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ARE ALFONSINO FISHERIES IN THE SIOFA AREA 'DATA POOR'?

Relates to agenda item: 3.6 Alfonsino future work plans Info paper ☐

Delegation of [SIODFA]

Abstract

- The use of the jargon term "data-poor" has evolved, somewhat differently in many fishery management jurisdictions.
- In each the term has developed in the context of the particular fishery/fisheries.
- However, a common, understandable interpretation by non-practioners is that more data are required.
- As this may not be the case it is recommended that the specific cause of concern giving rise to the term be described/noted instead.
- In the case of the SIO alfonsino fishery, the issue of concern is failure of management models to well describe the dynamics of the fishery – not the lack of data for analysis.

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February 2021

Summary Points

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- As this may not be the case it is recommended that the specific cause of concern giving rise to the term be described/noted instead.
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1. INTRODUCTION

It is common to see SIO alfonsino (and orange roughy) bentho-pelagic fisheries in the SIOFA area perceived as a data poor fishery. This has two common implications:

i. That more data should be collected and/or
ii. The type of data that has been, or is being, collected is inadequate for effective management of the alfonsino fisheries.

SIODFA believes that with a minor exception in the case of (ii) neither of these assumptions/views/ assertions are correct. The results from the management models used in the assessment of alfonsino are subject to wide confidence intervals but this is mainly a combined result of the aggregation/schooling behaviour of alfonsino and the consequences of aimed-trawl fishing for conventional stock assessment models. Thus, it is not so much that the data are poor as it is that the assessment models are poor – for this particular fishery.

2. THE CONCEPT OF DATA-POOR IN THE CONTEXT OF SIO ALFONSINO FISHERIES AND USE OF THE TERM *DATA POOR*

Among discussion documents presented at the Informal Video Meeting of 2 February 2012 were:

i. Interim Headline Report on Harvest Strategy Contract Progress to the SIOFA Meeting on 4th February 2021
ii. Appendix 3: Overview of available assessments and results for the three main fisheries in the SIOFA area. Alfonsino (*Beryx splendens*).
iii. Appendix 1: Summary of West Coast US, New Zealand and ICES Tier systems used to advise on HCRs, Reference Points and Catch Limit

iv. Appendix 2: Overview of Harvest Strategy Guidelines for Australia

Appendix 1 notes in the summary that for top tier SIOFA fisheries tiers for which harvest control rules (HCRs) are linked to Reference Points, data are required that are not available for nearly all of the top 15 commercial SIOFA species listed for the SIOFA study.

Appendix 1 notes that the Data Poor Tier 3 fisheries of the **US West Coast** are characterized by:

i. No reliable catch history or reliable catch estimates are available only for recent years.
ii. No basis for establishing the average catch during a period when a stock is considered to be stable and close to B_{MSY} equilibrium on the basis of expert judgment
iii. A default analytical approach based on depletion-corrected average catch, used for estimating sustainable yields based on the idea that the average catch has been sustainable if abundance has not changed. The DCAC makes a correction to that average if abundance has increased or decreased which may be the subject of an educated guess based on subjective impressions.
iv. "Uncertainty is recognized in all of the parameters in the model, and is reflected in the output of a probability distribution."
v. Reliable annual historical catches and approximate values for natural mortality and age at 50% maturity are required. The default analytical approach is a depletion-based stock-reduction analysis.

In the SIOFA alfonsino fishery, good, if not very good to excellent catch data are available since around 2002 and some accurate catch and effort data from 1999– a period of nearly two decades and possibly covering two generations of alfonsino. All reported catch is believed to be accurate; any bias would arise from failure to capture all landings data, particularly in 2000 and 2001. But at that time, the emphasis of the fishery was on orange roughy. There have never been reasons or incentives to mis-report though there are accounts that this may not have been the case for the Soviet commercial fishery. The other requirements appear satisfied for SIO alfonsino.

In the **New Zealand** *data poor* case the level of stock productivity is:

i. Defined based on six parameters, all of which appear available for SIO alfonsino
ii. Depends on existence of unfished biomass and estimates of fishing mortality in terms of spawning biomass per recruit - default proxies for B_{MSY} expressed as $\%B_0$ based on productivity level
iii. A retrospective 3-5 year running average may be appropriate. For a CPUE proxy, over the 3–5-year period the average CPUE should not fall below the target CPUE level. Similarly, over the preceding 3-5 years, the average reported landings should not exceed the target catch level.
iv. And a one-off fluctuation should not necessarily result in a change to the TAC.

By the (high) New Zealand standard, the SIOFA alfonsino fishery may be characterized as data poor though this does seem to be a misleading term for the situation that is described.

When providing advice on levels of harvest, **ICES** categorizes the candidate stocks according to the amount of information that is available. The category for the least-well described situation is "**Category 5: Data-poor stocks**". These apply to stocks for:

- When only landings data are available
- When only landings (or catch) data are available and no relevant fishery information can be gleaned from similar stocks/species.
- The situation to be addressed is considered to be that of biodiversity rather than yield.

