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Socio-economic impact assessment of permit re-allocations in the South African West Coast Rock Lobster industry

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M. Com. Economics 2008

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ABSTRACT

The decline of the WCRL fishery in recent decades has been accompanied by the restructuring of the permit process to a long-term rights allocation process and the increased participation of historically disadvantaged individuals. This paper examines the effects of declining somatic growth rates and stock abundance over the years, increased levels of poaching, and the placement and effectiveness of marine reserves, on the WCRL industry, which incorporates the offshore and nearshore commercial fisheries and the recreational fishery. Small-scale traditional fishermen face access constraints to the fisheries, including lack of skills, limited access to credit and insufficient organisation. Sustainability of both the resource and fishery-based livelihoods must be ensured when examining the social and economic impacts underlying the recent legal issue between MCM and the large rock lobster firms who were contesting the allocation of permits to nearshore fishermen. There is currently an attempt to resolve this ongoing conflict by the drafting of a small-scale fisheries policy. New focuses in the industry include introducing an ecosystem-based management approach by 2012, commitment to co-management, and marine protected areas, particularly a call for increased use of no-take reserves.

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1. Introduction

The decline of the West Coast fisheries in the past few decades has been accompanied by restructuring of the permit process to a long-term rights application process. Those fishermen unsuccessful in acquiring these rights, and those with few permits, are trapped in poverty and often forced to poach in order to survive.

For example, the formal industry set up in Doringbaai to catch the West Coast Rock Lobster (hereafter WCRL) was at its peak from the 1960s to the 1980s. Subsequent over-fishing of the resource, together with environmental factors, led to the factory being shut down and moved down to Cape Town and Saldanha Bay in the late 1980s. This had a detrimental effect on the area and resulted in limited alternative employment opportunities (Jacobs, 2007). This, compounded with the perception of illegitimacy in the allocations process, increases incidences of poaching by small-scale fishermen.

This paper will examine the effects of declining somatic growth rates and stock abundance over the years, as well as the placement and effectiveness of marine reserves, on the WCRL industry, which incorporates the offshore and nearshore commercial fisheries and the recreational fishery.

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With declining WCRL stocks, and resources in the fishery fully utilised, the re-allocation of fishing access rights is contested. The sustainability of both the resource and fishery-based livelihoods must be guaranteed when examining the socio-economic impacts underlying the recent legal issue between MCM and the large rock lobster firms who were contesting the allocation of permits to nearshore fishermen. Most of the catch in the recreational fishery is also landed by these nearshore fishermen in an effort for survival, while a glance at the value chain shows how much more the large commercial firms stand to profit. There are presently attempts to rectify the ongoing conflict between the sectors by the drafting of a small-scale fisheries policy.

Section two of this paper introduces a brief overview of the South African fishing industry, including a look into the responsibilities of Marine and Coastal Management (MCM) and transformation in the industry. Section three focuses on the WCRL industry. Attention is given to the nature of the resource, as well as the effects of declining somatic growth rates and stock abundance on the resource. Section four highlights the placement and efficacy of marine reserves on the WCRL resource. Section five spotlights the socio-economic implications of permit re-allocations between sectors, and section six concludes.

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2. Overview of the South African Fishing Industry

South Africa has an imperative role to play in the optimal and sustainable use of its coastline and marine ecosystems, being a signatory of obligations such as the Sea Fisheries Act (Act 12 of 1988). Many other regional and international policy agreements have been influential on policy-making with regards to fisheries in South Africa (van Sittert et al., 2006). Examples of these include the Food and Agriculture Organisation (FAO) Code of Conduct for Responsible Fisheries and the FAO Guidelines to the Ecosystem Approach to Fisheries.

There are two marine areas off South Africa that are economically and biologically significant, the Benguela Upwelling Region on the west coast, and the Agulhas Bank. The west coast is the most productive area along the coastline. Although having lower species diversity than the east coast, these two areas are the focus of ninety percent of the country's fishing effort. The fishing industry has been productive since the late nineteenth century, but increasing effort, unsustainable catch levels and depleting stocks resulted in the need for protection and sustainability of future fisheries (White Paper, 1997).

The role of regulating the South African fishing industry belongs to the Department of Environmental Affairs and Tourism's division of Marine and Coastal Management (MCM). An open access fishery would lead to rent

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dissipation and collapse of the country's marine resources. The role of MCM is to preserve these marine stocks and to a lesser degree to keep up profits.

