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ECOLOGICAL RISK ASSESSMENT FOR THE EFFECTS OF FISHING IN THE WESTERN & CENTRAL PACIFIC OCEAN: PRODUCTIVITY-SUSCEPTIBILITY ANALYSIS

WCPFC-SC3-EB SWG/WP-1

Paper prepared by

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1. Background & Introduction

The First Regular Session of the WCPFC Scientific Committee (SC1) endorsed the suggestion (Molony 2005, Kirby et al. 2005) that Ecological Risk Assessment (ERA) be carried out for the WCPFC Convention Area. SPC-OFP undertook a preliminary ERA (Kirby & Molony 2006) based on the CSIRO/AFMA approach (Hobday et al. 2006). These results were presented to the Second Regular Session of the WCPFC Scientific Committee (SC2), who called for the continuation of this work. In December 2006 the Commission approved its budget for 2007 and a collaborative proposal to carry out the ERA work was then developed between SPC-OFP and CSIRO, Australia. This included the intention to hold an ERA Research Planning Workshop involving technical experts and relevant NGOs, and to prepare a 3 yr ERA Research Plan for submission to SC3. This proposal was subject to peer review and the WCPFC Secretariat gave their approval in March 2008. The analysis presented here is therefore a work-in-progress and there remains room for improvement in data quality/quantity and the resolution and complexity of the analyses. Nonetheless, what is presented illustrates the utilty of Ecological Risk Assessment (ERA) in supporting the Ecosystem Approach to Fisheries (EAFM) and in assisting CCMs and the SC to meet their obligations under the WCPFC Convention.

The CSIRO/AFMA approach to ERA is heirarchical (Levels 1, 2 & 3; Hobday et al. 2005): Level 1 is based on stakeholder workshops, and is designed to identify hazards to species and systems and to carry out a Scale-Intensity-Consequence Analysis (SICA). Level 2 is based on the biological characteristics of species caught in the fishery concerned, and the degree of interaction between that fishery and those species. This has been called Productivity-Susceptibility Analysis (PSA) and is the approach and level at which the ERA for the WCPFC Convention Area has so far been carried out. At this level, individual species are assigned risk scores relative to each other, resulting in a risk ranking along each of the two axes used (productivity, susceptibility) and as the distance from the origin of the graph. It is important to emphasise both the relative nature of these scores, such that they are valid only for the particular PSA carried out, and the fact the this is a risk assessment *for the effects of fishing* and not an estimate of extinction risk due to the sum of all risks experienced by any particular species (i.e. trophic interactions, environmental variability, climate change, fishing, habitat destruction, pollution, etc.). Estimates of population status for any single species result from analyses at Level 3, which may take the form of a classical stock assessment. ERA as a process then, is designed to engage stakeholders, identify those species at most risk from fishing activites, and ultimately to provide population assessments for those species. It is therefore a useful process for prioritisation of fisheries research and conservation/management action.

2. Updates since SC2

A new database for life history data was made available for analysis, through a collaborative agreement between SPC-OFP and CSIRO, Australia. This has allowed refinement of the indices used in the Productivity-Susceptibility Analyses (PSAs).

Productivity: as well as the age-based metrics used previously, it has also been possible to use population parameters such as natural mortality, as well as the growth parameters *k* and length-at-infinity.

Susceptibility: Vertical overlap index between species habitat (max. & min. depth) and longline gear (max. depth) was calculated, as well as the length- and condition-at-capture metrics and percentage retained, used previously.

The following 3 PSAs were carried out for 2 fishery categories (deep & shallow longline)

- PSA 1 for **all species** observed caught (number of species: N=233)
- PSA 2 for **all fish species** observed caught (N=190)
- PSA 3 for **species of special interest** (SSIs: birds, mammals, reptiles, sharks) (N=99)

Spatial overlap plots have been updated to the period 2002-2006 for longline effort, observer effort, and observed encounters of birds, mammals, reptiles, and sharks.

PSAs have not been carried out for purse seine fisheries, as the observer data do not include the same attributes used in the PSAs for longline (condition, fate) – nevertheless, purse seine fisheries are likely to have some impact on non-target associated and dependent species, so a summary plot reproduced from Langley et al. (2006) is provided, to illustrate the degree of bycatch in the different set types. Further work will be carried out on purse seine fisheries in the course of the project.

3. Spatial overlap between species distributions and longline fishing effort

The updated database includes both minimum and maximum depth as well as global distribution for 94% of species observed caught. This enables the degree of overlap between fishing effort and species distribution to be calculated and included in PSAs.

$$\text{Vertical Overlap Index} = \frac{[\text{maximum hook depth} - \text{minimum species depth}]}{[\text{maximum species depth} - \text{minimum species depth}]}$$

For this year the degree of overlap has been calculated in the vertical dimension. A similar index for the degree of overlap in the horizontal dimensions (see Fig, XX) has not yet been calculated, but will be included in future analyses.

Overlap indices are simple metrics serving a similar purpose to habitat standardisation of catch rates in stock assessments for tunas (Bigelow et al. 2005). The statistical approach now favoured (Maunder et al. 2006) may be useful for PSAs, although the lack of species identification for non-target species on commercial logsheets would be a limiting factor.

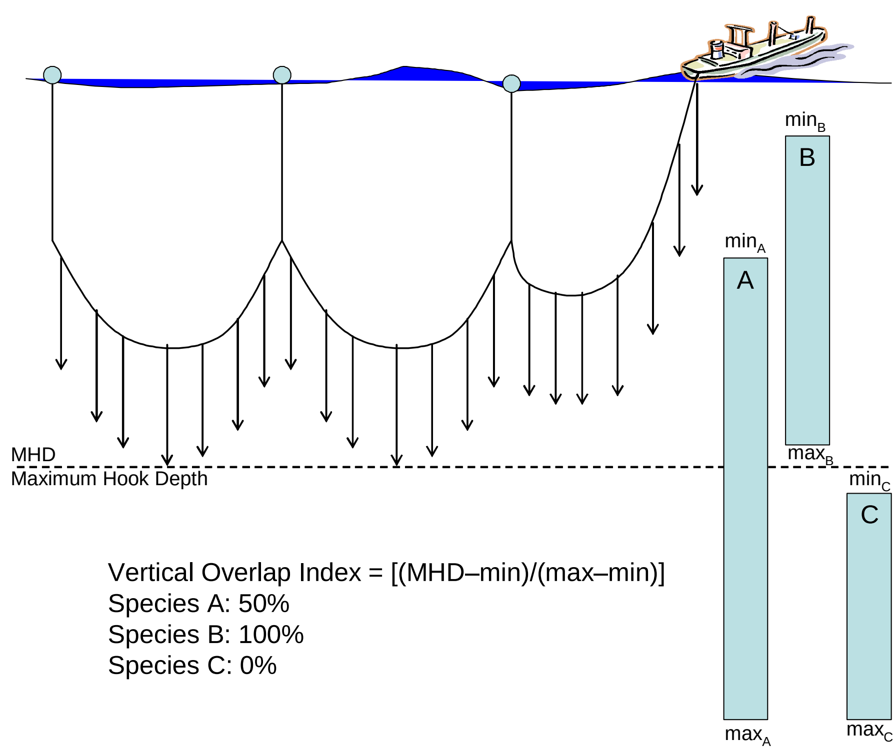

Fig. 1. Sketch to illustrate how the Vertical Overlap Index is calculated from the minimum and maximum depths defining the species' depth range and the maximum hook depth for shallow and deep longline

4. Indicators for Susceptibility

PSA 1: all species, age-based

Exposure: Vertical Overlap Index
Sensitivity: Condition × Retained*

PSA 2: fish (bony fish & sharks, rays, dogfish), length- and age-based

Exposure: Vertical Overlap Index
Sensitivity: Condition × Retained*
Length-at-capture / maximum length; L_{LL}/L_{max}

PSA 3: Species of special interest (birds, mammals, turtles, sharks), age-based plus reproductive output

Exposure: Vertical Overlap Index
Sensitivity: Condition × Retained*

5. Indicators for Productivity

PSA 1: all species, age-based

Reproductive strategy (1–5: 1: teleosts; 2: sharks; 3: turtles; 4: birds; 5: mammals)
Age-at-maturity / Maximum age; A_{mat} / A_{max}
Maximum age; A_{max}

PSA 2: fish (bony fish & sharks, rays, dogfish), length- and age-based

Natural mortality, M
Von Bertalanffy growth coefficient; k
Von Bertalanffy length-at-infinity; L_{inf}
Age-at-maturity / Maximum age; A_{mat} / A_{max}

