

FISHERY ASSESSMENT REPORT

IFFO GLOBAL STANDARD FOR RESPONSIBLE SUPPLY OF FISHMEAL AND FISH OIL



FISHERY:	<i>Anchovy (Engraulis encrasicolus)</i>
LOCATION:	South Africa
DATE OF REPORT:	November 2015
ASSESSOR:	Deirdre Hoare

1. APPLICATION DETAILS AND SUMMARY OF THE ASSESSMENT OUTCOME

Name:

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Key Contact:		Title:	
Certification Body Details			
Name of Certification Body:		Global Trust Certification Ltd.	
Assessor Name	Peer Reviewer	Assessment Days	Initial/Surveillance/ Re-certification
Deirdre Hoare		7	reassessment
Assessment Period	2014-2015		
Scope Details			
1. Scope of Assessment		IFFO Global Standard for Responsible Supply – Issue 1	
2. Fishery		Anchovy (<i>Engraulis encrasicolus</i>)	
3. Fishery Location		South Africa	
4. Fishery Method		Purse seine	
Outcome of Assessment			
5. Overall Fishery Compliance Rating		High	
6. Sub Components of Low Compliance		None	
7. Information deficiency		None	
8. Peer Review Evaluation			
9. Recommendation		Approve fishery	

2. QUALITY OF INFORMATION

Good; primarily government reports and websites.

3. COMPLIANCE LEVEL ACHIEVED

High.

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Recommendation
Approve fishery
4. GUIDANCE FOR ONSITE ASSESSMENT
Based on HIGH compliance findings
Based on MEDIUM compliance findings
Based on LOW compliance findings
5. ASSESSMENT DETERMINATION
<p>The South African anchovy fishery continues to be managed as described in the initial fishery assessment. There have been no substantial changes made to either the frameworks or practices applied in the management process. Landings continue to be substantially below TAC, which is set according to the scientifically-derived Operational Management Procedure. In 2014 a new Operational Management Procedure (OMP-14) for the small pelagic fishery, and a fisheries act amendment Bill for South African fisheries in general, were implemented and reviewed during this assessment. At the time of this assessment, the assessment team considers that the fishery should remain approved against the IFFO RS standard.</p>
HIGH Compliance
A1, A2, A3, B1, B2, C1, D2, D3, E1, E2
MEDIUM Compliance
D1
LOW Compliance

SUMMARY OF LEVEL OF COMPLIANCE					
	The Management Framework and Procedures	Stock assessment procedures and management advice	Precautionary approach	Management measures	Implementation
legal and administrative basis	A1				
Fisheries management should be concerned with the whole stock unit	A2				
Management actions should be scientifically based	A3				
Research in support of fisheries conservation and management should exist		B1			
Best scientific evidence available should be taken into account when designing conservation and management measures		B2			
The precautionary approach is applied in the formulation of management plans			C1		
The level of fishing permitted should be set according to management advice given by research organisations				D1	
Where excess fishing capacity exist, mechanisms should be in established to reduced capacity				D2	
Management measures should ensure that fishing gear and fishing practices do not have a significant impact on non-target species and the physical environment				D3	
A framework for sanctions of violation of laws and regulations should be efficiently exists					E1
A management system for fisheries control and enforcement should be established					E2

KEY: Low Compliance: Medium Compliance: High Compliance:

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6. RATIONALE OF THE ASSESSMENT OUTCOME	
A. THE MANAGEMENT FRAMEWORK AND PROCEDURE	
LEVEL OF COMPLIANCE	
<i>A1. The management of the fishery must include a legal and administrative basis for the implementation of measures and controls to support the conservation of the fishery.</i>	
LOW	An administrative framework that ensures an efficient management of the fishery for its conservation is not established.
MEDIUM	An administrative framework that ensures an efficient management of the fishery for its conservation is somehow established, but there is evidence of not being efficient to ensure the conservation of the stock.
HIGH	A legal and administrative framework that ensures an efficient management of the fishery for its conservation is established and works efficiently toward the conservation of the stock.
<p><i>Determination: South Africa has in place a robust legal and administrative framework for the determination and implementation of fishery management measures and controls. This framework is applied to the anchovy fishery.</i></p> <p>Legal Basis</p> <p>The legal foundation for the management of South African fisheries, including fisheries for sardine, anchovy and round herring, is the Marine Living Resources Act, 1998 (Act No. 18, 1998) of South Africa, which includes the following overarching goals:</p> <ul style="list-style-type: none"> • achieve optimum utilisation and ecologically sustainable development of marine living resources • conserve marine living resources for present and future generations • apply precautionary approaches in respect of the management and development of marine living resources • utilise marine living resources to achieve economic growth, human resource development, capacity building within fisheries and mariculture branches, employment creation and a sound ecological balance consistent with the development objectives of the national government • protect the ecosystem as a whole, including species which are not targeted for exploitation; • preserve marine biodiversity <p>minimise marine pollution</p> <ul style="list-style-type: none"> • achieve to the extent practicable a broad and accountable participation in the decision- making processes provided for in the Act <p>The passing of the Marine Living Resources Amendment Bill 2013 has resulted in some changes to the basis for fisheries management since the 2013 surveillance. The Bill replaces the concept of subsistence fisheries with ‘small-scale’ fisheries, and introduces the main mechanisms by which the fisheries Minister may exert control over these; primarily, through licencing, area restrictions and quotas.</p> <p>Administrative Basis</p> <p>The South African fishing industry is managed and regulated by the Fisheries Management Branch (FMB) of the Department of Agriculture, Forestry and Fisheries (DAFF). The FMB is the primary implementer of the Marine Living Resources Act, and its aims include the maintenance and restoration of the productive capacity and biodiversity of the marine environment, ensuring the protection of human health, and promotion of the conservation and sustainable use of marine living resources. The Branch conducts research and monitoring on anchovy, amongst other stocks, including biannual research surveys, manned field stations, and creating Scientific Working Groups (SWGs) to gather state and invited outside specialist scientists to assess the status of the various pelagic stocks. The FMB uses this research to make recommendations regarding management measures, including total allowable catches (TACs) and fishery closures. The specific SWG relevant to the anchovy stock is the Small Pelagic Scientific Working Group, which provides advice and recommendations to ensure the sustainable utilisation of South Africa's small</p>	