The chief responsibility of MCM is to uphold the goals emphasised in the Marine Living Resources Act (MLRA) of 1998: equity, sustainability and stability (Isaacs, 2006). Recent MCM policy developments include a policy on the transfer of fishing rights and a draft policy for subsistence and small-scale fisheries. They have also made progress with improving monitoring and compliance by means of the new Vessel Monitoring System, recruiting hundreds of volunteers to MCM and increased officials and officers along the coastline (DEAT, 2007). There are several aspects of MCM's administration that need to be improved, such as unfilled positions in the organisation, inexperienced management staff and under-funding (van Sittert et al., 2006).

South Africa exports approximately 80% of its annual fish catch per year, with the rest either consumed domestically or processed into fish meal and oil, a lot of which is also for export (Donald Grant, pers. comm.). The monetary value of the fisheries includes both the processing value as well as income from associated industries (DEAT, 2005). The annual worth of South Africa's fishing industry today is valued at R2.5 billion, representing less than 1% of total GDP. Nevertheless, the industry contributes a great proportion to GDP growth[1].

[1] Statistics SA, 3rd Quarter 2008

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Access to and utilisation of these resources may be vital for the livelihoods of coastal communities. There were almost 28,000 people directly employed in the South African fishing industry in 2000, around half of whom were permanently employed. Approximately 83% of the workers are employed in the Western Cape and a further 1% in the Northern Cape. There are also an estimated 500,000 to one million recreational fishers participating in the industry annually.

The structure and ownership of the industry has changed profoundly since the end of Apartheid and the change of government in 1994. These transformations observed in the industry have been accompanied by shifts in the management of the country's marine resources. In the past decade there has been greater emphasis on co-management efforts, wider use of marine protected areas and the need for ecosystem-based management (Branch and Clark, 2006).

Of the 2700 commercial fishing vessels in 1994, only 7% were black-owned. Non-whites had 6% of the 4,000 fishing licenses and a mere 0.75% of the TAC quotas allocated. It was also strongly oligopolistic; in 1994 the large scale commercial fishing sector controlled between 70 and 90% of economic revenues (Hersoug and Holm, 2000).

During the apartheid era the black coastal communities could justifiably consider the fisheries administration illegitimate, and the processes of quota allocation and licensing as corrupt. This was compounded by the lack of transparency in the

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processes and the protection of the large and established white-owned companies (Hersoug and Holm, 2000). MCM has tried to address the distortions of marine access rights and utilisation caused by a history of racism, reforming rights allocations to make their distribution more equitable. However, policies developed to address and correct these issues have had to take note of environmental concerns, fast population growth rate along the coastline, and issues of efficiency.

Black small, medium and micro-enterprises (SMMEs) were encouraged and supported (although many have been unsuccessful) and transformation goals were prioritised (Isaacs et al., 2007). In 2006, 2,480 (of over 8,000 applications) long-term fishing rights were granted in the industry; 59% of the rights holders being BEE compliant (DEAT, 2007). However, during this process of reallocating fishing rights to new black entrants, artisanal fishers with historical dependence on the sea and its resources were frequently overlooked (van Sittert et al., 2006).

South Africa's most valuable fishing sector is the hake fishery (trawl and line); the fishery which lands the greatest mass is the small pelagic fishery (sardine and anchovy). Statements from the Department of Environmental Affairs and Tourism declare the management of most of South Africa's important fish stocks successful by international standards, except for the abalone and West Coast rock lobster industries, threatened by extensive poaching and decreased somatic growth rates (Isaacs et al., 2007). The latter is an industry in which small-scale

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fishermen have a long history of involvement. It is this high-value, low-volume rock lobster industry that will be examined in this paper.

3. West Coast Rock Lobster Industry

I. Introduction

Exploitation of the West Coast rock lobster, *Jasus lalandii* (hereafter WCRL), is considered one of the oldest and most important components of the South African fishing industry (Heydorn et al., 1965), with the commercial fishery starting operations in the late nineteenth century. The WCRL resource supports both commercial and recreational sectors, and is the third most valuable marine resource in South Africa for landed value (Johnston and Butterworth, 2005).

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For over sixty years until the stock collapse in the late 1960s, the WCRL supported commercial catches 400 to 500 percent greater than the amount sustainable today. Declining stock levels and falling somatic growth rates of the rock lobster call for an examination of the resource and related policies. The challenge is to find what led to the current state of the resource and what should be done to rectify it.

