

## **South Pacific Regional Fisheries Management Organisation**

### **6<sup>th</sup> Meeting of the Scientific Committee**

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#### **SC6-DW06**

### **Characterisation of SPRFMO species within the stock assessment framework for bottom fisheries within the SPRFMO Convention Area**

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## 1. Purpose of paper

This paper provides for the Scientific Committee's consideration of a preliminary characterisation of SPRFMO species within the tiered [assessment framework](#) for bottom fisheries in the SPRFMO Convention Area (adopted at SC5). This characterisation should help the SC to formulate assessment options for the large number of species with which SPRFMO bottom fisheries interact. It is likely that a number of non-standard assessment approaches will need to be applied. Descriptions of non-standard assessment approaches referred to herein are documented comprehensively elsewhere (e.g. Edwards 2015) and are not covered further here.

## 2. Rationale for a Tiered Assessment Framework

The SPRFMO Scientific Committee may be requested to provide scientific advice on stock status and catch limits for a large number of demersal species, as well as advice on the impact of fishing on associated and dependent species with which these fisheries interact. The quantity, quality and suitability of data varies among species over time and space. This variability influences the parameters that can be estimated. This in turn drives the assessment approaches that can be applied. Uncertainties associated with data availability, as well as assessment approaches, will influence the scientific advice that the Scientific Committee can provide to the Commission.

To improve the efficiency of processes run by the Scientific Committee, a tiered framework for assessing and prioritising stocks for status assessment has been accepted (see [SC5-DW04](#)). The framework is based on the parameters that can be estimated given the data available. Such a tiered framework will assist the Scientific Committee with developing transparent decision rules for advice on recommended biological catches and potential buffers (e.g. 'discount factors') that may be applied to account for assessment uncertainty. The tiered levels consist of:

1. Full Benchmark Assessment that utilises catch data from fishery monitoring, ideally in combination with stock abundance from independent surveys, catch rates and biological data with the purpose of estimating depletion levels and fishing mortality rates;
2. Data Limited Assessment that may utilise catch only or simple indicators to track status (e.g. CPUE, size composition, Productivity-Susceptibility Analysis);
3. No assessment necessary.

Two subsets may apply after initial classification of stocks into tiers:

- i. Research Assessment where new methods or data types are applied which may require substantive review of the methods by the Scientific Committee; and
- ii. Update Assessment where previous accepted assessments are updated with new data.

Given that many of the potential methods have not yet been tested in SPRFMO's bottom fisheries, it is likely that subset i. Research Assessment would apply in most cases.

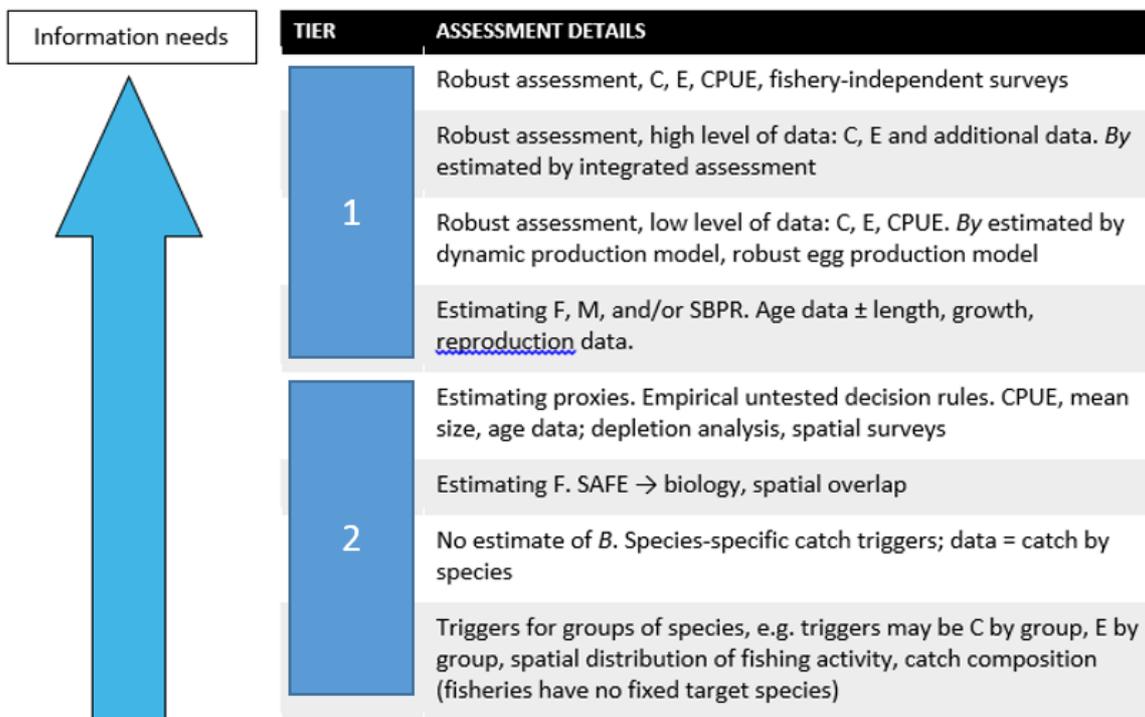
Discussion on harvest strategies, including potential buffers, discount factors and harvest control rules, was provided in [SC5-DW04](#). These are not discussed in more detail in this paper and will require additional development and testing.

