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ECOLOGICAL RISK ASSESSMENT (ERA) PROGRESS REPORT (2007/8) & WORK PLAN (2008/9)

WCPFC-SC4-2008/EBSWG-WP-1

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ABSTRACT: A 3 year (2008-2010) Ecological Risk Assessment (ERA) Research Plan was approved by SC3 in August 2007 and by WCPFC4 in December 2007. This now allows work to proceed from one SC meeting to the next with funding from WCPFC for one fulltime-equivalent research scientist position at SPC-OFP for the duration of the plan period. Additional funding has also been received from the French Pacific Fund, the Japan Trust Fund and Papua New Guinea for activities including travel, training and integration of national and regional analyses. The ERA Research Plan has the following HIGH-LEVEL OUTCOME: Identification of highly migratory species and associated / dependent species that are at relatively high risk of adverse effects due to fishing, for consideration by the SC in terms of further research or management responses. In pursuit of that outcome, the following RESEARCH OUTPUTS were identified in the Research Plan: (1) Enhanced Productivity-Susceptibility Analyses (PSAs) that are comparable, transferable and for which uncertainty has been quantified; (2) Identification of highly migratory species, or associated / dependent species at high apparent risk that can be assessed using existing data and models; (3) Identification of data requirements, through fisheries monitoring or bio/ecological research, in order for other high-risk species to be assessed; (4) Scientific support for SIDS in implementing ERA/EAFM at the national level, as requested by countries/territories and in collaboration with FFA. Since SC3, national analyses have been carried out under Output (4) for Nauru, Federated States of Micronesia and Kiribati. Collaborative analyses have also been carried out with/by colleagues in New Zealand and USA (Hawaii) under Output (1), including analyses of spatial overlaps of seabirds and fishing effort in the New Zealand EEZ. Discussions have taken place but no activities have been carried out under Outputs (2) & (3) during 2007/8. In addition to activities carried out under the ERA Research Plan, SPC-OFP held a two-day ERA Training Workshop for 25 colleagues from Pacific Island countries and territories in June. We have also participated in an intiative in collaboration with FFA and SPREP to develop a Regional Plan of Action (RPOA) on Sharks. Trends in catches and catch rates for non-target highly migratory fish species have been estimated and a database on bycatch biological characteristics and bycatch mitigation methods has been developed. For the period 2008/9 (i.e. from SC4 to SC5) national scale analyses are planned for Papua New Guinea, Samoa, Marshall Islands, New Caledonia and French Polynesia. In further collaboration with New Zealand it is planned to extend the seabird ERA work into high seas areas. Through further work under Output (1) we plan to identify key shark species at high apparent risk from fishing, and to investigate whether such species are amenable to stock assessment under Output (2); if they are not we will proceed to consider them under Output (3). These activities will feed into the WCPFC Shark Research Programme. We also propose to carry out several turtle bycatch mitigation projects in collaboration with FFA and certain CCMs.

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The Contracting Parties to this Convention…

Mindful that effective conservation and management measures require the application of the **precautionary approach** and the **best scientific information available**,

Conscious of the need to avoid adverse impacts on the marine environment, preserve biodiversity, maintain integrity of marine ecosystems and **minimize the risk** of long-term or irreversible effects of fishing operations,

Article 2
Objective

The objective of this Convention is to ensure, through effective management, the **long-term conservation and sustainable use** of highly migratory fish stocks in the western and central Pacific Ocean in accordance with the 1982 [UN] Convention [on the Law of the Sea] and the [1995 UN Fish Stocks] Agreement.

Article 3
Area of application

3. This Convention applies to **all stocks of highly migratory fish** within the Convention Area except sauries.

Article 5
Principles and measures for conservation and management

(d) **assess the impacts of fishing**… **on target stocks, non-target species, and species belonging to the same ecosystem or dependent upon or associated with the target stocks**;

(e) **adopt measures to minimize** waste, discards… **catch of non-target species**… and **impacts on associated or dependent species, in particular endangered species**...

(f) **protect biodiversity** in the marine environment;

…

Article 10
Functions of the Commission

(a) determine total allowable catch or total level of fishing effort … **for such highly migratory fish stocks as the commission may decide** and adopt such other conservation and management measures … as may be necessary to ensure the long-term sustainability of such stocks;

(c) adopt conservation and management measures … for nontarget species and species dependent on or associated with the target stocks, with a view to **maintaining or restoring populations above levels at which reproduction may be seriously threatened**

Box 1. Verbatim extracts from the 'Convention On The Conservation And Management Of Highly Migratory Fish Stocks In The Western And Central Pacific Ocean', signed in Honolulu in 2000, hereafter referred to **as 'the Convention'.**

1. Background

In August 2005 the 1st Regular Session of the WCPFC Scientific Committee (SC1) endorsed the recommendation (Molony 2005, Kirby et al. 2005) that Ecological Risk Assessment be carried out as a means to evaluate and prioritise bycatch issues in the WCPFC Convention Area. SPC-OFP then undertook a preliminary ERA (Kirby & Molony 2006) based on the Australian CSIRO/AFMA approach (Hobday et al. 2006). In August 2006 these results were presented to the 2nd Regular Session of the Scientific Committee (SC2). The SC2 final report recorded that:

> 187. The Scientific Committee endorsed the Ecological Risk Assessment exercise in general, and the PSA [Productivity-Susceptibility Analysis] in particular, as an appropriate way to assist the Commission in prioritizing species for management action or further research. There was agreement to further refine the PSA risk assessment approach and to encourage members to further develop this approach.
>
> 188. The Commission should develop a dedicated shark research programme to support stock assessment of shark species that rank highly in the Ecological Risk Assessment, in cooperation with other RFMOs. Alternative methods of analysis other than stock assessment should also be explored.
>
> 189. The Commission should develop long-term data collection, monitoring and research programmes dedicated to all species identified as higher risk in the productivity–susceptibility analysis.

In December 2006 the Commission accepted the SC2 report and approved its budget and work plan for 2007. The ERA work plan for 2007 included a workshop to prepare a 3 year ERA Research Plan for submission to SC3 in August 2007. If approved by WCPFC in December 2007 this would then allow the project to proceed from one SC to the next during the period of the plan (2008-1010) without any further delays and financial insecurity due to the lag between SC and WCPFC meetings.

An ERA Research Planning Workshop was convened by SPC-OFP and hosted by the US Western Pacific Regional Fisheries Management Council in Honolulu from 6 to 9 August 2007. The purpose of the workshop was to discuss and propose risk assessment methodologies for the WCPFC Convention Area and to consider the interface between ERA and traditional fisheries scientific methods such as stock

assessment. Development and application of ERA has implications for fisheries monitoring, in terms of logsheets and other data collection forms, levels of observer coverage, and allocation of observers to areas and fleets, and these issues were also discussed in the workshop. Participants from national agencies, international governmental organisations (IGOs), non-governmental organisations (NGOs) and universities were invited to attend on the basis of their technical competence and prior experience of ecological risk assessment. The Ecosystem and Bycatch Specialist Working Group (EBSWG) subsequently reviewed the workshop report and 2008–2010 ERA Research Plan (Kirby & Molony 2007). This was approved by SC3 in August 2007 and by WCPFC in December 2007. This paper therefore represents the first progress report and annual work plan under the 2008–2011 ERA Research Plan.

The ERA Research Plan has the following HIGH-LEVEL OUTCOME: "*Identification of highly migratory species and associated / dependent species that are at relatively high risk of adverse effects due to fishing, for consideration by the SC in terms of further research or management responses*."

The following RESEARCH OUTPUTS have been identified and approved:

(1) Enhanced Productivity-Susceptibility Analyses (PSAs) that are comparable, transferable and for which uncertainty has been quantified;

(2) Identification of highly migratory species, or associated / dependent species at high apparent risk that can be assessed using existing data and models;

(3) Identification of data requirements, through fisheries monitoring or bio/ecological research, in order for other high-risk species to be assessed;

(4) Scientific support for SIDS in implementing ERA/EAFM at the national level, as requested by countries/territories and in collaboration with FFA.

2. Context

A recent review by Beddington et al. (2007) in the journal Science entitled 'Current problems in the management of marine fisheries' recognised that 'Given the problems that most authorities have in deriving reliable quantitative assessments of their stocks of major commercial importance, the large numbers of small, commercially unimportant stocks present in most areas, usually as bycatch, cannot realistically be assessed.' They go on to state: 'Under a comprehensive ecosystem approach, risk assessment methodologies should be used to identify those bycatch species in need of special measures' citing the ERA work carried out by SPC-OFP for WCPFC (Kirby & Molony 2006).

A review of the performance of Regional Fisheries Management Organisations (RFMOs) was recently carried out by an expert panel under the auspices of the Royal Institute of International Affairs, at Chatham House, London, with the aim of defining best practice under a model RFMO (Lodge et al. 2007). The panel calls for 'risk-based impact assessment of the effect of fishing activities on non-target species, followed by explicit analytical assessments and/or action when risk is determined to be high'.

In supporting the ERA project the WCPFC is taking a strategic approach to its legal obligations to non-target highly migratory species and associated/dependent species, putting itself in a relatively good position by comparison with other RFMOs and indeed many national fisheries management bodies. As WCPFC CCMs carry out research activities on highly migratory fish stocks and associated/dependent species, the ERA project can serve as a link between members and between activities at national and regional scales. It can therefore develop, refine and promote best practice in risk-based analysis of fisheries impacts across the Convention Area.

3. National-scale activities

Output 4 of the ERA Research Plan (Scientific support for SIDS) recognises three important aspects of WCPO tuna fisheries. Firstly, that there is a requirement under the Convention for consistency among CCMs and with international waters, which extends to the provision and use of scientific advice for fisheries management; secondly that regional objectives may be at least partly achieved by national actions; and thirdly that there is a need for capacity building for those CCMs that are SIDS.

