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THE CHOKKA SQUID FISHERY IN SOUTH AFRICA: REVIEW OF THE 2005 POLICY

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ABSTRACT

The paper embodies an evaluation of the fishery policy and recommendations of the corrective measures that are conducive to the effective resource management and maximization of profits in the Chokka Squid sector in South Africa. The fishery policy is designed to solve a complex set of problems that emerge in the sector. This embodies on the one hand that the fishery policy is directed towards objectives that have their offspring in different theoretical paradigms. Objectives of the policy strive to achieve transformation, investment, job creation, economic viability and conservation at sustainable level. The analysis in the paper shows that the objectives of the Fishery Policy are not fully met. This paper discusses the main reasons and recommends solutions. The paper outlines the major elements in the historical process of the development of the Chokka Squid fishery policy. It is found that the issue of transformation has a lot to do with the formulation of this policy as well as the Marine Living Resources Act (1998), which regulates the fishing in South Africa. In the analysis of the current Chokka Squid fishery policy the paper primarily places its focus on the elements of the policies for conservation, structure and control, their objectives and means. The analysis indicates that the implemented policies do not achieve the goal of preventing poverty in the society.

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1. INTRODUCTION

When the Chokka Squid fishery started during 1960s, foreign fleets dominated in South African waters (Roel *et al.* 2000, Glazer and Butterworth 2006). In 1984, the coastal hand-line Chokka Squid jig industry was established (Sauer 2003). At that time the catches and product quality were poor with much of the resource being wasted at the same time as the local markets became saturated.

In 1986 a licensing system was initiated in the chokka squid sector. This system was introduced to limit the number of vessels participating in the fishery (Sauer 2003). The fishery was regulated in terms of a Total Allowable Effort, restricting effort in terms of the number of fishers, allowing the use of hand lines (jigs) only and a closed season during spawning time. The effort of recreational anglers was restricted using limitations on bags. Each person was allowed twenty Chokka per day.

From 1988, the fishery was regulated by the Sea Fishery Act of 1988 (White Paper 1997). Prior to 1994, there was no formal and clearly articulated fisheries policy in South Africa. Instead, each fisheries sector had to develop a strategy related to its needs, largely dependent on fluctuations in stock sizes (Payne and Cochrane 1995). Also the uneven distribution of resource use rights and the effects of the policy resulted in some of the excluded groups forming underground poaching societies, a factor that was viewed by most (native) fishers as reasonable and acceptable (Hersoug and Holm 1998, Anon. 1999). The authorities and control laws that were in place at that time were considered illegitimate and unfair by many black fishers. These historical imbalances prompted the new democratically elected government in 1994 to initiate a new fisheries policy process aimed at redistribution of fishing rights.

In October 1996, the Minister of Environmental Affairs and Tourism (DEAT), who at the time was overseeing the Fisheries Sector, initiated a policy process known as the Fisheries Policy Development Committee (FPDC). The FPDC was commissioned to develop a fisheries policy that was to conform to the democratic values of the country and specifically to broaden access to the fishing industry to include people that had previously been excluded by the apartheid policy (Anon. 1998, Mayekiso *et al.* 1998). The committee was composed of representatives from various stakeholders in the fisheries and from the government. After the period of 18 months the FPDC submitted a report to the Minister in 1996. The FPDC recommended the use of individual transferable quota (ITQ) systems with the rights granted in perpetuity, but did not show how that was going to be implemented. However, their report did form the basis for the White Paper on Marine Fisheries Policy that became the new fisheries policy in 1998 (Payne and Cochrane 1995), and was made into law in the Marine Living Resources Act (MLRA) that was proclaimed in September 1998. Under that Act, fishing rights and allocations were controlled by the Minister of Environmental Affairs and Tourism, rather than by an independent quota board as in the past. That gave the minister powers to transform South Africa's fishing industry into one that would more fairly reflect the demography of the country (Tilney and Purves 1999).

The MLRA replaced the old Sea Fisheries Act that had become outdated with democratic change. The General policy, together with the Fishery specific policies, was intended to serve as a guide for the long term rights allocation process (DEAT 2005a).

The guiding principles for fisheries in South Africa are embraced in the Marine Living Resources Act (18) of 1998 (MLRA). The new legislation and policy emphasised the need to

transform the industry in order to benefit the historically disadvantaged. The transformation of the fishing industry is a constitutional and legislative imperative.

In 2001, the Department allocated rights to 128 commercial squid fishing enterprises for a four year period from 2001 until 2005, thereby authorizing more than 2 400 crew to fish for squid on 145 vessels. Number of crew was determined by the approved vessel length and approved safety standards. Allocation records show that, thirty three percent of right-holders were majority-owned by blacks; 61 percent of workers were blacks and almost all right holders were small and medium sized enterprises (SMEs) (DEAT 2005b).

The objectives of the allocations were to increase the transformation profile of the squid fishery. Applicants who lived in, or whose place of registered business was in the Eastern Cape, were given preference because the fishery was exploited in the region. Further investment in vessels, infrastructure and jobs, particularly by historically disadvantaged persons, was also to be encouraged and considered in the allocation process. Special consideration was also given to applicants who predominantly rely on squid for their income. A major objective was also to support the economic viability and ensure environmental sustainability of the fishery.

In 2005 the Department of Environmental Affairs and Tourism (DEAT) allocated fishing commercial rights for a period of eight years (01 January 2006 to 31 December 2013); subject to review at regular intervals against predetermined performance criteria, including the attainment of agreed transformation goals. The department was to institute a number of formal performance measuring exercises for the duration of the commercial fishing rights, and that was to be used as a criteria for the next allocation of rights.

The stated purpose of the Act is to provide for the conservation of the marine ecosystem, the long term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources; and for these purposes to provide for the exercise of control over marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa; and to provide for matters connected therewith (MLRA 1998).

The Ministry that is currently responsible for Fisheries in South Africa is the Ministry of Agriculture, Forestry and Fisheries (DAFF). In January 2010 a new administration was put in place to run the country in order to achieve visible and tangible socio-economic development within five years of the fourth term of democracy.

1.1 The Scope, Goal and Objectives

The Chokka Squid fishing industry is one of the best established industries amongst the twenty two fishing sectors in South Africa (DAFF 2009). The target specie is *Loligo reynaudii*. The industry is a capital intensive operation with modernised vessels. This study concentrates on the review of rights allocation to one hundred and twenty companies that were allocated rights during the 2005/6 allocation process and management of Chokka Squid Fishery Policy, 2005 which will be set as the baseline for the next round of allocation of Chokka Squid Fishery in 2014. A bio economic model is used to evaluate the fishery.

The study will try to evaluate to what extent the objectives of the Chokka Squid Fishery policy have been met in the actual implementation in terms of:

- Maintaining or improving transformation.
- The creation of an environment for investment and job creation.
- Supporting the economic viability and environmental sustainability of fishery resources.

Based on the outcomes of the investigation improvements to the policy are proposed.

2. BACKGROUND

2.1 Overview of South Africa

South Africa is situated at the southern tip of Africa bordered by Namibia, Botswana, Zimbabwe, Mozambique and Swaziland. The independent state of Lesotho is situated within South Africa's borders (Figure1). South Africa's land area is 1.221.000 km² with a coastline of 2.500 km (Mbendi 2012).

The climate varies across regions. In the Eastern Cape region, there is semi-desert climate with cold, dry winters and summer rainfall. Snow is uncommon (Figure 1).



Figure 1: South Africa with the main Provinces outlined. The main landing ports for the Chokka Squid are Cape St Francis and Port Elizabeth.

In 2011, the population of SA was estimated at about 51.8 million. It consists of a large number of tribes. Eleven languages are officially recognized and several religions (Holmes *et al.* (2012)).

SA has a constitutional democracy with a three-tier system of government and an independent judiciary. The national, provincial and local levels of government all have legislative and executive authority in their own spheres.

Legislative authority is vested in Parliament, which is situated in Cape Town and consists of two houses, the National Assembly and the National Council of Provinces. Parliament is bound by the Constitution and must act within its limits.

Mining, manufacturing and agriculture are the most important pillars of the economy in South Africa. Mining contributes about 18% of GDP (Kearney 2012). South Africa has the largest economy on the African continent accounting for 24% of Africa's Gross Domestic Product in terms of PPP. Economic growth rate over the past two decades have been over 3% per annum (IMF 2012). South Africa is currently ranked as an upper-middle income economy by the World Bank, which makes the country one of only four countries in Africa represented in this category.

Agriculture contributes only 2% to the country's GDP and consists largely of cattle and sheep farming with only 13% of agricultural land used for growing crops. Maize is most widely grown followed by wheat, oats, sugar cane and sunflower. The government is working to develop small-scale farming in efforts to boost job creation. Citrus and deciduous fruits are exported, as are locally produced wines and flowers.

South Africa is one of the countries with the highest rates of HIV prevalence in the world, with more than 5 million HIV-infected individuals. Overall, more than 30% of those who need it are currently on anti-retro viral treatment. Another major challenge is unemployment, which is around 25% (Figure 2).

