Overview and work plan for updated indicator analysis.

The main aspects of the TOR (ANNEX1) for the shark indicator analysis include

* 1. a species-specific review of data holdings and data gaps, and
  2. will take into consideration how recent shark management measures may have affected data quantity or quality.
  3. Indicators should include
     1. catch rate,
     2. size, sex, maturity,
     3. distribution,
     4. species composition and
     5. targeting
     6. and should update and improve the previous methods, if possible.
     7. An assessment of each WCPFC key shark species should be made to determine

i) if the available information can support a stock assessment; ii) the priority for stock assessment given the results of the indicator analysis.

This analysis is to be completed using all available observer and logsheet data for the WCPFC key shark species ( silky, oceanic white tip, blue, mako and thresher). Aside from the specific indicators listed in the TOR a recent paper (Francis et al 2014) list the following indicators;

high-CPUE (the proportion of half-degree rectangles having unstandardised catch per unit effort (CPUE) greater than a specified threshold);

proportion-zeroes (the proportion of half-degree rectangles having zero reported catches in a fishing year);

geometric mean index (the geometric mean of the species abundances in catches, for both the catch of all species including teleosts, and the catch of just the three sharks);

standardised CPUE (for both commercial and observer data); proportion of males in the catch; and median lengths of males and females.

The updated analysis will cover much of the same material as the previous analysis (Clarke et al 2011), with the additional goal of analyzing the effect of management measures designed to mitigate the shark catch, and improve the data reporting.

The proposed outline draws heavily on the Clarke et al (2011 TOC in ANNEX 2) and Francis et al (2014, TOC in ANNEX 3) papers;

**PROPOSED OUTLINE**

1. INTRODUCTION

2. GENERAL METHODS

2.1 DESCRIPTION OF DATA SOURCES

3. DISTRIBUTION INDICATOR ANALYSES

3.1 INTRODUCTION

3.2 METHODS

3.3 RESULTS

3.4 CONCLUSIONS

4. SPECIES COMPOSITION INDICATOR ANALYSES

4.1 INTRODUCTION

4.2 METHODS

4.3 RESULTS

4.4 CONCLUSIONS

5. CATCH PER UNIT EFFORT INDICATOR ANALYSES

5.1 INTRODUCTION

5.2 METHODS

5.3 RESULTS

5.4 CONCLUSIONS

6. MEDIAN SIZE AND SEX RATIO INDICATOR ANALYSES

6.1 INTRODUCTION

6.2 METHODS

6.3 RESULTS

6.4 CONCLUSIONS

7. SPECIES SPECIFIC RECOMMENDATION OF REGARDING STOCK ASSESSMENT FEASIBILITY FOR THE KEY SPECIES

8. DISCUSSION AND CONSIDERATION OF HOW RECENT SHARK MANAGEMENT MEASURES MAY HAVE AFFECTED DATA QUANTITY

9. RECOMMENDATIONS FOR FUTURE INDICATOR ANALYSES

10. MANAGEMENT IMPLICATIONS

11. ACKNOWLEDGMENTS

12. REFERENCES

APPENDICES

Proposed timeline.

Rough Draft by the 15th, final draft by the 7th.

**REFERENCES**

Clarke, S.; Harley, S.; Hoyle, S.; Rice, J. (2011). An indicator-based analysis of key shark species based on data held by SPC-OFP. Western Central Pacific Fisheries Commission Scientific Committee Seventh Regular Session WCPFC SC7-EB-WP-01. 88 p.

Francis, M.P.; Clarke, S.C.; Griggs, L.H.; Hoyle, S.D. (2014). Indicator based analysis of the status of New Zealand blue, mako and porbeagle sharks.

**ANNEX 1**

**TOR for shark indicator paper**

**Updated indicator analysis (Cost:  within the WCPFC SSP annual allocation).**  The WCPFC SSP (SPC) will conduct an indicator analysis (using all available **observer** **and logsheet data**) for the WCPFC key shark species and recommendations regarding the feasibility of conducting stock assessments for these species.  This will include a species-specific review of data holdings and data gaps, and will take into consideration how recent shark management measures may have affected data quantity or quality.  Indicators should include catch rate, size, sex, maturity, distribution, species composition and targeting and should update and improve the previous methods, if possible.  An assessment of each WCPFC key shark species should be made to determine i) if the available information can support a stock assessment; ii) the priority for stock assessment given the results of the indicator analysis.

**ANNEX 2 Table of Content From WCPFC-SC7-2011/EB-WP-01**

1. INTRO
2. Data Description
   1. Longline fishery data
   2. Purse seine data
3. Indicator of range base on fishery interactions
   1. Fishery interaction patterns by species
   2. Fishery interaction patterns by life history stage and sex
   3. Summary of fishery interaction indicator findings
4. Indicators of catch composition
   1. Observed catch composition in the longline fishery
   2. Observed catch composition in the purse seine fishery
5. Indicators of catch rate
   1. Nominal catch rates in the longline fishery
   2. Nominal catch rates in the Purse Seine Fishery
   3. Standardized catch rates in the longline fishery
   4. Spatial patterns of catch rate in the longline fishery
   5. Potential Biases in the Analysis of Shark Catch Rates
   6. Summary of Catch Rate Findings
6. Biological Indicators of Fishing Pressure
   1. Median length vs Maturity
   2. Sex Ratios
   3. Summary of biological indicator findings
7. Conclusions
8. References
9. ANNEXES

ANNEX 3 **TABLE OF CONTENTS FROM THE Indicator based analysis of the status of New Zealand blue, mako and orbeagle sharks New Zealand Fisheries Assessment Report 2014/69 M.P. Francis, S.C. Clarke, L.H. Griggs, S.D. Hoyle. ISSN 1179-5352 (online) ISBN 978-0-477-10518-7 (online) December 2014**

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Notes