PSA 3: Species of special interest (birds, mammals, turtles, sharks), age-based plus reproductive output

Age-at-maturity / Maximum age; A_{mat} / A_{max}
Maximum age; A_{max}
Litter size × Reproductive frequency (yr^{-1})

*including those categorised by observers as "DFR: discarded, fins removed"

6. Substitution of parameters

The database available for this analysis includes 73 attributes for 233 species. Many of these attributes are minimum, maximum and average values that are sexually disaggregated, so potentially 6 measurements of the same parameter for each species. Of course, not all these values are known, so we aggregated the anlaysis for the two sexes and used all the parameter values to derive a single value for each attribute for each species. Even this was not sufficient to obtain parameter values for every species, so average values were calculated for species groups (Table 1) and substituted for a number of species (Table 2). The sex aggregation and parameter substitution are necessary in order to include as many species as possible, which is the general aim of the Level 2 PSA. It must therefore be noted that there is an inherent trade-off between accuracy and precision in these analyses, and that for any finer scale analysis by area/fishery/sex it will be necessary to substitute average parameters for those that are area/fishery/sex specific but so far unquantified. Life history parameters may be largely independent of the area/fishery, though they can vary by sex, but length-at-capture, vertical/horizontal overlap index, condition and fate will vary by area/fishery and this variability may not be well described. Further work will attempt analyses at finer resolutions (including for individual CCMs) and identify the resolutions appropriate to the quality of the input data.

7. Results

Results are presented in Figs. 1–3 and Table 3. In the figures, risk scores are plotted along the two axes (*x*: productivity; *y*: susceptibility) such that the higher the score, the bigger the risk. Scores have been scaled on both axes such that the minimum value is zero and the maximum value is one. The assignment of risk categories HIGH, MEDIUM and LOW (Table 1) is such that MEDIUM encompasses all values in the range: mean±1SD, and HIGH and LOW risk categories are values above and below this range, respectively.

PSAs 1 & 2 flag albatrosses as HIGH risk in both deep and shallow longline fisheries, which serves as a bsaic sanity check for the method (although Shy Albatross (DCU) ranks MEDIUM for deep longline in PSA 3). Petrels tend to rank as HIGH risk in PSA 1 and

HIGH or MEDIUM risk in PSA 3. With such low productivity, being so long lived, being susceptible to both longline configurations at the surface, and being not able to survive hooking and immersion, it is no surprise that these species rank highly. What is missing in the method, however, is an index of horizontal overlap between species distributions and fishing effort, which in the case of albatrosses and petrels shows two things: firstly, that the degree of overlap is only a small percentage of the total fishery distribution, and secondly that this overlap is a significant proportion (41%) of the global breeding distribution (Birdlife Int 2006). Future PSAs need to incorporate both aspects, as the first aspect limits the generality of the results and the second may underestimate risk.

Turtles generally rank as HIGH risk in PSA 1 (relative to all species) and MEDIUM risk in PSA 2 (relative to other SSIs only). The exception is the leatherback turtle (LTB), which ranks as LOW and MEDIUM risk in PSA 1 and LOW risk in PSA 3; this apparently anomalous result, given the general concern about the population status of leatherbacks based on nesting beach surveys, is not actually surprising when the input data to the PSA are considered: leatherbacks have a lower age at maturity than other turtles; they occupy deeper habitat; and they are generally alive when caught and are subsequently discarded. This is a good example of how PSAs may identify relative risk posed by a particular fishery, rather than estimate population status or quantify the relative role of fishing in general compared to other sources of mortality.

Most of the rays rank as HIGH risk in PSA 2 if not in PSAs 1 or 3, where the other SSIs rank as higher risk. Several shark species rank as HIGH risk in PSA 1. They tend to be alive when caught (ca. 70%) though often their fins are retained and and only ca. 30% are discarded alive and intact. Despite scoring as HIGH risk on productivity, most of the sharks do not subsequently rank as HIGH risk in general in PSAs 2 & 3. In PSA 2 this is probably because sharks are generally caught as juveniles. Many of the species that do rank as HIGH risk in PSA 2 are teleosts that have the highest scores for susceptibility, being generally caught near their maximum size and not surviving the experience. Notable teleosts that ranks as HIGH risk in PSA 1 include blue marlin (BUM), frigate mackerel (FRI), longtail tuna (LOT), spanish mackerel (COM) and sailfish (SFA). In all PSAs, the principal market species of tuna – albacore (ALB), bigeye (BET), skipjack (SKJ) and yellowfin (YFT) – are scored as being at MEDIUM risk.

8. Sources of error and uncertainty

The first source of error and uncertainty is the database of biological parameters. These data were obtained from public domain databases such as *Fishbase* (www.fishbase.org), from the peer-reviewed and grey literature and from expert opinion. They therefore vary greatly in quality, in terms of sample sizes and sampling strategy more generally. It is not obvious whether different length metrics (total length, fork length) have been used consistently between the biological data and the observer data. Classifications by observers of CONDITION are largely subjective (here we have used both categories DEAD and DYING) and do not account for post-release mortality (i.e. of those classed as ALIVE). Species identification skill by observers is variable and may be poor, and we have not used data recorded for species groups, though this may actually be informative, e.g. in generating some of the average values used for substitution (Tables 1 & 2).

9. Conclusions

The PSAs generally capture what we would expect for the different species groups, and the formulation of the risk scores along each of the two axis (productivity, susceptibility) does lead to some obvious results in terms of the high risk experienced by long-lived, air-breathing species with low reproductive output. However, there are some surprises, such as for the leatherback turtle, and some obvious omissions, such as the horizontal habitat overlap with fishing effort, that serve to illustrate the limits of the analyses as presently formulated. The results should therefore be seen as indicative rather than conclusive. There is a need for closer screening of input parameters along both axes, finer scale analyses by area/fishery, and sensitivity analyses for some of the necessary assumptions. These aspects will all be addressed in the course of the ERA project, given the endorsement of the Scientific Committee and ongoing support of the WCPFC.

References

The database used for these analyses contains 816 references to primary sources and for obvious reasons these are not included here. The database itself will be made available on the WCPFC website so that the interested reader can look up the parameter values used here and check their sources. The following is a list of literature cited in this paper.

Bigelow KA (2005) Incorporation of other oceanographic factors into CPUE standardizations. Working Paper ME-WP2, 1st Regular Session of the WCPFC Scientific Committee, Nouméa.

Birdlife Int (2006) Distribution of albatrosses and petrels in the WCPFC Convention Area and overlap with WCPFC longline fishing effort. NGO Paper, 2nd Regular Session of the WCPFC Scientific Committee, Manila, 7 - 18 August 2006.

Hobday AJ, Smith A, Webb H, Daley R, Wayte S, Bulman C, Dowdney J, Williams A, Sporcic M, Dambacher J, Fuller M, Walker T (2006) Ecological risk assessment for the effects of fishing: methodology. Working Paper EB-WP14, 2nd Regular Session of the WCPFC Scientific Committee, Manila, 7 - 18 August 2006.

Kirby DS, Allain V, Molony B (2005) Potential ecosystem indicators for the WCPO. Working Paper EB-WP5, 1st Regular Session of the WCPFC Scientific Committee, Nouméa.

Kirby DS, Moloney B (2006) An ecological risk assessment for species caught in WCPO longline and purse seine fisheries. Working Paper EB-WP1, 2nd Regular Session of the WCPFC Scientific Committee, Manila, 7 - 18 August 2006.

Langley A, Williams P, Hampton J (2006) The Western and Central Pacific tuna fishery: 2005 overview and status of stocks. Tuna Fisheries Assessment Report No. 7, Secretariat of the Pacific Community, Nouméa

Maunder MN, Hinton MG, Bigelow KA, Langley AD (2006) Developing indices of abundance using habitat data in a statistical framework. Bulletin of Marine Science 79:545–559

Molony B (2005) Estimates of the mortality of non-target species with an initial focus on seabirds, turtles and sharks. Working Paper EB-WP1, 1st Regular Session of the WCPFC Scientific Committee, Nouméa.