Many Pacific Island members of the Forum Fisheries Agency have been going through a process to implement an Ecosytem Approach to Fisheries Management (EAFM). This is essentially a qualitative framework for identification of fisheries management priorities, with stakeholders assigning risk scores for the 'likelihood' and 'consequence' of failing to meet defined objectives. Where those objectives relate to the sustainability of target species, SPC-OFP has been providing scientific advice on tuna stock status and the implications for particular countries of regional assessments. Endorsement of Output (4) by the SC enables SPC-OFP to also provide national-scale advice, through the EAFM process, on likely fisheries impacts on non-target species.

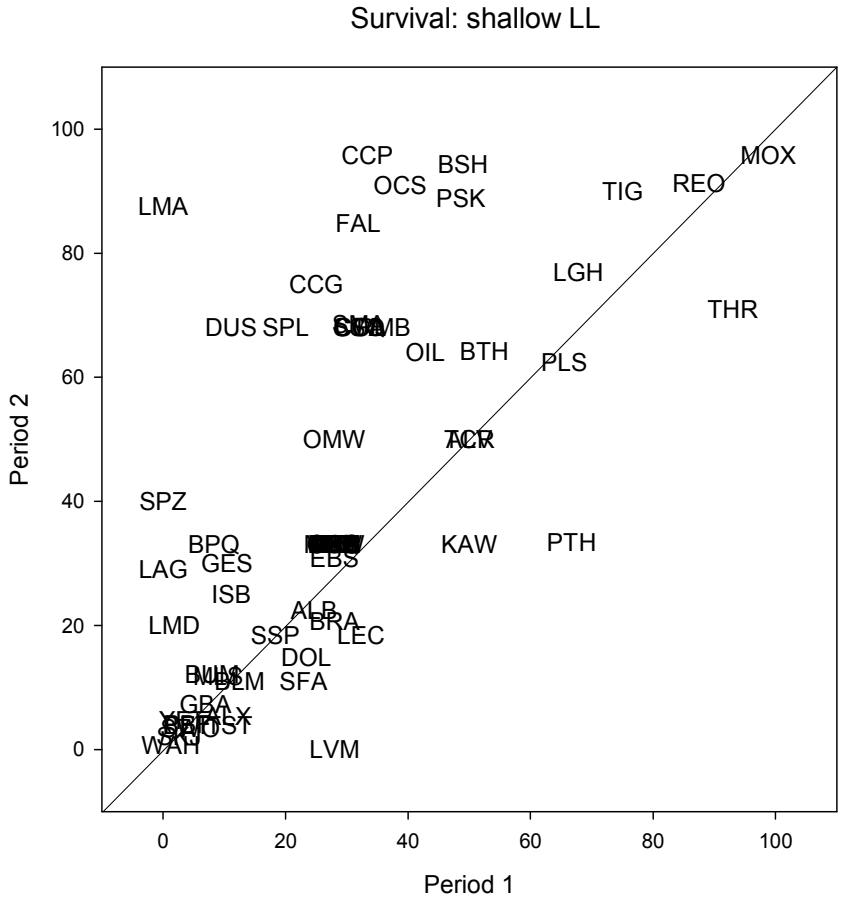
During the 2007/2008 year (i.e. between SC3 and SC4) national-scale ERA using productivity-susceptibility analyses (PSAs) were carried out for Nauru, Federated States of Micronesia and Kiribati. The results of these analyses will be presented to SC4 but are not included here; at this stage, while methods are under development and there has been no scaling of the results by fishing effort, it could be misleading to compare results from different national-scale analyses. As the project progresses, its methods become standardised and robust, as more countries are analysed and agreement is reached on the provision of observer data to WCPFC, comparisons among different national-scale analyses will become possible and will be encouraged.

For the 2008/2009 year, national-scale ERA is planned for Papua New Guinea, Samoa, Republic of the Marshall Islands, New Caledonia and French Polynesia.

Under Output 4, scientific support has also been extended to those CCMs that are not SIDS but for whom ERA is nonetheless a new and welcome concept. On the invitation of and with financial support from the US Western Pacific Regional Fishereis Management Council I attended and co-chaired with Paul Dalzell a workshop on applying ERA to fisheries under the Council's management. These include the Hawaii longline fisheries and both pelagic and demersal fisheries in American Samoa, Commonwealth of the Northern Mariana Islands, Hawaii and Guam. I subsequently worked with William Walsh and Keith Bigelow of NOAA Fisheries to refine an initial 'straw man' or illustrative productivity-susceptibility analysis (PSA) developed prior to the workshop. This collaboration enabled detailed analysis of the Hawaii longline observer data, in order to calulate total mortality by species (Walsh) and to better estimate the vulnerability of species to longline gear (Bigelow), both of which are components of the 'susceptibility' score. Scrutiny of the biological parameters used to calculate 'productivity' was also carried out by Hawaii-based experts to ensure that Pacific-based parameters are used as far as possible.