As well as data availability, the choice of assessment method needs to be driven by:

- The level of risk that is acceptable. Precautionary fishing mortality limits may be appropriate for the vast majority of species with which SPRFMO demersal fisheries interact
- The desired management and regulatory framework. The economics of the fisheries should drive the required level of monitoring and the implementation of harvest strategies. A fishery being fished at MSY will usually require far more monitoring (and investment) than one with a much higher biomass target
- A user-pays model whereby the cost for assessment and monitoring is borne by those seeking to exploit the resources, or indirectly exploiting the resources in the course of fishing for target or byproduct species
- Capacity. Situations may arise (commonly in RFMOs) where data are available, but capacity and funding is often lacking.

Figure 1 demonstrates how information availability might relate to the tiered framework. There may need to be a ‘fuzzy’ barrier between tiers 1 and 2 to account for assessment uncertainty.

Figure 1. Schematic showing increasing information needs for different tiers and assessment options



Adapted from Dichmont et al. 2013

### 3. Data requirements for non-standard stock assessment

Age-structured assessments, including those incorporating relative abundance indices such as CPUE and acoustic surveys, may be possible for a small number of SPRFMO species (generally tier 1), but the paucity of data means that other options will be required to assess numerous other species. These other species include target and non-target species. Table 1 (see Edwards 2015 for additional detail) demonstrates the data requirements for a number of non-standard assessment approaches. These approaches generally use a combination of fishery-dependent and fishery-independent data.

Table 1. Data requirements for non-standard assessment methods

A - Fishery independent data									
Method	Life history				Fishery			Status	
	Mortality	Growth	Maturity	Productivity	Selectivity	Catchability	Area	Depletion	Trajectory
Depletion Adjusted Catch Scalar				O				X	
Depletion Corrected Average Catch	X			X				X	
Depletion-Based Stock Reduction Analysis	X			X				X	
Catch-MSY				X				X	
Average-length	X	X			X				
Length-based SPR	X	X	X		X				
Swept area						X	X		
Productivity-Susceptibility Analysis, bSAFE				X	X	X	X		
Sustainability assessment (eSAFE)						O	X		
Non-parametric models									O
Time-series models									O
Production models				X		O		O	O
Delay-difference models	O	O	O	X	O	O		O	O
B - Empirical or fishery-dependent data									
Method	Time series data		Current data						
	Catch	Abundance	Length	Survey	Effort				
Depletion Adjusted Catch Scalar	X								
Depletion Corrected Average Catch	X								
Depletion-Based Stock Reduction Analysis	X								
Catch-MSY	X	O							
Average-length			X						
Length-based SPR			X						
Swept area				X	X				
Productivity-Susceptibility Analysis, bSAFE					O (required for SAFE)				
Sustainability assessment (eSAFE)				X	X				

X = required data inputs  
O = data that can be accommodated if available

Non-parametric models	O	X			
Time-series models	O	X			
Production models	X	X			
Delay-difference models	X	X			

Adapted from Edwards 2015

#### 4. Categorisation of stocks into the Tiered Assessment Framework

The categorisation of species into the assessment framework (see Annex 1, *excel spreadsheet*), attempts to define which of the options highlighted in Table 1 may be available depending on the characteristics of each 'fishery' and the available data. This may allow preliminary categorisation of each stock into Tier 1, 2 or 3. The spreadsheet includes fields relevant to this categorisation as well as a characterisation of the data available to inform assessment options.