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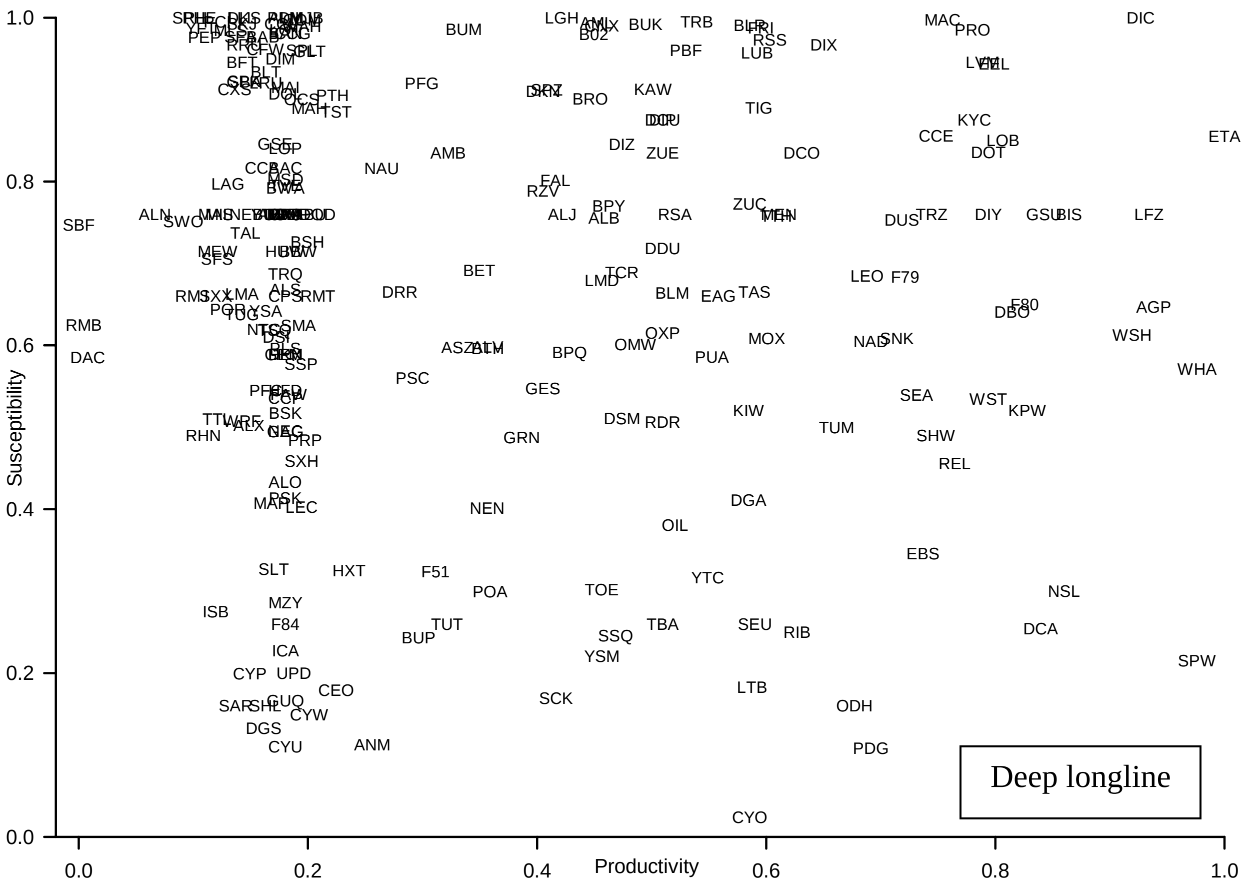
Table 1. Average values for species groups used when species-specific parameters were not available

	Bony fish	Sharks, Rays & Dogfish	Mammals	Birds	Turtles
LIFE SPAN: (A_{max}, YRS)	15	30	34	40	66
AGE AT MATURITY: (A_{mat}, YRS)	4	14	10	7	26
AGE RATIO: (A_{mat}/A_{max})	0.27	0.46	0.30	0.17	0.39
CONDITION: (*%DEAD*)	0.52	0.32	Dolphins: 0.67 Whales: 0.43	1.00	0.21
FATE: (*%RETAINED*)	0.31	0.70	1.00	0.00	0.95
LONGLINE LENGTH / MAXIMUM LENGTH (L_{LL} / L_{max})	0.75	Sharks: 0.50 Rays: 0.68 Dogfish: 0.71	NA	NA	NA
NATURAL MORTALITY: (*M*)	0.61	Sharks & Rays: 0.19 Dogfish: 0.09	NA	NA	NA
GROWTH COEFFICIENT k	0.52	Sharks: 0.17 Rays: 0.13 Dogfish: 0.08	NA	NA	NA
LENGTH AT INFINITY L_{INF}, cm	116	Sharks: 325 Rays: 83 Dogfish: 110	NA	NA	NA
LITTER SIZE	NA	Sharks: 21 Dogfish: 11	1	1	100
REPRODUCTIVE FREQUENCY (YR^{-1})	NA	0.65	0.25	Petrels: 1 Albatrosses: 0.75	2.2

Table 2. Number of species for which average parameter values were used.
Cap: where length-at-capture is greater than maximum recorded length in the database, the ratio was capped at 1.0

Total N=233	Bony fish N=133	Sharks, Rays & Dogfish N=58	Mammals N=16	Birds N=19	Turtles N=6
A_{max}	33	13	1	1	1
A_{mat}/A_{max}	41	8	0	0	1
%DEAD	36	16	0	0	1
%RETAINED	2	4	0	0	0
L_{LL} / L_{max}	Cap: 46 Avg: 37	Cap: 7 Avg: 15	NA	NA	NA
M	45	20	NA	NA	NA
k	28	13	NA	NA	NA
L_{INF}	25	16	NA	NA	NA
LITTER SIZE	NA	8	0	0	0
FREQUENCY	NA	34	5	2	1

Fig. 1. PSA 1: all species **Susceptibility: vertical overlap index, condition × fate**
Productivity: A_{mat}/A_{max}, A_{max}, reproductive strategy



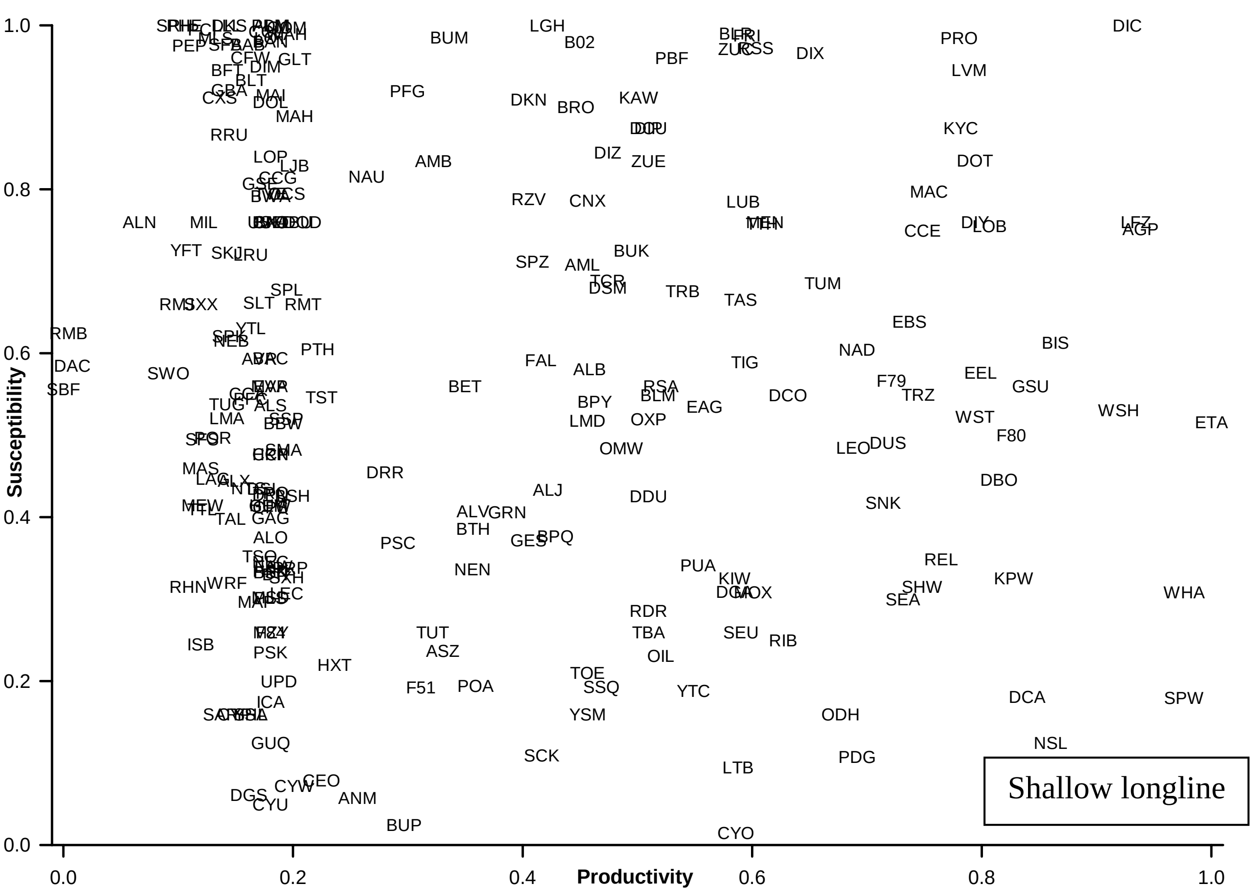


Fig. 2. PSA 2: all fish species **Susceptibility: vertical overlap index, condition × fate, L_{LL}/L_{max}**
Productivity: A_{mat}/A_{max}, M, k, L_{inf}

