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Ecological Risk Assessment Implementation Report

WCPFC-SC5-2009/EB-WP-05

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1. Introduction

Lodge et al. (2007) in their report on *Recommended Best Practices for Regional Fisheries Management Organizations* call 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". The 3rd Regular Session of the WCPFC Scientific Committee (SC) approved a 3 year Ecological Risk Assessment (ERA) Research Plan for 2008 to 2010.

The anticipated outputs of the ERA project are:

(1) Multi-species Productivity-Susceptibility Analyses (PSAs)
(2) Identification of high risk species/groups for further assessment or management
(3) Identification of data requirements for high-risk species to be further assessed
(4) Scientific support for SIDS in implementing ERA/EAFM at the national level
(5) Determination of risk posed in fisheries/areas/times to particular species/groups
(6) Identification, evaluation and recommendation of bycatch mitigation techniques and/or Conservation and Management Measures

This paper summarizes activities relevant to these outputs that were carried out and/or commissioned by the Secretariat of the Pacific Community's Oceanic Fisheries Programme (SPC-OFP) during 2008/9. The list of papers presented to SC5 is:

EB-WP-02 S. Clarke. *An Alternative Estimate of Catches of Five Species of Sharks in the Western and Central Pacific Ocean based on Shark Fin Trade Data.*

EB-WP-05 D. Kirby. *Ecological Risk Assessment (ERA) Progress Report (2007/8) & Work Plan (2008/9).*

EB-WP-06 D. Kirby, S. Waugh, D. Filippi. *Spatial risk indicators for seabird interactions with longline fisheries in the western and central Pacific.*

EB-WP-07 P. Williams, D. Kirby, S. Beverly. *Encounter rates and life status for marine turtles in WCPO longline and purse seine fisheries*

EB-WP-08 M. Manning, D. Bromhead, S. Harley, S. Hoyle, D. Kirby. *The feasibility of conducting quantitative stock assessments for key shark species and recommendations for providing preliminary advice on stock status in 2010.*

EB-WP-09 D. Kirby. *Monitoring the effectiveness of Conservation and Management Measures for bycatch.*

FT-IP-01 S. Beverly. *Longline terminal gear identification guide.*

2. Sharks

The annual paper by SPC-OFP on catch estimation for species caught in WCPFC fisheries (SC-IP-1) omits sharks this year, as further necessary work on the estimation methodology was not possible pre-SC5 due to other priorities. However, a consultancy was commissioned to investigate an alternative method of catch estimation for sharks (EB-WP-2). That work provides minimum estimates of shark removals using fin trade data. The results are in reasonable agreement with catch-based estimates (SC2-ST-IP-1) during the period 1998-2000 but after that time the median trade-based estimates are up to two to three times higher and the apparent trends are different. Discrepancies between the two estimation methodologies will require further attention post-SC5, so that preliminary stock assessments can follow.

EB-WP-8 details the general feasibility of stock assessments for sharks, with emphasis on what analysis is necessary and achievable in the immediate future, i.e. between SC5 and SC6/WCPFC7. Sufficient basic biological and fishery data exist to provide preliminary advice on stock status for the key shark species (blue, oceanic whitetip, short- and longfin mako, silky, and bigeye, common, and oceanic thresher sharks). These would be almost entirely based on observer data presently held by SPC on behalf of its and member countries and territories. A hierarchical or stepwise approach is recommended: beginning with (step one) a revised productivity-susceptibility and resilience analysis; followed by (step two) an evaluation of stock-status indicators outside a population model fit; and then by (step three) an evaluation of stock-status indicators calculated from a series of simple population model fits. It is not expected that step three will be feasible for all species. Construction of catch histories is likely to require a number of structural assumptions about the data that may not be immediately testable. The estimation of biomass and yield with statistical confidence, thus providing a precise picture of stock status, is unlikely to be possible without considerable investment in shark fishery data collection and reporting systems in the future. However, the process suggested in this paper should produce sufficient information to guide the development of the WCPFC Shark Research Plan.

