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Thoughts on the Management of Alfonsino in the Southern Indian Ocean

Relates to agenda item: 3.1 SERAWG Working paper ☐ Info paper ☒

Delegation of SIODFA

Abstract

This paper offers views on possible issues that may be involved in undertaking future management of alfonsino fisheries.

Recommendations *(working papers only)*

For consideration by the SERAWG in relation to providing advice on the management of the SIOFA alfonsino fisheries

SIODFA Technical Report
19/01

Southern Indian Ocean
Deepsea Fishers Association

Thoughts on the Management of Alfonsino in the Southern Indian Ocean

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1. INTRODUCTION

1.1 Management of the Fishery

The Southern Indian Ocean (SIO) deepwater fishery for alfonsino is small (tiny - ≤ four vessels). Despite this management needs embody all of the conventional requirements for effectively resource management:

i. Monitoring of catch and fishing effort
ii. Identification of alfonsino stocks, i.e. reproductively separate alfonsino populations
iii. A data collection programme that provides the information needed to parameterize yield models
iv. A management process that is, at least moving towards, undertaking these basic management requirements on a stock basis.

Despite its small size, it is a data-rich fishery. Of the three vessels active in the fishery and the possible re-entry into the fishery of one of the companies, two of the vessel operators have an extensive and detailed data record of their vessel operations since their entry into the fishery around 1999. A third vessel, originally under the flag of Namibian flag but now the Cook Islands implemented a detailed data collection programme that expanded on the initial procedures up until 2006. Thus 13 years of detailed information now exists on the operations of this vessel. The fourth remaining vessel has had an acceptable level of collection of management information and has recently moved to 100% observer coverage.

Despite the existence of the extensive data collections and archives only most recently have efforts to review the data files and to create the databases that would facilitate querying this information begun. The different operators have had variable success in creating databases that can be easily interrogated. *This is a major concern.*

1.2 Nature of the Fishery

The SIO alfonsino fishery is one of the most, and perhaps the most, extensive trawl fishery in the world, both for high seas fisheries and those within EEZs. The fishery prosecutes seafloor features (often referred to as underwater topographic features – UTFs) spread across the Southern Indian Ocean. To the west fishing occurs on and around Walters Shoal, part of the extension of the Madagascan Ridge, on many parts of the South Indian Ridge and much further to the west on 90° East Ridge. This is a span of around 45° of global longitude, 55° if Broken Ridge further to the west is included as it is fished from time-to-time. This embraces a distance of around 2500 nautical miles and vessels may traverse this distance during a single voyage, which may extend to 90 days. The time from leaving port to the start of fishing is commonly in the order of three days and if fishing conditions are inimical changing grounds can often take in excess of 24 hours. At present fishing vessels are essentially based in two ports, Cape Town and Port Louis, Mauritius. Appendix I shows images for the types of factory trawlers that are engaged in this fishery.

The number of UTFs that are fished or have been fished has not been determined exactly, however records maintained by the Southern Indian Ocean Deepsea Fishers Association show that 350 such features (last count) have had recorded catches and/or are known to have been fished. This record is incomplete though many features have been given more than one name.

Aspects of the socio-economics and flag state history of the fishery are given by Shotton (2016).

1.3 Processing of the Catch

Catch quantities are recoded daily in terms of processed weights for medium to larger-sized alfonsino and in terms of whole weights for smaller alfonsino. Conversions factors to obtain round weight values are generally specified by the flag state. In some cases observers monitor the efficiency of the processing equipment for the information of the vessel operator. In other cases, this monitoring is the responsibility of the factor manager. The two common forms of processing are:

i. Dressed: fish are headed and gutted and the pectoral fin is removed by cutting back along the fish and removing some of the belly flap and head meat. However, exactly how this is done depends on the species and where the product will be processed (see McGibbon *et al.* 2008). A more specific definition is provided by the New Zealand government that is referred to by McGibbon *et al.* (2008)
ii. Headed and gutted (H&G): This is similar to 'dressed' above but may (or may not) have the belly flaps trimmed or removed;

The moral is to be sure that the conversion factor to whole weight that is used reflects what is happening on the processing deck of the factory trawler involved.

2. RECORDING OF CATCH AMOUNTS

Factory trawlers usually do not measure the weight of the haul resulting from individual tows though this may be visually estimated by the officer on watch. Rather, the amount of fish processed in successive 24-hour periods is recorded in terms of processed weight and product form. Round/whole weight of catch can then be estimated using the appropriate conversion factor but see McGibbon *et al*. (2008). Positions of tows are recorded and the catch is ascribed to a particular area of UTF.