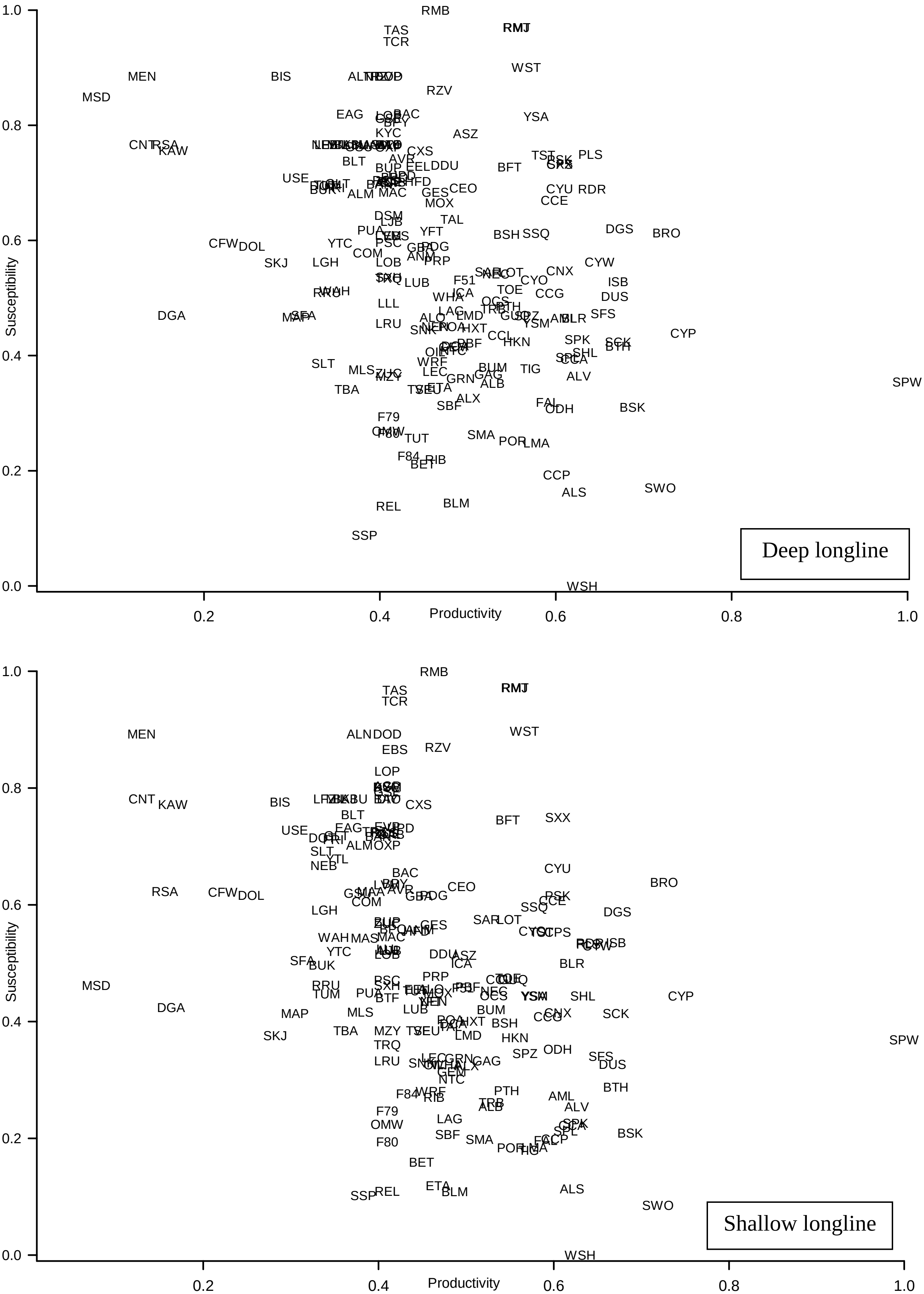
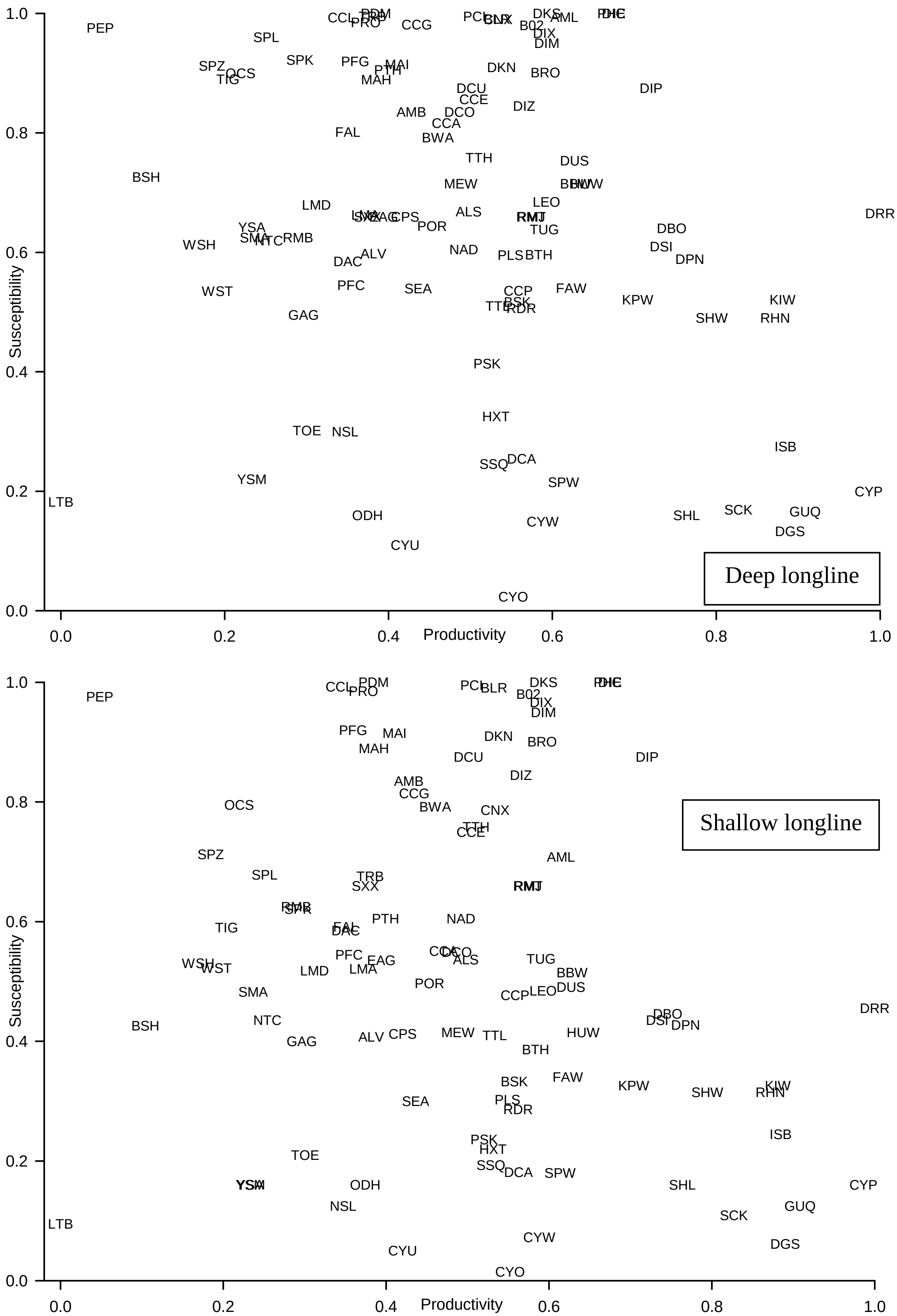