H

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pelagic fish resources.
R1, R2

LEVEL OF COMPLIANCE

A2. Fisheries management should be concerned with the whole stock unit over its entire area of distribution and take into account fishery removals and the biology of the species.

LOW	Fisheries management is not concerned with the whole stock unit over its entire area of distribution and do not take into account any of the matters listed in 'A1'.
MEDIUM	Fisheries management is concerned with matters listed in 'A1' but not entirely. Fisheries, in relation to 'A1' statement, should improve to ensure the long term conservation of the marine resource.
HIGH	Fisheries management should be concerned with the whole stock unit over its entire area of distribution and take into account: <ul style="list-style-type: none"> • All fishery removals • The biology of the species

Determination: The information provided to the assessment team suggests that the South African anchovy fishery is considered by scientists to constitute a distinct population, largely separate from the more northern *E. encrasicolus* distribution, justifying its management as a distinct stock.

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Sardine, anchovy, horse mackerel, round herring, lanternfish, and lightfish occur in the Benguela Ecosystem, which can be loosely considered to cover the continental shelf between the Angola-Benguela frontal zone off northern Namibia/southern Angola and the Agulhas retrolection area, typically between 36 °S and 37 °S. As such, it covers the west coast of South Africa, the entire Namibian coast, and part of southern Angola, depending on the position of the Angola-Benguela front, which moves seasonally typically between 14°S and 17°S. Thus although *E. encrasicolus* is phenotypically almost indistinguishable across its entire distribution from Scandinavia to South Africa, there is considered to be little or no mixing of the South African and Namibian stocks of anchovy, and the Namibian and South African stocks of the various Low Trophic Fishery species are managed entirely separately.

The two primary target species in the small pelagic fishery, sardine and anchovy, have to be managed jointly because the two stocks interact. Sardine and anchovy shoal together as juveniles, so any catch of juvenile anchovy is unavoidably accompanied by a bycatch of juvenile sardine. A larger anchovy TAC in one year could therefore have a negative effect on the potential (directed) catch of adult sardine some years later and the industry is faced with a choice between the anchovy catch and the directed sardine catch. For this reason, the two fisheries are considered jointly to allow more effective management of this trade-off.

Since June 2008, South Africa has been a member of the South East Atlantic Fisheries Organisation (SEAFO). The objective of the organisation is to ensure the long-term conservation and sustainable use of the fishery resources in the Convention Area through the effective implementation of the Convention. The Convention Area excludes the exclusive economic zones of the coastal states in the region, and so is largely not applicable to the anchovy fishery.

R3-5

LEVEL OF COMPLIANCE

A3. Management actions should be based on long-term conservation objectives

LOW	Management actions are not based on long term management objectives.
MEDIUM	Management actions are based on long term management objectives. However the actions are not scientifically formulated.
HIGH	Management actions are based on long term management objectives, and actions are science based.

Determination: The Operation Management Procedure sets out a probability-based, specific, and long-term objective for maintaining anchovy spawning stock biomass.

H

The long-term conservation objectives of the management of the South African small pelagic fishery are set

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out in the Operational Management Procedure (OMP). At the time of the initial and first surveillance assessments, the active OMP was OMP-08, which was due to be replaced by OMP-13 towards the end of 2013. Given the extensive testing desired for this new management procedure, which among other factors includes taking account of the possibility of multiple sardine stocks and of the impact of the recommended catches on penguins, a final version of OMP-13 was delayed. However, the Small Pelagic Scientific Working Group agreed a revised version of "Interim OMP-13", called "Interim OMP-13v2" for use in June 2013 for calculating recommended final TAC/Bs for 2013.

