



Republic of Namibia

MINISTRY OF FISHERIES AND MARINE RESOURCES

ANNUAL REPORT 2006

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LIST OF ABBREVIATIONS

BCLME	Benguela Current Large Marine Ecosystem Programme
BENEFIT	Benguela Environment Fisheries Interaction and Training Programme
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CSIR	Council for Scientific and Industrial Research (South Africa)
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agricultural Organisation
FOA	Fisheries Observer Agency
GDP	Gross Domestic Product
GEF	Global Environmental Fund
HAB	Harmful Algal Bloom
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICT	Information and Communication Technology
INFOPECHE	Intergovernmental Organisation for Fishery Information and Co-operation Services for Fishery Products in Africa
Km	Kilometre
MCS	Monitoring, Control and Surveillance
MFMR	Ministry of Fisheries and Marine Resources
N\$	Namibian dollar
n. mile	Nautical mile
NAMFI	Namibian Maritime and Fisheries Institute
NATMIRC NORAD	National Marine Information and Research Centre Norwegian Agency for Development Cooperation
NPC	National Planning Commission
PV	Patrol Vessel
RV	Research Vessel
SADC	Southern African Development Community
SEAFO	South East Atlantic Fisheries Organisation
TAC	Total Allowable Catch
UNDP	United Nation Development Programme
VMS	Vessel Monitoring System

During the year under review (2006), the sector made positive contributions to the national economy in terms of employment creation and job retention, value addition (through processing of fish landed and fish processed at sea, which resulted in a creation of 214 new jobs) and improved quality of fishery products. In 2006, the final value of production amounted to N\$3.9 billion.

Furthermore, at the beginning of 2006 fishing season, various management measures were identified and implemented; these includes the one-month closed season for hake fishery. Such management measures were introduced for the purpose of conservation of marine resources.

Some of the major challenges facing the Fisheries Sector since year 2002 are the factors from the external environment such as adverse climatic conditions, which affect the Marine Ecosystem; exchange rate and fuel price.

Improvement of activities in aquaculture development was also recorded by the sector. This improvement aims to positively contribute towards food security and poverty reduction by producing and distributing more fingerlings to fish farmers in all the regions, giving orientations to various communities, training fish farmers and undertaking scientific research.

Marine Fisheries scientific research was also undertaken during the period under review. Such research assists the Ministry of Fisheries and Marine Resources in determining the Total Allowable Catches (TAC), and promotes the conservation of fisheries resources.

In addition the Ministry of Fisheries through its Monitoring Control and Surveillance system has successfully protected the fisheries resources from Illegal Unreported and Unregulated (IUU) activities.

The challenge to all stakeholders is the effective implementation and compliances with conservation and management measures, resulting in improvement in the sector. The Ministry of Fisheries and Marine Resources will continue to conserve and protect the fisheries resources as well as to create favourable conditions for marine, inland and aquaculture industries to prosper.



1. THE MINISTRY OF FISHERIES AND MARINE RESOURCES

The Ministry of Fisheries and Marine Resources is responsible for the management and development of fisheries and aquaculture.

1.1 Objectives

The overall objectives of the Ministry are derived from the Mission Statement. Our objectives are to:

- Promote and regulate the responsible and sustainable utilisation of living marine and freshwater resources and aquaculture within the context of environmental sustainability.
- Establish a conducive environment in which the fishing and fish processing industries can prosper and derive optimal income from marine resources.
- Further Namibia's interests within the international fishing sector.
- Provide professional, responsive and customer-focused services.
- Deliver our services efficiently and effectively providing best value for money.
- Continuously invest in human resource development so as to enhance Namibia's capacity to manage fisheries and marine resources, develop and participate in domestic fishing and fish processing, and play an effective role in regional and international fisheries affairs.

1.2 Organisational Structure

The Office of the Permanent Secretary provides executive management to four directorates within the Ministry namely: the Directorate of Resources Management, responsible for scientific research and advice, the Directorate of Operations, responsible for monitoring, control and surveillance, the Directorate of Policy, Planning and Economics, responsible for MFMR planning activities, formulating fisheries policies and legislation as well as to undertake research to advise on the socio-economic issues, and the Directorate of Aquaculture, responsible for the administration and promotion of aquaculture development. A General Services Division provides administration and support services.

1.2.1 Directorate of Operations



*Mr. Peter Amutenya,
Director of Operations*

Main responsibilities:

- Regulation of fishing activities within the Namibian EEZ.
- Monitor, control and surveillance through the operation of fisheries patrol vessels, cars for coastal inspection and fisheries patrol aircraft.
- Deployment of Inspectors at processing plant, harbour and midwater.
- Fisheries legislation enforcement.

1.2.2 Directorate of Resource Management



*Dr. Moses Maurihungirire,
Director of Resource
Management*

Main responsibilities:

- Provides advice on the state of commercially important marine fish stocks and recommendations on their appropriate yields;
- Advises on appropriate management measures in relation to species and fish size limitations, closed seasons, closed areas, and limitations on the types and effectiveness of fishing gear.

1.2.3 Directorate of Policy, Planning and Economics



*Ms. Anna Erastus,
Director of Policy, Planning and
Economics*

Main responsibilities:

- Co-ordinates the formulation, implementation, as well as monitoring and evaluation of fisheries policies and legislation.
- Carries out continuous policy and economic research and analyses.
- Responsible for the management of information services of the Ministry
- Administration of fishing rights and quotas
- Collection of fees
- Analysis and publication of fisheries statistics.
- Co-ordinates overall planning of the Ministry.

1.2.4 Directorate of Aquaculture



*Dr. Ekkehard Klingerhoeffer,
Acting Director of Aquaculture*

Main responsibilities:

- Ensure the responsible and sustainable development of aquaculture to achieve socio-economic benefits and environmental sustainability.
- Facilitate an efficient, coordinated administrative and institutional framework for aquaculture.
- Ensure that the genetic diversity and integrity of the aquatic ecosystem is maintained.
- Promote responsible aquaculture production practices.
- Research on fresh water fish resources in the interior of Namibia and provides advice on the conservation and management of those resources.

1.3 Ministry's Strategic Plan and Customer Charter

The Strategic Plan for 2004–2008 has been reviewed and realigned according to the Office of the Prime Minister strategic plan framework. As a result of the realignment, several consultations have taken place with all stakeholders and the new plan is to be implemented during the period of 2008 onwards.

The Ministry uphold the standard of customer charter as per Public Service Charter of Namibia. The Customer Charter was also reviewed to accommodate aquaculture services. Both the Strategic Plan and Customer Charter can be accessed via the Ministry website. www.mfmr.gov.na

1.4 Finance

The operations of the Ministry are financed through the Operational Budget for all recurrent expenditure; and the Development Budget, for capital projects. The operational budget for 2006/2007 was N\$113,117 million the breakdown is indicated in Table 1.

Table 1: Operational Budget for 2006/2007 (million)

Office of the Minister	3,009
Administration	21,695
Resource Management	19,808
Operations and Surveillance	52,603
Policy Planning and Economics	8,980
Aquaculture	7,020
Total	113,115

Source: MFMR, 2006.

The development budget for 2006/2007 was N\$22,562 million. Ten capital projects were identified for funding support under this budget, as shown in Table 2 below.

Table 2: Development Budget for 2006/07

Project	(N\$,000)
Kamutjonga Inland Fisheries Institute	10,931
Acquisition of Patrol Aircraft	931
Traditional Fishing Development	800
Aquaculture Development Project at Olushandja Dan/Onavivi	4,400
Aquaculture Development in Kavango	500
Aquaculture Development in Caprivi	500
Renovation of MFMR Head Office Windhoek	350
Construction of the Processing School in Walvis Bay	350
Renovation of Hostels, Premises, Offices and Classrooms	350
Upgrading of Ongwediva Hatchery and Construction of New Offices	350
Upgrading of Hardarp Facilities/Ponds	350
Construction of New Research Vessel	1,000
Extension and Renovation of Swakopmund (NATMIRC)	1,000
Construction of MFMR Regional Office in Caprivi	350
Construction of MFMR Regional Office in Kavango	350
Development and Integration of Fisheries Information System	350
Leonardville Fish Farming Project	350
Total	22,562

Source: MFMR, 2006

In addition to the budget provided by Government, the Ministry received technical and financial assistance from countries and organisations during the year. The main areas of donor support are indicated in Table 3 below.

Table 3: Donor assistance received during 2006.

Donor	Type of assistance provided
Spanish Regional Government of the Xunta de Galicia	Financial assistance on aquaculture development projects (Omahenene/Onavivi); technical assistance to NAMFI; staff training in Spain. Cooperation amongst Namibian and Spanish scientist to carry out surveys.
Government of Malawi	Technical assistance (aquaculture development projects).
Government of Cuba	Technical assistance (aquaculture development projects).

Source: MFMR, 2006

2. FISHERIES RESEARCH

2.1 Marine Capture Fisheries Research

The Ministry continues to undertake research on capture fisheries within the Namibian economic zone. The research is aimed at assessing the status of the fisheries resources, as well as that of the marine environment, in order to provide scientific advice needed for the sustainable exploitation such resources.

Several fisheries-independent stock surveys were conducted during 2006. A hake survey was conducted with a commercial fishing vessel, the F/V Blue Sea. This vessel has been used for surveys since 2002 (three consecutive years) and was calibrated with the Norwegian research vessel, Dr Fridjof Nansen in order to compare data collected since independence. The Fishing vessel Southern Aquarius and the R/V Welwitchia were used to survey the orange roughy stock. The R/V Welwitchia was used to survey the horse mackerel and crab stocks. In the case of pilchard two surveys were conducted with the R/V Welwitchia, assisted by commercial vessels (purse seiners) who did the scouting for pilchard. The rock lobster surveys were conducted with the R/V !Anichab. The R/V Welwitchia and R/V Anichab collected environmental data in remote weather stations along the coast and via satellites.