Fig. 3. PSA 3: sharks & rays, birds, mammals, reptiles
Susceptibility: vertical overlap index, condition × fate
Productivity: A_{mat}/A_{max}, A_{max}, annual reproductive output



					PSA 1					PSA 2					PSA 3		
CODE	SCIENTIFIC_NAME	COMMON_NAME	DEEP_SUSC	SHALLOW_SUSC	PRODUCTIVITY	**DEEP_RISK**	**SHALLOW_RISK**	DEEP_SUSC	SHALLOW_SUSC	PRODUCTIVITY	**DEEP_RISK**	**SHALLOW_RISK**	DEEP_SUSC	SHALLOW_SUSC	PRODUCTIVITY	**DEEP_RISK**	**SHALLOW_RISK**
ABU	*Abudefduf saxatilis*	SARGENT MAJOR	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**					
AGP	*Agrostichthys parkeri*	RIBBON FISH	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**HIGH**					
ALB	*Thunnus alalunga*	Albacore	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**					
ALJ	*Allomycterus jaculiferus*	PORCUPINE FISH	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
ALM	*Aluterus monoceros*	unicorn leatherjacket	HIGH	HIGH	MEDIUM	**MEDIUM**	**HIGH**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
ALN	*Aluterus scriptus*	FILEFISH (SCRIBBLED LEATHERJACKET)	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**					
ALO	*Alepisaurus brevirostris*	Short-nosed Lancet Fish	MEDIUM	MEDIUM	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
ALS	*Carcharhinus albimarginatus*	Silvertip Shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	HIGH	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
ALV	*Alopias vulpinus*	Thintail Thresher Shark, thresher shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	HIGH	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
ALX	*Alepisaurus ferox*	Long-nosed lancet fish	MEDIUM	MEDIUM	MEDIUM	**LOW**	**MEDIUM**	LOW	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
AMB	*Lagenorhynchus obscurus*	Dusky Dolphin	MEDIUM	MEDIUM	HIGH	**HIGH**	**HIGH**						MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**
AML	*Carcharhinus amblyrhynchos*	Grey Reef Shark	HIGH	MEDIUM	MEDIUM	**HIGH**	**MEDIUM**	MEDIUM	LOW	HIGH	**MEDIUM**	**MEDIUM**	HIGH	MEDIUM	MEDIUM	**HIGH**	**MEDIUM**
ANM	*Nemichthys scolopaceus*	SLENDER SNIPE EEL	LOW	LOW	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
ASZ	*Assurger anzac*	RAZORBACK SCABBARDFISH	MEDIUM	LOW	MEDIUM	**MEDIUM**	**LOW**	HIGH	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
AVR	*Aprion virescens*	Green Jobfish	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
B02	*Thalassarche impavida*	Campbell Albatross	HIGH	HIGH	HIGH	**HIGH**	**HIGH**						HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**
BAB	*Sphyraena qenie*	Blackfin barracuda	HIGH	HIGH	MEDIUM	**MEDIUM**	**HIGH**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**					
BAC	*Sphyraena jello*	Slender Barracuda	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	HIGH	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
BAN	*Sphyraena putnamae*	chevron barracuda	HIGH	HIGH	MEDIUM	**MEDIUM**	**HIGH**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
BAO	*Platax teira*	round-faced batfish	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**					
BBW	*Mesoplodon densirostris*	Blainville's Beaked Whale	MEDIUM	MEDIUM	HIGH	**HIGH**	**HIGH**						MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
BET	*Thunnus obesus*	Bigeye Tuna	MEDIUM	MEDIUM	LOW	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**					
BFT	*Thunnus thynnus*	ATLANTIC BLUEFIN TUNA	HIGH	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**HIGH**					
BIS	*Selar crumenophthalmus*	[a trevally]	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	HIGH	HIGH	LOW	**MEDIUM**	**MEDIUM**					
BKJ	*Euthynnus lineatus*	BLACK SKIPJACK	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**					
BLM	*Makaira indica*	Black Marlin	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**					
BLR	*Carcharhinus melanopterus*	Blacktip Reef Shark	HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**	HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**
BLT	*Auxis rochei rochei*	BULLET TUNA	HIGH	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**					
BPQ	*Brama japonica*	PACIFIC POMFRET	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
BPY	*Pterycombus petersii*	PRICKLY FANFISH	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	HIGH	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
BRO	*Carcharhinus brachyurus*	Bronze Whaler	MEDIUM	HIGH	MEDIUM	**HIGH**	**HIGH**	MEDIUM	MEDIUM	HIGH	**HIGH**	**HIGH**	MEDIUM	HIGH	MEDIUM	**HIGH**	**HIGH**
BSH	*Prionace glauca*	Blue Shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	LOW	**MEDIUM**	**LOW**
BSK	*Cetorhinus maximus*	basking shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	HIGH	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
BTF	*Halieutaea maoria*	BATFISH	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
BTH	*Alopias superciliosus*	Bigeye thresher shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	LOW	HIGH	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
BUK	*Gasterochisma melampus*	Butterfly Mackerel	HIGH	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	LOW	**MEDIUM**	**MEDIUM**					
BUM	*Makaira mazara*	Blue Marlin	HIGH	HIGH	MEDIUM	**MEDIUM**	**HIGH**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
BUP	*Psenopsis anomala*	PACIFIC RUDDERFISH	LOW	LOW	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
BWA	*Procellaria parkinsoni*	Black Petrel; Parkinsons Petrel	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**HIGH**						MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
CCA	*Carcharhinus altimus*	Bignose Shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	LOW	HIGH	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
CCE	*Carcharhinus leucas*	Bull Shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
CCG	*Carcharhinus galapagensis*	GALAPAGOS SHARK	HIGH	MEDIUM	MEDIUM	**HIGH**	**MEDIUM**	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**	HIGH	MEDIUM	MEDIUM	**HIGH**	**MEDIUM**
CCL	*Carcharhinus limbatus*	Common Blacktip Shark	HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**
CCP	*Carcharhinus plumbeus*	Sandbar shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	HIGH	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
CEO	*Centrolophus niger*	Rudderfish	LOW	LOW	MEDIUM	**LOW**	**LOW**	LOW	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
CFW	*Coryphaena equiselis*	POMPANO DOLPHINFISH	HIGH	HIGH	LOW	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	LOW	**MEDIUM**	**MEDIUM**					
CNT	*Canthidermis maculatus*	Spotted Triggerfish	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	LOW	**MEDIUM**	**MEDIUM**					
CNX	*Nasolamia velox*	WHITENOSE SHARK	HIGH	MEDIUM	MEDIUM	**HIGH**	**MEDIUM**	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**	HIGH	MEDIUM	MEDIUM	**HIGH**	**MEDIUM**
COM	*Scomberomorus commerson*	Spanish Mackerel	HIGH	HIGH	LOW	**MEDIUM**	**HIGH**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
CPS	*Cephaloscyllium isabellum*	CARPET SHARK	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	HIGH	**HIGH**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
CXS	*Caranx sexfasciatus*	Great Trevally	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**					
CYO	*Centroscymnus coelolepis*	Portuguese dogfish	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**LOW**	**MEDIUM**
CYP	*Centroscymnus crepidater*	deepwater dogfish	LOW	LOW	HIGH	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**	LOW	LOW	HIGH	**MEDIUM**	**HIGH**
CYU	*Scymnodon plunketi*	PLUNKETS SHARK	LOW	LOW	MEDIUM	**LOW**	**MEDIUM**	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**HIGH**	LOW	LOW	MEDIUM	**LOW**	**LOW**
CYW	*Centroscymnus owstoni*	owston's dogfish	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**
DAC	*Daption capense*	Cape Petrel	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**						MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
DBO	*Tursiops truncatus*	Bottlenose Dolphin	MEDIUM	MEDIUM	HIGH	**HIGH**	**MEDIUM**						MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**
DCA	*Deania calcea*	Brier Shark	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**
DCO	*Delphinus delphis*	Common Dolphin	MEDIUM	MEDIUM	HIGH	**HIGH**	**MEDIUM**						MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
DCU	*Thalassarche cauta*	Shy Albatross	MEDIUM	HIGH	HIGH	**HIGH**	**HIGH**						MEDIUM	HIGH	MEDIUM	**MEDIUM**	**HIGH**
DDU	*Seriola dumerili*	Eye Streak Kingfish/ Amberjack	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
DGA	*Diogenichthys atlanticus*	DIOGENICHTHYS ATLANTICUS	LOW	MEDIUM	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM	LOW	**MEDIUM**	**MEDIUM**					
DGS	*Squalus acanthias*	white-spotted dogfish	LOW	LOW	HIGH	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**HIGH**	LOW	LOW	HIGH	**MEDIUM**	**MEDIUM**
DIC	*Thalassarche chrysostoma*	Grey headed Albatross	HIGH	HIGH	HIGH	**HIGH**	**HIGH**						HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**
DIM	*Thalassarche melanophrys*	Black browed Albatross	HIGH	HIGH	HIGH	**HIGH**	**HIGH**						HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**
DIP	*Diomedea epomophora*	Southern Royal Albatross	MEDIUM	HIGH	HIGH	**HIGH**	**HIGH**						MEDIUM	HIGH	HIGH	**HIGH**	**HIGH**
DIX	*Diomedea exulans*	Wandering Albatross	HIGH	HIGH	HIGH	**HIGH**	**HIGH**						HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**
DIY	*Diodon hystrix*	Spotted Porcupinefish	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**					
DIZ	*Phoebastria immutabilis*	Laysan Albatross	MEDIUM	HIGH	HIGH	**HIGH**	**HIGH**						MEDIUM	HIGH	MEDIUM	**MEDIUM**	**HIGH**
DKN	*Phoebastria nigripes*	Black footed Albatross	MEDIUM	HIGH	HIGH	**HIGH**	**HIGH**						MEDIUM	HIGH	MEDIUM	**HIGH**	**HIGH**
DKS	*Thalassarche salvini*	Salvin's Albatross	HIGH	HIGH	HIGH	**HIGH**	**HIGH**						HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**
DOD	*Clupanodon punctatus*	GIZZARD SHAD (KONOSHIRO)	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**					
DOL	*Coryphaena hippurus*	Dolphin Fish (mahi mahi)	MEDIUM	HIGH	LOW	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	LOW	**MEDIUM**	**MEDIUM**					
DOT	*Gymnosarda unicolor*	Dogtooth tuna	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	LOW	**MEDIUM**	**MEDIUM**					
DPN	*Stenella attenuata*	Spotted Dolphin	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**						MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**
DRR	*Grampus griseus*	Risso's Dolphin	MEDIUM	MEDIUM	HIGH	**HIGH**	**HIGH**						MEDIUM	MEDIUM	HIGH	**HIGH**	**HIGH**
DSI	*Stenella longirostris*	Long-snouted Spinner Dolphin	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**						MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**

