.1	1	1	2	Navigation / steaming occurs over a large range / scale and introduces noise and visual stimuli into the environment =>intensity negligible as it is unlikely to have a measurable/ detectable impact on distribution of community =>consequences negligible =>confidence high- logical	I
	Activity/ presence on water	1	3	5	Distribution of community	Northern - Coastal East Cape York	3.1	1	1	2	Activity/ presence occurs over a large range / scale and introduces noise and visual stimuli into the environment =>intensity negligible as it is unlikely to have a measurable/ detectable impact on species distribution in pelagic community =>consequences negligible because unlikely to impact on the distribution of species =>confidence high as considered unlikely that activity/ presence would impact on the behaviour/movement of demersal prawns	I
Disturb physical processes	Bait collection	0									Does not occur	I
	Fishing	1	3	5	Distribution of community	North Eastern Transition Inner Shelf	3.1	2	2	1	The trawl gear interacts with the sea bed. Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year =>intensity minor, although the fishing gear does disturb the sea bed and sediment this disturbance would be small compared with the disturbance to sediments created by the strong tidal currents the prevail in TS =>consequences minor as disturbance of sediment not likely to affect distribution of community from habitat disturbance =>confidence low as little available data	I
	Boat launching	0										I
	Anchoring/ mooring	1	3	5	Distribution of community	North Eastern Transition Inner Shelf	3.1	2	2	1	Fishing occurs in 20% of the designated management area of the TSPF for about 9 months each year. Distribution of community most likely to be affected as anchoring occurs on reefs where damage to habitat may result in alteration of species distributions. Risk of sediment suspension low as likely to anchor on 'hard' structures or coarse sands. =>Intensity minor, anchoring over relatively short timeframes. =>Consequence minor as anchoring considered to affect only a very small percentage of the area of the habitat. =>Confidence low, it is unknown to what degree Anchoring/ mooring has affected physical processes in mooring grounds of the TS.	I

Direct impact of fishing	Fishing Activity	Presence (1) / Absence (0)	Spatial scale of Hazard (1-6)	Temporal scale of Hazard (1-6)	Sub-component	Unit of analysis	Operational objective (S2.1)	Intensity Score (1-6)	Consequence Score (1-6)	Confidence Score (1-2)	Rationale	Internal / External
	Other anthropogenic activities	1	4	6	Species composition	Northern - Coastal East Cape York	1.1	2	2	1	Recreational / traditional fishing and boating could impact the environment =>intensity minor as current level of this activity are low and impacts would be localised =>consequences minor as it is unlikely that changes in species composition detectable. =>confidence low, no data	E

Summary of SICA results

The report provides a summary table (**Level 1 (SICA) Document L1.6**) of consequence scores for all activity/component combinations and a table showing those that scored 3 or above for consequence (shaded), and differentiating those that did so with high confidence (in bold).

Level 1 (SICA) Document L1.6. Summary table of consequence scores for all activity/component combinations.

Direct impact	Activity	Target species	Byproduct and bycatch species	TEP species	Habitats	Communities
Capture	Bait collection					
	Fishing	3	3	3	4	2
	Incidental behaviour	1	1	1	1	1
Direct impact without capture	Bait collection					
	Fishing	2	3	1	3	2
	Incidental behaviour	1	1	1	1	1
	Gear loss	1	1	1	1	1
	Anchoring/ mooring	1	1	1	2	1
	Navigation/ steaming	1	1	1	1	1
Addition/ movement of biological material	Translocation of species	1	1	1	4	1
	On board processing	1	1	1	1	1
	Discarding catch	3	1	4	3	2
	Stock enhancement					
	Provisioning					
	Organic waste disposal	1	1	1	1	1
Addition of non-biological material	Debris	1	2	2	2	1
	Chemical pollution	2	2	2	1	1
	Exhaust	1	1	1	2	1
	Gear loss	1	1	1	1	1
	Navigation/ steaming	1	1	1	1	1
	Activity/ presence on water	1	1	1	2	1
Disturb physical processes	Bait collection					
	Fishing	2	2	1	2	2
	Boat launching					
	Anchoring/ mooring	1	1	1	2	2
	Navigation/steaming	2	2	1	1	2
Note: external hazards are not considered at Level 2 in the PSA analysis						
External hazards	Other fisheries	1	3	4	3	3
	Aquaculture	1	1	1	1	1
	Coastal development	1	1	1	2	1
	Other extractive activities					
	Other non extractive activities	3	3	3	3	3
	Other anthropogenic activities	1	3	3	2	2

Evaluation/discussion of Level 1

A number of internal hazards (fishing activities) were eliminated at Level 1 (risk scores 1 or 2). Those internal hazards remaining included:

- Fishing capture (Target, Bycatch/byproduct, TEP and Habitat components)
- Fishing without capture (Bycatch/byproduct and Habitat)
- Translocation of species (Habitat), and
- Discarding catch (Target, TEP and Habitat).