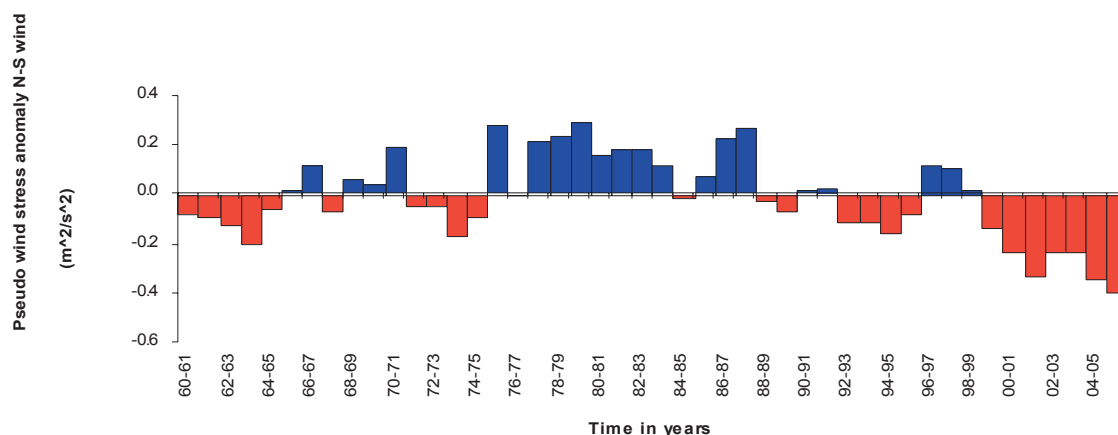
The Spanish R/V Vizconde de Eza was made available by the Kingdom of Spain to conduct a deep-water (500 – 2000m) survey to estimate the presence and abundance of all deep-water resources in this water depth. Specific attention was given to species that may have future commercial potential such as deep-water sharks, crustaceans, and cephalopods. Namibian scientists participated in this month-long survey.

2.2 State of the Marine Environment

Several environmental monitoring surveys were conducted in 2006 to gather information on important oceanographic parameters and processes such as sea surface temperature, salinity, dissolved oxygen, hydrogen sulphide, nutrients, chlorophyll-a, phyto- and zooplankton, upwelling and frontal movements. Other opportunities to collect environmental information, such as the resources surveys were utilised. Additionally, remotely sensed data of wind speed and direction, air temperature have also been collected from various satellites and weather stations. Regular monthly updates of the state of the marine environment were compiled with this information.

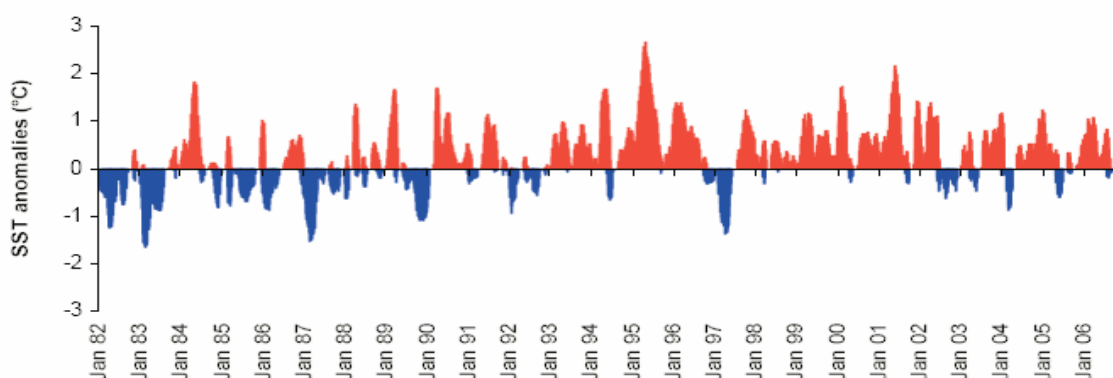
2.2.1. Wind: Wind induced coastal upwelling is the most important oceanographic process along the Namibian coast as it stimulates primary production in the sunlit zones through the enrichment of the surface water with nutrients. The Diaz Point (Lüderitz) time series of wind speed and direction is used to create a coastal upwelling index for the southern Namibian coast. Figure 1 illustrates the annual wind-stress anomaly at Lüderitz, which is the main upwelling centre in the Benguela system. It is clear from the graph that upwelling has been below average since the 1999/2000 seasons up to present (2005/2006 season).

Figure 1: Annual longshore wind anomalies recorded at Diaz Point, Lüderitz – blue indicates stronger than average southerly winds and red indicates below average winds.



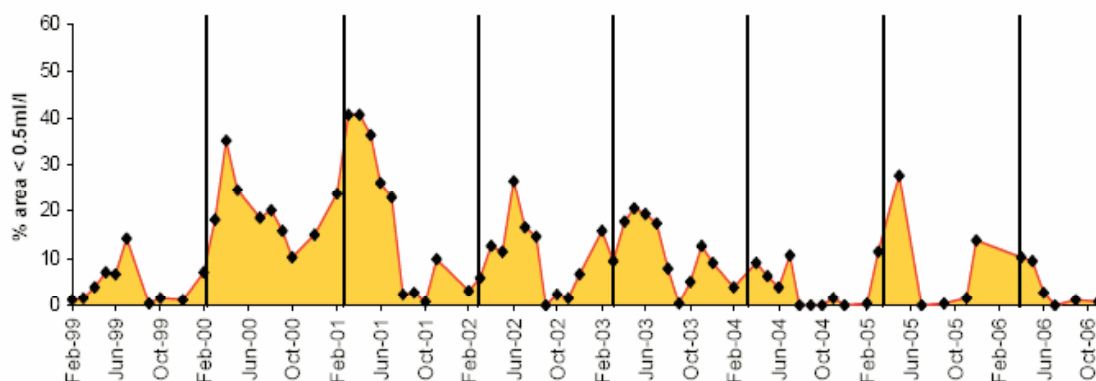
2.2.2. Sea surface temperature: Figure 2 represents the weekly sea surface temperatures over the central Namibian shelf area since 1982. Temperatures were above average for most of the 2006 but it never reached levels comparable to former Benguela Nino years i.e. 1984 and 1995. However, 2006 would still rate among the warmer years of recent times, similar to 1999 and 2001. The unusually high rainfall in April 2006 along the Namibian coast was partly due to this positive sea surface temperature anomaly.

Figure 2: Weekly SST anomalies off central Namibia since January 1982.



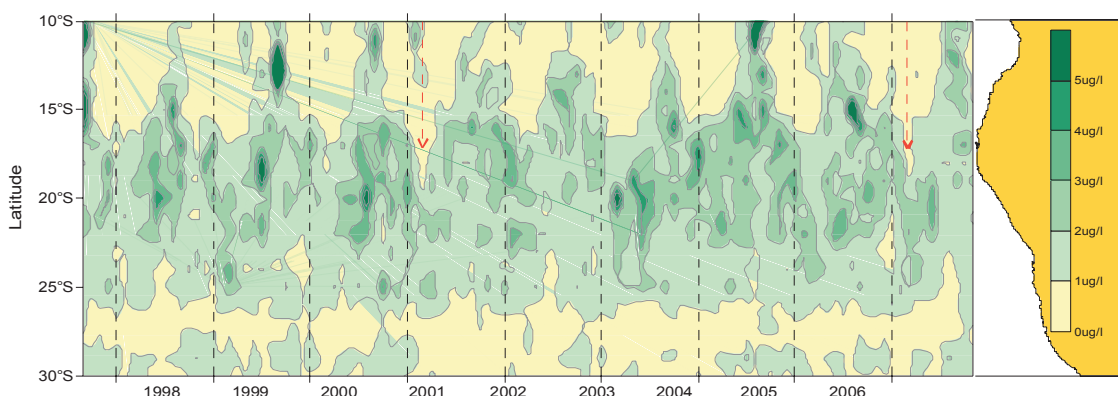
2.2.3. Oxygen: Dissolved oxygen is one of the key environmental variables influencing the habitat suitability in biologically productive systems such as the northern Benguela. Species that are not adapted to hypoxic (<2.0 ml/l) and even anoxic (0.0ml/l) conditions would be constrained both vertically and horizontally by oxygen poor water. However, fish species occurring in coastal upwelling regions, such as the Benguela system, have adapted either physiologically or behaviourally to survive in these extreme conditions. The low oxygen index in Figure 3 illustrates both seasonal and inter-annual variability. Larger volumes of oxygen poor water usually appear during summer/autumn due to local oxygen consumption. In winter/spring the bottom oxygen conditions improve as a result of upwelling that transports oxygen richer water onto the shelf area. Oxygen conditions over the Namibian shelf have been favourable in 2006 as shown in the Figure 3.

Figure 3: Percentage areas of low oxygen water (≤ 0.5 ml/l oxygen) the shelf off central Namibia, Walvis Bay



2.2.4. Phytoplankton: Monthly chlorophyll-a index, representing the Angolan and Namibian coast, has been derived from SeaWiFS satellite images. Highest chlorophyll-a concentrations usually occur off central Namibia, which is located downstream of the Lüderitz upwelling cell. Low chlorophyll-a areas are usually found off this strong upwelling cell due to high water turbulence (indicated with blue) and off northern Namibia during intrusions of nutrient poor Angolan water, usually from December to March (represented by yellow areas). Although chlorophyll-a concentrations in 2006 extended over similar areas as in previous years, concentrations were lower during much of the year. Early 2006 we have experienced a strong southward intrusion of warm, nutrient poor Angolan water into northern Namibia similar to the 2000 season (indicated by red arrows).

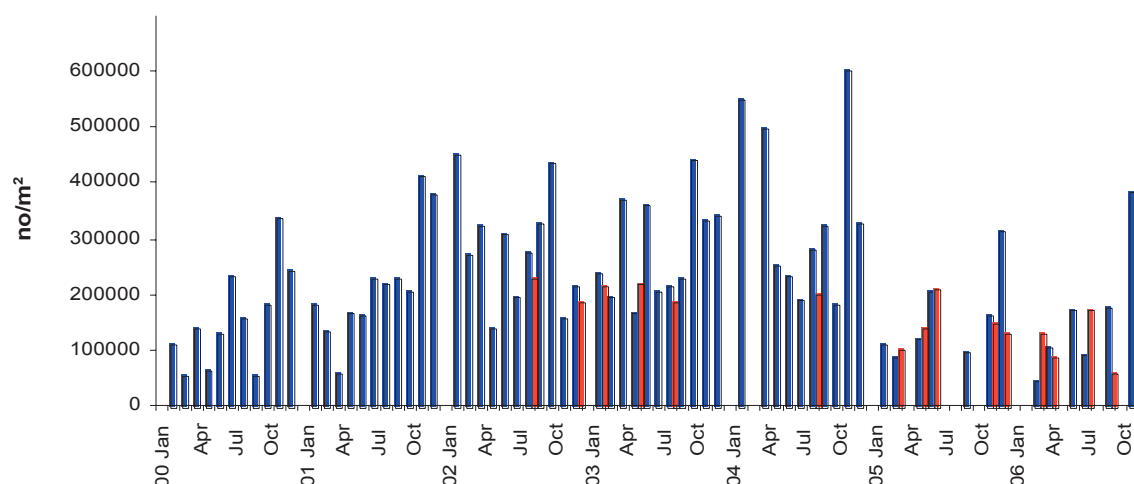
Figure 4: Time series of chlorophyll-a concentration along the southern Angolan and Namibian coastlines since September 1997.