3. MEASUREMENT OF FISHING EFFORT - WHAT IS AN APPROPRIATE MEASURE OF FISHING EFFORT?

Effective regulation of a fishery usually requires good measures of the amount of fishing effort that has happened in an area and for a specified time. Ideally, the unit of fishing effort used should be meaningful in relation to the fishery. This is complicated in the SIO alfonsino fishery by how the respective vessels operate (see Section 3.2) and the fishing tactics they use.

Two (three?) of the vessels fish using aimed trawling. Successful aimed trawling requires that a commercially viable aggregation of fish is located where the skipper believes that a successful tow can be completed. Important here is that should the gear make contact with the seafloor it will not become fast with a significant risk of gear damage or even loss of the entire gear - °€100 000. Depending on the behavior of the fish and the skill and luck of the skipper a catch of all, some or none of the alfonsino aggregation may result. The issue here is what is the appropriate measure of fishing effort?

Conventionally, management models are based on the assumption that for any particular level of fish biomass, the catch is proportional to the amount of fishing effort and the fish biomass, mediated through the *catchability coefficient*:

$$C = qBf$$

Where:

C = catch
q = catchability coefficient, a constant giving the fraction of the biomass taken by a unit of fishing effort
B = fish biomass.

In this management model, as biomass declines, so does catch in proportion. When fishing involves active search for fish concentrations, as in this fishery, this relation is not constant. Catches may remain high as the trawl is set on successive aggregations of fish until few fish aggregations remain – *hyperdepletion* – a phenomenon well recognized in fisheries for at least 50 years.

But, managers need an indication of how catch changes as does fishing effort, i.e.is change in catch related to a corresponding change in fishing effort and how? A number of options exist for the measurement of fishing effort in the alfonsino fishery, all with some deficiencies in how well they describe the effective fishing effort in the fishery. These are described as follows.

- *Number of Vessels that participated in the fishery on an annual basis*

An advantage of this measure is that this measure is known (IUU fishing notwithstanding).[1] The disadvantage of this measure is immediately apparent. Of the three (potentially four) vessels in the alfonsino fishery:

i. One targets alfonsino year-round
ii. A second targets alfonsino outside of the winter spawn season for orange roughy
iii. A third divides its annual fishing effort between the North Pacific and the Southern Indian Ocean and
iv. A fourth mainly fishes within its flag state's EEZ and will fish in the Area if it has exhausted its quota in its EEZ fishery.
v.

Analysis requires determining an annual estimate of 'equivalent' fishing vessels notwithstanding the complications described in Section 4.

- *Number of days spent at sea*

This measure would exclude time spent in port, usually for trip turn-around requirements and/or vessel refit. It implicitly includes:

- The time spent travelling to, and returning from, the fishing grounds and
- The time spent searching for fish and switching fishing grounds.

It should be expected that as total overall resource abundance declines, the time spent searching for fishable aggregations will increase. This phenomenon – changes in time spent 'searching' - should probably be the object of a separate study. Travel to and from the port will be around 10% (?) of the time spent at sea but this can be easily checked..

- *Number of days on which fishing took place, i.e. the gear was in the sea*

This measure will exclude potential bias from excessive travel time – but as noted above, it may not be appropriate to do so. Agreement would be needed as to how to handle tows started on one day and finished the next day. I suggest that only the start day is counted.

- *Number of tows*

This is the conventional measure used by fishery analysts. The failure of the number of tows as a measure of effective fishing effort in this fishery has been described by Shotton (2018a).

- *Time the gear was on the bottom or in the sea*

The time a trawl is on the bottom is another metric used by fishery analysts. This measure attempts to avoid bias arising from differences in the length of a fishing tow and thus provide a better estimate of fishing effort. A significant complication arises in its potential use for analysis of the SIO alfonsino fishery.

[1] There is no evidence of this.

Complications exist in the deciding when a tow starts. The practice of skippers in this fishery is to record the start time of the tow when the gear is at the intended fishing depth. Keep in mind that the trawl may be up to a nautical mile behind the vessel and has to be maneuvered to enable it to catch the fish aggregation, first detected under the vessel. At this time the trawl could be some distance from the UTF on which the set will be attempted. As the gear approaches the fish concentration the trawl may contact the bottom but only when the fish have been driven to the bottom prior to (the skipper hopes) entry into the trawl. If fish encounter a thermocline they may swim off the feature. A question is what is the appropriate time to records as the start of the tow? The skipper may spend more or less time positioning the tow before it was decided that the gear is at the 'fishable depth' and the start of the tow is recorded. Variations in this time would be expected to have no relation to fish abundance, locally or generally.