These remaining internal hazards were assessed at low confidence for the Byproduct and TEP components, but at high confidence for the Target and Habitat components. The exception was the Habitat component Translocation hazard, which was assessed at low confidence.

Three internal hazards were scored as a major hazard (consequence level 4): Habitat component impact of Fishing capture and Translocation of species; and TEP component impact of Discarding.

The following external hazards contained consequence scores of three or above:

- Other fisheries (Bycatch/byproduct, TEP species, Habitat and Communities)
- Other non-extractive activities (all five components)
- Other anthropogenic activities (Bycatch/byproduct and TEP species).

There are a number of external hazards in the fishery that are likely to be as important, or more important, than those identified from the fishery itself. Translocation of pest species or a major oil spill caused by international shipping potentially poses a greater threat to the Torres Strait environment than the activities associated with the Torres Strait Prawn Fishery. Dugong, turtle and elasmobranchs are probably the most at risk TEP species in Torres Strait. Illegal fishing by foreign fishing vessels and traditional fishing activities in Torres Strait could have a much greater impact on these species than the TSPF.

Target

In the case of the target species, fishing (direct capture) was considered to have a moderate impact (consequence level 3) on the brown tiger prawn stocks as the current stock assessments suggest that this species was fully fished during the 1990's. In recent years (2004-05) the level of fishing effort has declined below the estimate of E_{msy} for brown tiger prawns due to a combination of low prawn prices and high fuel costs while catch rates have increased and the annual tiger prawn catch remained stable. The November 2005 reduction in allocated fishing days and voluntary surrender of allocated fishing days to give effect to the cross-boarder fishing arrangements now limits effort in the fishery to E_{msy} (9,200 days for 2006). Fishing effort by Australian operators is currently restricted to 6867 days for 2006.

Discarding of bycatch was also considered to have a moderate impact on the Target component. Discarding of bycatch occurs extensively throughout the fished region, and is known to attract predators. These predators will in turn prey upon the resident prawn population. The effects of discarding of bycatch are well documented in the TSPF.

Bycatch/byproduct

In the case of bycatch/byproduct species fishing, both capture and direct impact without capture are considered to have a moderate (consequence level 3) impact.

Elasmobranches, in general, are considered more susceptible to overfishing than bony fish, but there is likely to be a range of sensitivities among the species (Walker 1998; Stevens *et al.* 2000). Of the species recorded in the TSPF aside from pristids (sawfish), the benthic species (wobbegongs and rays) are likely to be of most concern due to their high susceptibility and little information available to estimate their recovery. The mobility of elasmobranch species also means that they may be impacted by several fisheries (Stobutzki TSFAG Prawn Workshop Report 2001). The consequence were scored as moderate as a precautionary measure although there is no data to suggest these species are impacted by trawl fishing in the TSPF. Our confidence in this assessment is low as data on these species is limited.

Sharks and rays larger than ~1m are excluded from the catch by Turtle Excluder Devices (TEDs), therefore it could be assumed that this has increased their survival rate, however this may not be the case as they may be damaged by contact with a TED. As a precautionary measure, although there is no data to suggest these species are impacted by trawl fishing, the consequence was scored as moderate. Confidence in this assessment is low as there is limited data on survival of these species after passing through the TED.

TEP

In the case of TEP species sea snakes were considered the species mostly likely to be of concern as the survival of sea snakes after trawling has been estimated as 49% (Wassenberg *et al.* 2001). The risk to these species is dependent on the relative proportion of the population taken by trawling, however this is unknown. In the research surveys conducted in Torres Strait the catch rates of sea snakes has been very low and these taxa were rarely identified to species level. The consequence was scored as moderate as a precautionary measure although the available data suggests that sea snake catch rates are low in the TSPF. The confidence in this assessment is low as data on these species is limited. The existing observer program in the TSPF should be used to obtain data on the catch rates and species of sea snakes that occur in the commercial catch.

The discarding of bycatch was assessed as a major hazard (consequence level 4) impacting the TEP Tern species through modification of behaviour and movement. Discarding of high volumes of bycatch occurs after each trawl shot, throughout the nine-month season on the fishing grounds. Scavenging behaviour by terns behind trawlers is a common activity. They are known to continuously follow trawlers to feed on these discards, and may become dependent on discarding as a food source. This in turn has the potential to impact the population dynamics of the terns, and may take some weeks after the close of the season for normal foraging behaviour to return.