2.2.5. Zooplankton: Copepod abundance provides an excellent measure of secondary production as illustrated in Figure 5. In general copepod numbers have decreased since the start of 2005 and are currently at a lower level, similar to the 2000/01 period. The steep increase in copepod abundance towards the end of 2006 (and other years)

can be ascribed to the seasonal increase in upwelling activity and subsequent primary production at this time of the year (September and October) and subsequent increase in primary production.

Figure 5: Copepod abundance along the 23°S (blue) and 20°S (red) monitoring lines.



2.3 State of the Marine Resources

2.3.1 Hake

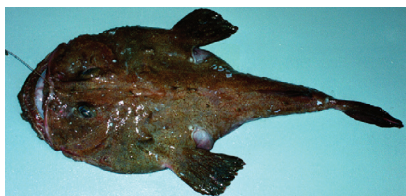


The Jan/Feb 2006 swept-area biomass survey showed the total relative abundance estimates to be 898 000 tons, an increase of 50% from the previous year. However, about 80% of this biomass was made up of small fish of less than 36 cm in length (classified as non-fishable stock), as the fishable biomass (larger than 35 cm) decreased by 35%, possibly as a result of a weak recruitment detected during the 2003 survey. Also, the spawning biomass was estimated to be very low, while the overall stock indicator was below the maximum sustainable yield (MSY) level, estimated to be about 30-40% of MSY. However, recruitment potential

was estimated to be strong, above the long-term average and so far the second highest observed since 1988 and if allowed to grow bigger may be able to replenish the fishable stock during the 2008/2009 fishing season. The hake stock was found in high abundance between Walvis Bay and Orange River, as well as far North towards the Kunene River, mainly between 200 and 500 m depth.

This year also saw the introduction of new conservation measures for the hake stock, which included a first ever closed fishing season during the month of October. At the same time, selectivity devices, which were introduced during 2004 to help reduce the catching of small hake, were discontinued, until more information becomes available on the practicality of these devices. These new management measures were also primarily introduced to protect small hakes, which are abundantly available, but also to protect the wetfish trawling sector, that bring fish to land-based processing facilities and thereby provide much-needed employment.

2.3.2 Monk



Two monkfish species, *Lophius vomerinus* and *Lophius vaillanti* are caught off the coast of Namibia. *Lophius vomerinus* is the more abundant of the two and contribute approximately 99% to the total Namibian monkfish landings. The monkfish stock is surveyed annually at the end of each year since 2000. However, the survey for 2006 did not take place due to delays in awarding the contract for manning/operating the research vessel.

Namibian monkfish fishery consists of two components. Firstly monk and sole right holders targeting monkfish and secondly monkfish is caught as by-catch by the hake bottom trawlers. The hake fishery lands around 30% of the total monkfish catches annually. Monkfish catches by the monk and sole right holders were for the first time quota regulated for the 2001 fishing season with a quota set at 13 000 tons. Since then, the quota has dropped to 11 500 tons for the 2005/6 and to 9 500 tons for the 2006/7 fishing season. The stock assessment model estimate for the fishable biomass in 2005 is at around 45 000 tons.

2.3.3 Deep-sea red crab



Assessment of the Namibian deep-sea red crab stock for 2006 was based mainly on data from 2005, since data from the 2006 season (January to December) are still being analysed during 2007. Ninety-seven percent of the total allowable catch (TAC) for 2005 was filled by August 2005. Since the start of crab trawl surveys, biomass estimates for crab can now also be calculated using the swept area method (initial estimates compared relatively well to that of the De Lury model. Annual biomass estimates calculated by the De Lury

model indicate an increase in biomass since 1997, with more than 16 000 tons estimated for 2005. Size distribution data for 2005 from trawl surveys compared to that of commercial samples (from observers), demonstrated the biased selection of commercial traps towards larger size crab. This bias was also observed in research traps, despite a smaller mesh size used.

2.3.4 Rock lobster



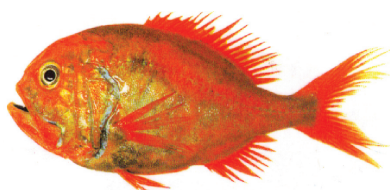
During the 2005/2006 fishing season, the lobster industry managed to fill only 70% of the annual total allowable catch. Catch-per-unit effort (CPUE) remained relatively low (<2 kg/trap fishing days) throughout most of the season at the southern grounds. At the Central and Northern grounds fishing started off well during

January and February 2006, with monthly CPUE levels above 2 kg/trap fishing days (thus higher than that of the previous season). However, during March catch rates at grounds north of Lüderitz dropped sharply, and the fishing fleet returned to the southern grounds for the rest of the season.

It is not clear why Northern and Central catch rates declined during March, since swell conditions were moderate during the 2005-2006 season (compared to the high swell conditions of 2001-2004), and environmental data did not indicate unusual high levels of bottom dissolved oxygen (which would result in the adult stock moving offshore earlier than

usual, and thus become less available to traps). Fishable biomass estimated for 2006 remained below 2 000 tons for the main fishing grounds. Commercial size frequency data from more than 100 000 lobsters measured by observers indicate the presence of a cohort around the 65 mm size limit. Cohort progression analysis of commercial length frequency data indicates the mode of this cohort to have moved from just below 65 mm during the 2003-2004 seasons to above 65 mm CL during the 2005-2006 seasons.

2.3.5 Orange Roughy



During the 2006 fishing season only two vessels were fishing for orange roughy. Thus the level of disturbance by fishing vessels on the known orange roughy grounds Johnnies, Frankies, Rix and Hotspot, can be considered low. The 2006 survey revealed that the estimated biomass of orange roughy is slightly lower than the 2005 estimates. The catch for 2006 was 433 tonnes.

2.3.6 Horse Mackerel



The 2006 acoustic biomass survey showed that the stock was at its lowest since the assumption of horse mackerel surveys in the early 1990s. This decline was not singled out in the midwater catch-per-unit effort (CPUE) series, as this is a series of only kg caught over the time trawled. For shoaling species this index is known to be an over-estimate of abundance, as shoals tend to aggregate more

densely (or at least at the same density) while overall stock density is declining. Horse mackerel distribution mapped during the biomass survey in February 2006 reflected this - showing a patchy distribution of dense aggregations, yet fewer aggregations. No fish were found south of Walvis Bay, and there is a possibility that part of the stock was in Angola at the time of the survey but the survey did not extend across the Namibia-Angola border.

The 0-year old cohort (10-14 cm) detected in 2005 was seen as 1-year olds (15-18 cm) in 2006, but did not show up as strong as expected from the previous survey. Total mortality (including fishing- and natural mortality) on these fish had thus increased. Length at 50% maturity (L50) was calculated at 17.2 cm in 2006. Most fish caught by both the pelagic and the midwater fleet are thus fish that are either sexually immature (are unable to spawn) or those that have probably only spawned for one season.

A total allowable catch (TAC) of 360 000 tonnes was allocated for the 2006 fishing season. The midwater fleet was allocated 315 000 tonnes (87.5 %) of this TAC and had landed 253 713 tonnes by December 2006. The mean length of fish landed by the midwater fleet was 21.5 cm, showing a reduction from the mean length of fish landed in the 1990s (about 25 cm), indicative of growth overfishing. The pelagic fishery had landed their full TAC – 44 429 tonnes by June 2006 with a mean length of 16 cm (10-22 cm). The combined total catch for 2006 was thus 298 142 tonnes.

Currently, the main concern for the horse mackerel stock is the decrease in the size structure and the seeming decrease in the length at 50% maturity of the stock. Fish should be allowed to grow larger to increase their reproductive potential and productivity and to ensure long-term sustainability to the horse mackerel fishery.

2.3.7 Large Pelagics



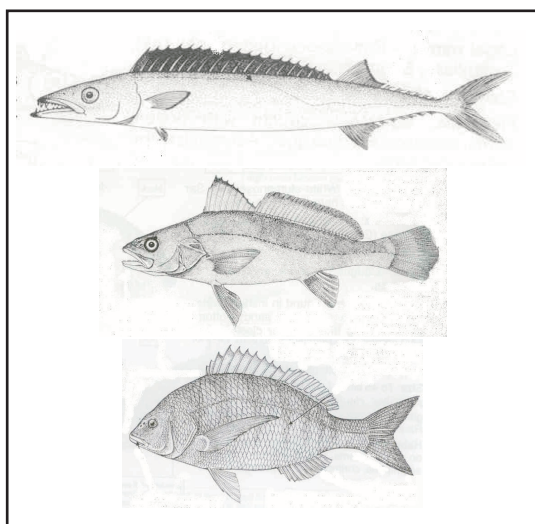
The three most important tuna and tuna like species that are caught in Namibian waters are Albacore, Bigeye tuna, Yellowfin tuna and Swordfish. The industry was expanded in recent years when rights to catch sharks were issued by the Ministry, hence most of Large Pelagic right holders started targeting mostly Blue sharks and Short fin mako sharks that are believed to yield high value products. Albacore landings stands at 2 484

tons compared to 2 344 tons in 2005 indicating an increase in catches with the majority of landings recorded in the first four months of the year. Bigeye stands at 156.35 tons (Rwt), which is still far from the 271 tons (Rwt) landed in 2005. The swordfish catches have also increased from 831.58 tons (Rwt) in 2005 to 877.12 tons (Rwt) in 2006. This could reach 900 tons if all landings are received, showing positive growth for the industry as this would be the highest landings recorded since the fishery commenced.

The shark fishery continues to grow each year and currently the landings for blue shark have already surpassed the total catches of 2005 with 6 642 tons recorded so far compared to 6 615 tons landed in 2005. It is anticipated that the catches will continue to increase again in 2007 due improvement of shark products prices in Asia. However there is a slight decrease in the shortfin mako catches as only 1244 tons were recorded in 2006 compared to 1415 t landed in 2005.

2.3.8 Line-fish Sector

2.3.8.1 Silver kob



Silver kob is the most important component of the linefish fishery of Namibia and is caught by rock-and-surf anglers, skiboat fishermen and fishermen on lineboats mostly in waters shallower than 20m deep.

During 2005, recreational anglers caught 71 915 individual silver kob, which relates to about 189 tons (average mass of 2.5kg). In 2006 recreational anglers caught a total of 49 221 silver kob which relates to approximately 100 tons. There was thus a decrease in numbers of silver kob caught in 2006 when compared to 2005 fishing season. During 2006 the lineboat industry only landed 6.5 tons of kob as they are normally only targeting snoek.

It is of importance to note that in 2005 and 2006 significant kob runs occurred in the Sandwich and Meob Bay spawning grounds.