As agreed at SC5, prior to categorisation into Tier 1 or Tier 2 the Scientific Committee may place some species into Tier 3 (No Assessment required) based on the presentation of sufficient evidence that existing measures provide adequate precaution for the interactions known (e.g. for species that rarely (if ever) interact with the SPRFMO demersal fisheries).

Categorisation into Tier 1 and Tier 2 of the framework will be based on the data available. Species/stocks with data suitable for estimation of current fishing mortality and depletion would generally be categorised into Tier 1. Species/stocks initially considered for Tier 1 may be subsequently classified for Tier 2 assessment if the Tier 1 assessment diagnostics fail to satisfy Scientific Committee review. Species not placed into Tier 1 or Tier 3 categories by default are placed in Tier 2. To assess species at Tier 1 (and to a lesser degree Tier 2), full characterisation of the fishery's history, data, management arrangements, risks and other information is desirable. This would ideally be done on a species-by-species basis, but efficiencies could be made with grouping key species to be assessed at Tier 1 (or possibly Tier 2) for each of the main bottom fishing gears.

Species/stocks placed into Tier 2 should initially be subjected to semi-quantitative risk assessment methods such as Productivity-Susceptibility-Analyses and/or Sustainability Assessment for Fishing Effects (SAFE). These assessments are currently underway for SPRFMO demersal teleosts and chondrichthyans. These methods rank species/stocks into priority from high to low relative risk (or vulnerability), with SAFE also being capable of generating proxy estimates of fishing mortality. This step should identify to the Scientific Committee the Tier 1 or Tier 2 species/stocks requiring immediate attention. It may be determined by the Scientific Committee that stocks assessed to this level may not require further assessment if the risks from fishing are assessed to be low, or if adequate management measures are in place to mitigate moderate or high risks. Alternatively, species or stocks that are assessed as requiring additional attention may then be prioritised for other non-standard assessment approaches, for example those that may provide precautionary catch limits.

## 5. Notes on the species list

The species list was built using catch records from the SPRFMO database, which included records submitted by Australia and New Zealand. This primary list was checked using observer and logbook records from Australia and New Zealand. As a result, a number of additional species—predominantly very low volume discarded species—were added to the primary list. Many of these species would intuitively fall into Tier 3 after preliminary risk assessment.

The species list contains a number of errors. These relate to species which are not thought to occur in the fishery (e.g. COD Atlantic Cod), potential coding errors (e.g. where a generic code has been assumed as a specific species based on the FAO species codes, but may be questionable), or species that do not fall within SPRFMO's mandate (e.g. pelagic tunas, mahi mahi, wahoo etc.).

An important limitation of the data relates to the use of group codes. For example, there are a number of codes for 'alfonsinos' and 'boarfish' in the SPRFMO database and it is unclear which species they relate to. In these instances, assessment using these data would need to consider whether data could be assumed to be a single species, or whether certain species could be assessed and managed as a species complex (or, alternatively, to disregard the data altogether).

## 6. Recommendations

It is recommended that the SPRFMO SC:

- **Note** that the species list and the preliminary categorisation of stocks into the SPRFMO tiered assessment framework is a work in progress and Australia and New Zealand will continue to work together to refine them
- **Note** that the preliminary categorisation of species into the tiered assessment framework highlights a number of potential assessment options at Tier 1 and Tier 2
- **Note** that the preliminary categorisation could be used in conjunction with the results of the teleosts ecological risk assessment to prioritise stocks into Tier 3 (as well as strengthening justification for assessment of species at Tiers 1 and 2
- **Recommend** that this work is continued and supported as part of the SC workplan.

## 7. References

Dichmont et al 2016. Operationalising the risk-cost-catch trade-off. FRDC Project Number 2012-202.

Edwards, C 2015. Review of data-poor assessment methods for New Zealand fisheries, New Zealand Fisheries Assessment Report No 2015/27.