OMP-14, the management procedure to be used to recommend total allowable catches (TACs) and bycatches (TABs) for sardine and anchovy in South African waters, was adopted by the Small Pelagic Scientific Working Group (SPSWG) at its meeting on 29th October 2014.

The key control parameters have been re-tuned based on updated perceptions of the sardine and anchovy resource productivity and dynamics (i.e. updated operating models), and changes made to the operating models to account for the removal of the additional season and inclusion of additional bycatches.

R6, R7

B. STOCK ASSESSMENT PROCEDURES AND MANAGEMENT ADVICE

LEVEL OF COMPLIANCE

B1. Research in support of fisheries conservation and management should exist.

LOW	Research to support the conservation and management of the stock, non-target species and physical environment does not exist
MEDIUM	Research to support the conservation and the management of the stock, non-target species and physical environment exists, however research programmes could be significantly improved to decrease scientific advice uncertainty.
HIGH	Research to support the conservation and the management of the stock, non-target species and physical environment exist, and existent research is considered most adequate for the long term conservation of the target, non-target and physical environment

Determination: Management of the South African small pelagic fishery is supported by ongoing fishery dependent and annual fishery independent research.

Fishery dependent: Information collected from pelagic landing sites includes the catch weight, species composition, and catch location (grouped into 10 × 10 mile blocks). Anchovy catch data are used to ensure quotas are not exceeded. Additionally, anchovy catch data and the ratio of juvenile sardine to anchovy as observed in commercial catches during May are both used as input in the operational management procedure in the mid-year determination of the revised anchovy total allowable catch and sardine total allowable bycatch. Catch location data are used to monitor spatial trends in fishing patterns and from those infer distribution patterns of pelagic species. For example, anchovy, round herring and sardine appear to have increased substantially in their distribution ranges between mid- to late 1980s and the 1990s and, since 1997, the average location of sardine catches has shifted further eastwards each year. Additionally, this data may be used in conjunction with other data sources to derive spatial ecosystem indicators such as an index of spatial biodiversity and the exploited fraction of the ecosystem surface for the pelagic fishery. Catch-at-age and weight-at-age data for both anchovy and sardine are generated from age-length keys derived from commercial catch samples, and are required for the stock assessment models. Biological data have been used to construct time series of indicators that characterise the state of the target stock and the fisheries they support. Observers on boats have been deployed in the pelagic fishery since 1999, to provide data relating to catch weight and locality, catch composition, and length frequencies of important species, in addition to collecting some biological data. Observer data has been used to validate catch data (primarily catch weight and species composition) recorded by fisheries inspectors at landing sites, and to compare the fishing behaviour of observed versus unobserved vessels. The most significant gap in the observer data pertains to the low coverage of the pelagic fleet, which is currently around 8% of fishing trips. Vessel monitoring systems are presently on board every pelagic vessel

and provide data on location (with a temporal resolution of six hours), but are currently only used for compliance purposes to ensure that vessels do not fish in restricted areas.

Fishery-independent: A hydroacoustic survey programme to estimate pelagic fish biomass was initiated in 1983. These surveys cover much of the continental shelf around South Africa, although the spawner biomass survey has a greater offshore coverage than does the recruitment survey. Annual biomass estimates of anchovy and sardine spawner biomass have been made every November since 1984, resulting in an uninterrupted time series that spans 22 years. The collection of ichthyoplankton samples during spawner biomass surveys permitted estimates of anchovy spawner biomass using the daily egg production method (DEPM), and between 1984 and 1993 concomitant acoustic and DEPM estimates were made which were combined to obtain a single, unbiased measure of population size. The DEPM estimates and acoustic survey estimates for anchovy spawner biomass showed good agreement over a period of ten years, leading to discontinuation of the DEPM due to the additional work load required to produce two essentially similar biomass estimates. Ichthyoplankton data have also been used more broadly to study other life history characteristics of the small pelagic species, such as spawning habitat and nursery areas.