The Hawaii longline analysis was stratified by fleet (deep and shallow setting) and by time period, for the periods 1994-2001 and 2004-2007, before and after a 2001 ban on shark finning which has greatly increased survival of sharks caught in both fisheries, from ca. 40% to 80% (see Fig 1). Vulnerabilty of species to gear was not assumed to relate simply to vertical overlap between habitat and gear, as has been assumed in previous analyses. Rather, capture at hook number was converted to capture at depth, and catch rates were then modelled with depth and integrated over longline depth (see Figs. 2 & 3 and Bigelow et al. 2006).

Fig. 1. Survival of species caught before (Period) and after (Period 2) the shark finning ban in 2001



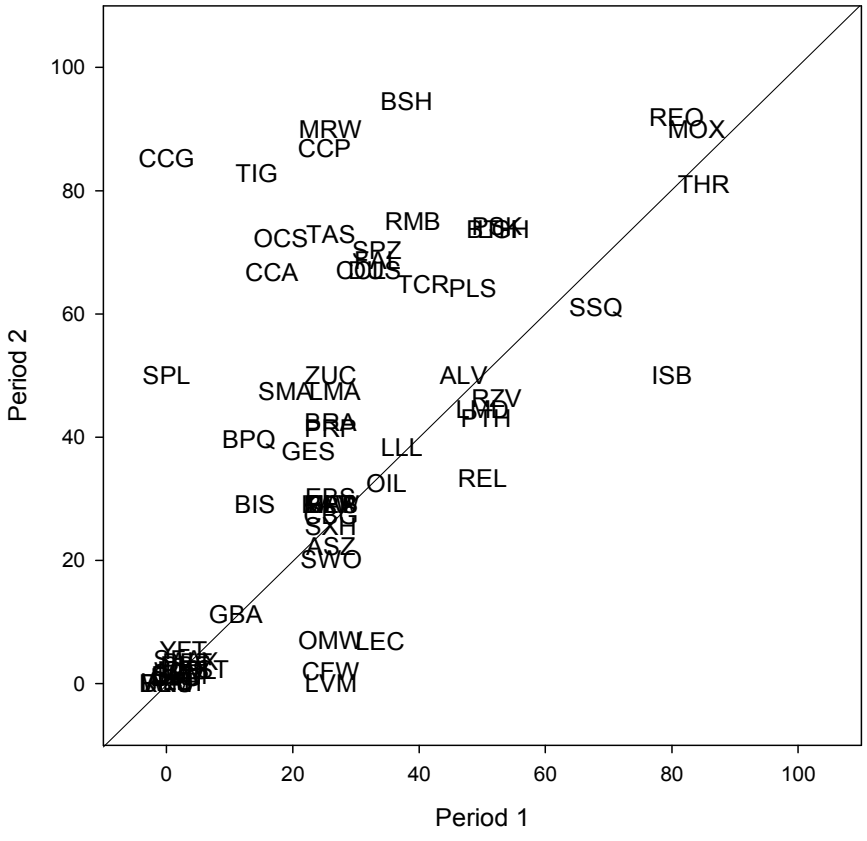


Fig. 2 Catch by depth for (left to right) striped marlin, blue shark, bigeye tuna

