STATUS AND MANAGEMENT OF THE SOUTH AFRICAN SMALL PELAGIC FISHERY

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THE FISHERY AND THE MANAGEMENT SYSTEM

The South African pelagic fishery is a limited-access, rights-based fishery, based on three species: sardine, anchovy and round herring. These species are found in South African waters ranging from the Orange River in the west to Port Alfred in the east and are caught with a mixture of wooden and steel-hulled purse seine vessels. Anchovy and round herring are reduced to fishmeal, whereas most of the sardines caught are canned, although some are marketed as fresh fillets or bait.

The Total Allowable Catches (TACs) for sardine and anchovy are set using a joint Operational Management Procedure (OMP). Juvenile sardine and anchovy school together during the first few months of their life and the young sardines are then prone to be regarded as an unwanted, but unavoidable, by-catch with the recruiting anchovy, which is targeted from April/May onwards as recruiting juvenile fish. This is usually the period when the juveniles of both species begin their southward migration along the west coast, from as far north as the Orange River, then via St Helena Bay and around Cape Point, back to their main spawning grounds on the eastern and western Agulhas Bank. A sardine Total Allowable By-catch (TAB) is also calculated to allow for reasonably unrestricted anchovy-directed fishing for about five months when the two species are quite extensively mixed in the sea.

Input data for the joint OMP are derived from annual hydroacoustic surveys conducted during November to measure the adult biomass of sardine, anchovy and round herring. Additional input data are also derived from dedicated annual hydroacoustic surveys during May/June the following year to measure the amount of recruitment stemming from spawning by the adult component measured in November.

FORAGE FISH

Sardine and anchovy are known as forage fish and they play a crucial role in marine food webs in many ecosystems. They are small and medium-sized pelagic species that occupy a key position in marine food webs, linking the energy produced by plankton to large-bodied fish, birds and mammals. The characteristics of forage fish include small body size, rapid growth, schooling behaviour, and strong population responses to environmental variability.

Forage fish have the propensity to form large shoals. This behaviour probably evolved as a defence against natural predators but it makes them easily detectable and catchable by modern fish spotting and catching technologies. Pelagic trawls and purse seine nets that surround and capture very large shoals result in fishing that is highly efficient and effective, even after a population declines. Fisheries for forage species are among the largest in the world, and the demand for products derived from forage fish, especially fishmeal for fish farming, is increasing at a tremendous rate. Forage fish have been particularly important to the development of the aquaculture sector, which globally now supplies almost half of the total fish and shellfish for human consumption.

THE PRIMARY CHALLENGE FOR FISHERIES MANAGERS AND POLICYMAKERS

The primary challenge for fisheries managers and policymakers is to determine a level of catch that accounts for the important ecological role that forage fish play in the larger marine environment. To ensure sustainable forage fish resources, precautionary management is necessary for three fundamental reasons:

- The abundance of forage fish can be difficult to quantify, and they exhibit large natural variations in abundance over space and time.
- Forage fish are prone to booms and busts, with large associated impacts on dependent organisms.
- Single-species quotas have shortcomings that are most apparent when applied to forage fish.

SUSTAINABILITY AND THE IMPLEMENTATION OF AN ECOSYSTEMS-BASED APPROACH TO FISHERIES MANAGEMENT

To date, scientific guidance for implementing an ecosystem-based approach to forage fisheries management has mostly focused on broad principles rather than specific goals, targets, or thresholds. In part, the reason is a lack of information about the impact of forage fish removal on marine ecosystems. There has been a global call for research and synthesis to advance scientific understanding of forage fish and to inform management recommendations for these species. The South African government is committed to an ecosystems-based approach to fisheries management and over the past five years much progress has been made in attempting to incorporate the needs of at least some of the top predators in the ecosystem that depend on forage fish, for example penguins, into the management procedures.

PLANNED REVISION OF THE CURRENT JOINT SOUTH AFRICAN PELAGIC OMP DURING 2011/2012

The joint South African pelagic OMP was developed specifically to deal with the risks inherent in fishing for short-lived species, such as sardine and anchovy, in the highly dynamic and changeable marine environment, which characterises our temperate waters where these two species are found in great but fluctuating abundance. The OMP goes to great lengths to minimise year-on-year fluctuations in TACs to ensure industry stability; of course, within the constraints of the dynamics of the resources themselves. However, the duty cycle of an OMP is usually only four years, whereafter it has to be adapted, as new and updated information about the two main pelagic species, as well as new insights into the role of these two species as forage fish in the ecosystem, particularly their effect on top predators, such as penguins, become available.