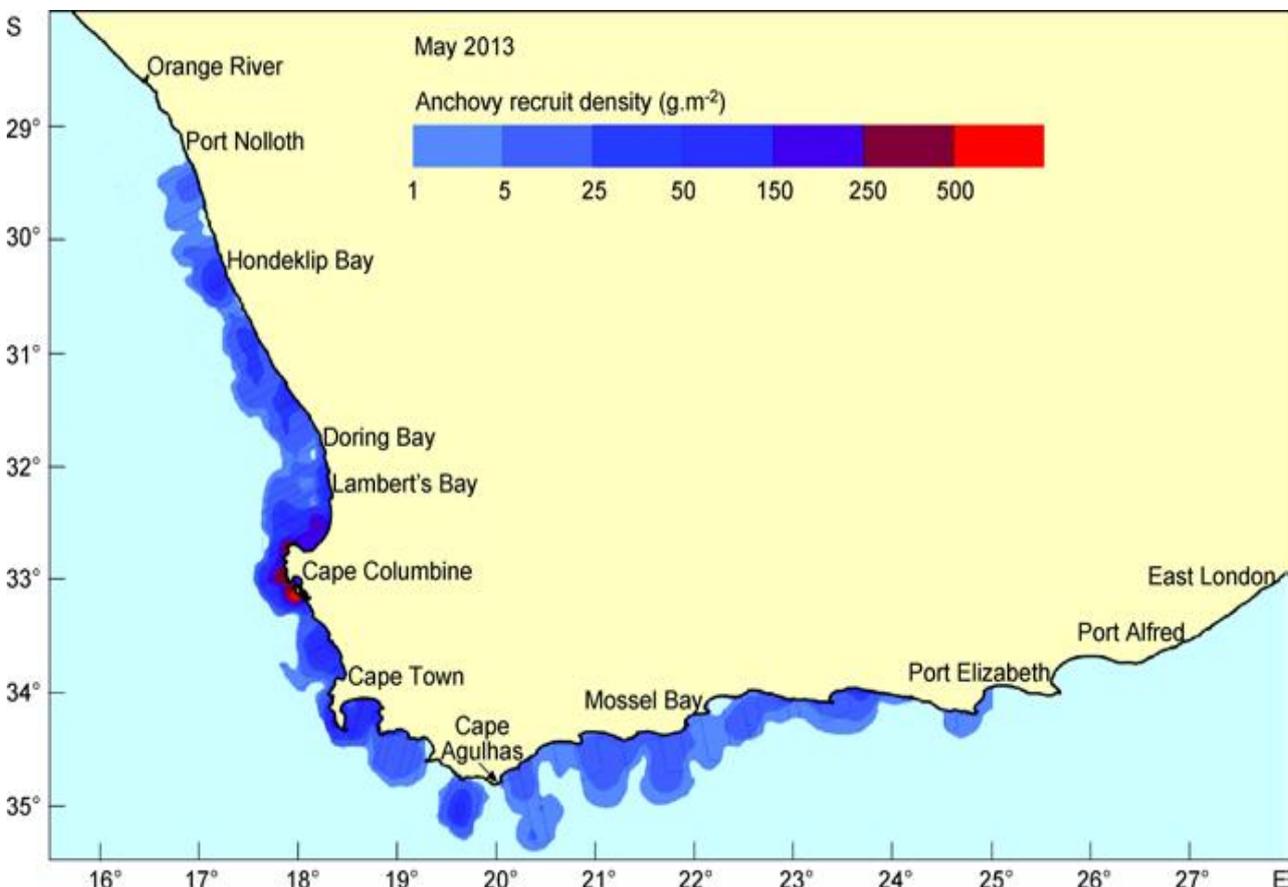


Figure 1. The distribution and relative density of anchovy recruits observed during the May 2013 recruitment survey.

R8,9,10

LEVEL OF COMPLIANCE	
<i>B2. Best scientific evidence available should be taken into account when designing conservation and management measures.</i>	
LOW	Scientific advice is not taken into account when designing conservation and management measures.
MEDIUM	Scientific advice is taken into account, when designing conservation and management measures. However some areas of discrepancy are identified that could have a significant impact in the long term conservation of the marine environment.

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HIGH	Scientific advice is taken into account, when designing conservation and management measures, in a comprehensively manner.
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Determination: Several scientific working groups are involved throughout the fishery management process, and in the opinion of the assessment team the recommendations of these groups are heavily relied upon for the development of management actions.

H

By constituting various scientific working groups, such as the Ecosystems Effects of Fishing Working Group and the Small Pelagic Scientific Working Group, the Fisheries Management Branch ensures that the best available scientific evidence is taken into account when designing conservation and management measures. The scientific working group for the sustainable management of small pelagic resources produces recommendations, including seasonal and sub-seasonal TACs and TABs, and other management measures where relevant. For example, the marine areas around the largest penguin breeding colony in the Eastern Cape (St Croix Island off Port Elizabeth) have been closed to pelagic fishing for several years as a result of scientific advice. The structure of the quota system is also based on scientific understanding of the relationship between the sardine and anchovy stocks, and the inevitable overlap between the fisheries. Sardine and anchovy shoal together as juveniles, so any catch of juvenile anchovy is unavoidably accompanied by a bycatch of juvenile sardine. An initial juvenile sardine TAB is set to allow fishing for anchovy to start in January, and then revised after the May/June survey allows an estimate of that year's recruitment. The policy aims to restrict juvenile sardine bycatch (and therefore by necessity anchovy-directed catches) in order to secure the long-term future of the sardine directed fishery. One consequence of this sardine-anchovy trade-off is that the limitations on juvenile sardine bycatch can lead to lower anchovy catches than that resource could actually sustain. However, juvenile sardine and anchovy, which appear in mixed shoals of similar sized fish when they first recruit to the fishery, tend to separate later in the season, and so to address concerns of under-utilisation a later sub-season to target "clean" anchovy shoals was introduced. Annual anchovy quotas are divided into 'normal' season (1 Jan – 31 Aug) and 'sub-season' (1 September – 31 December). According to the South African Sustainable Seafood Initiative, set up by the WWF, the broad consensus amongst experts is that management procedures for the anchovy stock are generally effective; there are precautionary limits in place which come into effect if the stock is perceived to be in trouble.