EB-WP-9 discusses the WCPFC Conservation and Management Measure for Sharks (CMM-2008-06) with reference both to its explicit objective (full utilization) and its implicit objective (reduce fishing mortality). Although there is some evidence in EB-IP-8 that fishing mortality on sharks may be reduced through requirements for full

utilization this cannot be taken for granted: if markets for shark product exist and access to markets can be achieved, or if there are no regulations against dumping of landed carcasses, then the economic incentive remains to land sharks that are caught, whether or not they are alive at the time of capture and would survive if released. Furthermore, as the 5% fin-to-carcasse ratio required under the CMM is not species-specific, it allows for roughly twice as many sharks to be killed as there are carcasses on board. This is not the case if fins are required to be naturally attached until unloading. Because of these issues and the general difficulty in scientific monitoring and analysis of implicit management objectives, it is recommended that the desired outcome of the CMM is explicitly expressed in terms of a decrease in fishing mortality by comparison to a reference year/period. This could be monitored at first by observed catch rates and later by more rigorous stock assessment (see EB-WP-8).

3. Seabirds

A spatially explicit productivity-susceptibility analysis (PSA) was developed in a collaboration between SPC-OFP and Birdlife International (EB-WP-6). Range maps were compiled for seabird species at risk from fishing in the WCPFC Convention Area (see EB-WP-6 Appendix). Susceptibility indicators were then developed for each species, on a 5x5 degree grid, by comparison of range distributions with the distribution of longline fishing effort. These indicators defined the risk landscape firstly in terms of areas where seabirds are more or less common (i.e. independent of fishing effort) then as areas where interactions are more/less likely (i.e. including fishing effort). Finally the PSA was carried out using the intrinsic rate of population increase, presenting the risk landscape as the potential for adverse population effects.

The main conclusion are that areas of high potential encounter rates are not necessarily the same as areas where fishing has greatest risk of population effects. There are some small, highly vulnerable populations in tropical waters (e.g. Fiji petrel), whose limited range includes some high fishing effort areas. Given these results it is suggested that WCPFC ultimately move towards more refined spatial management than the large-scale latitudinal bands presently used. However, at this stage there are important factors not included in the analysis, specifically (a) any variation in catchability of different species, and (b) use of mitigation measures. Further work is recommended on these aspects prior to revision of the seabird CMM.

4. Turtles

EB-WP-7 has been produced in order to inform discussion at SC on the topic of marine turtle encounter rates. Of the various factors affecting marine turtle encounter rates in longline fisheries, the depth of set appears to be the most important. Although there is a relationship between depth and time of set, such that shallow sets are usually made at night while deep sets are usually made during the day, the data show that incidence of marine turtle encounters is higher for all shallow sets than for any deep sets (>4.5% vs. <2.4%). This difference is even more apparent when nominal CPUE is calculated: encounter rates for shallow-setting vessels are then up to an order of magnitude higher than for deep-setting vessels. The data for deep-setting vessels also show that encounters are likely to be on the shallowest hooks.

SC5 needs to decide on a definition of what turtle interaction rates are 'minimal' so that any shallow-set swordfish fisheries that already have minimal interaction rates (based on 3 years observer data with 10% coverage) may be exempt from the requirements under CMM-2008-03 to use circle hooks and fish bait. In EB-WP-7, SPC-OFP has provided the information that it holds on behalf of its members, without suggesting what should be deemed 'minimal', as this is really a determination for SC to make. It is suggested in another paper (EB-WP-4) that this definition should be whatever is the rate achieved in fisheries where all effective mitigation measures are used, with a suggested nominal CPUE value of 0.019 turtles per 1000 hooks - this would effectively include almost all shallow set fisheries (see EBWP7 Table 3).

The incidence of marine turtles in purse seine sets is generally a lot lower than for the longline fisheries, i.e. 0.2%–4.6% for longline vs. 0.3%–1.6% for purse seine. Encounter rates are highest in animal-associated sets, drifting log sets and anchored FAD sets, and lowest for drifting FADs. This reflects the time it takes for multi-species assemblages to form under drifting objects, with marine turtle encounter rates being highest for those set types where the object or school is floating for longest.