Important issues that will be examined during the revision include:

- How recruitment and its future variability is best modelled for both sardine and anchovy.
- How best account is taken for implementation uncertainty in the OMP, particularly regarding likely undercatches of anchovy.
- How to best calculate the TAC if abundance estimates from the most recent hydroacoustic survey, upon which computations are highly dependent, are unavailable (e.g. because of a survey vessel breakdown).
- How to best calculate the risks to the resources, which are used to adjust the OMP.
- How to address potential spatial management issues, i.e. how to best determine the relative plausibility for alternative sardine stock-structure hypotheses, by testing the hypothesis that two sardine stocks exist in South African waters and whether they should be managed separately or jointly in the new management procedure.
- How to include broader ecosystems objectives in the management procedure, as improved clarity in this area would assist management and decision-making.

This revision started in 2011 and will continue during 2012 in full consultation with the industry and other role players involved in the management of the pelagic fishery with implementation planned for 2013. A number of constraints and control parameters are in place in the OMP to ensure maximum industry stability, without exceeding generally accepted levels of risk for the two main pelagic species. These constraints and control parameters include, inter alia, maximum and minimum TACs for sardine and anchovy, maximum year-on-year deviations in TACs for both species, and the proportions of the total biomass that may be taken of each species. These, and other constraints, will be tested during exhaustive simulation studies by scientists of the two resources during the course of 2012. In addition, the revised OMP will also consider the needs of top predators, in this case as a first step, taking into account the interactions between the fishery and penguins.

FINAL SARDINE AND INITIAL ANCHOVY TAC ALLOCATIONS FOR 2012

The Small Pelagic Working Group of the Branch Fisheries Management of Department of Agriculture, Forestry and Fisheries met on 15 December 2011 to consider the results of the November 2011 spawner biomass survey (figure 1) and to recommend the final sardine and initial anchovy TACs for 2012. The anchovy spawner biomass was estimated at approximately 750 000 tons, substantially lower than that estimated in 2010, and well below the long-term (1984–2010) average of 2,2 million tons. The sardine biomass of 1,04 million tons was considerably higher than the 508 000 tons estimated in 2010 and similar to the long-term (1984–2010) average of 1,02 million tons for this stock. The estimate of round herring biomass almost doubled from the earlier level of around 1,1 million tons in 2010 to just less than 2 million tons in 2011. This biomass is considerably higher than the long-term (1984–2010) average of 960 000 tons.

NOVEMBER SURVEY BIOMASS ESTIMATES

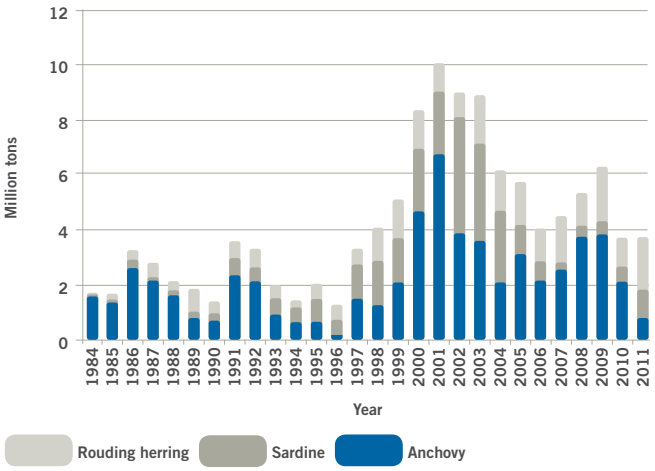

FIGURE 1

The distribution of horse mackerel was patchy over most parts of the survey area, particularly towards the inshore and shelf edge, where low densities were recorded. On the west coast, a large area between Hondeklip Bay and Doring Bay had no horse mackerel. Horse mackerel occurred patchily between Lambert's Bay and Cape Agulhas, with low densities close inshore. This indicated that the problems with high horse mackerel by-catch that hampered the industry greatly in 2010 would most likely not occur in 2012 (this later proved to be the case).

Given the low anchovy recruitment measured earlier in 2011, it was anticipated that the biomass of anchovy would decline. The unexpected increase in the biomass of sardine appears to suggest that the strong recruitment measured in 2010 had now recruited successfully to the population, particularly in the area to the east of Mossel Bay. The population is now dominated by fish that are at least two years old, with recruits from 2011 making up only a small proportion of the total sardine biomass. Only 18% (< 200 000 tons) of the sardine biomass was found in the area to the west of Cape Agulhas. This suggests that the recent observed "reversal" of the eastward shift in the distribution of sardine had only been a temporary phenomenon.

Following the results from the biomass survey, the 2012 final directed sardine TAC, initial normal season TAC (A-season) for anchovy, and initial normal season TAB for sardine were recommended in terms of OMP-08 as follows (with the 2011 values given in brackets):

- Directed sardine TAC: 100 595 tons (90 000 tons)
- Initial normal season anchovy TAC: 202 718 tons (247 500 tons)
- Initial normal season sardine TAB for anchovy-directed fishing: 21 947 tons (28 830,5 tons)
- Sardine TAB for round herring-directed fishing: 3 500 tons (3 500 tons)

The recommendations were accepted by the Minister and declared the final TAC (for sardine) and initial TAC (for anchovy) for 2012.