4. ASSESSMENT OF RESOURCE ABUNDANCE

4.1 USE OF ACOUSTIC SURVEYS

A good acoustic fish-stock assessment provides a fishery-independent estimate of abundance. Their results can complement estimates derived from analysis of fishery data and may also be used to initialize such methods.

In the SIO alfonsino fishery, acoustic surveys must be integrated into the factory trawler operations, either by stopping fishing operations to undertake the survey or by surveying while the vessel is processing the catch. All vessels currently targeting alfonsino in the SIO are equipped with the necessary acoustic systems needed for 'scientific level' acoustic fish stock assessment surveys. Interpretation of the echo record requires specialist data analysis. Companies able to do this exist in Australia (CSIRO, Hobart), Cape Town (Marine Resource Surveys), New Zealand (NIWA) and no doubt elsewhere.

To best benefit from the results of acoustic surveys include the following requirements:

- Agreement on vessel survey procedures and data recording practices
- Agreement on the area(s) to be surveyed
- Agreement on the minimum frequency of surveys
- Agreement on role/responsibilities of vessel operators
- Agreement on the period of time to be allocated to a single survey – precision required of results
- Design and implementation of a programme of data analysis to determine backscattering cross section of alfonsino (note: the required data probably exist already)
- Usefulness of minimum biomass estimates
- And more such as calibration procedures.

Information and insights are given in FAO (2011) and Shotton (2006). A small team, working inter-sessionally and dedicated to dealing with this task is probably a good way to achieve these goals.

4.2 Other Critical Factors Affecting Indications of Alfonsino Resource Abundance

The success of fishing effort targeting alfonsino is affected by the presence of fishable aggregations of alfonsino in association with fishable UTFs. This in turn is related to:

- The absolute stock abundance of alfonsino but the nature of this relation is poorly understood and is highly uncertain
- The coincidence of water masses at temperatures clement to the distributional behavior of alfonsino.

The area of the SIO where the alfonsino fisheries occur is dynamic in terms of its fisheries oceanography. They are subject ot the passage of large scale gyres and small scale eddies associated with and influenced by

the UTFs that are present. (see, e.g. Shotton 2006 and SIODFA). These phenomena now appear to be supplemented by the effects of *climate change'* on the distribution of the SIO water masses such that unprecedented changes in water temperatures are resulting in current and unprecedented changes in alfonsino distributional behaviour (20018-2019).

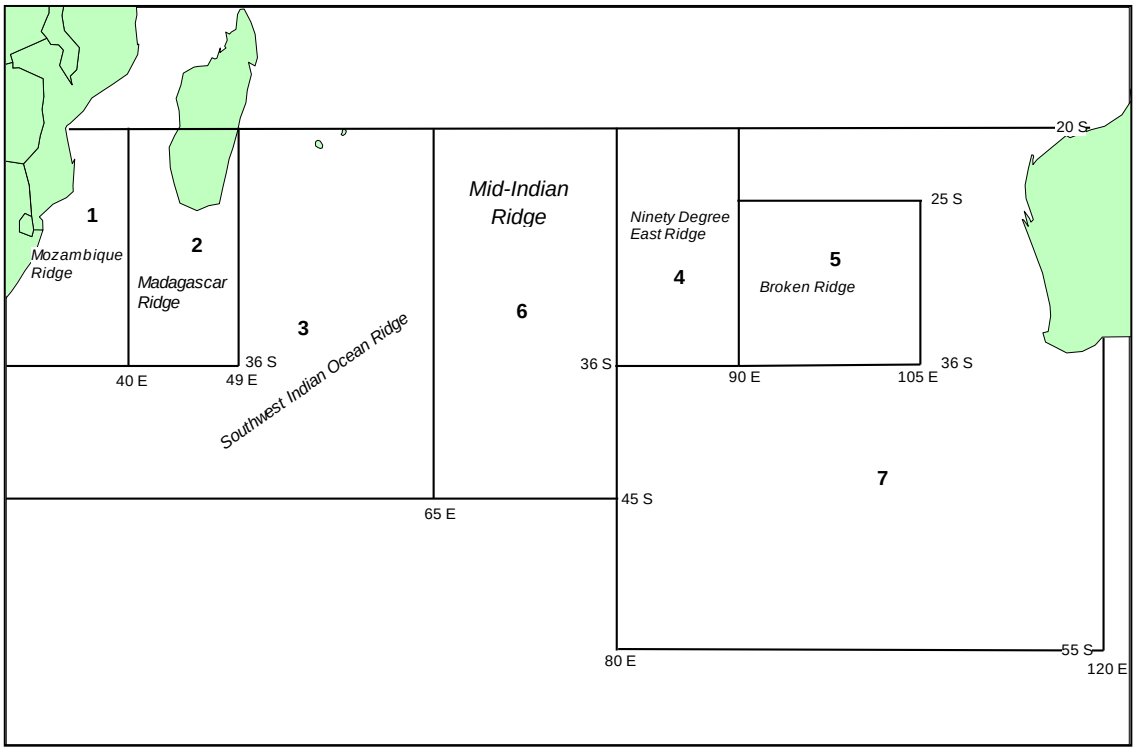
We are poorly prepared, if at all, to deal with such phenomena through existing management models and assessment methodology. Bleating about the precautionary approach offers only the most threadbare support for addressing this issue. It does raise the question as to **what** environment risks are envisaged in the name of the corresponding working group.