R4, R8, R11

C. THE PRECAUTIONARY APPROACH

LEVEL OF COMPLIANCE

C1. The precautionary approach is applied in the formulation of management plans.

LOW	The precautionary approach is not applied in the formulation of management plans.
MEDIUM	The precautionary approach is applied, however not all uncertainties are taken into account.
HIGH	The precautionary approach is applied, taking into account uncertainties relating to the dynamic of fish population (recruitment, mortality, growth and fecundity), and the impact of the fishing activities, such as discards and by-catch of non-target species as well as on the physical environment (Habitats).

Determination: South African fisheries policy states the application of the precautionary approach as one of the primary aims. The small pelagic OMP utilises a risk-based approach to setting annual quotas, factoring in a large number of research variables (detailed below).

H

The Marine Living Resources Act, 1998 includes as one of its recognised principals "the need to apply precautionary approaches in respect of the management and development of marine living resources". OMPs are aimed at quantifying risks and benefits of alternative short- and long-term management options, in terms that resource managers and decision-makers can understand and

relate to. OMPs perform a risk analysis, which allows results to be expressed as the probability that a defined event will occur (e.g. the biomass falling below a specified threshold level or the fishery collapsing) within a fixed period. Commonly used risk statistics include the probability of depleting the (spawning-stock) biomass below some threshold or the median biomass expected at the end of the simulation period (compared with the biomass at the onset of this period).

At the time of the initial and first surveillance assessments, the small pelagic fishery was managed by OMP-08. This OMP performed a risk analysis, which allowed results to be expressed as the probability that a defined event will occur (e.g. the biomass falling below a specified threshold level or the fishery collapsing) within a fixed period for the two main target species, sardine and anchovy. An undated management procedure is now in place OMP-14 however the definitions of risk have remained unchanged from OMP-08: the probability that anchovy 1+ biomass falls below 10% of the average anchovy 1+ biomass between November 1984 and November 1999 at least once during the projection period of 20 years. However, given changes to key assumptions in the base case operating model for anchovy, particularly those relating to natural mortality and stock-recruit relationships, the method of de Moor and Butterworth (2010) could not be applied straightforwardly to obtain a new risk level for anchovy. The SPSWG thus agreed use a maximum risk level of 0.25 for anchovy.

The OMP quota calculation model factors in a large number of variables, including observed estimates of sardine and anchovy abundances from the acoustic surveys; historical catches and biomass estimates; predicted annual bycatch of small pelagic species in other fisheries; estimated ratios of juvenile sardine to juvenile anchovy; and also fixed values reflecting the relative risk levels and economic factors of the stocks. Although under normal conditions there is a minimum recommendable TAC, under exceptional circumstances (i.e. if estimated biomass falls below a pre-defined level), this minimum quota can be ignored. For example, the 1997 anchovy TAC was 0t

R1, R4

D. MANAGEMENT MEASURES

LEVEL OF COMPLIANCE

D1. The level of fishing permitted should be set according to management advice given by research organisations.

LOW	The level of fishing permitted is not set according to management advice given by research organisations.
MEDIUM	The level of fishing permitted is higher than management advice given by research organisations. However, the difference is not considered to have a significant impact of the sustainability of the stock
HIGH	The level of fishing permitted is set according to management advice given by research organisations.

Determination: Although the anchovy TAC has historically been set in line with the scientific advice, and the 2014 TAC followed scientific advice, the 2015 TAC has been set higher than the scientific advice. However the TAC for 2015 is still within the maximum allowed TAC for 2015 according to the OMP-14.

M

The level of fishing permitted is set according to the annual management advice given by the Small Pelagic Scientific Working Group, which in turn calculates its recommendation based on the scientifically-derived formula detailed in the OMP. Historically, these recommendations have been implemented and the total landings have been within the TAC set.

Recommended Directed anchovy normal season TAC for 2014: 450 000 tonnes.