					PSA 1					PSA 2					PSA 3		
CODE	SCIENTIFIC_NAME	COMMON_NAME	DEEP_SUSC	SHALLOW_SUSC	PRODUCTIVITY	**DEEP_RISK**	**SHALLOW_RISK**	DEEP_SUSC	SHALLOW_SUSC	PRODUCTIVITY	**DEEP_RISK**	**SHALLOW_RISK**	DEEP_SUSC	SHALLOW_SUSC	PRODUCTIVITY	**DEEP_RISK**	**SHALLOW_RISK**
DSM	*Desmodema polystictum*	DEALFISH (DESMODEMA POLYSTICTUM)	MEDIUM	MEDIUM	MEDIUM	**LOW**	**MEDIUM**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**HIGH**					
DUS	*Carcharhinus obscurus*	Dusky Shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
EAG	*Myliobatis tenuicaudatus*	EAGLE RAY	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	HIGH	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
EBS	*Eumegistus illustris*	BRILLIANT POMFRET	LOW	MEDIUM	MEDIUM	**LOW**	**MEDIUM**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**HIGH**					
EEL	*Epinephelus flavolimbatus*	YELLOWEDGE GROUPER	HIGH	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
ETA	*Etelis carbunculus*	Ruby snapper; Northwest Ruby Fish	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**					
EVP	*Evoxymetopon poeyi*	POEY'S SCABBARDFISH	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	HIGH	HIGH	MEDIUM	**HIGH**	**MEDIUM**					
F51	*Hyperoglyphe antarctica*	Blue Eye Trevalla	LOW	LOW	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
F79	*Trachipterus altivelis*	KING-OF-SALMON	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**					
F80	*Trachipterus fukuzakii*	TAPERTAIL RIBBONFISH	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**					
F84	*Alepocephalus australis*	SMALL SCALED BROWN SLICKHEAD	LOW	LOW	MEDIUM	**LOW**	**LOW**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**					
FAL	*Carcharhinus falciformis*	Silky Shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
FAW	*Pseudorca crassidens*	False Killer Whale	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**						MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
FRI	*Auxis thazard*	Frigate mackerel	HIGH	HIGH	MEDIUM	**MEDIUM**	**HIGH**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
GAG	*Galeorhinus galeus*	School Shark, Tope shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	LOW	**MEDIUM**	**LOW**
GBA	*Sphyraena barracuda*	Great Barracuda	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
GEM	*Rexea solandri*	Gemfish	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
GES	*Gempylus serpens*	Snake mackerel	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
GLT	*Gnathanodon speciosus*	Golden Trevally	HIGH	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
GRN	*Macruronus novaezelandiae*	Blue Grenadier	MEDIUM	MEDIUM	MEDIUM	**LOW**	**LOW**	LOW	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
GSE	*Grammistes sexlineatus*	Sixline Soapfish	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	HIGH	HIGH	MEDIUM	**MEDIUM**	**HIGH**					
GSU	*Pagrus auratus*	Snapper/Squirefish	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
GUQ	*Centrophorus squamosus*	nilson's deepsea dogfish	LOW	LOW	HIGH	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	HIGH	**MEDIUM**	**MEDIUM**
HFD	*Schedophilus maculatus*	PELAGIC BUTTERFISH	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
HKN	*Merluccius australis*	Southern Hake	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
HUW	*Megaptera novaeangliae*	Humpback Whale	MEDIUM	MEDIUM	HIGH	**HIGH**	**MEDIUM**						MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
HXT	*Heptranchias perlo*	sharpnose seven-gill shark	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**
ICA	*Icichthys australis*	Smooth driftfish	LOW	LOW	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
ISB	*Isistius brasiliensis*	cookie-cutter shark (cigar shark)	LOW	LOW	HIGH	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**	LOW	LOW	HIGH	**MEDIUM**	**MEDIUM**
KAW	*Euthynnus affinis*	Eastern Little Tuna/Mackerel tuna	MEDIUM	HIGH	LOW	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	LOW	**MEDIUM**	**MEDIUM**					
KIW	*Orcinus orca*	Killer Whale	MEDIUM	MEDIUM	HIGH	**HIGH**	**HIGH**						MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**
KPW	*Feresa attenuata*	Pygmy Killer Whale	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**	HIGH	HIGH	MEDIUM	**MEDIUM**	**HIGH**	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**
KYC	*Kyphosus cinerascens*	DRUMMER (BLUE CHUB)	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**										
LAG	*Lampris guttatus*	Spotted moonfish	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	LOW	MEDIUM	**MEDIUM**	**MEDIUM**					
LEC	*Lepidocybium flavobrunneum*	Escolar or Black Oil fish	LOW	MEDIUM	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
LEO	*Lepidochelys olivacea*	Olive Ridley turtle	MEDIUM	MEDIUM	HIGH	**HIGH**	**HIGH**						MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
LFZ	*Lagocephalus sceleratus*	giant toadfish	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**					
LGH	*Lagocephalus lagocephalus lagocephalus*	PELAGIC PUFFER	HIGH	HIGH	MEDIUM	**MEDIUM**	**HIGH**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
LJB	*Lutjanus bohar*	sea perch/snapper	HIGH	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
LLL	*Lophotus lacepede*	Crest Fish (J RTMP Obs)	HIGH	HIGH	MEDIUM	**MEDIUM**	**HIGH**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
LMA	*Isurus paucus*	Longfin Mako	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
LMD	*Lamna ditropis*	SALMON SHARK	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
LOB	*Lobotes surinamensis*	TRIPLE-TAIL	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
LOP	*Lophotus capellei*	CRESTFISH/UNICORNFISH	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	HIGH	HIGH	MEDIUM	**MEDIUM**	**HIGH**					
LOT	*Thunnus tonggol*	Long-tail tuna	HIGH	HIGH	MEDIUM	**MEDIUM**	**HIGH**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
LRU	*Luvarus imperialis*	luvar	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
LTB	*Dermochelys coriacea*	Leathery turtle	LOW	LOW	MEDIUM	**LOW**	**MEDIUM**						LOW	LOW	LOW	**LOW**	**LOW**
LUB	*Lutjanus sebae*	Red Emperor	HIGH	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
LVM	*Pristipomoides typus*	threadfin snapper;sharptooth snapper	HIGH	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
MAA	*Scomber australasicus*	Blue Mackerel	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
MAC	*Scomber scombrus*	Atlantic mackerel	HIGH	MEDIUM	LOW	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
MAH	*Macronectes halli*	Northern Giant-Petrel	MEDIUM	HIGH	HIGH	**HIGH**	**HIGH**						MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**
MAI	*Macronectes giganteus*	Southern Giant-Petrel	MEDIUM	HIGH	HIGH	**HIGH**	**HIGH**						MEDIUM	HIGH	MEDIUM	**MEDIUM**	**HIGH**
MAP	*Magnisudis prionosa*	barracudina	LOW	MEDIUM	LOW	**LOW**	**LOW**	MEDIUM	MEDIUM	LOW	**MEDIUM**	**MEDIUM**					
MAS	*Scomber japonicus*	SLIMY MACKEREL	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
MEN	*Melichthys niger*	BLACK TRIGGERFISH	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	HIGH	HIGH	LOW	**MEDIUM**	**HIGH**					
MEW	*Peponocephala electra*	Melon-headed Whale	MEDIUM	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**						MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
MIL	*Chanos chanos*	MILKFISH	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**					
MLS	*Tetrapturus audax*	Striped marlin	HIGH	HIGH	MEDIUM	**MEDIUM**	**HIGH**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
MOX	*Mola mola*	ocean sunfish	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
MSD	*Decapterus maruadsi*	AMBERSTRIP SCAD	MEDIUM	MEDIUM	LOW	**MEDIUM**	**LOW**	HIGH	MEDIUM	LOW	**MEDIUM**	**MEDIUM**					
MZY	*Melanonus zugmayeri*	ARROWTAIL	LOW	LOW	MEDIUM	**LOW**	**LOW**	LOW	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
NAD	*Natator depressus*	Flatback turtle	MEDIUM	MEDIUM	HIGH	**HIGH**	**HIGH**						MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**
NAU	*Naucrates ductor*	PILOT FISH	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	HIGH	LOW	**MEDIUM**	**MEDIUM**					
NEB	*Parapercis colias*	Blue Cod	MEDIUM	MEDIUM	LOW	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
NEC	*Pseudophycis bachus*	red cod	MEDIUM	MEDIUM	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
NEN	*Nesiarchus nasutus*	BLACK GEMFISH	LOW	MEDIUM	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
NSL	*Phocarctos hookeri*	Hooker's sea lion	LOW	LOW	HIGH	**MEDIUM**	**MEDIUM**						LOW	LOW	MEDIUM	**LOW**	**LOW**
NTC	*Notorynchus cepedianus*	Broadnose sevengill shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	LOW	**MEDIUM**	**MEDIUM**
OCS	*Carcharhinus longimanus*	Oceanic Whitetip Shark	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	LOW	**MEDIUM**	**MEDIUM**
ODH	*Odontaspis noronhai*	BIGEYE SAND SHARK	LOW	LOW	MEDIUM	**LOW**	**MEDIUM**	LOW	MEDIUM	HIGH	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**LOW**	**LOW**
OIL	*Ruvettus pretiosus*	Oilfish	LOW	LOW	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
OMW	*Omosudis lowii*	OMOSUDID	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	LOW	LOW	MEDIUM	**MEDIUM**	**MEDIUM**					
OXP	*Odax pullus*	BUTTERFISH / GREENBONE	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
PBF	*Thunnus orientalis*	Northern Bluefin Tuna	HIGH	HIGH	MEDIUM	**MEDIUM**	**MEDIUM**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
PCI	*Procellaria cinerea*	Grey petrel	HIGH	HIGH	HIGH	**HIGH**	**HIGH**						HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**
PDG	*Paradiplospinus gracilis*	snake mackerel/gemfish	LOW	LOW	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**	**MEDIUM**					
PDM	*Pterodroma macroptera*	Great-winged Petrel	HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**						HIGH	HIGH	MEDIUM	**HIGH**	**HIGH**