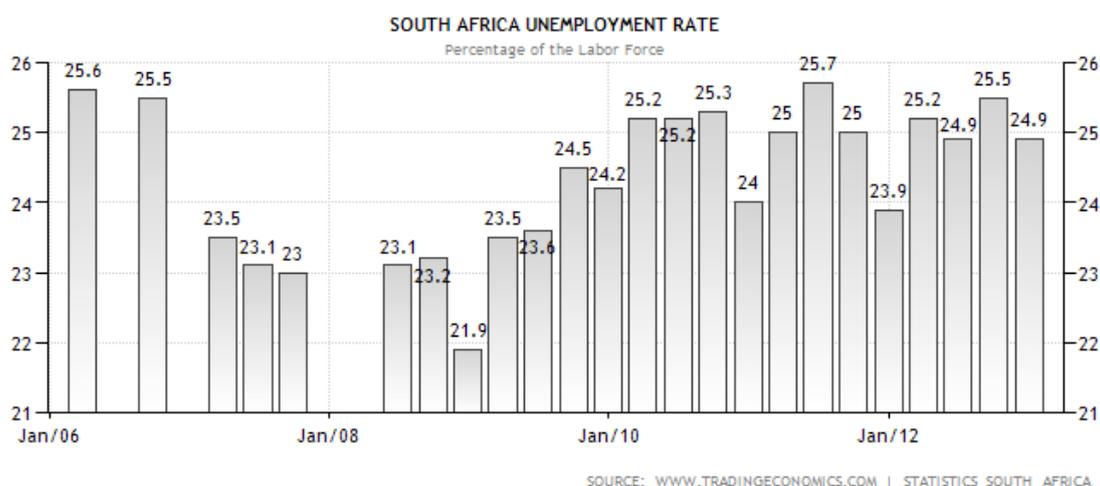


Figure 2: South African Unemployment Rate (Stats SA 2012).

2.2 South African Fisheries

There are two distinct ecosystems within SAs EEZ. The western coastal shelf on the Atlantic side has highly productive commercial fisheries similar to other upwelling ecosystems around

the world, while the east coastal shelf of the Indian Ocean is considerably less productive but with high species diversity, including both endemic and Indo-Pacific species (FAO 2010).

All fisheries resources are managed by the national government. The highest executive office conducting this management is currently the Department of Agriculture Forestry and Fisheries (DAFF), in accordance with the Marine Living Resources Act 18 of 1998 (MLRA) (Fielding *et al.* 1994).

The value of commercial and recreational fishing industry in the country is estimated at USD 0.5 billion annually, that includes primary and secondary industries. The commercial sector provides direct employment to approximately 28000 individuals, both in fishing and in processing (FAO 2010).

South Africa is the largest fishing nation in Africa, but only ranks 30th among fishing nations worldwide. The South African fisheries sector plays a small part in the economy of the country. However, fisheries play a major role in certain regions especially in the Western Cape, where it contributes approximately 2% to the Gross Geographic Product (GGP).

South Africa's fishery sector comprises of two distinct components, which are well-established wild capture fisheries, and a relatively small aquaculture component. Wild capture fisheries can be separated into commercial, recreational, and subsistence fisheries, each of which requires specific management interventions. The commercial fishing sector can be further broken down into highly industrialised, capital-intensive fisheries, which generally operate in deep water (e.g. hake trawl and pelagic purse seine fisheries), and near-shore fisheries that are more easily accessible and tend to use traditional types of gear (line fishery and near shore rock lobster hoop net fishery).

Commercial fisheries target stock that is mostly fully utilised or over exploited as in the case for some high valued species. Some rebuilding strategies are underway, for example in the hake, rock lobster and abalone sectors (FAO 2010). Total annual production is more than 600 000 tons, valued at 0.5 billion USD. (FAO 2010). Demersal fishing sectors contribute approximately 70% to the total value of the fishing industry. Large-scale capital investment in vessels and factories is generally a prerequisite for participation; hence the minimal participation in the commercial fishing sector. In this sector long-term rights were allocated in 22 fishing sub-sectors in 2005/2006 with just over 2 900 rights holders and about 1 788 vessels (DAFF 2009).

Nine sub-sectors are managed in terms of total allowable catches (TAC) only. One (South coast rock lobster) is managed in terms of a combination of a TAC and a total applied effort (sea day restrictions). The remaining fisheries are regulated in terms of a TAE only, which includes restricting vessel numbers or gear, crew numbers or sea days (or a combination of the two). There are no tax incentives or subsidies for South African fisheries (DAFF 2009).

Some estimates indicate that approximately 750 000 people participate in recreational angling, although fewer than 200 000 anglers are issued with annual recreational licenses. The actual annual catch is approximately 17 000 tons of high valued species. There are important secondary economic activities associated with recreational fisheries such as boat-building, fishing tackle and tourism but these have not been properly assessed (FAO 2010).

Small scale and subsistence fisheries include different levels, from truly subsistence to small-scale commercial. Coastal communities traditionally made use of intertidal and shallow-water resources as a source of food, with only the occasional surplus sold, usually locally. A national

survey conducted in 2002 suggested that the subsistence fisheries sub-sector comprised about 28 000 fisher households residing in 147 fishing communities (Harris 2002).

At present, South Africa's aquaculture production is approximately 3 500 tons per annum with a value of around \$30 million USD. Aquaculture is focused mainly on high value products (abalone, oysters and mussels), but is considered to be underdeveloped relative to its potential (DAFF 2010).

2.3 Chokka Squid Fishery in South Africa

The Chokka Squid fishery in South Africa is based on harvest of *Loligo reynaudi*, which is locally referred to as Chokka Squid or Chokka (Roberts and Sauer 1994). The South African Chokka Squid fishery is concentrated off the South East Coast, in the Eastern Cape region (Figure 1) (Schon *et al.* 2000). This is one of the more impoverished regions of South Africa and economic growth and job creation in the province are urgent priorities. The directed fishery for Chokka Squid uses jigs operated by hand from sea-going vessels, making it a labour intensive fishery. Some Chokka Squid are also caught as by-catch by South African whitefish trawlers (Glazer and Butterworth 2006) but this study focuses on the directed fishery, hereafter referred to as the Chokka Squid fishery.

The Chokka Squid fishery started in the 1960s. Initially by small vessels 6-8m, locally known as ski boats, and powered by twin outboard motors were used. Those Ski –boats would remain at sea for no more than a day. However, the fishery was rapidly capitalised resulting in the current predominance of relatively large (a fisher capacity of between 8 and 24 people) freezer boats that can remain at sea for a few weeks at a time. Some small ski boats still remain, but their viability is questionable, as finance companies will not provide capital (Sauer 2003). It is a relatively small sector with 2422 fishers and about 136 fishing boats and may be considered a stable, mature fishery. Ownership of fishing boats, access rights, business and trading skills and also the processing plants were historically almost exclusively in the hands of individuals of European origin (Mather *et al.* 2000).

Generally the department attempt to maximize long-term catch. This strategy provides continued employment and also protects the stocks for future generations (DEAT 2005b). Practically, this approach requires careful control of catches in order to maintain each resource at its most productive level. Animal populations are least productive at very high and very low levels - at high levels because of environmental factors, such as food, are limited; at low levels because fewer adult fish cannot produce sufficient juvenile fish (Payne 1989).

2.4 The Biology of the Chokka Squid

Chokka Squid is classified under the phylum Mollusca, class Cephalopoda. *Loligo reynaudi* belongs to a Loliginidae family (Hanlon *et al.* 2002).

Loligo reynaudii is the most abundant Chokka Squid species in South African waters as it accounts for about 95% of the total Chokka Squid catch. *Loligo reynaudii* is distinguished from other loliginid Chokka Squids by its relatively long grayish diamond fins, which cover more than half the length of their mantle. The Chokka Squid is distributed mainly in the Eastern Agulhas Bank and around the South Eastern Coast from Plettenberg Bay to Port Alfred (Figure

3). It is also found along the extension of the Cape Point continental shelf to the southern Namibia on the West Coast (DEAT 2005b). Temperature, dissolved oxygen, turbidity and wind currents are the major abiotic factors that determine the distribution of the Chokka Squid.

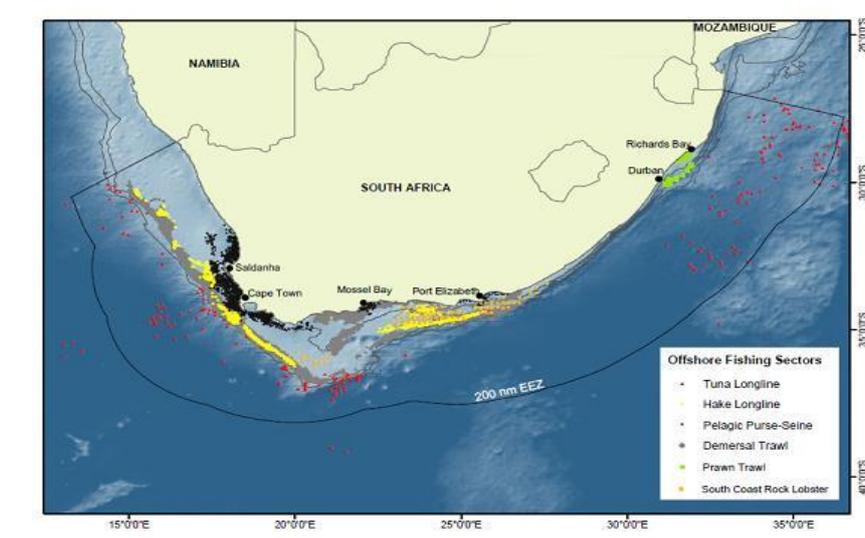


Figure 3: Distribution of main commercial fisheries in South African waters showing main fishing ports.

Chokka Squid reach sexual maturity at a mantle length of 125 mm for males and at 160 mm for females. The growth of *L. reynaudii* is highly variable. Normally, males grow larger than females reaching a mantle length of about 460 mm, while females reach a mantle length of 280 mm (DEAT, 2005b). Chokka Squid life span is approximately two years. As is common with short-lived species the population is typically unstable, responding rapidly to changes in environmental conditions (DAFF 2010).