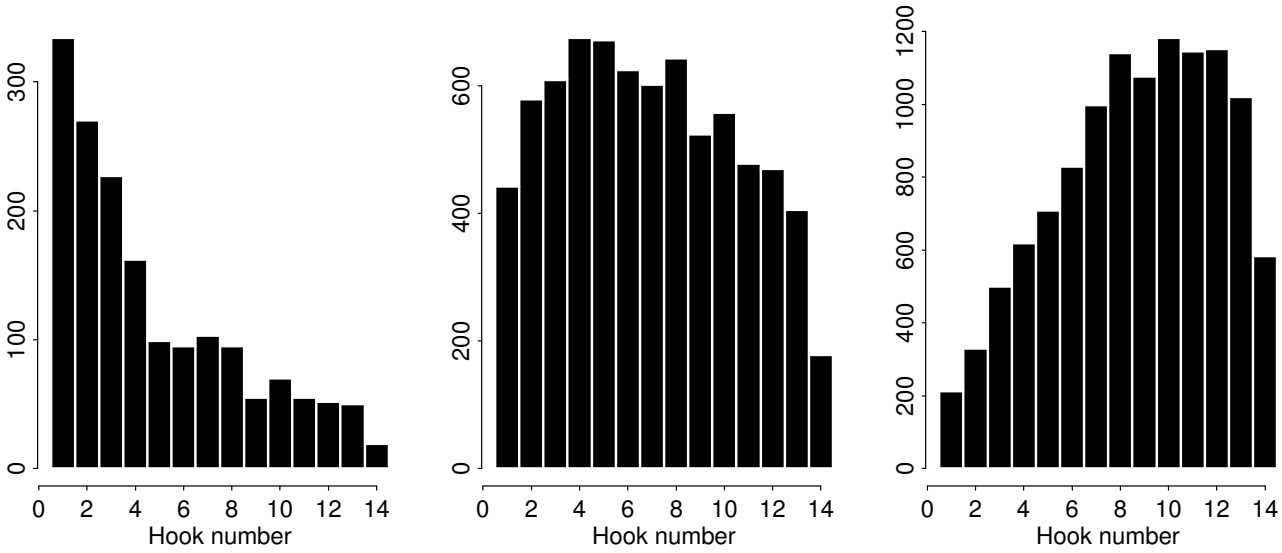
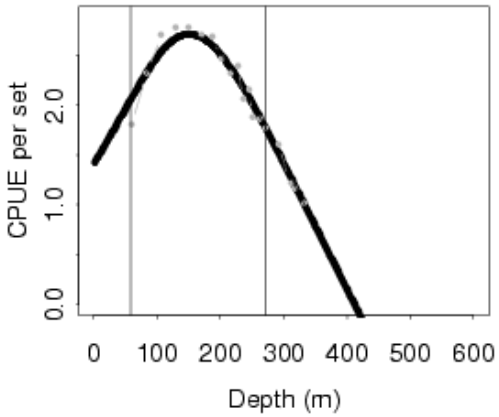
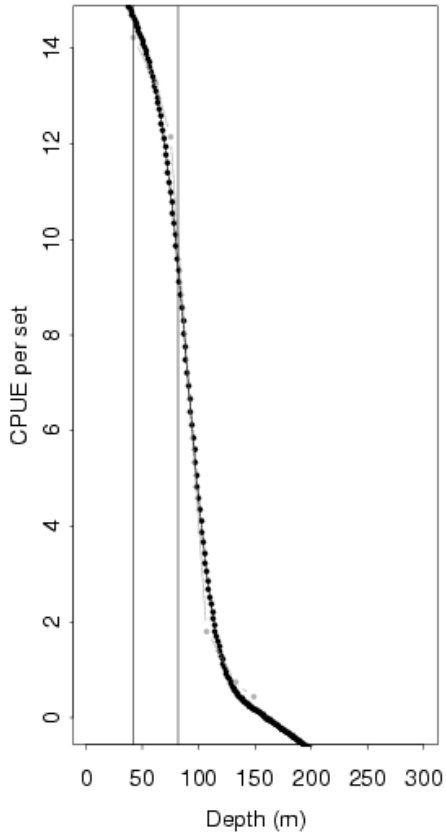