In order to make sense of competing policy responses to the situation, several variables must be considered. The nature of the resource and its accompanying

fishing methods must be examined. An important consideration is that neither the resource nor the ocean that supports it is homogenous; a response that would suffice in one area may not work in another.

Policy changes and permit allocations not only affect the stock, but also the companies and individuals involved. Large established firms want to access the resource as before in order to maintain profits and secure employment for their fishermen. At the same time, household incomes of many communities along the west coast are heavily dependent on fishing and the associated industries. Most have no alternative source of income to feed their families and pay for basic necessities. For both the large-scale and small-scale fisheries then, along with the recreational sector, cutting TAC levels, necessary for investment in the future of the resource, will need to compete with sustaining livelihoods.

This conflict between maximising sustainable rent and meeting immediate demands is not just an issue of time preference, but also one of political responsibility. If the poorer fishermen are deprived of resources by overexploitation of the stock, they may attach less political blame to MCM than would be the case if MCM deprived them of fishing permits and the over-fishing was a result of others.

This problem has surfaced many times in the past. Most recently, conflicts in the rock lobster industry were demonstrated in a legal dispute between the

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commercial fishermen in the WCRL fishery and the artisanal fishers. Around 1000 bona fide artisanal fishermen received an interim relief order in 2007, after contesting the rights allocation process on the grounds that they had been unfairly prevented from earning a living by not receiving long-term fishing rights. After the relief period ended and with no formalised small-scale fishery policy in place, several commercial companies and right holders took the Minister of Environmental Affairs and Tourism, Marine and Coastal Management and a group of traditional fishers to court in August 2008. More details of this court case and the subsequent ruling will follow.

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II. Nature of the WCRL Resource

Jasus lalandii is found in shallow waters from 23° S just north of Walvis Bay in Namibia, to 28° S close to East London in South Africa (Pollock, 1986). Commercial exploitation of the lobster takes place as far down as Gansbaai on the Cape south coast, while the recreational fishers harvest as far east as Mossel Bay. Field studies by Hazell et al. (2000) indicate that the WCRL does well in the cool temperate waters of the Benguela system.

The rock lobster life cycle includes larval and post larval stages. The larval stage occurs offshore, some hundreds of kilometers away. The post larval stage sees inshore settlement and subsequent transformation into small juveniles (Booth, 1997) of less than 50mm carapace length (hereafter CL). Mayfield et al. (2000a)

indicate a variety of wild prey species consumed by the rock lobster, including sponges, barnacles, coralline algae, ribbed mussels and black mussels, with the latter two found to be the most common. The rock lobster is considered a powerful predator, having a large effect on the quantity and population structure of its prey (Barkai et al., 1996).

An Operational Management Procedure (OMP) was first developed in 1997 and implemented with the intention of calculating Total Allowable Catch (TAC) levels (Cockcroft and Payne, 1999), and is re-evaluated and updated every few years. The OMP approach uses a size-structured model. The key data inputs are commercial Catch Per Unit Effort (CPUE of traps and hoopnets), somatic growth rates (physical growth) estimated from a long-term tag-recapture program, and a Fisheries Independent Monitoring Survey (FIMS) index of abundance (Department of Statistics, University of Cape Town, 2003). A priori, all three are positively correlated with the stock; hence an upward trend in any one of them (cet. par.) indicates an improved resource stock situation and could lead to an increase in TAC.

The OMP is driven by a single species model; however fishery management is committed to undertake an ecosystem approach by 2012. In consequence, since 2006, all recommendations made on future TAC levels are accompanied by a report on the state of the environment and ecosystem. The ecosystem effects of fishing may be categorised into five groups (Branch and Clark, 2006). These are:

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direct impacts on the target species, indirect impacts on the prey, predators and competition of the target species, harvesting gear effects, by-catches, and other environmental influences.

J. lalandii is targeted by both commercial and recreational fisheries. The stock is managed in separate geographic zones along the coast, using a combination of tools: TAC quotas which are allocated annually for each zone, a minimum legal size limit (75mm CL for commercial fishers), closed seasons (winter), guarding females in berry, protecting soft-shelled lobsters and restricted fishing times (DEAT, 2005).

The commercial sector is made up of the large offshore firms (allocation > 1.5 tons) and small nearshore operations (allocation < 1.5 tons). The commercial fisheries account for 90% of total catch (D. Grant, pers. comm.). The subsistence sector, originally introduced in the 1999/2000 season, was subsequently incorporated into the small-scale nearshore commercial sector in 2002.