Australian Harvest Strategy Guidelines (Appendix 2) for *data poor* situations are noted especially for multi-species fisheries but no mention is apparent as to the manner in which the data are deemed to be *data poor*. Butterworth noted (pers comm) that the term 'data-poor' is a relative term and can cover a range of conditions. Dichmont *et al.* (2011) has developed procedures for *data poor* situations and notes the following characteristics:

- ***i.*** Classic (quantitative) stock assessment models are unable to be used, for reasons either of data availability, data quality and/ or analytical capacity; - ***not the alfonsino situation***
- **ii.** A large uncertainty in the status and dynamics of the stock due to poor data; - ***not the alfonsino situation as the data are not 'poor'***
- iii. Uncertainty in the nature of fishing (e.g., in terms of fleet dynamics and targeting practices); - ***not the alfonsino situation as reliable information exists as to the fleet dynamics and targeting practices***
- iv. Have a low gross value of production - ***not the alfonsino situation as this is at least a medium-value product, e.g., relative to Patagonian toothfish.***

Dowling *et al*. (2020) Introduce the term "data-limited" as an equivalence for "data-poor". In their use it can cover a range of conditions that have struggled to resolve stock status and establish the associated fishery risk. They note that a key question in the context of data-limited fisheries is identification of the drivers for the need for more or better data, and the need for improved fishery management.

3. WHAT DATA ARE COLLECTED?

3.1 Biological Data

For some vessels, comprehensive biological and position data have been collected from the start of the fishery in 1999. The requirement to collect comprehensive data became a requirement for membership of SIODFA members in 2006. The responsibility for this activity has since passed to the flag states, in the case of biological data through their observer programmes (all vessels carry flag-state designated observers) and in the case of position and tow-related information through use by bridge officers of carefully designed electronic tow book software. The collection of such data is a licensing condition. The biological data that are collected enable estimation of the parameters needed for growth models and subsequent use in yield estimation.

Biological information is deficient in three instances. The first of these is the lack of a good estimate of natural mortality – hardly an unusual situation for many/most fisheries. The second deficiency, perhaps of greater concern, is lack of knowledge of the SIO alfonsino's stock structure. Current yield models assume the existence of an eastern and western stock. However, some workers believed, based on their personal observations, that smaller areas have their own separate spawning alfonsino populations that are vulnerable to overfishing. Clearly this is an important – should this be the case the danger is of sub-populations being overfished, if not depleted. SIODFA believes that no information exists to confirm any stock structure hypothesis in the Southern Indian Ocean.

Related to the issue of stock structure is knowledge of an appropriate relation between spawning stock egg production, fish size and maturity, fecundity and egg viability, and subsequent recruitment success. Again, uncertainty as to the nature of the stock-recruitment relation is common for many fish stocks, notwithstanding the common assumption of a Beverton & Holt stock recruitment relationship and steepness parameter value – i.e., one value fits many different fisheries.

3.2 Fishing Operations Data

A full suite of data is recorded concerning fishing operations, however, there are several caveats.

While all tow-by-tow data are recorded, the amount of the catch by each tow is only visually estimated. Its accuracy depends on the experience and judgement of the relevant crew member – bridge officer and/or factory manager. However, exact records are kept of the daily processing production, by species and product grade including any relevant product processing conversion value, so that a precise 24-hour production total is recorded. This information is not usually used for resource management purposes.

Time and depth of a tow is recorded. But it is the depth at which the fishing operation commences, i.e., often a fairly standard depth is recorded from which the pursuit (it is aiming trawling that is undertaken) is begun, not the depth to the sea floor and possibly not the depth of the fish aggregation. The end depth that is recorded at the end of the tow, when retrieving the net with the catch begins or the tow is abandoned. It is not always indicated separately if a second attempt immediately follows. The 'end depth' may depend on the occurrence of oceanographic factors, such as thermoclines as these can affect the flight response of the fish aggregation. Assumptions that the alfonsino are either entirely missed, i.e., a zero-catch tow (see also SIODFA 2018) or the aggregation is caught *in toto* ignore that the vessel may catch some unknown fraction of the pursued school.

Attempting to determine the time the gear is in contact with the bottom – not a requirement for commercial operations - is fraught with complications. Different skippers use different fishing tactics, which may also depend on the nature of the sea floor and can vary seasonally. Bentho-pelagic fishing targeting of orange roughy uses heavier rock-hopper gear and characteristically is in close contact with the seafloor. Video observation shows that in these fisheries contact is usually the consequence of the gear bouncing over the seafloor. When targeting alfonsino, a more lightly constructed net is used. Many skippers attempt to 'fly' the gear, e.g., around 2 m off the bottom. Both types of fishing use trawl doors that are designed for a pelagic mode of fishing as fishing practice is to keep them off the bottom. Loss of trawl doors from bottom fastenings, is exceedingly rare, i.e., greater than decadal events.

4. Recommendations

The term *'data poor'* has become widely used jargon in fisheries management and whose interpretation depends on the background and experience of those using or hearing the term. It has been commonly used in relation to the SIOFA bentho-pelagic fisheries. A common (inevitable?) response is that more data needs to be collected to reduce the uncertainty in the results of models that have been used.

It is neither the insufficiency of data nor the nature of the data that are collected that prevent getting better management model results. Rather, the peculiarities of alfonsino behaviour render application of conventional stock assessment procedures such as Age-structured Production Models highly problematic given either the failure of, or meagre extent to which some, assumptions hold. This causes large error in the model results and thus reduces their usefulness. This source of error is supplemented by the nature of aimed trawling such that the relation between catch success and fish abundance is tenuous.

Rather than use the term *data poor* it is recommend to explicitly describe the factors that are deemed deficient in their use in an assessment model. "Data-poor" as a general term may be interpreted differently by different audiences.

5. LITERATURE CITED

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