					PSA 1					PSA 2					PSA 3		
CODE	SCIENTIFIC_NAME	COMMON_NAME	DEEP_SUSC	SHALLOW_SUSC	PRODUCTIVITY	**DEEP_RISK**	**SHALLOW_RISK**	DEEP_SUSC	SHALLOW_SUSC	PRODUCTIVITY	**DEEP_RISK**	**SHALLOW_RISK**	DEEP_SUSC	SHALLOW_SUSC	PRODUCTIVITY	**DEEP_RISK**	**SHALLOW_RISK**
PEP	*Pelamis platurus*	yellow-bellied seasnake	HIGH	HIGH	MEDIUM	MEDIUM	HIGH						HIGH	HIGH	LOW	MEDIUM	HIGH
PFC	*Puffinus carneipes*	Flesh-footed Shearwater	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM						MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
PFG	*Puffinus griseus*	Sooty Shearwater	MEDIUM	HIGH	MEDIUM	HIGH	HIGH						HIGH	HIGH	MEDIUM	MEDIUM	HIGH
PHE	*Phoebetria palpebrata*	Light-mantled Albatross	HIGH	HIGH	HIGH	HIGH	HIGH						HIGH	HIGH	MEDIUM	HIGH	HIGH
PLS	*Dasyatis violacea*	Pelagic Stingray	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
POA	*Brama brama*	Ray's Bream	LOW	LOW	MEDIUM	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
POR	*Lamna nasus*	Porbeagle shark	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
PRO	*Procellaria aequinoctialis*	White-chinned Petrel	HIGH	HIGH	MEDIUM	HIGH	HIGH				LOW	LOW	HIGH	HIGH	MEDIUM	HIGH	HIGH
PRP	*Promethichthys prometheus*	ROUDI ESCOLAR	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
PSC	*Psenes cyanophrys*	MAN-O-WAR FISH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
PSK	*Pseudocarcharias kamoharai*	Crocodile Shark	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM
PTH	*Alopias pelagicus*	Pelagic Thresher	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
PUA	*Sphoeroides pachygaster*	balloonfish	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
RDR	*Dasyatis brevicaudata*	smooth stingray	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
REL	*Regalecus glesne*	oarfish ("king of herrings")	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	LOW	LOW	MEDIUM	MEDIUM	MEDIUM					
RHN	*Physeter macrocephalus*	SPERM WHALE	MEDIUM	MEDIUM	HIGH	HIGH	HIGH	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM
RIB	*Mora moro*	Ribaldo	LOW	LOW	LOW	LOW	LOW										
RMB	*Manta birostris*	Manta Ray	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM	HIGH	HIGH	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM
RMJ	*Mobula japanica*	MANTA RAY	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM	HIGH	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
RMT	*Mobula tarapacana*	CHILEAN DEVIL RAY	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM	HIGH	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
RRU	*Elagatis bipinnulata*	rainbow runner	HIGH	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
RSA	*Decapterus macarellus*	MACKEREL SCAD / SABA	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM					
RSS	*Rhabdosargus sarba*	Bream Silver/Tarwhine	HIGH	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM	HIGH	MEDIUM	MEDIUM	MEDIUM					
RZV	*Ranzania laevis*	SLENDER SUNFISH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM	HIGH	HIGH					
SAR	*Sarotherodon galilaeus galilaeus*	SAROTHERODON GALILAEUS	LOW	LOW	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
SBF	*Thunnus maccoyii*	Southern Bluefin Tuna	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	MEDIUM	MEDIUM	MEDIUM					
SCK	*Dalatias licha*	Black Shark	LOW	LOW	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	LOW	LOW	HIGH	MEDIUM	MEDIUM
SEA	*Arctocephalus forsteri*	New Zealand Fur-seal	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM						MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
SEU	*Seriolella caerulea*	White Trevalla	LOW	LOW	MEDIUM	LOW	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
SFA	*Istiophorus platypterus*	Sailfish	HIGH	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM					
SFS	*Lepidopus caudatus*	Southern Frostfish	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM					
SHL	*Etmopterus baxteri*	rough deep-sea shark	LOW	LOW	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	LOW	LOW	HIGH	MEDIUM	MEDIUM
SHW	*Globicephala macrorhynchus*	Short-finned Pilot Whale	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM						MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM
SKJ	*Katsuwonus pelamis*	Skipjack Tuna	HIGH	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM					
SLT	*Allothunnus fallai*	Slender Tuna	LOW	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM					
SMA	*Isurus oxyrinchus*	Shortfinned Mako or Blue Pointer	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM
SNK	*Thyrsites atun*	Barracouta	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
SPK	*Sphyrna mokarran*	Great Hammerhead	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM	LOW	MEDIUM	MEDIUM
SPL	*Sphyrna lewini*	Scalloped Hammerhead	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	LOW	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM	LOW	MEDIUM	MEDIUM
SPW	*Rhincodon typus*	whale shark	LOW	LOW	HIGH	MEDIUM	MEDIUM	LOW	MEDIUM	HIGH	HIGH	HIGH	LOW	LOW	MEDIUM	MEDIUM	MEDIUM
SPZ	*Sphyrna zygaena*	smooth hammerhead	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM
SRH	*Spratelloides gracilis*	SILVER SPRAT / SILVER-STRIPPED ROUND HERRING	HIGH	HIGH	MEDIUM	MEDIUM	HIGH										
SSP	*Tetrapturus angustirostris*	Short Bill Spearfish	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	MEDIUM	MEDIUM	MEDIUM					
SSQ	*Scymnodon squamulosus*	VELVET DOGFISH	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	MEDIUM	MEDIUM	MEDIUM
SWO	*Xiphias gladius*	Broad Billed Swordfish	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	HIGH	MEDIUM	MEDIUM					
SXH	*Scombrolabrax heterolepis*	BLACK MACKEREL	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
SXX	*Stegostoma fasciatum*	Zebra Shark	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	HIGH	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
TAL	*Taractichthys longipinnis*	Long finned Bream (pomfret)	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
TAS	*Taractes asper*	FLATHEAD POMFRET	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM	HIGH	HIGH					
TBA	*Trachinotus bailloni*	Black-Spotted Dart	LOW	LOW	MEDIUM	LOW	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
TCR	*Taractes rubescens*	DAGGER POMFRET	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM	HIGH	HIGH					
TIG	*Galeocerdo cuvier*	Tiger Shark	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM
TOE	*Torpedo fairchildi*	ELECTRIC RAY	LOW	LOW	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	MEDIUM	LOW	LOW
TRB	*Triaenodon obesus*	Whitetip Reef Shark	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM
TRQ	*Trachipterus trachypterus*	DEALFISH / RIBBON FISH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
TRZ	*Pseudocaranx dentex*	Silver Trevally	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM	HIGH	MEDIUM					
TSQ	*Nototodarus sloanii*	flying squid	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW				LOW	LOW					
TST	*Taractichthys steindachneri*	SICKLE POMFRET / MONCHONG	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	MEDIUM					
TTH	*Eretmochelys imbricata*	Hawksbill turtle	MEDIUM	MEDIUM	HIGH	HIGH	HIGH						MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
TTL	*Caretta caretta*	Loggerhead	MEDIUM	MEDIUM	HIGH	HIGH	HIGH						MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
TUG	*Chelonia mydas*	Green turtle	MEDIUM	MEDIUM	HIGH	HIGH	HIGH						MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
TUM	*Atule mate*	[a trevally]	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
TUT	*Tubbia tasmanica*	Rudderfish, Tasmanian rudderfish	LOW	LOW	MEDIUM	LOW	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
TVE	*Pteraclis velifera*	SPOTTED FANFISH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
UPD	*Pleuroscopus pseudodorsalis*	blue stargazer	LOW	LOW	MEDIUM	LOW	LOW	MEDIUM	HIGH	MEDIUM	MEDIUM	MEDIUM					
USE	*Uraspis secunda*	COTTONMOUTH JACK	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	LOW	MEDIUM	MEDIUM					
WAH	*Acanthocybium solandri*	Wahoo	HIGH	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
WHA	*Polyprion oxygeneios*	Hapuku	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
WRF	*Polyprion americanus*	Bass groper	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM					
WSH	*Carcharodon carcharias*	white shark	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM
WST	*Dasyatis akajei*	WHIP STINGRAY	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM	HIGH	HIGH	MEDIUM	MEDIUM	LOW	LOW	MEDIUM
YFT	*Thunnus albacares*	Yellowfin Tuna	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
YSA	*Scymnodalatias albicauda*	Sherwoods dogfish	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	LOW	LOW	MEDIUM	LOW
YSM	*Scymnodon macracanthus*	ROUGHSKIN DOGFISH	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	LOW	LOW	LOW
YTC	*Seriola lalandi*	Yellowtail Kingfish	LOW	LOW	MEDIUM	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
YTL	*Seriola Rivoliana*	Almaco jack	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
ZUC	*Zu cristatus*	SCALLOPED RIBBONFISH	MEDIUM	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM					
ZUE	*Zu elongatus*	DEALFISH (SCALLOPED)	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	MEDIUM					