Spawning occurs throughout the year with a peak between September and December. Eggs are laid on the underside of rocky overhangs attached to hard substratum or the branched sessile organisms on the sea bottom, where they form large masses. After hatching paralarvae come to life, which resembles the adult, already in the 1st larval stage.

In the current fishery, the jigs are attached with parachute sea anchors to reduce the jig drift (DEAT, 2005b). When fishing at night, fishers use open bulbs and spotlights to attract Chokka Squid close to the anchored boat. In the past Chokka Squid vessels were divided into two vessel categories and maximum number of crew was set for each vessel. A twin outboard engine powered the ski-boats. These boats were unable to carry large amounts of Chokka Squid. In the middle of 1980s introduction of large deck boats became evident. The Chokka Squid Fishery fleet has changed due to the technological improvement on the vessel. Yet there are still some ski-boats operating. Currently the vessels operating in the Chokka Squid fishery are categorized into group sizes based on the crew number.

Almost all the Chokka Squid caught in South Africa is graded, packed and frozen in 10kg trays at sea. Chokka Squid Fishery contributes directly to the local economy of the Eastern Cape Province as it provides high level of employment opportunities (DAFF 2009).

2.5 Existing measures for conservation in Management of Chokka Squid Fishery

At the end of 1986, a six weeks closed season from December to January was implemented with the aim of reducing the Chokka Squid fishing pressure on the spawning grounds. This seasonal closure did not apply to recreational anglers. The fleet size was limited and there was a restriction on the vessel size. The fishers were not permitted to transfer or sell their Chokka Squid fishing license for a period of 3 years.

In 1988, the government in collaboration with Southern Cape Commercial Line Fishing Association (SCCLFA) moved the closed season from December-January to October-November. This was done because most spawning took place between September to December. The main spawning grounds are along the coast, east of Plettenberg Bay (Figure 4). The Tsitsikamma National Marine Park (TNMP) located within the main spawning grounds was totally closed for all fishing industries in South Africa. This Marine Protected Area was proclaimed in 1964 (DEAT 2005b).

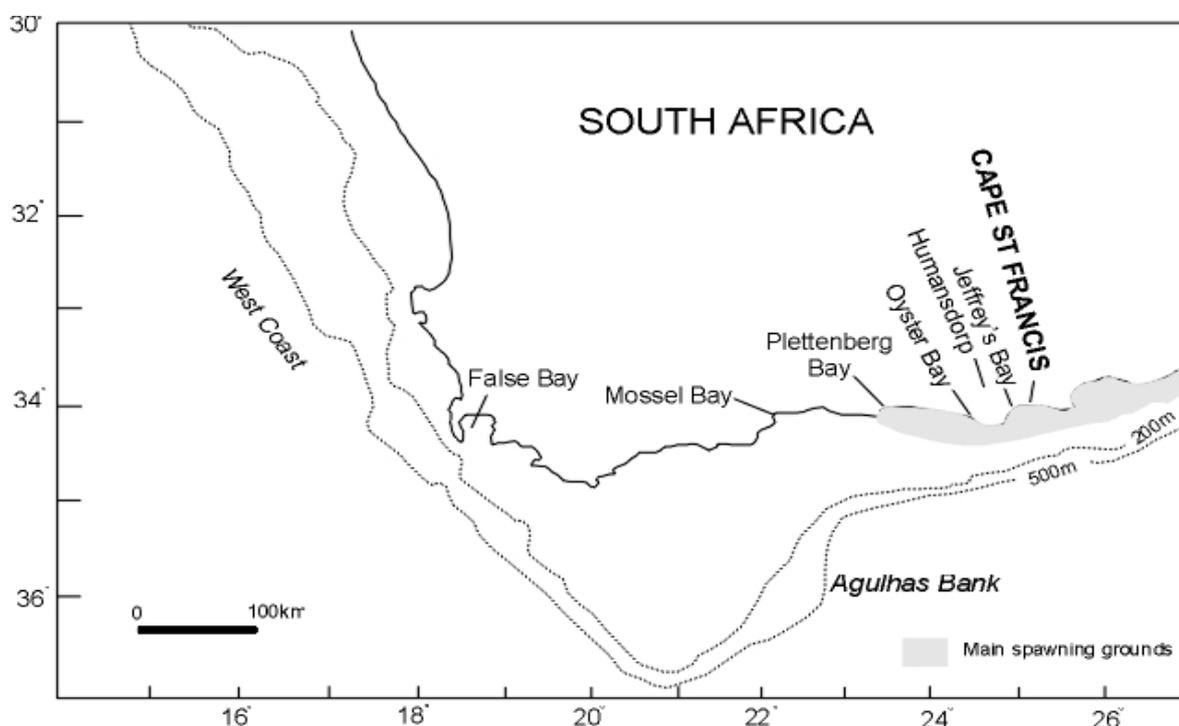


Figure 4: The main spawning grounds of the South African Chokka Squid.

The Chokka Squid fishery is managed by a biological management system. Its purpose is to increase the yield of the resource biologically by protecting the young squid, spawners and habitat. It is an ITQ system. Individual Transferable Quotas are set by the management to sustain the fishery. According to Arnason, 2006, the ITQ system combined with a Total Allowable Catch (TAC) set by the management to target MEY is the best option for any fishery worldwide. Total Allowable Effort, MPAs, gear restriction, jig, and the five-week spawning period closure control the squid fishery. An ecosystem approach to fisheries management is introduced in the management of squid sector (DEAT 2005b). Risk assessment reviews have been conducted twice (DAFF 2013).

A Vessel Monitoring System (VMS) is an important part of MCS of this fishery.

3. THE CHOKKA SQUID POLICY

3.1 General Description of the Chokka Squid Policy

The Chokka Squid Fishery currently is regulated by the Marine Living Resource Act (MLRA) of 1998 with a goal of transformation and provides equal access to rectify historical imbalances. MLRA has three main pillars, which include equity, sustainable use of resource and industrial stability. At the international level, South Africa aligned itself with the FAO Code of Conduct Responsible for Fisheries to manage the Chokka Squid Fishery in a sustainable manner.

The policy is set to guide the operations of the sector. In 2005 an eight-year ITQ was extended to most right holders. The fishery is managed by TAE that is determined in accordance of section 14 of the MLRA (DEAT 2005a).

The number of fishermen and vessels permitted to participate in the Chokka Squid fishery are limited. Limits are set by based on the historical catch return reports; Chokka Squid scientific research surveys and reviewed annually. The TAE has not been changed since 2006 and is 136 vessels and 2422 crew members (DEAT 2010). Recreational fishers are allocated a bag limit of 20 Chokka Squid per person per day. The fishery is closed from 19 October-23 November. No output control measures imposed (TAC). For instance no minimum landing size or specifications for by-catch or discards are stated in the Chokka Squid management plan and policy.

The main objectives of the Chokka Squid policy are in line with the general policy's objectives:

- 1) Promote transition (to black participation in the fishery).
- 2) Promote investment and job creation.
- 3) Ensure economic viability and environmental sustainability of the fishery.

Historically Disadvantaged Individuals (HDI) are those black individuals who were, by design, socially, economically, educationally and otherwise, underprivileged and deprived by the previous SA governments political history of white supremacy and inequitable racial treatment (Nefcorp 2005).

The department has tried to achieve these objectives by discussing in the following sections according to the criteria that the applicants had to follow.

3.2 Promotion of transition to black participation in the fishery

The Black Economic Empowerment was to be achieved through the consolidation in the fishery through the formation of joint ventures, which will increase transformation.

As far as transformation is concerned the applicants were to be assessed and scored in terms of the following;

- Companies with black and women ownership and black and women representation at top salary, board of directors and senior official and management levels, were to be given priority.
- Applicants were required by law to comply with the Employment Equity Act 55 of 1998. The number of black persons and women employed by the applicant were to be

in a balancing criterion. More points were to be allocated for blacks and women employed at the higher end of the applicant's salary notches or in professional and skilled positions, than at the lower end and in unskilled positions.

- Applicants were required to demonstrate that they complied with the Skills Development Act 97 of 1998 and the Skills Development Levies Act 9 of 1999. If an applicant participated in a learner ship programme or had spent proportionately more on the training of blacks, this factor was to be taken into account. The major thing was for the applicants to ensure that they empowered their employees especially blacks with all the skills they required as far as fishing is concerned. Affirmative procurement (procurement from black companies) was to be considered as a factor. Corporate Social Investment, which is the percentage of net profit spent on corporate social investment during the previous rights tenure, was to be taken into account. Tax-deductible donations were to be considered to be corporate social investment but other donations were also to be considered.

A total of 236 applications were received for long-term commercial rights in the Squid fishery. Of these, 122 applicants applied as medium-term right holder applicants and the balance applied as new entrant applicants (DEAT 2005c).

109 medium term right holder applicants were allocated rights and were authorized to use 124 vessels and 2232 crew. The decision makers decided not to give the rights to the new applicants as the new applicants did meet the criteria set. During appeal period additional 190 crew and the 14 vessels were allocated (DEAT 2005b). All those that were successful on appeals were blacks; they had HDI (Historically Disadvantaged Individuals) ownership. In total after the appeals 120 companies were allocated rights with 2242 and 136 vessels (DEAT 2005b).

The number of black controlled right holders increased from 33% during the medium term period to 48% when rights were allocated in 2006.