In addition to the analysis in EB-WP-7, SPC has been carrying out a range of other projects under the FFA Sea Turtle Action Plan. These include circle hook trials in Cook Islands, a training of trainers workshop in handling of hooked turtles, and the production of a longline terminal gear identification guide (FT-IP-1), among other work. SPC also assisted the WCPFC Secretariat in producing the WCPFC Guidelines on the Handling of Sea Turtles (GN-WP-13).

5. Other activities

WCPFC Bycatch & Bycatch Mitigation Information System (BBMIS)

SPC-OFP has developed a database for the WCPFC Secretariat that will be made publically available on the WCPFC website by the end of 2009. Initial work in 2007 and 2008 focused on the technical development of the database. In 2009 the emphasis has been on compiling the information content so that it becomes a practical and useful information system for CCMs, NGOs and independent researchers.

A Research Assistant has been employed at SPC-OFP on a half-time basis commencing in June 2009 and on contact until the end of December 2009. The entry of turtle bycatch mitigation references is well underway, with the aim of entering the most current literature first. A list of seabird bycatch mitigation references has been received from Birdlife International, as well as factsheets outlining seabird bycatch mitigation techniques in pelagic longline fisheries (EB-WP-3), which have been used to help define mitigation methods in the BIS. A literature search for shark bycatch mitigation references is underway.

An additional component has been developed to incorporate ca. 100 biological attributes for ca. 200 bycatch species. Species group experts are requested to assist the WCPFC Secretariat with the ongoing task of quality control for these data.

Purse seine bycatch analysis for Papua New Guinea

A national-scale analysis was made characterizing the purse seine fisheries of Papua New Guinea, including ecological risk assessments for bycatch. The final project report is available from: http://www.aciar.gov.au/publication/TR70

Workshop on monitoring the effectiveness of CMMs

WCPFC CMMs require evaluation of their efectiveness, otherwise the Commission will not know if it is achieving its aims. Workshop participants reviewed the CMMs from the perspective of scientific monitoring and analysis of their outcomes. The discussion on the shark CMM in particular highlights how the CMMs if not carefully drafted may well lead to unintended consequences, including increases in fishing mortality, even with 100% compliance. The CMMs therefore need to be more outcome focussed, spelling out their intention in ways that can be more easily monitored, so that the Commission is provided with the best possible science. The workshop report and further discussion on this topic is presented in EB-WP-9.

6. Work programming 2010-2012

Since the 2007 financial year, WCPFC have provided funding equivalent to one fulltime-equivalent (FTE) research scientist position at SPC-OFP. Co-finance for particular activities has been attracted from the AusAID, Japan Trust Fund (JTF), the French Pacific Fund (FPF), the Papua New Guinea National Fisheries Authority (NFA), and the United Nations Department of Ocean Affairs and Law of the Sea (UNDOALOS). In-kind support has been received from Australia (CSIRO), New Zealand (Ministry of Fisheries), and USA (NOAA Fisheries, Hawai'i).

Financial year 2008 was the first year in a 3 year period (2008–2010) for which funding was approved by WCPFC5, to pursue a research plan presented to SC3. Since then it has formed part of the annual service agreement between WCPFC Secretariat and SPC-OFP. Following the Independent Review of Science Services carried out in 2008 (see GN-WP-7), SPC-OFP and the WCPFC Secretariat now propose to include further work on bycatch and bycatch mitigation in a new 3 year Service Agreement covering the period 2010–2012 (see GN-WP-3), thus ensuring some stability and continuity in the scientific support provided. The actual work carried out would be determined by SC on an annual basis and monitored by the WCPFC Secretariat and the Research Advisory Committee inter-sessionally. An ongoing priority would be the scientific monitoring and evaluation of the effectiveness of WCPFC Conservation and Management Measures for bycatch (CMMs; see EB-WP-9), preliminary work on stock assessment for sharks, and ongoing work on seabird spatial risk assessment. EBSWG is invited to recommend to SC5 that it endorse this proposal under the appropriate plenary Agenda Item(s).