Fig. 4. Spatial distribution of (a) longline and (b) observer effort, and encounters with (c) sharks, (d) marine mammals, (e) birds, and (f) turtles, for the period 2002-2006

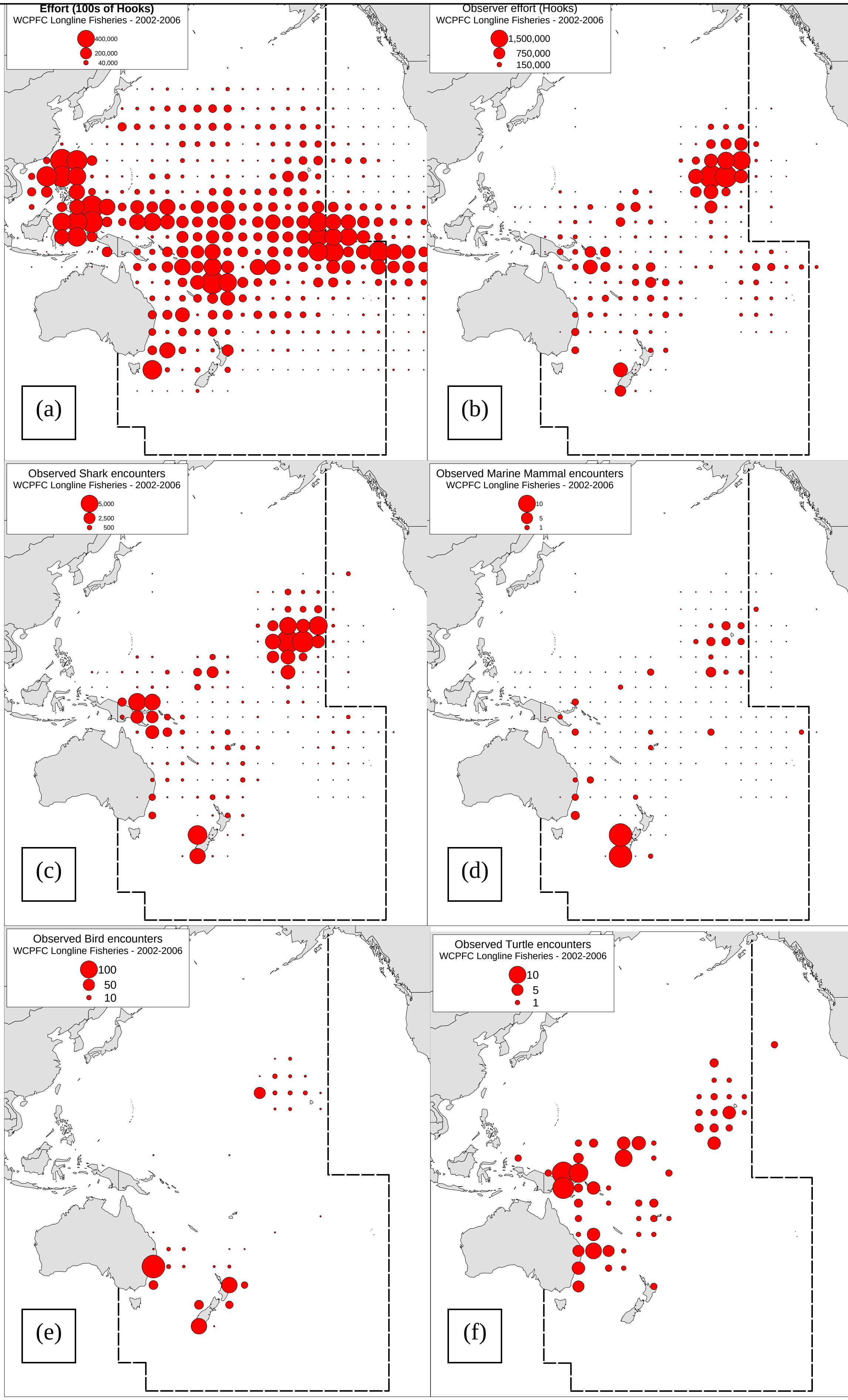


Fig. 5. Proportion of purse seine catch by species / species group and set type. (a) unassociated sets, (b) log sets, (c) drifting FADs, (d) anchored FADs