Fig. 3 Example vulnerability calculations for deep and shallow longline



Deep longline vulnerability=0.72



Shallow longline vulnerability = 0.37

Fig. 4. Estimated vulnerability for deep and shallow longline fisheries

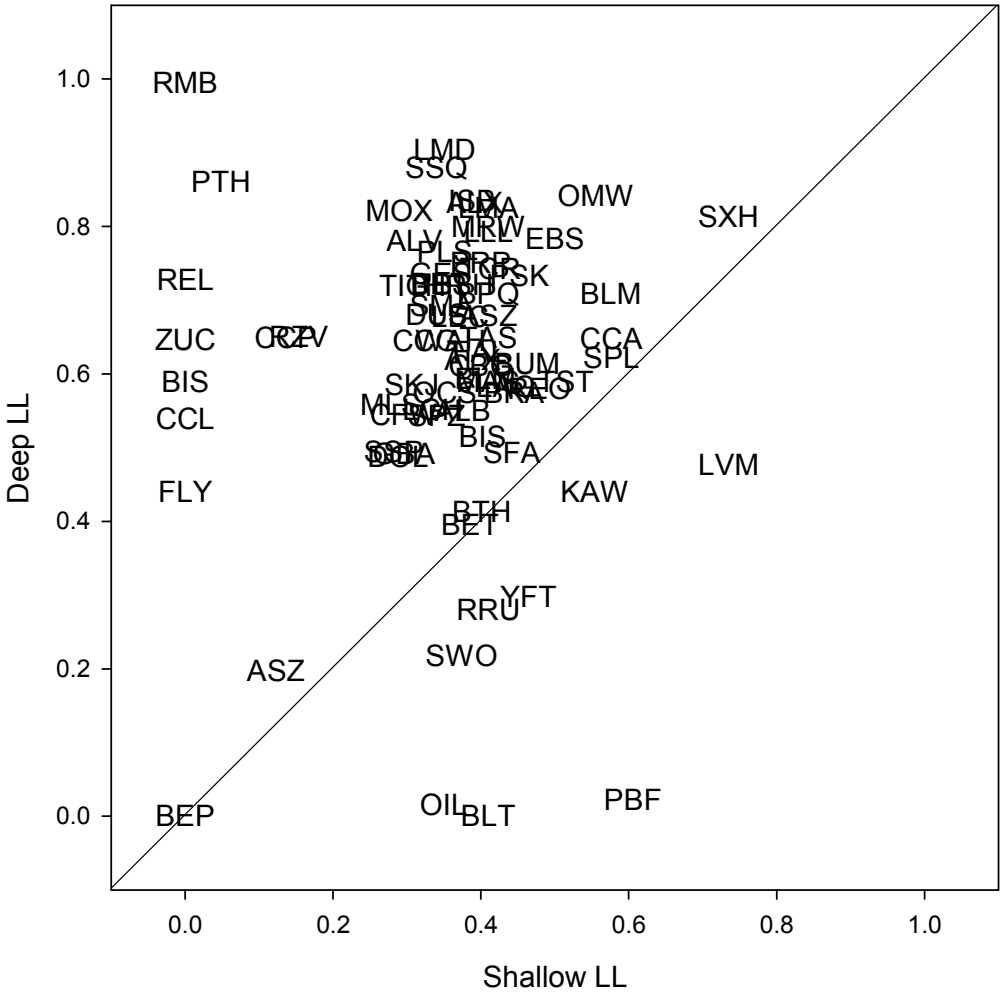


Fig 4 shows that vulnerability to deep longline is generally higher than to shallow longline. However, any comparison must also take into account the ca. 40:1 ratio in fishing effort (number of hooks) for deep:shallow longline fisheries (Keith Begelow pers. comm.). The results of these PSAs will be presented to SC4.

In addition to collaboration in national-scale analyses for SIDS and the Hawaii longline analysis described above, SPC-OFP collaborated in a national-scale analysis of spatial overlaps of seabirds with fishing effort in New Zealand waters. This is described in Waugh et al. (2008; EBWP2) and some aspects of that study will be presented and discussed at SC4.

4. Regional-scale activities

4.1 ERA training workshop

In July 2008 a 2-day training workshop was held at SPC headquarters in Nouméa. This was held in between the two Stock Assessment Workshops, so that participants could attend the ERA workshop and one or other of the stock assessment workshops. The workshop covered the background and context of ERA and how it is supposed to assist WCPFC CCMs to meet their obligations arising under the Convention. The workshop also reviewed the 2008-2011 ERA Research Plan. Finally, the participants worked through a productivity-susceptibility analysis (PSA) as a case study. Feedback from participants was positive: Pamela Maru of the Cook Islands, a participant in the workshops, said, 'This type of capacity building assists Pacific Island fisheries administrations by enhancing our understanding of the science used…to identify which species are more vulnerable to fishing activities.'

COUNTRY/AGENCY	Participant name
AMERICAN SAMOA	Nonu Tuisamoa
COOK ISLANDS	Pam Maru
FFA	Darren Cameron
FIJI	Jone Amoe
FRENCH POLYNESIA	Marie Yonger
FSM	Steve Retalmai
INDONESIA	Budi Iskandar Prisantoso
KIRIBATI	Aketa Tangaa
MARSHALL ISLANDS	Berry Muller
NAURU	Terry Amram
NEW CALEDONIA	Regis Etaix-Bonnin
NIUE	James Tafatu
PAPUA NEW GUINEA	Ludwig Kumoru
PAPUA NEW GUINEA	Luanah Koren
PHILIPPINES	Elaine Garvilles
SAMOA	Ueta Fa'asili
SAMOA	Roseti Imo
TOKELAU	Feleti Tulafono
TONGA	Tu'ikolongahau Halafihi (Hau)
TUVALU	Falasese Tupau
VANUATU	Tony Taleo
WALLIS & FUTUNA	Bruno Mugneret

Table 1. Participants at the ERA Training Workshop

4.2 Seabird spatial overlaps study

The ERA project originally included a separate budget line for activities to "identify areas of spatial and temporal overlap of seabird and sea turtle interactions with tuna fisheries, and (ii) estimate sea bird mortality, as requested under CMM 2006-02." This is no longer a separate budget line but the topic remains an important ongoing concern. SPC-OFP has previously advised SC that observer coverage needs to be very high to estimate statistically rare events, i.e. seabird/turtle catches & mortalities, with confidence. The seabird spatial overlaps study could be used to detemine where to concentrate observer coverage, on the assumption that 100% observer coverage across the Convention Area is unrealistic.

Under CMM-2007-04 there are further requirements that:

8. The intersessional working group for the regional observer programme (IWG-ROP) will take into account the need to obtain detailed information on seabird interactions to allow analysis of the effects of fisheries on seabirds and evaluation of the effectiveness of by-catch mitigation measures.

9. CCMs shall annually provide to the Commission, in part 1 of their annual reports, all available information on interactions with seabirds, including bycatches and details of species, to enable the SC to estimate seabird mortality in all fisheries to which the WCPF Convention applies.

SC4 should confirm the purpose of the seabird spatial overlaps study and discuss the extent to which the analyses presented by ACAP (EB-WP3) might be improved upon through collaboration among CCMs and with SPC-OFP. Subsequently, during the 2008/9 year, an informal workshop could be convened by those CCMs and WCPFC Observers most concerned with seabird interactions, particularly in waters south of 30 degrees south and north of 23 degrees north, with the purpose of identifying areas where observer coverage should be dedicated in order to derive mortality estimates. New Zealand have indicated that they would like to extend their national seabird spatial risk assessment into neighbouring high seas and SPC-OFP are available to collaborate with them and with other CCMs in this exercise.