2014 Anchovy final TAC	450 000t
Juvenile Sardine by-catch allowance	44 477t

The initial 2015 TAC and TAB recommendations are calculated by OMP-14 to be:

Initial normal season anchovy TAC: 305 060 tonnes

Initial normal season ≤14cm sardine TAB with directed anchovy fishing: 31 118 tonnes

>14cm sardine TAB with directed round herring and anchovy fishing: 7 000 tonnes

≤14cm sardine TAB with directed round herring fishing: 1 000 tonnes

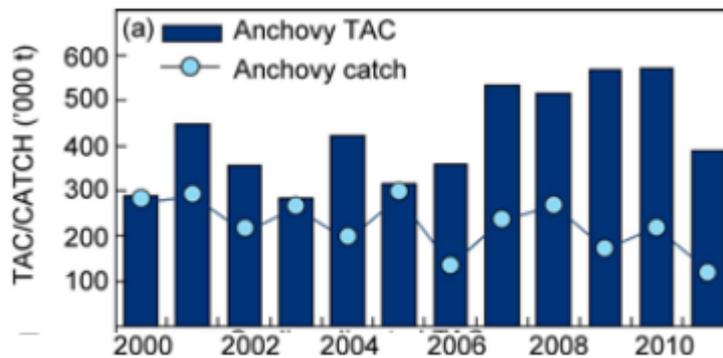
Anchovy TAB for sardine only right holders: 500 tonnes

2015

INITIAL Anchovy TAC	305 060t
Juvenile Sardine by-catch allowance (associated with anchovy directed catches)	31 118t

FINAL Anchovy TAC	450 000t
Juvenile Sardine by-catch allowance (associated with anchovy directed catches)	66 375t

However this is still within the Maximum total anchovy TAC allowed by the OMP-14. 450 000t



TAC (bars) and annual landings (circles) for anchovy, 2000 – 2011. From the DAFF fishery status report, 2012 (R4).

LEVEL OF COMPLIANCE

D2. Where excess fishing capacity exist, mechanisms should be in established to reduced capacity to allow for the recovery of the stock to sustainable levels.

LOW	Mechanisms to allow for recovery of the stock to sustainable levels are not established.
MEDIUM	Mechanisms to allow for recovery of the stock to sustainable levels are somehow established. However there is no evidence of the efficiency of the methods used.
HIGH	Mechanisms are established to reduce capacity to allow for the recovery of the stock to sustainable levels and there are evidences of recovery.

Determination: South Africa has several mechanisms in place to reduce excess fishing capacity, including the setting of strict, enforced quotas, vessel registering and commercial fishing licenses.

H

There is currently not considered to be excess fishing capacity in this fishery. Any commercial fishing in South Africa requires an annually-renewed license. Commercial fishers are considered to be exercising a fishing right. The right must first be applied for and granted, to exploit, harvest fish or engage in a fishing related activity for trade purposes. It also includes engagement in fishing related and non-consumptive activities. Commercial fishing permits are granted by the Minister of Department of Agriculture, Forestry and Fisheries (or the delegated authority). Full or limited commercial fishing rights are granted in selected

fishing sectors based on a Total Allowable Catch or Effort (TAC/E) which is determined annually by the Minister of the Department of Agriculture, Forestry and Fisheries. It is illegal to engage in commercial fishing without a permit. In addition, any vessel which is “used for, or equipped for the management, harvesting and exploitation of living marine resources, or in support of related activities” must be registered with and approved by the DAFF and African Maritime Safety Authority (AMSA). Historically, when anchovy and sardine biomass levels have been low, TACs and TABs have been adjusted accordingly to allow stock recovery, extending as far as the closure of the anchovy fishery in 1997.
R12, R13

LEVEL OF COMPLIANCE

D3. Management measures should ensure that fishing gear and fishing practices do not have a significant impact on non-target species and the physical environment.

LOW	There are no management measures to prevent the impact of the fishing methods and fishing practices on non-target species and the physical environment.
MEDIUM	There are management measures to prevent the impact of the fishing methods and fishing practices on non-target species and the physical environment. However it is not science based.
HIGH	There are management measures to prevent the impact of the fishing methods and fishing practices on non-target species and the physical environment. Measures are based on scientific information.

Determination: Purse-seine nets are not considered to have a major impact on the physical environment. The major bycatch species in the small pelagic fishery are subject to quotas, and in any case the fishery is considered highly targeted (within the four main species caught). DAFF scientists have stated that there is no PET bycatch in the fishery.

Anchovy are caught using purse-seine nets in the mid-water. This method is preferred for capturing commercially important fish species which aggregate close to the water’s surface, and is not considered destructive to the benthic habitat or species within the benthic habitat. Bycatch in the small pelagic fishery is less than 10 %, due to the dense schooling behaviour of target species and the fishing methods employed. Some reef species traditionally referred to as linefish (e.g. yellowtail, white steenbras and kob) are occasionally caught. The two major bycatch species, redeye round herring and horse mackerel, are subject to annual quotas. Small pelagic fishing permits set out a detailed plan for regional fishery closures if bycatch exceeds defined minimums, and processor permits prohibit certain gear types to minimise Cape fur seal casualties. Government scientists (from the Small Pelagic Scientific Working Group, SPSWG) have stated that there is no TEP bycatch in the small pelagic fishery. Sealions and seals are scared out of the nets by skippers when they are seen. All landings are monitored by a government official, who completes a pelagic landing report for each vessel. Skippers also complete a report, which must match the monitor’s figures to within 10%. Samples are taken of landings every 30 minutes to check bycatch composition. Excessive bycatch of certain species leads to area closures, as described in the assessment report. Small pelagic fish such as anchovy are an important part of the food chain in the Benguela Current, and as such they are important for the functioning of the ecosystem in the region. It is illegal in South Africa to use any explosive, fire arm, poison or other noxious substance to catch fish.