Table 3 that follows shows the comparison between the Chokka Squid fishery and the other industrial fisheries in South Africa since the allocation in 2006. Note that about 120 fishing rights that were issued in 2005, only 14 fishing rights awarded to new entrants were HDI owned. The slow pace of transformation in the Chokka Squid fishery may be explained by the fact that it is difficult to transform small, family owned enterprises that have one or two shareholders, the fishery does not compare well with other fisheries that are dominated by SMEs.

Table 1: The Chokka Squid Sector HDI status in comparison of Economic and Sectoral Study (ESS) of the squid fishery (2003) data and the 2009/2010 Performance Review (DAFF 2013).

	ESS study 2003 on the squid fishery	DAFF Performance Review 2009/2010 on other industrial fisheries
HDI* total work force	91%	98%
HDI managers	30%	34%
HDI shareholding	48%	48.4%
Female shareholding	11%	11%
Top wage earners HDI	12.7%	31.95%
Employment from the Eastern Cape	82%	82%

HDI- Historically Disadvantaged Individuals

The 2009/2010 DAFF Performance Review estimated that 44% of rights holders in the squid fishery had more than 50% HDI shareholding, compared with, for example, 85% in the hake deep sea trawl fishery and 75% in the small pelagics fishery. Seaweed (33%) and pole tuna (40%) were lower than the squid fishery. The average percentage of HDI shareholder ownership in the squid fishery at the time of the Performance Review was 48%, an increase from the average of 39% in the sector in 2004. This compares with an average of 60% in the fisheries sector as a whole, also an increase from the 2004 average of 45% (DAFF 2009).

It is to be noted that in order for the right to be utilized it needs to be activated by getting a permit for each vessel from the DAFF. Those permits have to be renewed annually. Before getting the permit the right holder has to get the license for that specific vessel. All those processes are administered through MAST system within the Department. MAST is the data base system used to administer all the fisheries resources information. According to MAST records, the number of permits issued ranged between 132 in 2006 to 144 in 2011. In 2012 143 permits were issued (Figure 5). These results suggest that the right holders have activated their rights consistently since the allocation. It is to be noted that number of permits issued may exceed the number of right holders as some right holders operate in more than one vessel.

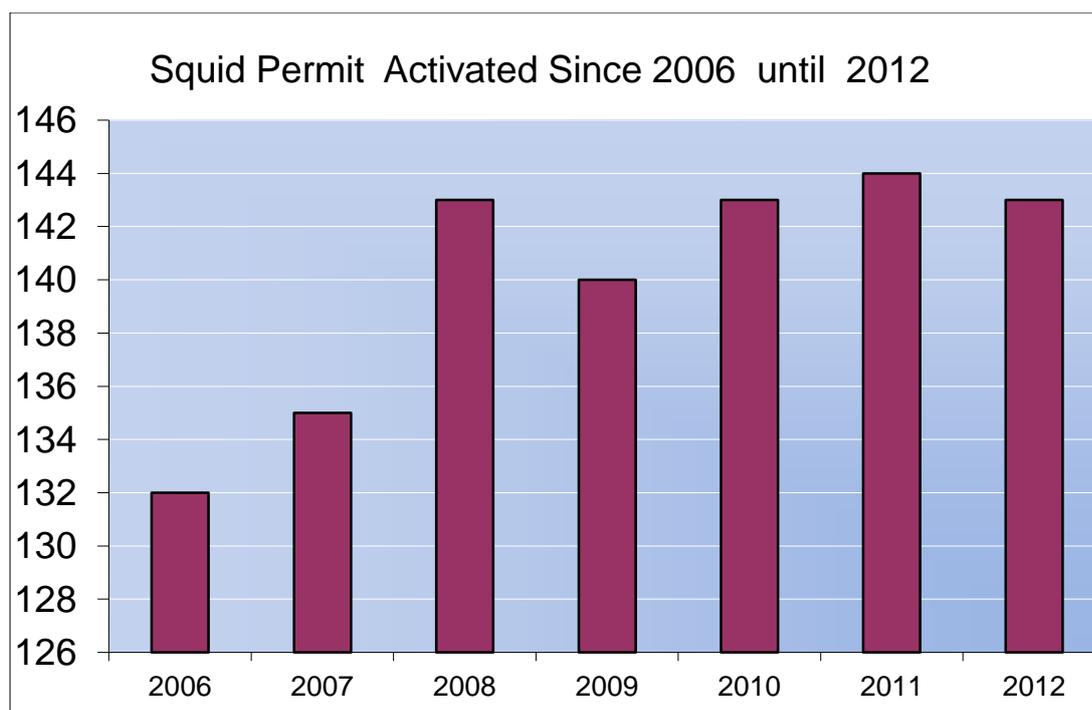


Figure 5: The total number of permits activated in the Chokka Squid fishing industry from 2006 until 2012.

The question is to what extent was transformation accomplished? It is clear that it is in fact difficult to determine the current level of transformation achieved due to incomplete and contradictory transformation criteria, obscurity of ownership, inaccessibility and lack of correlated information (SASMIA 2012).

About 50% of the companies in the squid fishery are small to medium size enterprises and many of them are family owned (DEAT 2005b). There are claims that companies do not in all cases provide reliable information on ownership and employees making it difficult to assess the progress in transformation.

The small size of most fishing operations has also meant that the Chokka Squid fishery has been lagging other fisheries with regards to transformation: Only 33% of the Chokka Squid resource is in the hands of majority Historically Disadvantaged Individuals (HDI) owned enterprises' (DEAT 2005b). Note that this percentage stood at 48% when the rights were allocated but that did not change according to 2009/2010 Performance Reviews.

3.3 Promoting investment and job creation

Investment in terms of shareholding was another objective. Right-holder applicants were to be rewarded for having concluded purchase agreements, charter agreements or catching agreements. Those who had invested in processing and marketing infrastructure were to be rewarded. New entrants were to demonstrate that they had the knowledge, skill and ability to participate in the Chokka Squid fishery.

The performance of the Right-holder applicants was to be assessed over the period of between 2002 and 2004 (DEAT 2005b).

A vessel of approximately eight meters is considered to be suitable in the Chokka Squid fishery. All vessels were certified by SAMSA. Smaller vessels were considered on the basis of their Chokka Squid fishing performance. All vessels had to have a functioning vessel monitoring system; and be equipped for Chokka Squid fishing using the jigging method. Vessels were disqualified if the length had been artificially increased by the right-holder in an attempt to increase the number of crewmembers.

Right-holding companies, including their directors or controlling shareholders, who were investigated for breaches of the MLRA, whether criminal or administrative, were not to be allocated a Chokka Squid fishing right until the investigations were over. Minor infringements of the MLRA, including its regulations, by the applicant, its directors or controlling shareholders was to affect the score negatively.

In 2006 when rights were allocated the harbour based assets were R2.22 million. In 2009 the harbor-based assets had increased to R4.19 million which indirectly creates the jobs the communities closer to the harbor.

The number of crew allowed in terms of TAE of 2422 has been exceeded in all years in the period of 2007 until 2011. During this period the TAE is 136 vessels and 2422 men (Table 2).

Table 2: Landings of the Chokka Squid for the period of 2007 until 2011.

Year	Catch (ton)/1000	Number of Boats	Number of man (crew)
2007	8.401	132	2466
2008	8.645	137	2584
2009	10.684	132	2505
2010	10.42	130	2489
2011	8.201	127	2464

Source: DAFF (2012).

The squid fishery is the third most important industrial fishery in terms of employment in South Africa. It provides employment to about 3000 people (DAFF, 2009). The hake deep sea trawl employs the highest number of employees (5917) followed by the fishery for small pelagic with 5204 employees. The fourth highest employment occurs in the tuna pole fishery with 2131 employees (DAFF 2009).

From the total of fourteen industrial fisheries, the chokka squid is the third most important fishery in terms of value in South Africa. It contributes 9.3% (R391 568 702) to the total value of catch sales of over R4 billion in the fishing sector as a whole. The Hake deep sea trawl provides the largest contribution followed by small pelagic fishery (DAFF 2012).

If a right holder wishes to change a vessel, that process is administered by the DAFF. The right holder launches an application to the department and in the request he clearly states the motivation behind the vessel change application. For the vessel change to be approved by the department the new vessel should be surveyed by South African Maritime Safety Authority and licensed and the right holder should accommodate all crewmembers that were in the previous vessel. This process is according to the guidelines for vessel changes in Chokka Squid Sector that were put in place by the Scientific Working Group (DAFF Guidelines for Vessel Changes)

(DAFF 2013). In order for the department to approve the request the application should conform to the guidelines. For example, if the new vessel for which a license is requested will not cater for all the crewmembers that the nominated vessel was allocated the department decline that proposal. The Right Holder will have to make arrangements for the crew that will not be utilized in the new vessel.

Most of the right holders who were allocated with rights on smaller vessels managed to replace those vessels with larger and more modernised vessels. Also old vessels were all replaced. About 45 vessels were changed within this period of 5 years.

3.4 Ensuring the economic viability and environmental sustainability of the fishery

To encourage local economic development, the DEAT was to positively score those applicants that elect to land their catches at small harbors, such as those along the Cape south coast and in the Eastern Cape Province. The Department was also to reward those applicants who had provided their employees, or who undertook to provide their employees with full-time employment; medical aid and pension; any other employment benefits; and safe working conditions.

The economic situation of the industry is difficult, with rising costs and unknown expenses in the present and future equation (SASMIA, 2012). The industry is plagued by variable export prices, which were fluctuated from 4.1-6.8 USD per kg over the last 5 year period.