4.3 Shark Research Programme

SC2 agreed to pursue a Shark Research Programme (SRP), which will be discussed in more detail at SC4. The ERA Project has several roles to play in the SRP. Under CMM-2006-05 the WCPFC resolved that 'Each CCM shall include key shark species, to be identified by the Scientific Committee, in their annual reporting to the Commission…' and that 'CCMs are encouraged to co-operate in the development of stock assessments for key shark species within the Convention Area.' Firstly, productivity-susceptibility analyses (PSAs) may be used to identify 'key shark species'. Secondly, in collaboration with CCMs, SPC-OFP would also be in a good position to determine the feasibility of stock assessments for sharks. Determining feasibility is already an agreed output of the ERA project [Output (2) Identification of highly migratory species…at high apparent risk that can be assessed using existing data and models; Output (3) Identification of data requirements…in order for other high-risk species to be assessed] and a general feasibility study on shark stock assessment doesn't require a prior decision as to which particular species to assess. SC4 should consider whether this might be an early research priority under the SRP. This would require extra resources if the present level of support for national-scale ERA for SIDS is to be maintained. Also, for the last few years catch estimates for non-target species have been provided to SC without being fully financed by WCPFC. The co-finance from the Global Environment Facility that has so far been used to fund that work is no longer available and additional funding is required in order to develop more robust estimates of catches and catch rates of sharks and other non-target species.

4.4 Pacific Islands Regional Plan of Action on Sharks (PI-RPOA Sharks)

SPC is involved in a regional initiative in partnership with SPREP, FFA, WCPFC and FAO, to develop a Pacific Islands Regional Plan of Action on Sharks (PI-RPOA Sharks). A PI-RPOA Sharks will provide a framework for the technical and science advisory activities of SPC-OFP to inform decision-making by FFA members and Pacific Island territories, building consensus and consistency with regard to the conservation and management of sharks in coastal and oceanic waters of the Pacific Islands. A funding application has been submitted to the United Nations Department for Ocean Affairs and the Law of the Sea (UNDOALOS) and a consultant will be contracted to provide the following direct outputs:

1) An overview of the management arrangements that WCPFC CCMs have implemented to conserve and manage shark stocks;

2) An analysis and overview of the catch and effort data on sharks in the region;

3) An overview of the threats facing shark stocks in the region (i.e. shark finning);

4) The identification of management arrangements and actions that can be applied by PICTs to address the conservation and management of shark stocks, with corresponding compliance, monitoring and research initiatives to support management arrangements; and

5) Guidance on how to apply information from the PI-RPOA Sharks at a national level to develop a national Shark Plan and/or management arrangements to conserve and manage shark stocks at a national level.

SPC-OFP wll provide assistance and guidance to the consultant as necessary, particularly with reference to the fisheries monitoring requirements necessary to better estimate the risks posed by fisheries to shark populations.

4.5 Evaluation of CMMs

The WCPFC CMMs on both sharks and seabirds (CMM-2006-05 and CMM-2007-04 respectively) presently apply only to vessels with overall length >24 m. In the shark CMM, "At the initial stage this Measure shall apply to vessels greater than 24 m overall length." In the seabird CMM, mitigation measures as detailed in the measure "…shall be implemented by CCMs in the following manner:

- In areas south of 30 degrees South, no later than 1 January 2008 in relation to large-scale longline vessels of 24 m or more in overall length, and no later than 31 January 2009 in relation to smaller longline vessels of less than 24 m in overall length.
- In areas north of 23 degrees North, and in relation to large-scale longline vessels of 24 m or more in overall length, no later than 30 June 2008."

A thorough analysis of the implications of these measures for catches of sharks and seabirds has not yet been undertaken. Nonetheless, there are some data available that give an indication of the efficacy of these measures, at least terms of the extent to which they cover the fleets and how catch rates differ by vessel length.

There are ca. 3500 longline vessels with length >14 m fishing in the Convention Area; only ca. 500 of these have an overall length >24 m (Gillet & McKoy 2006). The tables below document the observed catches of seabirds and sharks for those encounters where vessel length is known. Table 2 illustrates that for vessels >24 m catch rates (birds/set) is 3 times greater than for smaller vessels. The CMM is therefore covering the length class that poses the highest risk of seabird mortality. Table 3 illustrates that there is no such difference when it comes to sharks, with catches rates of TOTAL SHARKS being essentially the same between vessel length classes.

The main potential confounding factor when interpreting the tables below in relation to the CMMs is the lack of area and fleet stratification in the data presented. With better observer coverage providing more data, a more comprehensive analysis could be carried out, including more detailed consideration of the species concerned.