Current management regulations are: a daily bag limit of 10 fish per angler; a minimum size limit of 40cm, and the daily bag limit should allow an angler to retain only two silver kob larger than 70cm.

2.3.8.2 West coast steenbras

Two distinct West Coast steenbras populations occur in Namibian waters, a closed and separate population at Meob Bay situated in a closed area and is therefore unavailable to recreational anglers. Lineboats target this population only when silver kob becomes scarce and this last happened in 1997. Recreational anglers exploit the northern population, occurring in the open angling area. This northern population is relatively small, with a spawning stock biomass of around 493 000 tonnes in 2006.

During 2005, 12 360 individuals were caught by recreational anglers which relates to about 35 tons (average mass of 2.9kg). In 2006 recreational anglers caught a total of 16 580 West Coast steenbras which relates to approximately 48 tons. There was thus an increase in numbers caught compared to the previous year.

In order to protect the smaller-sized males as well as the larger-sized females, management regulations introduced in 2001 include 1) a daily bag limit of 10 fish per angler, 2) a minimum size limit of 40cm, and 3) the daily bag limit allows an angler to retain only two West Coast steenbras larger than 65cm.

2.3.9 Pilchard



Pilchard stock estimated from the April/May 2006 survey was 72 000 tons, consisting mainly of spawners with a modal length of 22.5 cm. The two aggregations that made up this biomass were found around Walvis Bay and in southern Angola close to Tombua. The pilchard stock assessment model indicates that the surveys underestimate the biomass. It estimated the April biomass to be around 139 000 tons. The October 2006 survey which aimed to determine recruitment, failed to locate any aggregations of pilchard.

2.3.10 Cape fur seal

During the 2006 harvesting season, the seal industry managed to fill 91.5% and 87.9% of the allocated 85 000 pup and 6 000 bull TAC, respectively.

Poor pup growth, starvation (for pups and adult seals) and widespread abortions were characterised the latter half of 2006. These are linked to the negative south wind anomaly recorded in the Luderitz upwelling region during 2006. Consequently, low recruitment numbers of the 2006 cohort and a decrease in numbers of the 2007 cohort for harvesting purposes are expected.

In 2006, the total food consumption by the seal population was between 630 and 905 thousand tons. This is a decrease of between 8% and 36% compare to 2005, which includes nearly 44% of non-commercial species. This resulted mainly from a large decrease in horse mackerel consumption in 2006. The main contribution to the uncertainties in these food consumption calculations for 2006 was due to the unknown extent of the effect of starvation noted last year in the seal population.

3. MONITORING, CONTROL AND SURVEILLANCE (MCS)

3.1 Sea Surveillance

Namibia deployed two fisheries patrol vessels namely; "Nathanael Maxuilili" and "Anna Kakurukaze Mungunda" to enforce the sea surveillance functions. The vessel sailed for 103 days compared to 139 days in 2005. "Anna Kakurukaze Mungunda" sailed for 107 days during 2006, compared to 157 days in 2005. Both vessels sailed for lesser days in 2006. Both vessels sailed in accordance with the targeted days as planned in the new Monitoring, Control and Surveillance operation strategies. "Nathanael Maxuilili" undertook eight missions during the year.

Table 4: Deployment of Patrol vessels in 2006

Patrol vessel	Day at sea	Distance	Number of inspections
Nathanael Maxuilli	103 days	12 565 nm	77
Anna Kakurukaze Mungunda	107 days	13 344 nm	99
Total	210 days	24 909 nm	179

Source: MFMR, 2006

The two fisheries patrol vessels undertook 17 marine missions. Fisheries inspectors onboard the patrol vessels issued 44 summonses. Offenders paid N\$ 6 900 for non-compliance with fisheries regulations. Meanwhile, PV "Nathanael Maxuilili" made 168 observations on fishing vessels while PV "Anna Kakurukaze Mungunda" 165 respectively. The outstanding cases will be attended to in 2007.

Table 5: Reactions during sea surveillance missions

Number of Missions	Summons issued	Amount paid	Outstanding cases	Cases withdrawn	Warnings issued
17	44	N\$ 6900,00	31	0	0

Source: MFMR, 2006

3.2 Air Surveillance

The fisheries patrol fixed wing plane "Sea Eagle" undertook 84 patrol missions totalling 315.16 flying hours compared to 415, 9 hours in 2005. In all, the fixed wing patrol aircraft covered 54625 nautical miles. The decline in patrol hours during 2006 was caused by mechanical problems.

Table 6. Deployments of the fisheries patrol aircraft during 2006.

Fix-wing plane	Missions	Hours	Fuel	Observations
"Sea Eagle"	84	315,16	93 212 litres	1 175

Source: MFMR, 2006

3.3 Coastal Patrol and Inland Inspections

The Walvis Bay Inspectors undertook 1219 missions covering a distance of about 285 981 km. A total of 11 roadblocks were jointly attended with the Namibian Police, Immigration and Traffic Officers during 2006. A total of 1201 summons were issued and out of that only 985 were paid (N\$ 142 640.00).

Table 7: Reactions during coastal patrol and inland missions in 2006.

Missions	Summons issued	Amount paid N\$	Outstanding amount N\$	Cases withdrawn	Warning issued	Warrant of arrest issued
1 219	985	142 640	109 360	4	1	62

Source: MFMR, 2006

Luderitz Inspectorate undertook 294 coastal patrol mission, with a distance of 18 718 km. A total of 17 roadblocks were jointly held with the Namibian Police, Immigration Officers and Traffic Officers during the Easter and Christmas seasons.

3.4 Factories and Harbour Surveillance

3.5 Vessel Clearance

Table 8: Number of fishing vessels cleared before sailing by fishery types in 2006

Fisheries type	Hake freezer	Hake wet	Sword/Shark Tuna	Small Pelagic	Monk & Sole	Hake longline	Total
Number of fishing vessels	30	73	16	23	7	38	187

Source: MFMR, 2006

Luderitz Inspectorate had cleared 82 fishing vessels at Luderitz harbour and six fishing vessels in Cape Town. Vessels clearance for Cape Town was necessitated by unavailability of suitable cold storage for sashimi products as well as repair and maintenances for some vessels.

Table 9: Factories' offences and fines issued in 2006

Area of violation	Nature of offence	Fines issued	Amount paid
Coastal patrol & roadblocks	Insulting a Fisheries Inspector	2	N\$ 600.00
	Harvest Marine Resource without fishing permit	4	N\$ 1200.00
	Retain under size and Rock lobster in berry	7	N\$ 2100.00
	Harvesting more than 7 Rock-Lobster per day	6	N\$ 1800.00
	Harvesting for Rock-Lobster after sunset	2	N\$ 600.00
Factory inspection	Retain undersize and Rock-Lobster in berry	408	N\$ 122 400.00
	Failure to give notice before offloading	3	N\$ 900.00
Observers reports	Threatening of Fisheries Observers	2	N\$600.00
	Failing to complete logbooks	4	N\$ 1200.00
	Not carry official documents onboard	2	N\$ 600.00
	Discarding of fish at sea	2	N\$ 600.00
	Leaving without a Fisheries Observer onboard	1	N\$ 300.00

Source: MFMR, 2006

4. THE ECONOMICS PERFORMANCE OF THE FISHING SECTOR

During 2006, the fishing industry and other related activities (support industry) contributed to the national economy in terms of employment, export earnings and government revenue.

4.1 Number and Duration of Fishing Rights

The total number of fishing rights and their terms during 2006 is shown in table 10 below. All seven and ten year rights that expired in 2007 and early 2008 was evaluated during 2005, and successful applicants were informed during 2006.

Table 10: Number and duration of existing harvesting rights as at December 2006

Fishery	Duration of Rights				Total
	Seven-year	Ten-year	Fifteen-year	Twenty-year	
Hake	10	6	22	0	38
Monk	2	2	5	0	9
Horse Mackerel	0	11	1	0	12
Large Pelagic	1	6	12	0	19
Red Crab	1	2	0	0	3
Rock Lobster	0	1	20	0	21
Line Fish	1	2	8	0	11
Orange Roughy	0	5	0	0	5
Pilchard	7	5	10	0	22
Mulletts	0	0	13	0	13
Seals	2	1	1	0	4
Guano	1	0	0	0	1
Total	25	41	92	0	158

Source: MFMR, 2006

4.2 Vessel licences

The number of licensed vessels operating in the Namibian water from 2002 to 2006 is indicated in Table 11 below. The number of vessels licensed in 2006 has decreased by 13% if compared to 308 vessels licensed in 2005.

Table 11: Number of licensed vessels by fishery, 2002 – 2006

Fishery	2002	2003	2004	2005	2006
Small pelagic	25	20	16	17	16
Demersal Trawlers	114	100	125	121	78
Longliners	10	8	17	28	39
Midwater	20	26	24	15	10
Deepwater	6	5	5	4	4
Large pelagic	71	49	73	52	65
Linefish	26	19	16	16	15
Crab	2	3	2	2	2
Rock lobster	38	42	34	28	18
Monk	23	21	22	25	22
Total	335	279	334	308	269

Source: MFMR, 2006

4.3 Total Allowable Catches

The setting of Total Allowable Catches (TAC) is one of the main management measures to prevent overexploitation of Namibian fish stocks. TACs are set for most commercial species in Namibia. Table 12 below shows the TACs set by fishery during 2002 - 2006.

Table 12: Total Allowable Catches, 2001-2006 in tonnes.

Year	Pilchard	Hake	Horse Mackerel		Red Crab	Rock Lobster	Orange Roughy	Monk
			Mid water	Pelagic				
2001	10 000	200 000	410 000	(50 000)	2 100	400	1875	13 000
2002	0	195 000	350 000	(40 000)	2 200	400	2 400	12 000
2003	20 000	180 000	350 000	(40 000)	2 000	400	2 650	12 500
2004	25 000	195 000	350 000	(40 000)	2 200	420	2 600	12 000
2005	25 000	180 000	350 000	(40 000)	2 300	420	2 050	11 500
2006	25 000	130 000	360 000	(45 000)	2 400	420	1 100	9 500

Source: MFMR, 2006

4.4 Landings

The total catch for marine resources during 2006 amounted to 504,382.04 metric tonnes, valued at about N\$ 3.9 billion. This production level represents about a 9% decline from the level recorded during 2005. The decline in the total landing was due to fishers' compliance with conservation and management measures, which were introduced at the beginning of the fishing season.