When the policy for the chokka fishery was put in place the chokka squid abundance was at near-record levels and substantial declines could be expected. Scientific surveys indicated the need for a reduction in effort in the region of approximately 20% (DEAT 2005a). Presently, the chokka squid is healthy, but due to it being short lived it may be vulnerable to natural disasters (Glazer *et al.* 2012).

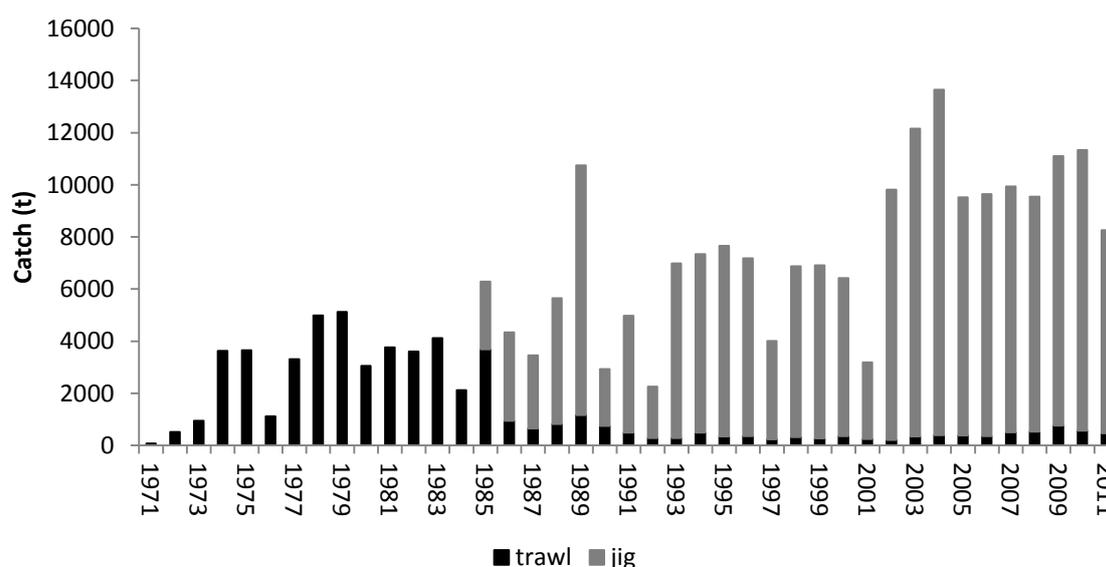


Figure 6: Annual jig and trawl catches of Chokka squid (tons). Source: Glazer *et al.* (2012).

Since the jig fishery started in 1985, catches have fluctuated considerably (Figure 6). Lowest catches of about 2000t were recorded in 1992 and highest catches of 14000t in 2004 (Figure 7). Catches have been relatively high and stable in 2002-2011.

The fishing is concentrated in the Port Elizabeth area with some catches made down in Cape Agulhas and up in Port Alfred (Figure 8).

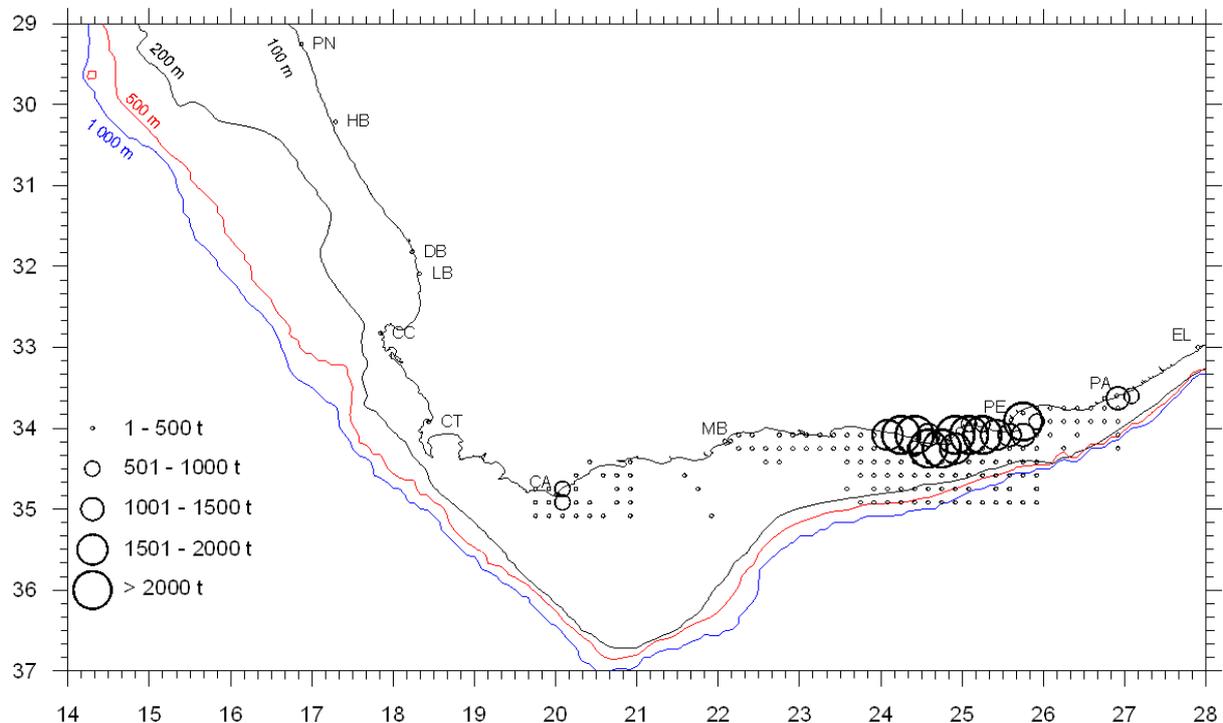


Figure 7: Distribution of commercial jig catches (2006-2011) Source: Glazer *et al.* (2012).

The minister essentially accepted the TAE and closed season recommended by the Scientific Working Group in 2006. The minister who decided on unchanged effort from 2006 did not accept recommended reduction in TAE in 2007 and 2008. The regulations from each year were remained unchanged until 2012 and have since 2010 been in agreement with the advice of the Scientific Working Group (Appendix 1).

4. A BIO-ECONOMIC MODELING OF THE CHOKKA SQUID FISHERY.

A simple bio-economic model was run for the Chokka Squid fishery to investigate the degree to which this fishery is biologically and economically efficient.¹ The model used in this paper is based on a prevailing paradigm in fisheries economics, which describes deterministic relationships between catch, effort, revenue and costs (FAO 2010). In this model sustainable catch has a dome-shaped relationship to effort. Its maximum occurs at a catch called the maximum sustainable yield (MSY).

Before any theoretical economic analysis was developed for fisheries science the MSY was a generally accepted target for sound management of fisheries. It is at present the goal (with qualifications) specified in the Marine Living Resources Act (1998). Economists brought cost and revenue into the picture. Revenue is simply the product of price and catch, and therefore, assuming a constant price, also has a dome-shaped curve in relation to effort. The cost of fishing is taken to be a linear function of effort. This gives a straight line, which if the fishery can be profitable, intersects the revenue curve at some level of effort. Three further equilibrium reference points are then defined by these relationships. The maximum economic yield (MEY) is the catch at which revenue less cost is greatest.

The maximum sustainable yield (MSY) occurs at the maximum of the sustainable revenue curve. The common property equilibrium occurs where revenues equal costs so that profits are zero.

4.1 Empirical specifications

Some empirical data on this fishery are available and have been presented in earlier section of this report. They include time series of landings, some information about the unit price of landed catch and some information about the profitability of the fishery. On this basis, the following empirical assumptions were adopted: Maximum sustainable yield (MSY) 9000 metric tons (mt)

- i. Virgin stock biomass (XMAX) 25000 metric tons.
- ii. Landings in base year (2011) $X_y(t^*)$ 8000 metric tons.
- iii. Landings price in base year $p(t^*)$ 6 ZAR per kg.
- iv. Net biomass growth in the base year (2011) is assumed as 0.
- v. Profits in base year is assumed to be 25 million ZAR.
- vi. Fixed cost ratio in base year $eps(t^*)$ 10% of total costs.
- vii. Schooling parameter b for the Chokka Squid 0.
- viii. Effort in base year fishing is 2464 men.

4.2 Results of a Bio economic model

Following is the sustainable diagram that shows the sustainable revenues and costs of the Chokka Squid fishery for the period from 2007 until 2011. It shows that the fishing is at the Maximum Sustainable Yield level. Note that the effort is at 2464 number of men, which is very close to a point of collapse. Also note that the bending sustainable revenue is unstable. The

¹ The bioeconomic model has been designed and developed by Professor Ragnar Arnason at the University of Iceland.

effort needs to be reduced to the optimal sustainable yield level, which is around 1800 (Figure 9).