African Penguins

The African Penguins are severely under threat and are now considered Endangered by the World Conservation Union (www.iucnredlist.org). Their populations have decreased by over 70% in the last ten years, initially as a result of egg collecting and guano scraping but more recently as a result

of competition between man and penguins for a source of food – sardines and anchovies. The RFA therefore opted to support a study by Dr Lorien Pichegru and Alistair McInnes of the University of Cape Town’s Percy FitzPatrick Institute of African Ornithology to assess the relationship between penguin foraging behaviour, prey abundance and fishing activity in the Algoa Bay region. St Croix Island is host to the world’s largest colony of African penguins (75 000 pairs) and was closed to fishing from 1 January 2009 to 31 December 2011 and nearby Bird Island (2500 pairs) remained open to fishing until the 1 of January 2012 after which it was closed for 3 years.

The project was aimed at defining the links between fishing closures and food availability for penguins, understanding how penguins respond to variable prey availability, and optimizing closures regarding both economic and biological needs. Acoustic surveys were used to assess the penguin’s prey availability, while high numbers of GPS tracking devices were simultaneously deployed on breeding penguins from colonies open and closed to fishing pressure to track foraging behaviour.

Although this study is part of a bigger project which still requires further work, the findings at this stage indicate that:

1. Foraging effort could be related to fish abundance in Algoa Bay, as low fish abundance was concomitant with high foraging effort on both islands in 2012 whereas the opposite was encountered in 2013.
2. Obvious difference in fish abundance was not observed between fished and non-fished areas. However, the identification of the small pelagic species encountered still need to be assessed as it is possible that fishing depletes certain species, thereby modifying the general structure of the fish assemblages.
3. Industrial fishing pressure negatively impacts foraging effort of penguins breeding on St Croix Island and the implementation of a 20km exclusion zone has been demonstrated to benefit penguins. However, further data and the influence of natural physical drivers of fish abundance need to be investigated for stronger conclusions.

The assessment of local fish abundance in this study adds nuances to previously published results: while the size of commercial fishing clearly influences foraging effort, the magnitude of such influence certainly depends on local fish abundance which can vary annually. The results of this study will serve to inform the planning and future development of Marine Protected Areas in South Africa.

Table 1. Some examples of how the EAMR is being applied in the South African small pelagic fishery

Table of Exemples				
The Issue	Indicators	Research Approaches	Technical Management	Implementation
Impacts of removal of forage fish on species bound to breeding sites on land (i.e. seabirds)	Bird population sizes; breeding success (fledgling weight, fledglings raised per breeding pair, breeding proportion); seabird diet composition;	Routine monitoring of seabird colonies; satellite tracking to assess foraging ranges; minimum realistic models; spatialised models of pelagic fish around	Avoid populations falling below levels that exceed limit reference points according to IUCN conservation criteria by reducing TACs or closing areas within foraging ranges; allow sufficient	Good potential for implementation of management response/ability to manage

	spatial indicators(e.g. overlap of seabird foraging and pelagic fisheries)	seabird colonies Quantify and formalise the link between the pelagic fishery and seabirds; quantify functional responses of seabirds to small pelagic prey and identify thresholds below which there are serious negative implications for seabirds	escapement of forage fish for predators; avoid threshold levels of pelagic fish below which the implications for seabirds are detrimental	
Poor understanding of decadal scale fluctuations in abundance of small pelagic fish and thus availability to fisheries	Biomass; catches; trophic replacement index; diet of predators (e.g. seabirds)	Develop indicators to track ecosystem changes; hindcast to pre-fishing period to provide information on ecosystem effects of fishing; develop expert system models to detect ecosystem changes (using indicators); compare ecosystem functioning over different periods and between systems; quantify trophic controls (bottom-up,top-down, wasp-waist); time-series analyses	Manage catches within productivity states/regimes, as identified using indicators of ecosystem state/ change Benefit: optimisation of catches while keeping the risk low that catch levels will accelerate stock decline	Fair potential for implementation of management response/ability to manage

R14, R15

E. IMPLEMENTATION

LEVEL OF COMPLIANCE

E1. There should be a framework for sanctions of violation of Laws and regulations.