Table 13: Landings of Commercial Species: 2002-2006

Species	2002	2003	2004	2005	2006
Pilchard	4,160	22,255	28,605	25,128	2,314
Hake	154,588	189,588	189,305	173,902	135,771
Horse Mackerel	359,183	360,447	310,405	327,700	309,980
Monk	15,174	13,135	8,961	10,466	9,816
Kingklip	7,210	6,603	7,067	5,567	4,193
Tuna	2,837	3,371	3,581	3,654	2,903
Crab	2,471	2,092	2,400	2,408	2,228
Rock Lobster	361	269	214	248	285
Other fish species	77,407	33,644	31,997	18,834	36,891
Total Catch (MT)	623,391	631,121	567,133	552,164	504,382
Seals (number)	40,000	34,000	59,407	64 167	83,045

Source: MFMR, 2006

4.5 Catch Value

The value of fish and fish products serves as an indicator of the performance of the fishing sector. Table 14 shows the three different value indicators for fish and fishery products from 2002 to 2006. The first indicator is the landed value

of the catch. This is the value of the fish in the form it is landed (i.e.) ex-vessel prices). Landed value has increased from N\$ 3 130 in 2005 to N\$ 3 189 million in 2006, i.e. an increase by 2%. The increase in landed value despite decreased landings is attributed to increase in prices of most fish and fishery products. Significant increases in prices ranging from 29% to 46% were experienced for rock lobster, long line hake and fishmeal. Prices increases were also experienced in all other fisheries except for tuna long line, which decreased by 6% in 2006.

Final value, the second indicator, is the value of fishery products in their final form at export (ex-factory) price. Final value is higher than landed value as it is shown in Table 14 below. This difference is attributed to value addition by onshore fish processing plants. The final value of fish and fishery products increased by 5% from N\$ 3 789 in 2005 to N\$ 3 985 million in 2006, despite a decrease in landings.

The final indicator is the export value, which gives the Namibian dollar equivalence of foreign currency earnings brought into Namibia due to the sale of fish and fishery products. Over the years, Namibia's fishing industry has experienced remarkable growth and has become the country's second biggest export earner of foreign currency. The export value has also increased by 5% from N\$ 3 697 million in 2005 to N\$ 3 883 million in 2006.

The demand for Namibian fish products is increasing; as a result prices are expected to increase. Should this trend continue, the fishing sector could expect positive financial returns thus increasing the landed, final and export values for the sector. The improvement in the resource stocks will in addition boost the increase in exports and thus financial returns.

Table 14: Value of Fish and Fish products - 2002-2006 (N\$ millions)

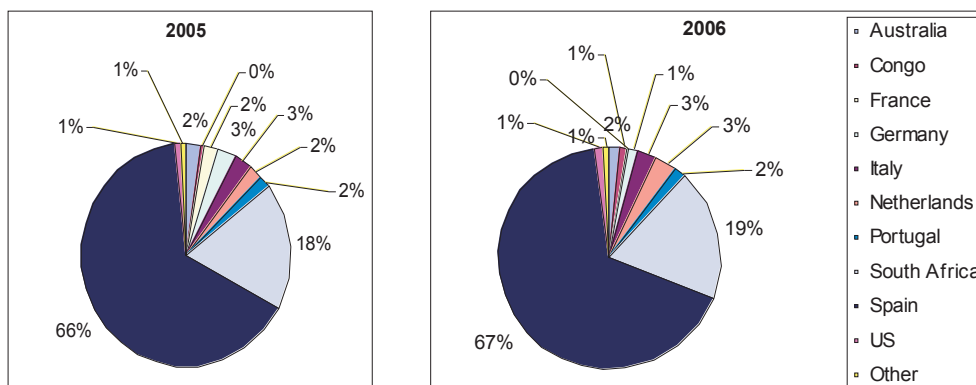
	2002	2003	2004	2005	2006
Landed Value	2,608	2,862	2,531	3,130	3,189
Final Value	3,394	3,867	3,427	3,789	3,985
Export Value	3,311	3,781	3,350	3,697	3,883

Source: MFMR & NPC

4.6 Export Markets

Figure 6; show the export markets of Namibian hake products, the largest percentage of Namibian hake exports go to Spain making up 66% in 2005 and 67% in 2006 respectively. South Africa is the second largest market of Namibian hake products, whereby 18% and 19% in of hake products were exported, in the years 2005 and 2006 respectively. Generally, export markets fairly remained the same during 2005 and 2006.

Figure 6: Export of Namibian hake products, 2005 and 2006



Source: MFMR, 2006

Deducing from figure 6, hake is the most valuable commercial species in Namibia. The bulk of hake products are exported to the principal European markets such as Spain, where it either enters the Spanish market or is distributed further to other markets like Italy, Portugal, France, Germany and Holland. Other non-European markets for Namibian hake are (SA), Australia, Malaysia, South Africa and USA. Namibian hake products face competition from SA, Argentina, Chile and Australia. Namibia has maintained its position as the leading frozen hake supplier in both volume and value terms to the Spanish market despite reduction in TAC. Hake is mainly exported in the form of frozen fillets (skin on and skinless); and in other various product forms such as headed and gutted; baby hake; cutlets; tails; minced; blocks; sausages; wings and roes. As one of the major exporters of hake to the EU, Namibia should be able to bargain better prices, which in return should result in additional earnings for Namibia.

The bulk of other commercial fisheries such as monk are also exported to the European markets like Spain, Italy, France, Germany, Netherlands and Portugal. Rock lobster and crab dominate the Asian markets, more specifically, Japan. Horse mackerel is largely exported to the SADC market Democratic Republic of Congo. Other horse mackerel markets are SA, Mozambique and other SADC countries. Pilchard in the form of canned product is exported to SA and UK, while fishmeal and fish oil are mainly exported to South Africa only. Namibia's share of the UK Pilchard imports has however suffered recently as a result of volume decline. Orange Roughy is exported to the USA, whereas Tuna and other Large Pelagic are shipped to USA, Japan and Spain.

Most players in the fishing industry are actively involved in implementing effective marketing strategies and constantly engaging in product differentiation as part of value addition to be able to ensure constant positive economic returns for the industry.

The outlook for 2007 is good with prices set to increase and forecasted improvement in landings. This will allow the fishing sector to rebound from a difficult year in 2006.

4.7 Contribution to Gross Domestic Product (GDP)

The fishing sector is a major contributor to the national economy. Contribution to GDP is an indicator of the level of output within the fishing sector. This is essentially the gross income earned, wages and salaries, gross profits, and indirect revenues from fish production. It does not include the value of intermediary inputs and it is therefore much less than the value of production.

Table 15, below indicates the contribution of the fisheries sector to GDP, both for harvesting and processing. In 2006, the sector contributed 6% to GDP at current prices. There has been a slight decrease in the contribution compared during 2006. The decrease is in both fishing, processing onboard and onshore and it is due to the implementation of new management measures (reduced TAC, and one-month closure for the hake fishery), which were introduced in 2006 fishing season.

Table 15: Fisheries contribution to GDP, 2002-2006, at current prices (N\$ Million)

GDP Contribution	2002	2003	2004	2005	2006*
Fishing and fish processing on board	1,608	1,757	1,547	1,916	1,870
Processing	703	876	750	466	620
Total	2,311	2,633	2,297	2,382	2,490

Source: NPC, 2007 *Preliminary figures

4.8 Employment

The fishing industry and other related activities made a significant contribution towards job creation and employment in 2006, with the sector providing employment to an estimated 13,200 persons. These include people employed in activities such as commercial fishing, fishmeal production, administration and other related activities. The white fish sector is by far the largest employer in the fishing sector, employing 9 500 workers during 2006.

In 2006, the hake sector created 214 jobs due to increases in value addition. In addition, there was a significant increase in the retail sector especially in the hake sector and this has prompted the need to increase production and subsequently employment.

4.9 Revenue Generated

Despite the decrease in revenue generated from quota fees and fund levy as shown in table16 below, the sector recorded an overall decrease in revenue by 13.6% from N\$106,531 000 in 2005 to N\$92 037 995 in 2006. The decrease in revenue generated from quota fees and Marine Resources Fund levy is attributed to external factors affecting the fishing industry, which in turn affected the profitability of majority of companies.

Table 16: State Revenue - 2002-2006 (N\$ millions)

Fees	2002	2003	2004	2005	2006
Quota fees	100 011	74,437	84, 629	81,363	68,299
Marine Resources Fund levy	15 794	12,042	17, 663	17, 358	12,446
By-catch fees	15 788	13,561	16, 294	7,699	11,199
License fees	286	187	110	111	00 093
Total revenue	131, 879	100,227	120,292	106,531	92,037

*Note: Figures for 2006 are provisional.

During 2006, a total of N\$ 928 228.00 was generated from recreational fishing permits.

Table 17: Types of permit issued in 2006.

Period	Total number of Permits	Amount Received (N\$)
Monthly permits issued	50 270	N\$703 780.00
Yearly permits issued	1 336	N\$224 448.00
Total	51 606	N\$928 228.00

Source: MFMR, 2006

4.10 The Marine Aquarium: Visitors and Income

The number of visitors (individual and groups) that visited the Aquarium during 2006 is outlined in the table below.

Table 18. Income generated from the National Marine Aquarium in 2006

Groups of Visitors	Number of visitors	Revenue (N\$)
Children	7884	39 420
Foreign Children	797	11 955
Pensioners	930	4 650
Foreign Pensioners	505	7 575
Adults	13 069	1 30 690
Foreign Adults	3 470	1 04 100
Individual Students	493	2 415
School Groups	5 891	5 891
Teachers	564	2 820
Total	33 593	30 9 516

Source: MFMR, 2006

5. THE AQUACULTURE SECTOR

5.1 Aquaculture Performance

During 2006, Aquaculture focused on the increase of productivity in the established fish farms, and for this reason, the Directorate of Aquaculture embarked on a marketing and funding strategy for aquaculture projects.

5.2 Coastal Marine Aquaculture

Within the Mariculture section of the Aquaculture Directorate, the Division Research, Monitoring, Disease and Quality control aims to promote the Mariculture industry within the framework of the Aquaculture Act. This division was created to specifically cater for the needs of the Mariculture industry through services offered by staff based at NatMIRC in Swakopmund and at Luderitz.

A prime objective of the Mariculture section is setting up the Shellfish sanitation and bio toxin-monitoring programme. Since inception, the programme has expanded and now covers all existing Mariculture farms, potential sites as well as the areas from Pelican Point in Walvis Bay up to Henties Bay including Luderitz Lagoon. The programme encompasses the regular collection and analyses of growing waters for microbiological parameters, phytoplankton enumeration, species identification and collection of shellfish samples for bio toxin analyses. All results obtained from the monitoring programme clearly show excellent water quality along the central coast as well as Luderitz area and to date none of the farms have been closed due to poor water quality.