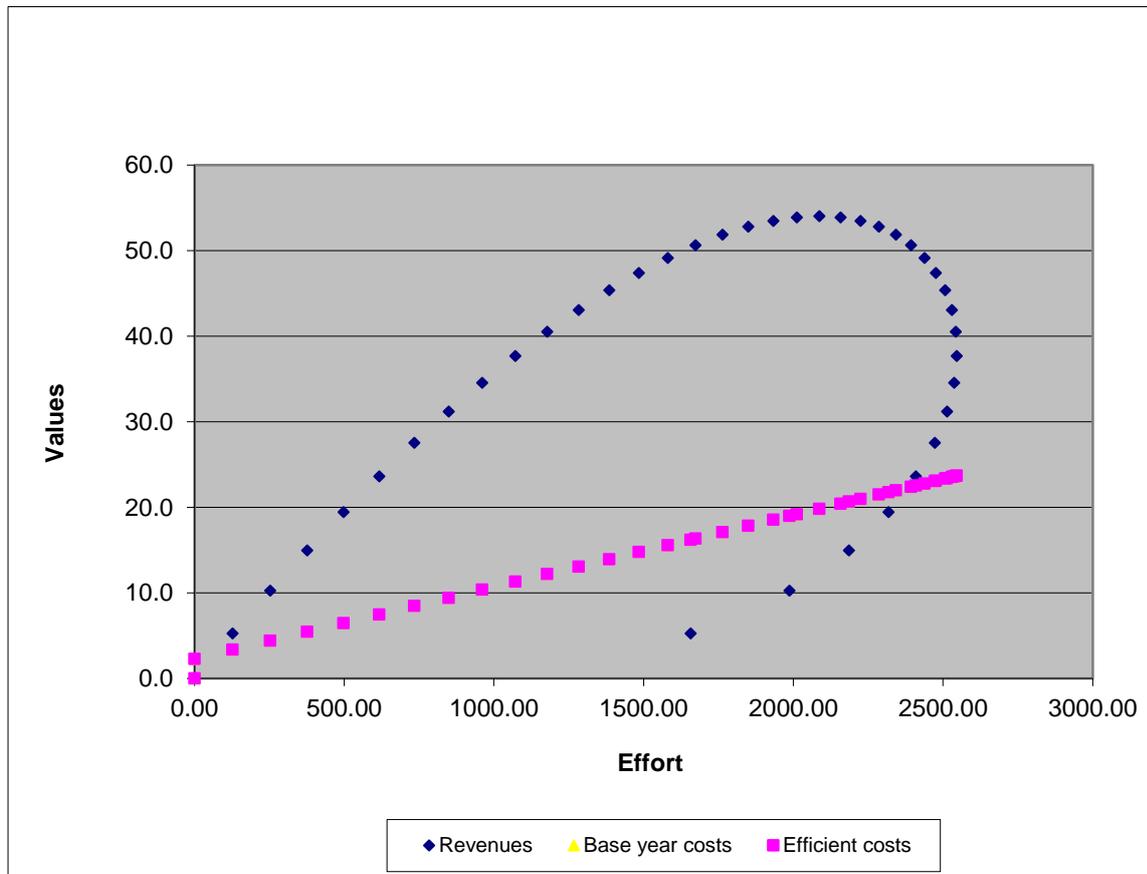


Figure 8: Sustainable revenues and costs² from the diagram in effort space that is on logistic.

The main results of the model with the key numerical results are summarized in Table 3. This bio-economic model runs for two different underlying biological models, the Logistic and the Fox model. In the Fox model, in order to maximize profits the effort has to be reduced by 294 men, which will in turn increase the biomass to 12.100 metric tons and the revenue will increase to 51.1 million ZAR which will generate profits of 31 million ZAR per annum. According to the Logistic model the effort should be reduced by 664 men resulting in an increase in biomass to 14.700 mt. The revenues generated then increase to 52.3 million ZAR and the profits become 34.8 million ZAR, according to the model. In this paper the logistic model results are used as they show greater efficiency as far as biomass, catches, revenues and profits are concerned.

² Note: Backward bending part of sustainable revenues is unstable.

Table 3: The results of the model that illustrate the key numerical results summarized.

	Units	Current		Optimal		Difference	
		Logistic	Fox	Logistic	Fox	Logistic	Fox
Biomass	1000 mt	8.3	9.2	14.7	12.1	6.4	3.0
Harvest	1000 mt	8.0	8.0	8.7	8.6	0.7	0.6
Effort	Men	2464.00	2464.00	1799.88	2170.04	-664.12	-293.96
Landings Price	m. ZAR/1000 mt	6.00	6.00	6.00	6.00	0.00	0.00
Revenues	m. ZAR	48.0	48.0	52.3	51.5	4.3	3.5
Costs	m. ZAR	23.0	23.0	17.4	20.5	-5.6	-2.5
Profits	m. ZAR	25.0	25.0	34.8	31.0	9.8	6.0
Profits per unit revenue	Ratio (percent)	0.521	0.521	0.667	0.601	0.146	0.081
Profits per unit effort	m. ZAR/Men	0.010	0.010	0.019	0.014	0.009	0.004
Profits per unit harvest	m. ZAR/1000 mt	3.125	3.125	4.000	3.608	0.875	0.483
Rents	m. ZAR	27.3	27.3	37.1	33.3	9.8	6.0

According to these results the biomass is currently at a level that could be considered sustainable though there is need for improvement to achieve economic efficiency. This model predicts that a reduction in effort by 664 men will increase biomass by 6.400 mt. That will in turn increase the catches by 8.8%. The model also predicts an increase in revenue of approximately 9% (4.3 million ZAR) and a reduction of cost of 24.3% (5.6million ZAR). This results in an increase in profit by 32% (9.8million ZAR), which represents 66% of projected revenue. Although the model depicts the fishery as operating at MSY, there is an urgent need to cut down on the effort to avoid imminent crash as illustrated by the backward turning portion of the sustainable revenue and cost curve (Figure 9). These results should be treated with caution due to uncertainty associated with the model specifications and the parameters used.

5. TO WHAT EXTENT WERE THE OBJECTIVES MET?

In this section, I review to what extent the objectives of the official Chokka Squid policy have been met. The policy consists of three main primary objectives:

- 1) Promote transition (to black participation in the fishery).
- 2) Promote investment and job creation.
- 3) Ensure economic viability and environmental sustainability of the fishery.

To attain these objectives, a suitable management method has to be introduced.

5.1 Promoting transformation

During the period of the policy (since 2006) there has been little real progress in bringing the Chokka Squid fishery into black hands. Most of the black ownership is nominal only. The real owners and operators in this fishery continue to be white people, pretty much the same social group as operated the fishery at the time of independence.

It seems that the policy of furthering transformation in this fishery will not be accomplished with the current methods. At present, most of the black people who enter this industry on the basis of transformation do not understand how it works. They enter the industry assuming they will make money. When that does not happen and creditors start to ask for repayment, they look for instant cash and sell their shares. (Black Right Holder interviewed). This is where the problem lies. The black people simply do not have the know-how and business acumen to make money in this business. Therefore, no matter how often they are brought into the business they will soon offload their shares to other people that can make money in the business. This, of course, is just in accordance with the basic laws of the market system.

In order to make black people real operators or partners in the Chokka Squid fishery, it is absolutely necessary to provide them first with the necessary training and business experience. If that is not done, the outcome is either a fairly efficient and profitable industry run and de facto owned by whites or, if the objective of effective black ownership is somehow implemented, an inefficient, decrepit industry that is run and operated by blacks.

The current situation is a variant of the first outcome. The whites still control the fishery and effective black participation is limited. Moreover, there has been very little advance in effective black participation since 2006. In this sense the objective of transformation has not been accomplished.

5.2 Creation of an environment for investment and job creation

This objective has been accomplished to a certain extent. Employment in the industry has not been reduced and there have been some investments. The problem is that this has been achieved at the cost economic efficiency. There were investments in vessels in infrastructure and jobs were created or at least maintained. However, the rights-holders have been forced to keep unchanged crew numbers (as evident from ministerial decision on TAE, see Appendix 1) instead of adjusting those to the most efficient or profitable levels. Thus, in effect, the jobs have been subsidized. Generally, maximizing efficiency also maximizes jobs although these jobs can be created outside the fishery sector. That is to say, when profits are maximized, the demand for labour will be maximized. Thus, the current policy, while maintaining jobs on the vessels, has

actually reduced the overall number of jobs by insisting on excessive labour on the vessels. Note also, in this context, that downsized crew will have access to the early retirement fund that might also help them to sustain themselves while look for other jobs. It is reported that the statutory council for the squid fishery has made a collective agreement on the minimum conditions of employment, including a fixed minimum remuneration of R 1333.50 ZAR for a 21 fishing day trip (Anon 2012a). In addition it is agreed that the employers contribute 60% to monthly provident funds (Anon 2012b). The objectives of this fund are to provide a **retirement savings plan** for its members, a life and disability benefit for its members, provide an income replacement plan for its members and funeral benefits for its members and their immediate families. The retirement fund will be from that provident fund. The modelling exercise shows that, given the model assumptions and limitation, one would expect that it would be wise to reduce the effort by 664 men. The reduction in effort by 664 men will increase biomass by 6.400mt. That will in turn increase the catches by 8.8 %. The model also predicts an increase in revenue of approximately 9% (4.3 million ZAR) and a reduction of cost of 24.3% (5.6 million ZAR). These results will increase profitability by 32% (9.8million ZAR), which represents 66% of projected revenue. The main lessons are that managing this fishery in a bio-economic efficient way will probably increase investments due to higher profits but job creation, if that is a goal, will have to take place elsewhere in the economy. Policymakers should consider this.

5.3 Economic viability and environmental sustainability of the fisheries

According to the results of bio-economic model the fishery is estimated to be at a level that could be considered sustainable though there is scope for improvement to achieve greater economic efficiency. The economic situation of the industry is precarious, with rising costs and unknown expenses in the future (SASMIA, 2013). The industry is presently plagued by variable export prices. The dollar price for Chokka Squid (*Loligo vulgaris*) dropped from a high of 6.1 USD per kilogram in 2007 to a low of 4.1 USD per kg in 2009 in 2010 and 2011 (Figure 10) 4,8 USD per kilogram.