5. WHAT ARE APPROPRIATE MANAGEMENT UNITS

Ideally, the management unit that is chosen has a functional relation to the fish stocks it embraces. Alas, nothing has been determined about the stock structure of the alfonsino resources in the SIO. Further, at this time the catch data record has not been disaggregated by even major management areas. What is required is to disaggregate existing data by putative management areas and use this stratification in the ongoing collection and analysis of data. A first attempt at specifying management units was made in FAO (2002) – See Figure 1.

Figure 1
Subareas proposed for reporting of catch and effort data
for the Southern Indian Ocean deepwater fisheries

There is no indication of straddling stocks in the Agreement area. A SIODFA vessel had, in the past, had access rights so as to target alfonsino on the Madagascar Ridge within the Madagascan EEZ.



A working group needs to be formed to analyze catch data, notwithstanding the requirements for data confidentiality (Section 6), perhaps disaggregated to an individual UTF basis. This would enable development of meaningful management units.

Those who best understand the possible stock structure of alfonsino in the fishery are the vessel skippers. It would be perverse not to use their knowledge. Skippers' meetings have been held in the past (Cape Town, June 2008 [FAO 2008] and Nelson, New Zealand, October 2009) to document information about the deepwater SIO fisheries. It should be of great benefit to convene a further such meeting to address benefit from skipper's knowledge. A meeting could be held, e.g., in Mauritius, Nelson and/or Cape Town.

6. SPECIFICATION OF A HARVESTING STRATEGY

What constitutes a harvesting strategy differs in different management jurisdictions (see for example Shotton (2018b). Discussion as to what should constitute a harvest control rule for the SIOFA alfonsino fishery remains to be done. In general terms the objectives for management of fisheries in the SIOFA area are specified in the text of the Agreement.[2] Provision on advice regarding absolute abundance of alfonsino resources in the SIOFA area appears still a somewhat distant goal though management using relative measures should be possible.

6. PROCESSING OF CATCH DATA – THE BUGBEAR OF DATA CONFIDENTIALITY

The Conservation and Management Measure for Data Confidentiality and Procedures for access and use of data (Data Confidentiality) is defined by CMM 2016/03 (SIOFA 2016). In a preambular paragraph it notes the requirement of "where appropriate maintaining confidentiality of data as it relates to the application of relevant national legislation". This requirement appears to trump the objective of transparency, e.g. public-level data. Publically availabile data should be on the basis of 5° blocks = 5° of latitude – 300 nm or 556 km, subject to the requirement that the catch of no single vessel can be identified within a time/area stratum. Where this not to be the case, data must be aggregated. In the case of the Scientific Committee, finer-scale data including catch and effort, length-frequency and observer data will be made available to the Scientific Committee and any of its working groups, on a confidential basis, to undertake its work. The CMM does not report what the minimum finer scale is or should be. However, its release, even presumably to the Scientific Committee, requires the written authorization of the flag state that made the data available.

No view is documented in the CMM as to have constitutes "finer scale". But, vessel operators are acutely aware that essentially there is little of no regulatory constraint on entry into the fishery. This is a major impediment to ensuring sustainability of the fisheries disclosure: the danger of open-access in fisheries has been widely known for decades!

7. LITERATURE CITED

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[2] Maximum sustainable yield.

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Appendix I
Vessels Operated by SIODFA Members

F.T. Will Watch

F.T. Nikko Maru No. 1

F.V. Atlas Cove

F.T. Tomi Maru No. 58