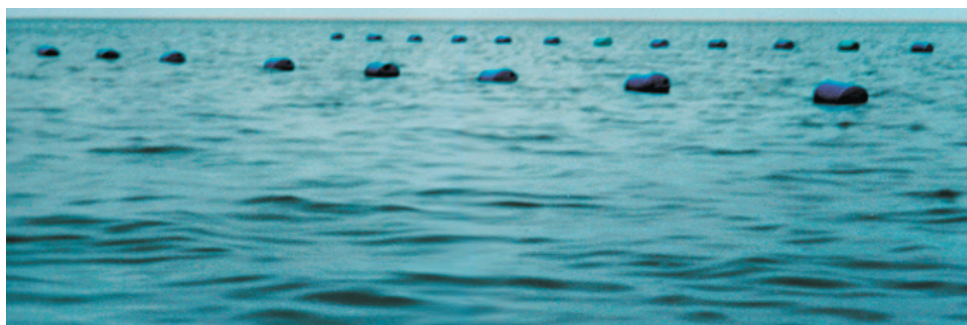
5.2.1 Sea-based Aqua Parks

With the assistance of Namport, two Aqua Parks were established in the Walvis Bay harbour during the latter of 2006. Aqua Park No 1 is 1 250 ha in size and Aqua Park No. 2 is 365 ha. The aqua parks are primarily dominated by oyster production, whilst abalone farming is mainly conducted in Luderitz. The establishment of these two parks, which fall under the jurisdiction of NamPort, have spurred on investor interest in the Mariculture sector and have been pivotal in enabled the Ministry of Fisheries and Marine Resources to establish specific zones through which the development of oyster and scallop farming activities can be conducted in a defined and managed environment.

5.2.2 Zoning of Lands Based Coastal Areas

Additional coastal areas need to be zoned solely for aquaculture purposes in order for the sector to expand. The land based aquaculture industry, which will operate off shore, will primarily focus on finfish and prawn farming. This industry has the potential to offer substantial benefits for Namibia in the form of job creation and generation of revenue.

Figure 7: An oyster farm at the sea based Aqua Park off, Pelican Point, and Walvis Bay



5.2.3 Shellfish Exports

In 2006 there was considerable commercial investment in oyster cultivation, particularly in Walvis Bay at Aqua Park No 1. Oyster production has shown a steady increase from 4.1 million oysters exported in 2003 to 11.2 million oysters in 2006. The oyster industry is lucrative and oysters are high value products, this is evident in the prediction of over 27.3 million oysters production envisaged for 2007. The primary export markets for oysters are South Africa and Asia, however, the potential to export oysters to other parts of the world holds promise and is currently being researched. Scallops are a high-value shellfish that show great promise in Namibian waters. Research into the growth of scallops and pilot cultivation over the last year resulted in increased growth rates.

The abalone industry in Lüderitz continues to flourish with expansion expected in 2007.

Table 19: Annual oyster production: Walvis Bay and Luderitz.

Year	Oysters (in millions)
2003	4.1
2004	4.3
2005	5.1
2006	11.2

Source: MFMR, 2006

Figure 8: Oyster (*Crassostrea gigas*), scallops (*Placopecten magellanicus*) and Abalone (*Haliotis discus hannai*)



5.2.4 Shellfish Testing Facilities

During the reporting 2006, budgetary allocation has been made to develop laboratories at the National Marine Information and Research Centre (Namtric) in Swakopmund. These laboratories will serve the aquaculture industry by testing the quality of water in the growing areas as well as the quality of the cultured products, to ensure that these comply with the strict international standards sought on global markets.

The Competent Authority, which is the Ministry of Trade and Industry, is setting up specialized laboratories for bio-toxin, microbiological and phytoplankton analyses, to provide a national shellfish testing facility. The Ministry of Fisheries and Marine Resources is equipping the microbiological and phytoplankton laboratories; whilst the bio-toxin laboratory will be equipped by the Ministry of Trade and Industry. The testing facility will enable quick testing and turnover of results,

in order to comply with the requirements of the EU and US markets. Staffs members of the Aquaculture Division in Swakopmund have received focused training and are competent in sampling and analytical protocols.

5.2.5 Laboratories

To enable exponential expansion of the shellfish industry and to ensure the delivery of high quality products, laboratory testing facilities for shellfish must be well developed, and of the highest standards. The Ministry of Fisheries will continue to source funds in order to ensure that shellfish testing laboratories are adequately equipped. This will, in turn lead to the development of excellent quality and reputable products that will remain preferred in existing markets, and which will eventually gain recognition in new global markets.

5.3 Inland Fisheries Research

5.3.1 Monitoring Programmes

Annual monitoring surveys were conducted in the Lower Orange, Zambezi, Chobe, Kwando, Kavango and Kunene Rivers where biological data were recorded. This data forms part of a programme which will generate a database that will be used for future comparisons and to identify trends in the fish population structures. The objective is to provide baseline information to form the biological foundation for recommendations for a sustainable management of the fisheries.

Table 20: Ten important species sampled: Lower Orange River during 2006.

Species	% Number	% Weight	% Frequency	% Index of Relative Importance
Labeobarbus aeneus Vaal-Orange Smallmouth Yellowfish	11.6	28.0	37.3	46.4
Liza richardsoni Southern Mullet	57.7	34.6	9.6	27.7
Labeo capensis Orange River Mudfish	5.3	15.8	22.2	14.7
Barbus trimaculatus Threespot Barb	5.8	0.2	15.8	3.0
Clarias gariepinus Sharptooth Catfish	1.1	10.9	7.4	2.8
Labeobarbus kimberleyensis Vaal-Orange Largemouth Yellowfish	1.2	3.2	10.3	1.4
Gilchristella aestuaria Estuarine Roundherring	7.7	0.2	5.5	1.4
Barbus paludinosus Straightfin Barb	3.6	0.1	8.9	1.0
Mugil cephalus Flathead Mullet	2.6	2.2	5.5	0.8
Cyprinus carpio Carp	0.2	4.2	2.6	0.4

Source: MFMR, 2006

Three of the ten most important species from the Lower Orange River are estuarine species, these include *Liza richardsoni*, *Gilchristella aestuaria* and *Mugil cephalus*. *Liza richardsoni* was the most abundant species with the highest weight contribution although it was mainly concentrated at the estuary at a low frequency. The freshwater

species, *Labeobarbus aeneus*, was the most important in terms of the index of relative importance, and occurred in high frequencies in the samples.

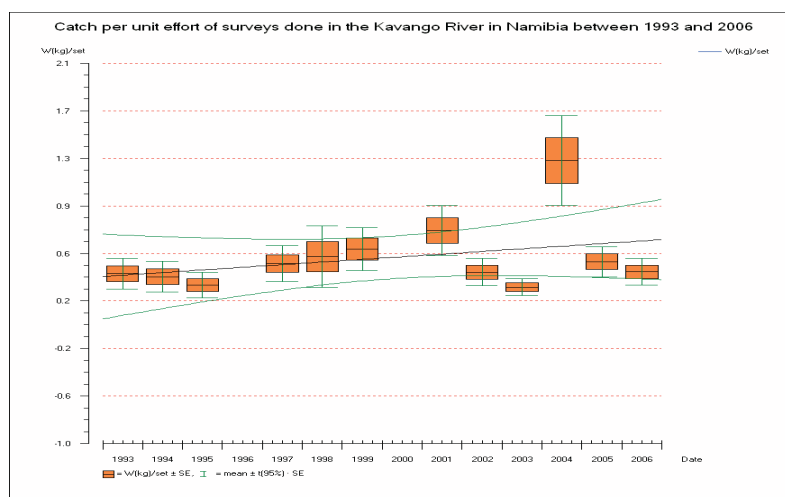
Table 21: Ten most important species sampled: Okavango River during 2006.

Species	% Number	% Weight	% Frequency	% Index of Relative Importance
Schilbe intermedius Silver Catfish	13.4	26.9	22.9	36.0
Brycinus lateralis Astriped Robber	23.3	5.2	15	16.7
Marcusenius macrolepidotus Bulldog	8.8	7.1	17.1	10.6
Barbus poechii Dashtail Barb	6.3	1.0	14.7	4.2
Petrocephalus catostoma Northern Churchill	6.9	0.8	13.7	4.1
Micralestes acutidens Silver Robber	7.7	0.6	7.9	2.6
Clarias gariepinus Sharptooth Catfish	0.4	11.5	2.6	1.2
Clarias ngamensis Blunttooth Catfish	0.5	9.6	2.9	1.1
Hydrocynus vittatus Tigerfish	0.7	3.9	4.2	0.8
Synodontis nigromaculatus Spotted Squeaker	1.8	2.2	4.7	0.7

Source: MFMR, 2006

The catches were dominated by *Schilbe intermedius* during 2006 especially in weight and frequency sampled. The most abundant species was *Brycinus lateralis*, and the most sought after fish was the Tiger fish, which was also the ninth most important species in the catches during 2006.

Figure 9: Catch per unit effort of all stations combined per year between 1993 and 2006.



Source: MFMR, 2006

There is a slight increase in the catch per unit effort in the Kavango River since 1993 although with greater variation between years since 2002 with low catches during 2005 and 2006. The reason for this is still under investigation though floods can be a contributing factor to low catches. The period is however still too short to accurately explain the reason for this phenomenon.

Table 22: Ten most important species sampled: Kunene River since - 1990

Species	% Number	% Weight	% Frequency	% Index of Relative Importance
Schilbe intermedius Silver Catfish	4.7	13.4	19.1	22
Brycinus lateralis Astriped Robber	16.8	2.6	13.5	16.6
Labeo ansorgii Kunene Labeo	3.2	11.1	11.2	10.2
Barbus mattozi Papermouth	2.6	7	14.7	9
Synodontis spp. Squeakers	6.4	3.7	11.5	7.4
Thoracochromis buysi Namib River Bream	8.8	0.7	9.3	5.6
Micralestes acutidens Silver Robber	7.6	0.4	8.4	4.3
Hepsetus odoe African Pike	0.9	7.9	7.4	4.2
Marcusenius macrolepidotus Bulldog	3	2.5	10.4	3.6
Clarias gariepinus Sharptooth Catfish	0.4	13.9	3.4	3.1

Source: MFMR, 2006

Table 23: Ten important species sampled: Zambezi, Chobe and Kwando Rivers since 1997

Species	% Number	% Weight	% Frequency	% Index of Relative Importance
Brycinus lateralis Astriped Robber	30.3	9.9	18.8	36
Schilbe intermedius Silver Catfish	7.5	9.6	25.2	20.6
Hydrocynus vittatus Tigerfish	2	14	13.4	10.2
Synodontis spp. Squeakers	5.6	3.6	14.1	6.2
Clarias gariepinus Sharptooth Catfish	0.4	25.2	3.9	4.8
Marcusenius macrolepidotus Bulldog	4.6	3.1	11.5	4.2
Petrocephalus catostoma Northern Churchill	7.3	1.9	8.1	3.5
Barbus poechii Dashtail Barb	3.7	0.9	10.3	2.3
Hepsetus odoe African Pike	0.8	4	7.9	1.8
Micralestes acutidens Silver Robber	6.3	0.3	5.7	1.8

Source: MFMR, 2006

The data from the fish surveys conducted in the Caprivi and the Kunene Rivers will be analyzed during 2006. Table 26 below shows the catches over the last decade.