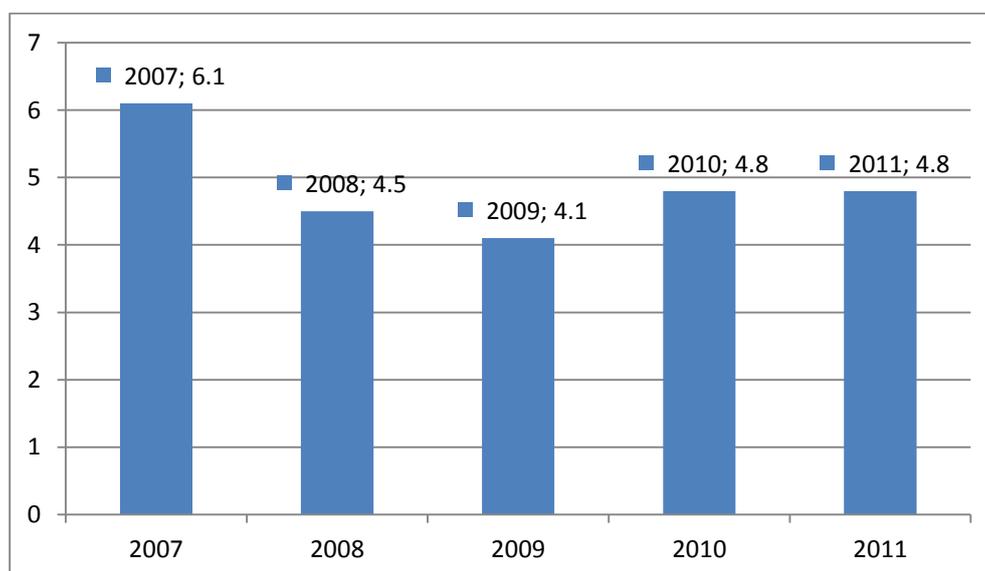


Figure 9. The export prices in dollars for the period from 2007 until 2011.

This situation is not helped by the fact that current fishing rights are approaching the end of their term. This has created uncertainty and volatility in the fishing industry as a whole and the Chokka Squid sector in particular and has made finance very hard to obtain (SASMIA 2012).

The policy has been quite successful in ensuring the environmental sustainability of the Chokka Squid fishery. The most recent update of modelling, incorporating data to 2008 indicates that the squid resource is in a healthier condition than previously thought, largely due to several successive years of above-average recruitment. Despite this, there is concern that latent effort exists in the fishery in that several vessels are fishing fewer days than they are capable of (Anon 2010a).

There have been improvements in terms of data collection as the fishery developed the jig logbooks that are assisting in submission of the data. The only challenge is the effort increase, according to the data the target effort limit (300 000 man days) have been exceeded in certain years. That is translating target effort level into practical management quantities as the number of crew, which is supposed to be 2422 men.

That could have been caused by the fact that the industry has to make more money before the government takes the rights back to the state. Also when the demand of the resource is high the catch sales will be also be high. Therefore, the industry will increase fishing and not worry about fishing down the stocks, and future recruitment success might be impaired. That means it is imperative to give the fishers a sense of ownership. This suggests the advisability of making the rights much more long lasting if not permanent. In that case the rights-holders will have more security and will not have to endure the risk of holding their rights only during a period of depressed stocks. Also, permanent right holders will have a strong incentive to conserve the stock as they know that it is, in effect, their resource in the long term.

The bio-economic modelling exercise showed that, given the model assumptions then reducing effort (men) not only increases the biological sustainability, but also increases revenues and profits. The profits are predicted to increase by 32% (9.8 million ZAR), which represents 66% of projected revenue. When it comes to sustainability, the model shows that it is likely in the current situation that the fishery is at dangerous level. According to the model and its' parameters, the effort is very close to the point where the fishery will become biologically unsustainable. Given the uncertainties in this fishery, a precautionary approach to management would stipulate caution, meaning that a lower level of effort is advisable to secure sustainability.

5.4 Conclusion

On the basis of the above, it is concluded that the objectives of the Chokka Squid policy have not been fully met. In particular, little progress has been made towards the objective of transformation, i.e. black people becoming the dominant players in the Chokka Squid fishery. Economic efficiency in the fishery, has also suffered from the policy and, therefore probably also the objective of job creation. On the other hand, the state of the resource appears good and the industry seems to be in a reasonable good health.

The reasons for the failure in fully attaining the objectives of the Chokka Squid policy are several.

One reason is that there are gaps and contradictions within the policy. First, it is not clear how the policy can be conducive for the maximization of profits in the industry and, thus, the social benefits. Second, the policy does not take account of improvements in fishing technology, which may reduce the optimal crew size and thus existing jobs aboard the vessels. Related to

this is the problem of crew wages. The wages are low, but at the same time no business can pay good salary unless it is profitable. Keeping people in low production and ill-paid jobs is not a solution to poverty. This policy is more likely to prolong poverty, rather than alleviate it.

The Fishery Management System in place also needs to be adjusted. The rights in the fishery are weak and short term and refer to fishing effort rather than volume of harvest. These limited and weak rights are insufficient to further resource conservation, long-term investments in vessels, processing and markets and encourage the firms to jointly enhance the productivity of the fishery. Taken together the reasons for the failure of the Chokka Squid policy is that the means by which the objectives were supposed to be achieved have not been sufficiently effective. The bio-economic modelling exercise supports those findings.

5.5 Summary and recommendations

The results of this study indicate that the Chokka Squid fishery is one of the more important fisheries in South Africa; ranking third both in terms of total employment and total value of landing. It is a labour intensive fishery and the total number of fishers participating is estimated at over 2464. Chokka Squid is valued locally and internationally with estimated of 98 % of its products exported. Failure to retain market share and the high prices it offers would lead to the point of collapse of the squid fishery as a major commercial fishery as local demand and price are a fraction of those in the export current markets.

It is imperative for this fishery to maintain its social-ecological performance and status, particularly important in view of the urgent social and economic development needs in this region. Progress has been made in transforming the fishery although the extent of transformation is lower than in most other major fisheries. The results of the 2009/2010 DAFF Performance Review indicated that average percentage of HDI shareholder ownership was 48% compared to the average of 60% for the fisheries sector overall (DAFF 2009). The overall picture emerging is of an important and valuable fishery, especially within the Eastern Cape, that has performed well in terms of economics and ecological sustainability but where there is scope for improvement in equitability in due time.

The challenge is to address the need for greater equitability in a way that does not damage the economic performance or the sustainability of the fishery. This study conceived means to manage this fishery to increase its economic efficiency for the benefits of the society.

Based on the results of the base year (2011), the effort creep is high. The effort is measured by the number of men, which according to Total Allowable Effort is 2422. The actual fishing effort in base year is 2464 men; meaning 42 men were operating illegally. According to a bio-economic model the number of crew needed to fish towards maximisation of economic yield is 1800 men. To fish at Maximum Economic Yield (MEY) the fishery needs to downsize 664 men according to the actual fishing effort in base year. The model predicts that if effort is reduced the stocks will increase which will in turn result in profits, as the revenues will be generated approximately 60%.

This also all shows that the fishing can be increased to 3000 men but that will mean that the revenues will go down and the profits will also go down resulting in the creation of jobs which will be paying much less. There is no company that can pay their employees well more while operating at loss. Comparing to the present situation, there are about 2464 jobs which are also

not paying well-meaning those jobs are not making much difference in the lives of the people but the companies has to retain them to comply with the government legislation.

If crewmembers lose their jobs, they will receive money from their retirement funds to sustain themselves and venture into other businesses. Meanwhile the fishery will be making more profits and opening more jobs opportunities for the society as a whole. According to these results, an effective and stable management and regulatory framework needs to be put in place. Also having clear objectives within that framework, and a commitment to monitoring performance against them, is another necessary condition to efficiently manage this sector.

Firstly, economic efficiency in this fishery, or pursuing MEY, is imperative. It will not only help to protect the squid population, by ensuring that stock levels are larger than those associated with the traditional MSY target, it will also guarantee that resources be allocated to the fishery correctly and in a manner that maximizes profits. The Fishery Management Regime that this paper recommends which will attempt to extend the amount of resources devoted to the fishery beyond MEY a Property Right Regime that is managed indirectly through the taxes of the landings. Fishery aggregate input or output controls alone are not sufficient to prevent a race to fish (Arnason 2006). Given the inevitable problem with effort creep in this fishery, Individual Total Quota's (ITQs) combined with Total Allowable Catch (TAC) set by the management to target MEY is the best option for this fishery. With a secure property right to catch, there will be no longer race to fish incentive, since catch will be assured, and thus there will be no tendency towards over capitalization in the fishery. Also according to the bio economic results presented in section 4.4, given its limitations, further strengthen the findings. There is scope for improved management, for improved sustainability and greater economic gains. Furthermore, ITQ system with set TAC will move the situation in the fishery closer to the optimal setting, compared to the actual setting.

Under such a system, technological change lowers the cost of fishing, rather than endangering stocks through increased fishing power. In addition, by providing a secure and easily transferable property right, ITQs result in increased capital values to fishing entitlements. Quota passes from high to low marginal cost producers, increasing efficiency, and maximizing fishery profit generates the largest possible asset value for quota holders. Lowering the TAC when conditions warrant also results in relatively seamless and autonomous fishery adjustment through the exchange of quota holdings, generally passed to more efficient vessels that can afford to pay relatively more for each unit of quota. In some cases, ITQs can be more costly to administer and enforce than other schemes and high grading will always be a concern. However, the establishment of private property rights with ITQs, and the desire to protect them, also generates incentives for self-policing and conservation. The cost of an ITQ system must also be compared with the costs associated with alternative management regimes. The cost of effort creep under an input-restricted management regime (in addition to the cost of monitoring and enforcement), for example, can be far more excessive than the cost of any comparable rights. These vessels will be licensed and checking for licenses on fleets mostly on ports will monitor that. The TAC will be monitored as landing in the ports or as harvest at sea or as value in processing and trades.