The distribution of the WCRL is approximately 80% offshore (> 30m depth) and 20% nearshore (< 30m depth). Accordingly, the commercial TAC is split unequally between the offshore commercial sector (80% of TAC allocated) and the nearshore commercial sector (20% allocated). The offshore fishery employs around 5,500 individuals; approximately 95% black (Fishing Industry Handbook,

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2005). The nearshore fishery employs around 820 individuals (Cape Argus, 2008).

The commercial sector can be divided into three categories; namely, catching, processing and marketing (Sauer et al., 2003). There are three groups of quota holders: small with < 10 tons, medium with 10-40 tons, and large with > 40 tons.

The equipment required to catch the rock lobsters includes baited nets and traps. Shallow waters employ small boats and use light baited hoop nets. Deeper waters utilise traps which became more commonly used from the 1970s (Cockcroft and Payne, 1999). An investigation into harvesting gear by Sauer et al. (2003) showed that hoopnets are mostly used in Zones A to C, while traps are more commonly utilised in the southern fishing grounds. Furthermore they report 292 vessels in use in the commercial fishery in 2001, with different sizes and types defining the sub-categories.

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In costing the economics of gear methods, the practicality of using these different gear types must be factored in (George Branch, pers. comm.). These differences in gear and capital investment contribute to making problematic the effective wealth redistribution via shifting permits from offshore to nearshore fishers.

According to Sauer et al. (2003), South Africa provides less than 2% of the world's total demand for rock lobster. The annual total value revenue of the

commercial fishery is estimated at approximately R200 million. The WCRL industry is South Africa's third most valuable fishery in terms of landed value (Johnston and Butterworth, 2005). The lobster products, namely live lobster (accounting for 60%), whole raw frozen (20%), whole cooked frozen (10%), and frozen tails (10%), are exported mainly to the USA, Europe, China and Japan. Frozen tails provide low financial rates of return, and are mostly taken from weaker or dead lobsters (D. Grant, pers. comm.).

The entry of South Africa into global markets has led to decreased employment opportunities for small-scale fishers. This is especially true in light of the rise in offshore harvesting and processing of lobsters, and the subsequent live exports to international markets (Woman's Net, 2008).

Although exporting live adult rock lobsters has been taking place for an extensive period, few studies have focused on the successful transportation of these lobsters. Importantly, a recent study by Taylor et al. (1997) showed lobsters to be resilient to physical stress during handling and transportation. Exporting live lobsters is capital-intensive and requires skilled persons. The economic marginalisation of the poorer fishermen is then in part a consequence of industry structure and the nature of the value chain.

Exports and revenue depend on the exchange rate, air transport, international trends in market demand (mostly seasonal), and foreign competition from

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countries also supplying lobster products (mainly Australia, New Zealand, Argentina and Chile whose seasons differ slightly from South Africa's). The current international recession is causing a big drop in prices (D. Grant, pers. comm.). There have also been exogenous shocks such as the fall in eating-out demand from Chinese consumers due to the SARS outbreak in that country.

The WCRL recreational fishery is characterised by daily bag limits (currently four per day), gear restrictions (using only hoopnets from the shore or from small boats or dinghies, and no artificial breathing gear for diving), an 80mm CL minimum size limit, restricted daily hours (8am to 4pm), and shorter fishing seasons. Brouwer (2005) estimates there to be 65,000 recreational fishers, participating by means of permit allocations. The recreational permit is valid for one year and may only be used by one fisher at a time. Selling of the rock lobsters is not permitted and a maximum of twenty rock lobsters may be transported per day; however, this sector has great economic benefits stemming from investment in small boats and equipment, as well as expenditure on trips out to the waters (Sauer et al., 2003). The recreational lobster fishery accounts for about 10% of total catch (D. Grant, pers. comm.). There is also evidence that recreational permits are used to augment family incomes in the west coast fishing villages (Jacobs, 2007), whereby local fishermen catch lobsters from the recreational permits of tourists and then share the catch, using their portion to generate additional income.

