

Research on Monkfish along the Namibian Coast

By Lima Maartens

Two species of monkfish or angler fish occur off Namibia, namely *Lophius vomerinus* (previously known as *Lophius upsicephalus*) and *Lophius vaillanti*. The former is found in the Southeast Atlantic and on the southwestern continental shelf and slope off Southern Africa, whereas *L. vaillanti* mainly occurs north of Walvis Bay. Both are demersal species and inhabit areas from the tidal zones to deeper than 600 m.

The females spawn flat, gelatinous veils that can contain more than one million eggs. The eggs and the larvae are planktonic. When the larvae reach about 6 cm in total length, they settle on the bottom. Monkfish are slow growing and reach sexual maturity at about four years of age when they have a length of between 30 to 35 cm.

The extent of adult migration for monkfish is unknown. They feed irregularly and are opportunistic sit-and-wait predators without swim-bladders. Monk have an interesting way of feeding by moving the illicium, an extension of the first dorsal spine, like a fishing rod in order to lure their prey.

History of exploitation

Statistics on the exploitation of monk date back to 1974. The highest catches of more than 14 000 tons were recorded by the International Commission for the Southeast Atlantic



Fisheries (ICSEAF) during 1981 and 1982. The catches then decreased through the years to approximately 6 000 tons by the end of 1989.

At the beginning of the eighties, Spanish scientists reported occasional directed fishing by some Spanish vessels and efforts were made to collect data for stock assessment purposes. By the end of 1986, their research indicated a stock size of between 30 000 to 40 000 tons in the areas 23°S to 30°S. The researchers also revealed two separate areas of recruitment namely off Walvis Bay and near the mouth of the Orange River. This coincides with more recent information collected by the Norwegian research vessel *Dr Fridtjof Nansen* during bottom trawl surveys in the nineties.

Monkfish used to be a valuable bycatch in the hake fishery but has since developed into a fishery in its own right. Since Namibia's independence, the size of the monk and sole fleet varied between 16 and 18 vessels. A special license system for catching monk with a hake bycatch quota was implemented in 1994. However, the monk bycatch by hake vessels still makes up about 30% of the total annual landings of monk.

Since 1990, monkfish catches have increased from 1 500 tons per year to more than 12 000 tons in 1994. In 1995 there was a decline to about 10 000 tons.

Although monkfish has an unappealing look, it has firm white meat, similar to rock lobster, and is delicious to eat. It is mainly sold headless and skinned or filleted. There has recently been market demand for head-on monk. The monk caught off Namibia had an estimated export value of N\$60 million in 1994 and was mainly exported to Spain, Italy, Korea and Japan.

Research

Research on monkfish started in 1993 and forms part of the research programme of the Bottom Trawl Section of the Ministry of Fisheries and Marine Resources. The main aim is to provide scientific advice for the sustainable exploitation of the monk stock.

Methods to adequately assess the monk population are still in the developing phase, while work estimating the bio-



Lima Maartens

Monkfish from Namibia is exported to Spain, Italy, Korea and Japan.



Lima Maartens

Monkfish used to be a valuable bycatch in the hake fishery, but has since developed into a fishery in its own right.

mass is continuing. To date realistic estimates of the stock size could not be obtained from the hake biomass surveys, conducted by the Norwegian research vessel *Dr Fridtjof Nansen*. These surveys are aimed at catching hake and the gear used and the trawl speed differ considerably from that used by the monk and sole fleet. The calculated biomass estimates are believed to be underestimates of the stock size.

From the biological data collected, length frequency and weight data, for example, are used to obtain length-weight relationships. Maturity stages of the male and female gonads

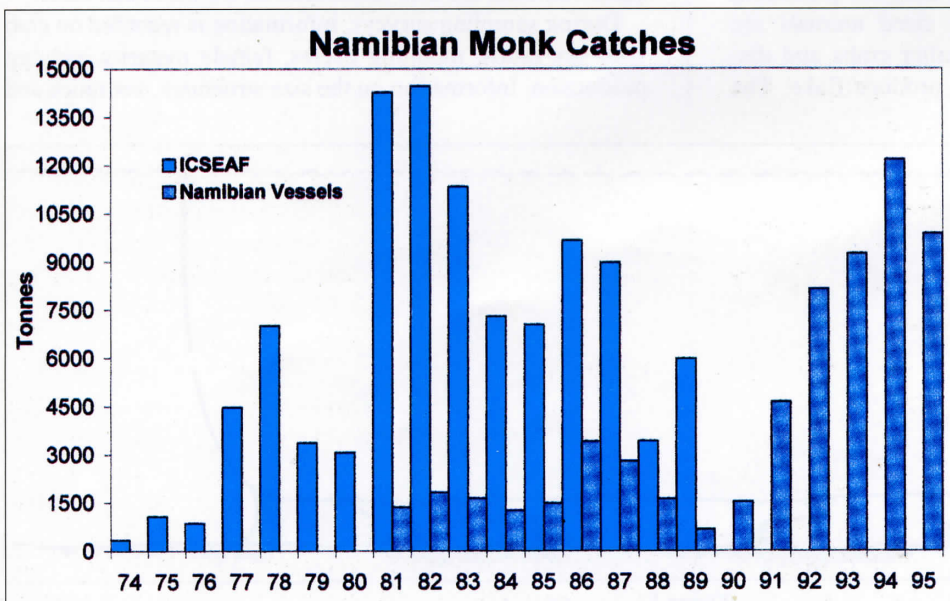
and sex ratios are also recorded. Otoliths and illiciums are collected for an aging project that will start at a later stage. Length and age data are important to determine changes in the population structure. These surveys also provide valuable information about the distribution and species composition.

Currently more emphasis is put on catch rates or catch per unit of effort data and the size distribution of monk caught by the industry. Catch rates in commercial fisheries are often used as an estimate or as an index of fish abundance. A critical assumption underlying the use of catch per unit of effort data is that catchability is constant. Catch per unit of effort is only proportional to abundance or biomass when abundance is proportional to density. For example, if these assumptions are not valid, an increase in catch per unit of effort would not indicate an increase in the stock size or the other way around. Additional information about the fishery is therefore needed before catch per unit of effort data can be used to provide a measure of variation in abundance. New fishing grounds are often discovered and the total spatial area of the fishery increases, but the overall catch per unit of effort remains stable or increases even though the overall abundance decreases. Once a time series has been established, the data can be used in biomass dynamic or surplus production models to provide information about stock size.

Commercial monk catches are sampled on a regular basis at the factories in Walvis Bay. The monk and sole fleet currently consists of two wetfish trawlers and sixteen freezer trawlers. The freezer trawlers usually land monk tails sorted into six size categories, namely XXS (0-50 g), XS (50-100 g), S (100-250 g), M (250-500 g), L, (500-1 000 g) and XL (1 000 + g). The wetfish trawlers land a mixture of monk tails. Random samples of the tails are measured and converted to total length.

The monk landed as bycatch by hake vessels are also sampled. The data provide information about the different size categories in which monk are landed. The size distribution of monk caught is used to determine the catches in number of fish for the different size categories. These data, together with estimates of growth parameters and natural mortality can then be used in length-based cohort analysis and prediction models to provide more information about the status of the stock.

On the basis of the combined data, recommendations on the optimal fishing levels are made to the management of the Ministry of Fisheries and Marine Resources to ensure the sustainable utilisation of one of Namibia's most valuable natural resources.



The author: Lima Maartens is a graduate of the University of Stellenbosch. She joined the Bottom Trawl Research Section of the Ministry of Fisheries and Marine Resources as a fisheries biologist in January 1993.