LOW	A framework for sanctions of violation of Laws and regulations do not efficiently exist.
MEDIUM	A framework for sanctions of violation of Laws and regulations do exist but do not work efficiently.
HIGH	A framework for sanctions of violation of Laws and regulations exists and is proven to be efficient.

Determination: There is a detailed legal framework for sanctions of violations of laws and regulations by South African fishers

H

A framework of sanctions for violations of laws and regulations is established by the Marine Living

Resources Act, 1998 (Act No. 18, 1998) of South Africa, with jurisdiction throughout the South-African EEZ. There are numerous other Acts that add to the marine legislative framework that work in conjunction with the MLRA. These include the National Environmental Management: Protected Areas Act (No. 57 of 2003), the National Environmental Management: Biodiversity Act (No. 10 of 2004), the Maritime Zones Act (No. 15 of 1994), Sea Birds and Seals Protection Act (No. 46 of 1973), Sea Shore Act (No. 21 of 1935) and the Nature and Environmental Conservation Ordinance, (Ordinance 19 of 1974). The Marine Living Resources Amendment Bill 2013 did not contain any changes to the sanctions framework.

Sanctions include the suspension or removal of fishing rights, the seizure of gear or vessels, fines of up to 5 million rand (approx. US\$500,000), or imprisonment for up to five years. A detailed list of sanctions is presented in Chapter 7 of the Marine Living Resources Act.

The conditions for small pelagic fishing permits include a section detailing the process of sanctions for violations.

LEVEL OF COMPLIANCE

E2. A management system for fisheries control and enforcement should be established.

LOW	A management system for fisheries control and enforcement is not established.
MEDIUM	A management system for fisheries control and enforcement is established but do not work efficiently.
HIGH	A management system for fisheries control and enforcement is established and work efficiently.

Determination: A management system for fisheries control and enforcement is established. Information obtained during a preliminary on-site visit confirms that the fishery is highly compliant in this section.

H

Enforcement is the responsibility of the Fisheries Management Branch of the Department of Agriculture, Forestry and Fisheries. Compliance is maintained through a comprehensive monitoring, control and surveillance strategy, 4 fishery patrol vessel warships and one chase vessel (used for all South African fisheries), officers and vessel monitoring systems. Vessel monitoring systems are presently on board every pelagic vessel and provide data on location (with a temporal resolution of six hours), and are used for compliance purposes to ensure that vessels do not fish in restricted areas. Both the skipper and holder of fishing rights of vessels detected fishing in closed or restricted areas are subject to fines. Fish must be landed in the presence of a Fishery Control Officer, who completes a pelagic landing report for each vessel. Skippers also complete a report, which must match the monitor’s figures to within 10%. Samples are taken of landings every 30 minutes to check bycatch composition. Excessive bycatch of certain species leads to area closures, as described above. Fishing permits also contain restrictions on where fish can be landed.

Catch data are recorded at landing, and observers are present on approximately 8% of fishing trips. All commercial fishing vessels are required by law to have a license and fishing permit, and all licensed vessels are required to permit observers and fishery control officers on board when requested. Full details of the powers of fishery control officers are set out in Chapter 6 of the Marine Living Resources Act, 1998.

7. KEY STAKEHOLDERS

Global Trust Certification Ltd, 3rd Floor, Block 3, Quayside Business Park, Mill Street, Dundalk, Co. Louth, Ireland Tel: 042 932 0912 Fax 042 938 6864

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8. REFERENCES

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R2 - South Africa Anchovy surveillance IFFO RS assessment, 2013: <http://www.iffo.net/files/iffoweb/approved-raw-materials/whole-fish/south-africa-anchovy-surveillance-july-2013.pdf>

R3– FAO species profile, Anchovy: <http://www.fao.org/fishery/species/2106/en>

R4 – South Africa OMP-14: Provided by client. OMP-14 C.L. de Moor* and D.S. Butterworth* FISHERIES/2014/DEC/SWG-PEL/60

R5 – South East Atlantic Fisheries Organisation: <http://www.seafo.org/>

R6- Interim OMP-13 v2 C.L. de Moor* and D.S. Butterworth* FISHERIES/2013/JUL/SWG-PEL/15

R8 – South Africa Department of Agriculture, Forestry and Fisheries: <http://www.daff.gov.za/>

R9 – Hutchings, L. et al, 2009: Marine fisheries monitoring programmes in South Africa. South African Journal of Science 105

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R11– South African Sustainable Seafood Initiative (SASSI) species page, Anchovy:
<http://wwfsassi.co.za/fish-species/anchovy-south-african/>

R12 – South Africa Government services, Applying for a fishing licence:
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R13 – FAO fisheries country profiles, South Africa: ftp://ftp.fao.org/FI/DOCUMENT/fcp/en/FI_CP_ZA.pdf

R14- Ecosystem Approach to the South African small pelagic fishery
http://www.vliz.be/wiki/Ecosystem_Approach_to_the_South_African_small_pelagic_fishery

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