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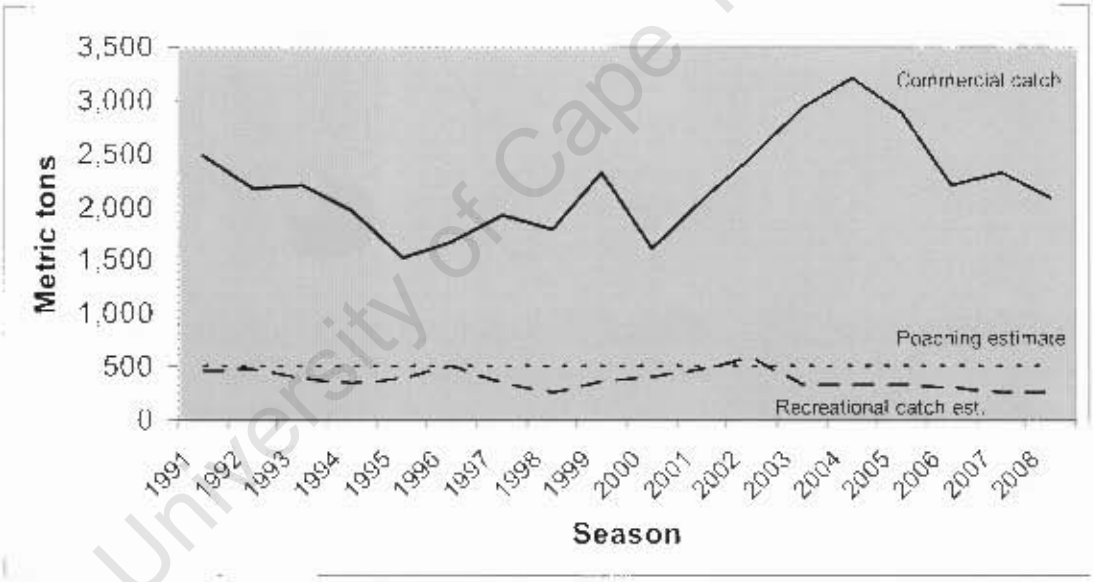
We can evaluate the rock lobster catch levels for the commercial and recreational sectors for the period 1991 - 2008. The recreational catch estimates were made after conducting annual telephonic surveys. The poaching estimate has remained at 500 tons over this period following private consultation with the industry as well as poachers (Johnston and Butterworth, 2005). This is despite the belief of an increase in lobster poaching in recent years (Susan Holloway, pers. comm.).

Figure 1: WCRL (MT) catches for the period 1991 - 2008



Source: MARAM

The rock lobster resource is currently considered to be conservatively managed. This is due to worries of falling stock levels owing to decades of over-exploitation, declining somatic growth rates and an increase in illegal harvesting (poaching). South Africa provides some protection of this resource through a budget allocation for monitoring and control (in attempt to combat issues such as

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illegal sales of recreational catches, and high-grading) as well as rock lobster reserves and other Marine Protected Areas, the efficacy of which will be discussed later.

III. Declining Stocks and Somatic Growth

Examining catch and monitoring data of rock lobsters using commercial data has several advantages; many years of data collection and low research costs are the most prominent (Herrnkind, 1980). A disadvantage, however, is bias towards those fishing areas likely to be most profitable, providing data dependent on the fishery's behaviour (ibid.). For this reason, examination of the South African Fisheries Independent Monitoring Survey data is an important part of investigation into the WCRL industry.

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The minimum legal size limit of 89mm CL was originally introduced in 1933 in order to protect the females, who were smaller in size and had a slower growth rate (Johnston and Butterworth, 2005). After the introduction of a tail-mass production quota in 1946, the commercial fishery peaked in the early 1950s with an annual catch of 18,000 tons. The catch levels fell drastically in the 1960s, negatively affecting the industry (Cockcroft and Payne, 1999); leveling off at approximately 10,000 tons until 1965. The catch levels were extremely low in the northern areas, where the minimum size limit was set at 76mm CL from 1959

(Sauer et al., 2003), until the 89mm CL minimum size limit was reintroduced everywhere in 1970.

The tail-mass production quota introduced decades earlier was replaced in 1979 by a whole lobster (landed mass) quota (Johnston and Butterworth, 2005). Cockcroft and Payne (1999) describe the new management controls introduced in the early 1980s: the Total Allowable Catch (TAC) applied to different fishing areas and zones, guarding soft-shelled rock lobsters, protecting berried females, having a closed winter season, and applying a daily bag limit for the recreational fishery. A key feature seen in Figure 2 is the steep drop from the apparently stable mid 1970s into the early 1980s, when these controls were established.