The Caprivi biological survey was conducted on the Zambezi, Chobe and Kwando Rivers with two stations on the Kwando (Nakatwa and Lyanshulu). On the Chobe River three stations were surveyed (Ihaha, Kasika and Kakononga) and four stations were sampled on the Zambezi River (Kalimbeza, Impalila, Katima Mulilo and Hippo Island). There is one final station at Lake Lisikili.

The most important fish species in the Caprivi since 1997 was *Brycinus lateralis*, followed by *Schilbe intermedius* and then by the Tigerfish, *Hydrocynus vittatus*. The first two species dominated the catches over the past 10 years.

For the Kunene biological surveys, three stations on the Kunene were covered namely Otjinungwa, Swartbooisdrif and Ruacana and a fourth station was covered at Etaka dam. The three most important species listed from the Kunene River since 1990 were *Schilbe intermedius*, *Brycinus lateralis* and then *Labeo ansorgii*. The most common species in number was *Brycinus lateralis* and the species with the highest weight contribution was *Clarias gariepinus*, which was actually the tenth most important species, listed from the Kunene River.

5.4 Integrated Management of the Zambezi/Chobe River System Fishery Resource

The Integrated Management of the Zambezi/Chobe River System Transboundary Fishery Project is in its formative stages. It is a joint initiative involving WWF Life Project, Namibia Nature Foundation and the Ministry of Fisheries and Marine Resources. The project's goal is to sustainably manage the shared Zambezi/Chobe River fisheries resources by promoting Transboundary coordination and collaboration through the introduction of integrated fisheries management systems. The project started in October 2006 and will run for three years.

The following objectives are envisaged for this project:

- To monitor implementation of the Inland Fisheries Resource Act of Namibia and provide feedback on its impact in the Caprivi Region
- To provide scientific basis supporting the need for a pilot closed fishing season (in collaboration with Zambia) and to determine the impact of such a measure on the subsistence fishery, vendors and other stakeholders
- Achieve collaboration on fisheries management between the transboundary communities through the establishment of a cross border committee (between Namibia, Botswana, and Zambia) that will have input on the joint management of the shared fishery resource and oversight of the closed fishing season.
- Establish links with the conservancy committees through incorporating management structures, fishery management practices, and data collection in relation to the fishery resource.
- Understand the impacts and potential impacts of the recently developed fish farms in the Upper Zambezi/Chobe River System on the subsistence fishery, the vendors and the fishery resource
- Introduce monitoring programmes for the river fisheries survey at Kalimbeza (Namibia) and Ngweshi (Zambia) area, the fish market survey at Katima Mulilo, and the biological surveys on the rivers and the lakes

The project was launched in October 2006 and stakeholders included Fish Farm Cooperatives, the Traditional Authorities in the Caprivi Region, Regional Councillors, fish vendors and representatives from Zambia.

5.5 Fresh Water Aquaculture

5.5.1 Onavivi Inland Aquaculture Centre (IAC) - Omusati Region

The Inland Aquaculture Center is a centre for breeding of tilapia and catfish, production, research and training. The centre remains working towards its goals of promoting fish farming and facilitating the development of aquaculture with focus on small scale farming in the 5 regions of North West. A total of 7,8 tonnes of catfish and 19,4 tonnes of tilapia were harvested and processed in the newly erected fish processing facility and sold to the rural population and business community.

Table 24: Number of fish farmers and fingerlings distributed to Omusati, Oshana, Ohangwena and Oshikoto regions.

Season	2004	2005	2006
Number of farmers	69	191	217
Fingerling distributed	43 292	288 739	138 231

Source: MFMR, 2006

5.5.2 Epalela Fish Farm, Omusati Region

The primary functions of Epalela fish farm are production and grow out. The first phase of this project was successfully completed during the year 2006. Epalela fish farm is seeded with fingerlings produced at the IAC. During may 2006, 100 000 tilapia fingerlings from the IAC were stocked at this fish farm. The outlook is to grow these fish to market size and to harvest and sell them to the local communities.

5.5.3 Extension Offices & Services

Several sites in the Karas and Hardap Regions which included Voightsgrund, Berseba, Gainachas, Bethanie, Warmbad, Noordoewer, Itsawisis, Kameelhaar, Falkenhorst, Kora-korabes, Dautchas, Aqua, Salami, Mispa, Goamus fountain, Tafelkop, Ganaus, Ubiamis, Rosenhof, Amalia, Fipersdorp, Blou Kheil and Soutput were visited for the possibility of stocking of ponds with fish for these rural communities. The aim is mainly for food security in these regions. Extension services are also delivered to communities who are assisted with harvesting ponds and dam which are already stocked with fish.

The Ministry in collaboration with the Karas Regional Council is constructing a semi-intensive fish farm in Keetmanshoop. The aim is to produce fish protein for the community and to generate some income in the process. Hardap Dam was again harvested and the fish sold in Mariental and in the area. This will be a bi-annual event in future to ensure that the valuable fish resource in Hardap Dam is utilized for the benefit of the communities. Approximately one metric ton was harvested.

5.5.4 Cooperative Fish Farms in the Kavango and Caprivi Region

The Ministry is involved in developing pilot projects in Kavango community-based intensive freshwater aquaculture in the Caprivi and Kavango Regions. The long-term strategy of this activity is to apply the lessons learned to other regions. Currently, tilapia and catfish are the primary production focus area of the fish farms as these local species have already been adapted to culture life.

In 2006, there has been progress on the freshwater fish farming projects in the Kavango and Caprivi Region, with a combined total production of 20 tons of fish produced by all six farms during one production cycle. Cooperative members on these fish farms have received training in aquaculture and are being encouraged to produce and harvest fish for sale to the local market and to generate and income in order to improve their livelihoods. All proceedings from the sale of fish are banked in the cooperative bank accounts – government does not share in the profits from the fish farms. Through the sales of fish, vegetables and fruit, members of the co-operatives were able to taste the first “fruits” of their dedicated input and hard labour over the past two years.

5.5.5 Fish Farming in Otjozondjupa Region

There are currently 21 fish farmers in the Otjozondjupa region. These fish farmers are mostly private individuals who are culturing fish for subsistence or recreational purposes.

Table 25: Number of fish farmers and fingerlings distributed in Otjozondjupa region

Year	2004/05	2005/06	2006/07	TOTALS
Number of farmers	5	8	8	21
Number of fingerlings distributed	9630	5250	16600	31480

Source: MFMR, 2006

5.5.6 Kamutjonga Inland Fisheries Institute (KIFI) - Kavango Region

Kamutjonga Inland Fisheries Institute (KIFI) was developed with four primary objectives in mind. These include research, training, breeding and fingerling production. Phase I of KIFI has been completed. Phase II commenced in March 2006 and will run for approximately 14 months. Efforts are underway to secure experts who will provide training at the Centre in conjunction with tertiary institutions (such as the University of Namibia, the Polytechnic, Henties Bay Research Centre and Neaudam Agricultural College). Once operational, it is envisaged that KIFI will play an important role in fostering regional, national and international collaboration on fisheries and aquaculture research.

6. HUMAN RESOURCES DEVELOPMENT

The Ministry continues to train its staff members at all levels, in various fields during 2006.

6.1 Bursaries

The Ministry provides a bursary scheme for staff members. Bursaries are awarded on an annual basis for staff members to further their studies in fields relevant to their daily duties. Funding is provided from the Marine Resources Fund. In 2006, a total of 19 staff members benefited from the bursary scheme, pursuing various degrees/diplomas/certificates locally and abroad on a part-time or full-time basis.

The Ministry is also pleased to announce that seven (7) staff members successfully completed their Degree (4) and Diploma (3) studies during the 2006 academic year.

6.2 Skills Development

The Ministry continued to train staff members through its capacity building initiative to meet required competencies in order to achieve its strategic goals and objectives. Fifty eight (58) staff members have attended training in Management, Financial Forecasting and Budgeting, computer, statistics and various other relevant disciplines.

Aquaculture staff participated in several training courses covering quality control and monitoring of growing areas. Aquaculture staff also undertook several courses in theoretical and practical studies and laboratory analysis of biological samples. The capacity development in aquaculture staff is aimed at developing the newly established aquaculture industry.

6.2.1 Marine Engineer Officer and Deck officer training

Four Engineer Officers were sent to Northlink College and Cape Peninsula University in Cape Town, South Africa, with financial assistance from Marine Resources Fund to upgrade their level of competency to Class II. Two staff members

successfully completed their theoretical examinations and are to do oral examination for certification. No new intakes on the deck officers training during the year under review.

6.2.2 Training at Namibian Marine and Fisheries Training Institute (NAMFI)

NAMFI continues to play an important role in the training of Namibians for the fishing industry. In 2006 NAMFI trained an average of 550 students in navigation, engineering and safety.

The Fisheries Inspectors and Observers course (FIOC) is offered by NAMFI. It is a nine months course for fisheries inspectors, fisheries observers and includes theory followed by practical in-service training.

The structure of the Institute was re-organised by the Board following the completion of a study that examined the requirements of the International Convention on Standards of Training, Certification and Watch-keeping for Seafarers. This Convention has compelled NAMFI to re-orient its educational strategies and methods and to carry them out as in accordance with the required international standards.

6.3 Donor Assisted Training

The Ministry utilises available donor support for capacity building through training of technical and professional staff. During 2006, capacity building was done through training upgraded by BENEFIT, BCLME, ICEIDA, and SADC Regional Fisheries MCS Programme. A total of 14 staff members benefited from support provided by these donors both on long term and short-term studies.

Training continues to play an important role to ensure that the staff maintains a high level of competency in the disciplines of bio-toxin analysis, microbiological culture and analysis, and phytoplankton identification. In addition environmental conditions in the coastal growing water are sampled and analysed.

7. REGIONAL FISHERIES RELATIONS

7.1 Benguela Large Marine Ecosystems Programme (BCLME)

The BCLME programme strengthened the co-operation amongst scientists during 2006 from various countries such as Angola, South Africa, Namibia, Norway and Spain.