The harvesting reporting may be imposed periodic or daily. It is vital to devise severe penalty for breaches of the fishery management system to force the ITQs to comply with legislation.

In addition to the ITQ system, the existing management measures such as area restrictions, fishing gear restrictions, and the use of closed areas to conserve important vulnerable habitats

must be retained. The five-week period closure of fishing areas to protect spawning fish from all fishing must also be retained. These measures are all meant to support and secure the sustainability of the Chokka Squid fishery.

Secondly, proposing the policy objectives to be restructured in a way to cover the promotion of the conservation and the efficient utilization of the marine resources to ensure the stable employment and economic viability of fishing communities. That will emphasize the sustainability of the fisheries while emphasizing on the economic benefits of the fisheries sector.

Thirdly and lastly, the ITQs should be awarded to the existing vessels in the Chokka Squid sector in order to maximize the economic yield. When awarding the ITQs, the colour of skin should not be considered but the capacity to generate more profits for the benefits of the society.

The challenges being faced by the South African squid fishery are another example of the difficulty of balancing sustainability, economic efficiency and equity in fisheries, a problem that confronts almost all fisheries worldwide (Cochrane 2000). As with many other sectors and industries in South Africa, the problem is multiplied by the need to redress the imbalances still persisting from the apartheid era.

The following proposed recommendations are intended to contribute to meeting those challenges and providing insight and information that will help to ensure equitable and sustainable benefits that make an optimal contribution to the development of the country obtained from the squid fishery.

According to the analysis in this paper the government should consider taking the following actions:

- (1) Introduce long-term, secure rights preferably in terms of ITQs.
- (2) Allocate these rights disproportionately to blacks and black communities with the stipulation that they may not be sold but only rented out.
- (3) Stipulate that the rights allocated to whites can only be sold to parties satisfying the objectives of transformation until that transformation is deemed to be completed.
- (4) Impose a modest fee on ITQ-holdings to pay for the cost of management.
- (5) Encourage the set-up of joint ventures between white Chokka Squid experts and black ITQ-holders.

Setting a differential fee higher for all white companies, lower for joint ventures and all black companies or legislation and possible tax rebates, could do this. These measures should be adjusted over time as transformation evolves.

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APPENDIX

Appendix I: A history of Total Allowable Effort in the South African jig squid fishery over the period 2006-2012

Table 1: History of TAE in the squid fishery over the period 2005/06 – 2011/12 (Glazer and Butterworth 2006).

Season	TAE		Comments	References
	SWG recommendation	Final recommendation		
2006	<p>Anon (2005a):</p> <ul style="list-style-type: none"> • Limit effort to 3 million man-hours (translated to 300 000 man-days for practical reasons). • Adopt effort limitation mechanisms from a set of proposals including: <ul style="list-style-type: none"> ○ Limiting number of days at sea ○ Extending the closed season ○ Reducing permits • 5 week Oct/Nov closed season 	<p>Anon (2005b):</p> <ul style="list-style-type: none"> • A maximum of 3.3 million man-hours fishing, with closure of the fishery when the target is met • 5 week closed season in Oct/Nov • Investigation of additional mechanisms for effort reduction • Bag limit of 20 squid per person per day in the recreational fishery <p>Annexure A of Anon (2007):</p> <ul style="list-style-type: none"> • 2423 crew or 138 vessels, whichever occurs first • 5 week closed season in Oct/Nov <p>Annexure A of Anon (2007):</p> <ul style="list-style-type: none"> • 2422 crew or 136 vessels, whichever occurs first 	<p>Anon (2005a) noted that limiting the fishery by means of number of men and vessels was not sufficiently effective given that the target effort level of 3 million man-hours was being exceeded; hence the effort limitation mechanisms suggested. The final mechanism of effort reduction was left to the discretion of the decision-maker. These mechanisms were presented as guidelines given that the long-term rights allocation process was underway.</p> <p>Although the Minister signed off on a TAE of 3.3 million man-hours, the formula for translating that into number of crew and vessels in the long-term rights allocation process was unclear (S. Moolla, pers comm via e-mail). Subsequent allocations were therefore made in terms of crew and vessels.</p> <p>It is noted in Annexure A of Anon (2007) that in 2006 the Minister approved a TAE of 2422 crew or 136 vessels and a 5 week closed season in Oct/Nov upon conclusion of the long terms rights allocations.</p>	<p>Anon (2005a)</p> <p>Anon (2005b)</p> <p>Anon (2007)</p>

Season	TAE		Comments	References
	SWG recommendation	Final recommendation		
2007	<p>Annexure B and associated Appendix of Anon (2007):</p> <p>Two alternative recommendations:</p> <ol style="list-style-type: none"> 1. in addition to the 5 week October/November closed season, a further closed period of three months (spread as most convenient operationally during the February-September period) be implemented. This would be the first phase of a two year programme to restrict the potential effort that the existing authorised fleet could apply by 40% (i.e. 20% each year), with attendant monitoring of the impact of patterns of fishing (this was moderated by the Chief Director to a 6 week closure – see Appendix of Anon(2006)) 2. no further restrictions be placed on effort for the 2007 fishing season. 	<p>Anon (2007):</p> <ul style="list-style-type: none"> • 2422 crew or 136 vessels, whichever occurs first • 5 week closed season in Oct/Nov 	<p>Two alternative hypotheses were put forward regarding resource status (Gaylard & Bergh, 2006 and Glazer & Butterworth, 2006). As a result two alternative recommendations regarding effort control in the jig fishery were put forward by the WG.</p> <p>It is assumed that the bag limit of 20 squid per person per day in the recreational fishery still applied.</p>	<p>Anon (2007)</p> <p>Gaylard, J.D. and Bergh, M.O. (2006)</p> <p>Glazer, J.P. and Butterworth, D.S. (2006)</p>
2008	<p>Annexure B of Anon (2007):</p> <ul style="list-style-type: none"> • In the absence of substantive analyses since 2006 it was agreed that the report of 2006 (for the 2007 recommendation) remains an 	<p>Anon (2007):</p> <ul style="list-style-type: none"> • 2422 crew or 136 vessels, whichever occurs first • 5 week closed season in Oct/Nov 	<p>It was noted that non-trivial differences existed between MCM catch and effort data and data reported in the long term rights applications of Right Holders. The implications of this required investigation.</p>	<p>Anon (2007)</p>

Season	TAE		Comments	References
	SWG recommendation	Final recommendation		
	appropriate recommendation of scientific views of resource status. It was therefore recommended to invoke an additional closed season to reduce effort.	<ul style="list-style-type: none"> An additional 6 week closed season The fishery be subjected to a social planning programme to safeguard the livelihoods of dependents in the event that there is a significant decline in catch rates Bag limit of 20 squid per person per day in the recreational fishery 		
2009		<p>Anon (2009):</p> <ul style="list-style-type: none"> 2422 crew or 136 vessels, whichever occurs first 5 week Oct/Nov closed season Additional 6 week closed season Bag limit of 20 squid per person per day in the recreational fishery 	It was noted that the reconciliation of the catch and effort data was still work in progress; hence an updated assessment was not undertaken.	Anon (2009)
2010	<p>Anon (2009):</p> <ul style="list-style-type: none"> 2422 crew or 136 vessels, whichever occurs first 5 week Oct/Nov closed season Additional 6 week closed season from 11 August to 22 September 2010, pending a mid-season review 	<p>Anon (2009):</p> <ul style="list-style-type: none"> 2422 crew or 136 vessels, whichever occurs first 5 week Oct/Nov closed season Additional 6 week closed season Bag limit of 20 squid per person per day in the recreational fishery 	The closed season was subsequently not implemented based on results from a mid-season review. This was in the form of an updated assessment incorporating revised data that suggested that the resource was in a healthier condition than previously thought, largely due to several successive years of above-average recruitment. It was also noted that the issue of latent effort was still under investigation	Anon (2009)

Season	TAE		Comments	References
	SWG recommendation	Final recommendation		
2011	Anon (2010): <ul style="list-style-type: none"> • 2422 crew or 136 vessels, whichever occurs first • 5 week Oct/Nov closed season 	Anon (2010): <ul style="list-style-type: none"> • 2422 crew or 136 vessels, whichever occurs first • 5 week closed season • Bag limit of 20 squid per person per day in the recreational fishery 	It was noted that a mid-season review of resource status would be conducted to provide information regarding the length of the additional closed season.	Anon (2010)
2012	Anon (2012): <ul style="list-style-type: none"> • 2422 crew or 136 vessels, whichever occurs first • 5 week Oct/Nov closed season 	Anon (2012): <ul style="list-style-type: none"> • 2422 crew/136 vessels • 5 week Oct/Nov closed season • Bag limit of 20 squid per person per day in the recreational fishery 		Anon (2012)

Appendix 2: Landings of the Chokka Squid for the period of 2007 until 2011. TAE was 2422 but was exceeded every year.

Squid jig data from DAFF, 2012

Year	Catch (ton)/1000	Number of Boats	Number of man (crew)
2007	8.401	132	2466
2008	8.645	137	2584
2009	10.684	132	2505
2010	10.42	130	2489
2011	8.201	127	2464