Table 2. Observed bird catches and catch rates by vessel length category.
DW: distant water vessel, length not available but assumed >24m

category	sets	No. of birds	CPUE (birds / 100 sets)
<=24 mt	2,737	100	4
> 24 mt	8,680	1,043	12
DW	308	0	0

Table 3. Observed shark catches and catch rates by vessel length category.
DW: distant water vessel, length not available but assumed >24m

		Vessel length category		
		≤24 m	> 24 m	DW
	No. of sets	2737	8680	308
BLUE SHARK	No. obs	6082	57740	1043
	CPUE	2.2	6.7	3.4
OCEANIC WHITE-TIP	No.	1761	2904	619
	CPUE	0.6	0.3	2.0
SILKY SHARK	No. obs	14577	9459	2317
	CPUE	5.3	1.1	7.5
MAKO SHARKS	No. obs	960	3197	138
	CPUE	0.4	0.4	0.4
THRESHER SHARKS	No. obs	1004	3045	51
	CPUE	0.4	0.4	0.2
OTHER SHARKS	No. obs	7018	11583	476
	CPUE	2.6	1.3	1.5
TOTAL SHARKS	No. obs	31402	87928	4644
	CPUE	11.5	10.1	15.1

5. Financing for the 2008–2011 ERA Research Plan

In December 2007 WCPFC committed to providing 3 years of finance for the ERA project at USD 130 000 per year. This sum was equivalent to one full-time equivalent (FTE) fisheries research scientist at SPC, at a base salary of USD 70 000 plus benefits and overheads. Since then the US dollar has fallen considerably and for 2009 a sum of USD 150 000 is required in order to continue to finance the position. This sum includes salary, benefits, overheads and 15% SPC Project Management fee.

WCPFC does not provide funding for associated activites, with costs mainly incurred through regional travel, i.e. to participate in national-scale ERA/EAFM consultations, travel by Pacific Island counterparts to SPC for training workshops and attachments, participation in regional-scale activities, etc. In 2008 SPC-OFP received the following contributions from CCMs to assist with these and other costs:

Japan Trust Fund	USD 60 000
Papua New Guinea	USD 50 000
French Pacific Fund	EUR 50 000

Travel costs to New Zealand and Hawaii to participate in national-scale ERA workshops and analyses were reimbursed.

Several turtle bycatch mitigation projects will be carried out at SPC during 2009 with funding from AusAID through FFA:

Turtle bycatch mitigation projects (AusAID)		**USD**
- document technical details of longline operations, including changes over the duration of the fishery		50,000
- training of trainers in turtle bycatch mitigation		50,000
- longline gear guide		25,000
- update SPC/SPREP publication on sea turtle interactions, including bibliography		25,000
- hook exchange experiments		25,000

As the project progresses and different activities are proposed and undertaken, additional finance will be sought from individual CCMs and/or WCPFC. One such activity, which could progress relatively quickly if funded, would be to translate exisiting SPC publications on bycatch (turtle identification & handling cards; shark identification guide; longline species identification guide) into the languages of distant-water fishing nations. The costs would be much reduced compared to the original documents, as all drawings and photographs have already been commissioned and paid for by the original donors (Australia, New Zealand, USA), and the layout of the original English/French version can be adapted to other languages. So only the costs of translation, printing and distribution remain. SPC therefore invites distant-water fishing nations to obtain the necessary funding for the production of these materials at cost price (below) so that all fishing vessels and scientific observers in the WCPO can be issued with copies.

***Unit costs for species identification & handling guides**	**USD**
Longline Species identification guide	10
Turtle Identification & Handling Cards	5
Shark Identification Cards	5
(*assumes a print run of ca. 3000)	

As noted above, while some activities related to the WCPFC Shark Research Programme can be carried out under exisiting finance, if activities such as a feasibility study for shark stock assessment are considered an immediate priority then additional finance would be necessary to carry out the study. Likewise, if more through analysis and robust estimatation of catches of non-target species is to be carried out, this activity would also benefit from more substantial and dedicated finance.

6. Summary and conclusions

WCPFC has taken a strategic view of its commitments to minimising the risk of fishing activities on non-target species. The ERA project, carried out by SPC-OFP in collaboration with colleagues in other sections of SPC and in FFA, CCMs and NGOs, provides a framework for communication and collaboration in the assessment of that risk. This is important so that analyses at national and regional scales are consistent, hopefully leading to consistent management by national authorities and WCPFC. At this early stage in the 3 year ERA Research Plan period much attention has been given to national-scale analyses for SIDS trying to implement an Ecosystem Approach to Fisheries Management. This has afforded little time to focus on method development. However, in carrying out several different analyses and through collaboration with colleagues it is apparent that methods can be enhanced in order to address particular aspects in the risk assessment, such as spatial overlaps in species and fisheries distributions and vulnerability of species to gear. Method enhancement will result in more robust assessments of overall risk posed by fishing. SC can therefore expect enhanced methods to be applied to future national and regional-scale analyses as data and time permit. Finally, a broad view has been taken of the kind of activities that should be pursued under the ERA project, in order to capitalise on the expertise available at SPC in observer training and data analysis, fisheries information and bycatch mitigation and training. Better coordination of these activites at SPC should result in added value to WCPFC, as we seek to identify activities that will serve all WCPFC members. Due to the limited budget of WCPFC and the various demands upon it, these additional activities will require additional funding, and it is hoped that CCMs will be receptive when approached to fund particular studies, and proactive in carrying out their own related studies in collaboration with SPC-OFP.

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