7.2 Benguela Environment Fisheries Interaction and Training Programme (BENEFIT)

Various joint workshops regarding the shared resources between South Africa, Angola and Namibia were attended. Scientists and technical staff of the Ministry participated in joint surveys, which were targeting shared fish stocks with the Norwegian research vessel the *R/V Dr Fridjof Nansen*. In addition, co-operation among scientists of Angola, South Africa, Norway, Namibia and Spain was promoted through the BCLME and BENEFIT.



8. INTERNATIONAL FISHERIES RELATIONS

8.1 South East Atlantic Fisheries Organisation (SEAFO)

The 3rd annual meeting of SEAFO was held on 2nd – 5th October 2006, Windhoek, Namibia. The meeting nominated Namibia to be the chairperson for the next five years. Scientific Committee of SEAFO also deliberated on various fisheries issues.

The Commission formulated and adopted the following conservation measures:

- **Conservation Measure 04/06:** Relate the Conservation of Sharks Caught in Association with Fisheries Managed by SEAFO.
- **Conservation Measure 05/06:** Relate to the Reduction of Incidental By-catch of Seabirds in the SEAFO Convention Area.
- **Conservation Measure 06/06:** On the Management of Vulnerable Deep Water Habitats and Ecosystems in the SEAFO Convention Area.

In addition to three conservation measures, the SEAFO Commission adopted **Resolution 01/06** on the Reduction of Sea Turtle Mortality during fishing operations.

8.2 International Commission for the Conservation of Atlantic Tunas (ICCAT)

ICCAT is responsible for the conservation and management of tunas and tuna-like species in the Atlantic Ocean and adjacent seas. Namibia became a 10th member of ICCAT in November 1999. Since then, Namibia has actively participated in the work of the Commission. Namibia's membership to this Commission is by the various species under the purview of ICCAT which occur in, and straddle our national waters; supporting a small but lucrative fishery for swordfish (*Xiphias gladius*), tuna *spp.* and tuna-like species. A country quota for swordfish, amounting to 890 tonnes and increasing to 1,140 tonnes by 2006, was allocated to Namibia for the first time in 2002. At the 15th Special Meeting of ICCAT held in Drovnik, Croatia in November 2006, Namibia was allocated a total annual quota of 1,400 tonnes, representing the highest allocation among the African fishing nations party to ICCAT. This gradual progression in the country's quota holding is due to the catching performance by the Namibian Large Pelagic industry and prudent management by Government. Meanwhile the Ministry ensured the promulgation of regulations relating to chartering of vessels to fully utilize Namibia's share of marine resources in ICCAT Convention Area during 2006, thereby creating a conducive environment for the fishing industry and establishing an unambiguous legal façade for enforcing ICCAT conservation and management measures.

8.3 Intergovernmental Organisation for Fishery Information and Co-operation Services for Fishery Products in AFRICA INFOPECHE)

INFOSA continue to serve the industry as well as authorities in the region with marketing and technical information, and during the 2006, INFOSA organized a workshop on Quality Assurance and HACCP in Fish Processing, which was later held in Mauritius in February 2007. INFOSA also organized national workshops on "International Fish Trade and Marketing" held in Zambia, Seychelles, Mauritius, Malawi and Tanzania.

INFOSA undertook a number of studies in 2006: "Study on Data Collection in the Small Scale Fisheries Sector in

Mauritius and Seychelles”, “Namibian Oysters – Production, Market and Opportunities”, “Value Addition - Assessment of Opportunities for Increased Value Addition and Improved Marketing of Namibian Marine Fish Products”, “Namibian Aquaculture – Assessment of Marketing of Namibian Aquaculture Products and the Setting Up of Freshwater Aquaculture Cold Storage Facilities in Namibia”, “The Competitiveness of Southern African Seafood Producers”, and a number of smaller markets reports.

INFOSA personnel participated in the meeting of the CODEX Alimentarius Committee in Beijing, China in September 2006, the AquaNor conference in Stavanger, Norway in August 2006, an FAO/EUROFISH training course in Denmark, December 2006, and the 10th Meeting of the FAO Committee on Fisheries Sub-Committee on Fish Trade in Santiago de Compostella, Spain.

INFOSA regularly publishes the newsletter “INFOSA Trade News” twice every month, and gives advice to the fisheries and aquaculture industry in the SADC region on technical and marketing matters.

8.4 Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)

Namibia has been a member to CCAMLR since 2002. The regional fisheries management organization is responsible for the management of living marine resources found in the Southern Sea, including *Patagonian* toothfish, deep-sea crab and krill.

At the XXV Annual Meeting of the Commission held in Tasmania on 23 October – 3 November 2006, CCAMLR approved for one Namibian long-liner vessel to fish in this organisation’s convention waters. In this regard, Namibian licensed MFV “Antillas Reefer” during the 2006/7 fishing season for that purpose. The vessel caught and landed some 64,281 kg of *Patagonian* toothfish.

8.5 COFI Sub-Committee on Fish Trade

Committee on Fisheries (COFI) is a subsidiary body of the FAO Council, and was established by the FAO Conference at its Thirteenth Session in 1965. COFI presently constitutes the only global intergovernmental forum where major international capture fisheries and aquaculture issues and problems are examined and recommendations addressed to governments, regional fisheries bodies, NGOs, FAO and international community, periodically on a worldwide basis. COFI has also been used as a forum in which global agreements and non-binding instruments were negotiated.

COFI establishes sub-committees on specific issues, and in 1985 the Sub-Committee on Fish Trade was set up. It meets bi-annually, and its purpose is to “provide a forum for consultation on technical and economic aspects of international trade in fish and fishery products including pertinent aspects of production and consumption.”

The Sub-Committee met for the tenth time in Santiago de Compostela, Spain from 30th May to 2nd June 2006. The Ministry of Fisheries and Marine Resources represented the Government of Namibia.

During the session the Sub Committee reiterated the important function of the Sub Committee as the foremost international forum for discussion of fish and fish trade matters. The crucial role of developing countries in international fish trade and the need for continued technical assistance and capacity building on market access in general, and quality and safety in particular were highlighted.

The Sub- Committee adopted the MOU between FAO and CITES. It was also agreed that an ad hoc Expert Panel should be convened to assess listing proposals made to the Conference of the Parties (CoP) and for subsequent meetings of the CoPs.

The importance of small-scale fisheries trade and some of the challenges facing this sector were also discussed. The Sub-Committee agreed with the conclusions of a study on impact of international trade in fishery products on food security that fish trade has had a positive impact on food security in developing countries. It was also emphasized that sustainable resource management practices are a necessary condition to ensure that trade remains sustainable.

Annex 1: Useful contacts

Institution and contact details	Mandate
Ministry of Fisheries and Marine Resources (MFMR)	
Head Office, Private Bag 13355, Brendan Simbwaye Square, Block C, Corner of Uhland & Goethe Streets, Windhoek, Namibia. Tel: +264 61 2053911 Fax: +264 61 224566 www.mfmr.gov.na	Office of the Minister, sectoral policy, planning and economics, fisheries administration, legislative controls, data collection and analysis.
National Marine Information and Research Centre, (NatMIRC), Strand Street, Box 912, Swakopmund. Tel: +264 64 410 1000 Fax: +264 64 404 385	Applied fisheries and environmental research, physical, biological and chemical oceanography, stock surveys and stock assessment, advice to MFMR on TACs for commercial stocks and other management measures, regional programmes and research collaboration, aquaculture and inland fisheries research and development.
NatMIRC Research Centre, Luderitz. Tel: +264 63 202 415 Fax: +264 63 202 495	Branch of the Swakopmund head office. Main research activities include seals, seaweed, rock lobster as well as regular commercial fish stock surveys and assessment work.
Hardap Freshwater Research Institute, Private Bag 2116, Mariental. Tel: +264 63 240 361 Fax: +264 63 242 643 Inland Fisheries - Rundu Office Private Bag 2084, Rundu. Tel: +264 66 256 853. Fax: +264 256 867 Inland Fisheries – Katima Mulilo Office Private Bag 1004, Ngweze. Tel: +264 66 253 224. Fax: +264 66 253 226	Freshwater fish and invertebrate research, migrations of freshwater fishes using radio tagging, development of freshwater aquaculture techniques and assessment of candidate species.
Fisheries Inspectorate Office, Box 394, Luderitz. Tel: +264 63 202 905 Fax: +264 63 203 337	Monitoring, control and surveillance of marine commercial and recreational fisheries.
Fisheries Inspectorate Office, PO Box 1594, Walvis Bay. Tel: +264 64 201 6111 Fax: +264 64 205,008	Monitoring, control and surveillance of marine commercial and recreational fisheries.
Regional programmes	
Benguela Current Large Marine Ecosystem (BCLME) Programme, PO Box 40728 Aussenplatz Circle, Windhoek, Namibia. Tel: +264 61 246 948 Fax: +264 61 246803 E-mail: pcu@bclme.un.na www.bclme.org	Multinational cross-sectoral initiative by Angola, Namibia and South Africa to manage the living marine resources of the Benguela Current Large Marine Ecosystem in an integrated and sustainable manner and to protect the marine environment.
Benguela Environment Fisheries Interaction and Training (BENEFIT) Programme, PO Box 912, Swakopmund, Namibia. Tel: +264 64 410 1165 Fax: +264 64 405 913 www.benefit.org.na	To establish a research framework for biological and oceanographic investigation of the entire Benguela Current system. Principal focus is training in resource management research in support of the major fisheries of the three co-operating countries: Namibia, South Africa and Angola.

INFOPECHE Unit, Kenya House, 4th Floor, Robert Mugabe Avenue – Windhoek – Namibia. Tel: +264 61 205 3112/3 Fax: +264 61 205 3041 E-mail: infosadc@mweb.com.na Web page: www.globefish.org/entry_infopech.htm	Provides timely information regarding prices and trends in the marketplace and stimulates greater intra-regional and international trade in fish products.
Other institutions	
Namibian Maritime and Fisheries Institute (NAMFI), PO Box 3228, Walvis Bay. Tel: +264 64 203 114 Fax: +264 64 203 112 Poly Andima 081 129 1983	Main institute providing education and training for MFMR staff, including Fisheries Inspectors, Fisheries Observers, patrol boat personnel and fisheries scientists.
Fisheries Observer Agency, PO Box 2903, Walvis Bay. Tel +264 64 219 500 Fax: +264 64 219 547/8	Management and administration of the MFMR Fisheries Observer Programme. Office should be fully operational from March 2002.
Fishing industry associations: Pelagic Fishing Association Hake Association Midwater Trawling Association Monk and Sole Association Tuna and Hake Longlining Association Deepwater Fishing Sector	PO Box 2513, Walvis Bay, Namibia. Phone: +264 (0)64 20 9083. Fax: +264 (0)64 20 6158. E-mail: hardrud@iafrica.com.na

Annex 2: Ministry of Fisheries and Marine Resources Structural Organogram