Habitat

The Habitat component was assessed to be at major risk of impact by the fishing capture activity, and moderate risk without capture. The prawn trawl-gear footprint is large, and the highly localised nature of the operations may result in severe localised structural modification of susceptible epifaunal and infaunal habitats, with damage and removal particularly of erect, rugose and inflexible octocorals associated with soft muddy substrata. Octocorals that are not removed by prawn trawl gear are also likely to encounter some degree of damage. Although inner shelf habitats may recover relatively quickly, the more structurally complex forms may take many years to recover. These habitat risks were assessed with high confidence due to the availability of data for some species within the Torres Strait region.

Addition/Movement of biological material was assessed as a moderate risk to Habitats through the hazard presented by catch discarding. Accumulation of large volumes of solid biomass, particularly in shallow waters, will alter the substrate quality via changed biogeochemical processes and sediment ecology, and further modify the habitat by the attraction of scavengers and predators. This hazard was assessed at high confidence based on documented data within the Torres Strait and tropical region (Harris and Poiner 1990, Hill and Wassenberg 1990, Wassenberg and Hill 1990)

Translocation of species, particularly through hull fouling, was assessed as a major risk (risk score 4) to Habitat structure and function. Species translocated may establish throughout the Torres Strait Prawn Fishery area, but are particularly likely to affect shallower habitats where they pose a hazard to previously compromised area, by altering pelagic and sediment processes, and displacing existing species. Fishing vessels regularly move between the TSPF and the adjacent NPF and ECOTF water. This hazard was assessed at low confidence as little data exists on the translocation of species by prawn trawlers, but the potential risk associated with this hazard has have major consequence due to the potential to alter habitat dynamics.

Components to be examined at Level 2

No Level 2 analysis has been conducted for the Torres Strait Prawn Fishery. Level 1 assessment for the Fishery has been completed as required for the ERAEF Stage 2 process. Generally, as a result of the preliminary SICA analysis, the components to be examined at Level 2 are those with any consequence scores of 3 or above.

Glossary of Terms

Assemblage	A subset of the species in the community that can be easily recognized and studied. For example, the set of sharks and rays in a community is the Chondrichthian assemblage.
Attribute	A general term for a set of properties relating to the productivity or susceptibility of a particular unit of analysis.
Bycatch species	A non-target species captured in a fishery, usually of low value and often discarded (see also Byproduct).
Byproduct species	A non-target species captured in a fishery, but it may have value to the fisher and be retained for sale.
Community	A complete set of interacting species.
Component	A major area of relevance to fisheries with regard to ecological risk assessment (e.g. target species, bycatch and byproduct species, threatened and endangered species, habitats, and communities).
Component model	A conceptual description of the impacts of fishing activities (hazards) on components and sub-components, linked through the processes and resources that determine the level of a component.
Consequence	The effect of an activity on achieving the operational objective for a sub-component.
Core objective	The overall aim of management for a component.
End point	A term used in risk assessment to denote the object of the assessment; equivalent to component or sub-component in ERAEF
Ecosystem	The spatially explicit association of abiotic and biotic elements within which there is a flow of resources, such as nutrients, biomass or energy (Crooks, 2002).
External factor	Factors other than fishing that affect achievement of operational objectives for components and sub-components.
Fishery method	A technique or set of equipment used to harvest fish in a fishery (e.g. long-lining, purse-seining, trawling).
Fishery	A related set of fish harvesting activities regulated by an authority (e.g. South-East Trawl Fishery).
Habitat	The place where fauna or flora complete all or a portion of their life cycle.
Hazard identification	The identification of activities (hazards) that may impact the components of interest.
Indicator	Used to monitor the effect of an activity on a sub-component. An indicator is something that can be measured, such as biomass or abundance.
Likelihood	The chance that a sub-component will be affected by an activity.

Operational objective	A measurable objective for a component or sub-component (typically expressed as “the level of X does not fall outside acceptable bounds”)
Precautionary approach	The approach whereby, if there is uncertainty about the outcome of an action, the benefit of the doubt should be given to the biological entity (such as species, habitat or community).
PSA	Productivity-Susceptibility Analysis. Used at Level 2 in the ERAEF methodology.
Scoping	A general step in an ERA or the first step in the ERAEF involving the identification of the fishery history, management, methods, scope and activities.
SICA	Scale, Impact, Consequence Analysis. Used at Level 1 in the ERAEF methodology.
Sub-component	A more detailed aspect of a component. For example, within the target species component, the sub-components include the population size, geographic range, and the age/size/sex structure.
Sub-fishery	A subdivision of the fishery on the basis of the gear or areal extent of the fishery. Ecological risk is assessed separately for each sub-fishery within a fishery.
Sustainability	Ability to be maintained indefinitely
Target species	A species or group of species whose capture is the goal of a fishery, sub-fishery, or fishing operation.
Trophic position	Location of an individual organism or species within a foodweb.
Unit of analysis	The entities for which attributes are scored in the Level 2 analysis. For example, the units of analysis for the Target Species component are individual “species”, while for Habitats, they are “biotypes”, and for Communities the units are “assemblages”.