Annual landings of 2,500 to 4,000 tons and increased catch rates in the mid 1980s gave the impression of sustainable harvesting[2] and successful management procedures. This appearance of success ended by 1990, with a decline in somatic growth rates. This fall in growth reduced the number of lobsters reaching the minimum legal size limit of 89mm CL, i.e. a lower recruitment to exploitable biomass.

The 1991/92 season saw the reduction in minimum legal size limit from 89mm to 75mm CL, partly to better the catch rates and also to allow for foreign exports of smaller rock lobsters (Johnston and Butterworth, 2005). This was increased to 80mm in 1992/93 but reduced again in 1993/94 to 75mm. The TAC was also

[2] albeit at a much lower level than before

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reduced around this time. The TAC in the 1990/91 season of 3,790 tons was reduced to 2,400 tons in the 1992/93 season, and further down to 1,500 tons in the 1995/96 season (Cockcroft and Payne, 1999; Johnston and Butterworth, 2005).

In light of the uncertainty involved in future trends, especially of recruitment and somatic growth rates, an Operational Management Procedure (OMP) was introduced in 1997 to compute future commercial TAC levels and to increase exploitable biomass by 20% between 1996 and 2006. A global TAC level is calculated and then is split between zones and areas.

The OMP has since been re-evaluated and adapted (in 2000 and again in 2003) with new data and better scientific knowledge of the rock lobster (Johnston and Butterworth, 2005). This is done to ensure the outcomes are accurate and unbiased. The updated 2000 OMP lowered the target to a 14% increase in harvestable stock. It also began computing a TAC that incorporated both commercial and recreational levels.

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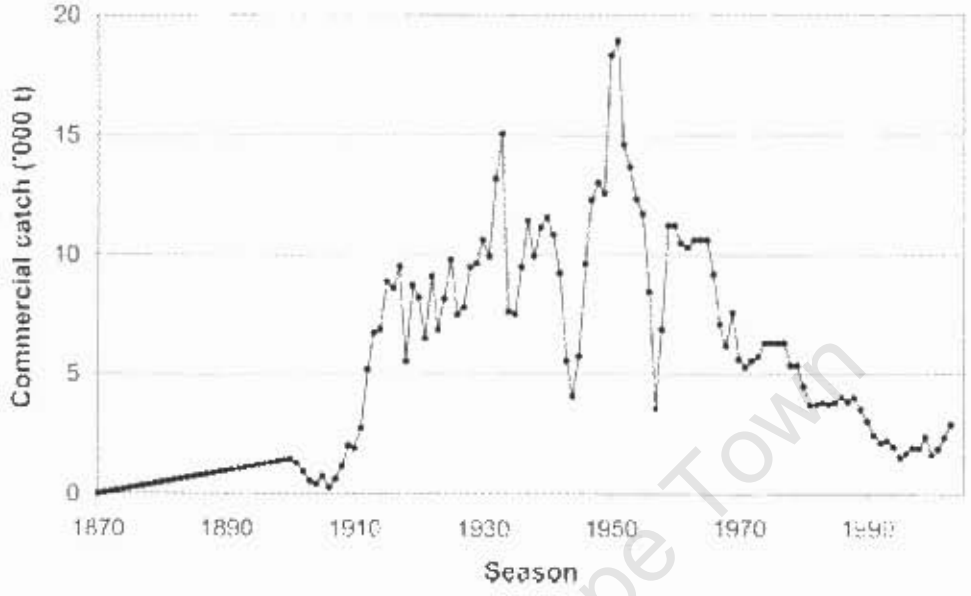
Figure 2: WCRL commercial catch history



Source: Johnston and Butterworth (2005)

The slow recovery of the resource stocks saw the commercial TAC rising from 2,018 tons in the 2000/01 season to 3,206 tons in 2003/04, and 3,527 tons in 2004/05. Unfortunately the TAC levels fell to 2,857 tons in 2006/07 and again down to 2,571 tons in 2007/08 (DEAT, 2007). Male lobsters grow larger and faster than the females and consequently, depletion of the WCRL resource has mainly been directed towards the males of the species. Approximately 90 to 99% of the catches are males (Brouwer, 2005).

The current harvestable biomass (>75mm CL) is predicted to be approximately 7% of pre-exploitation levels, and spawning biomass (females which are >65mm CL) to be at approximately 23% (Johnston and Butterworth, 2005). According to

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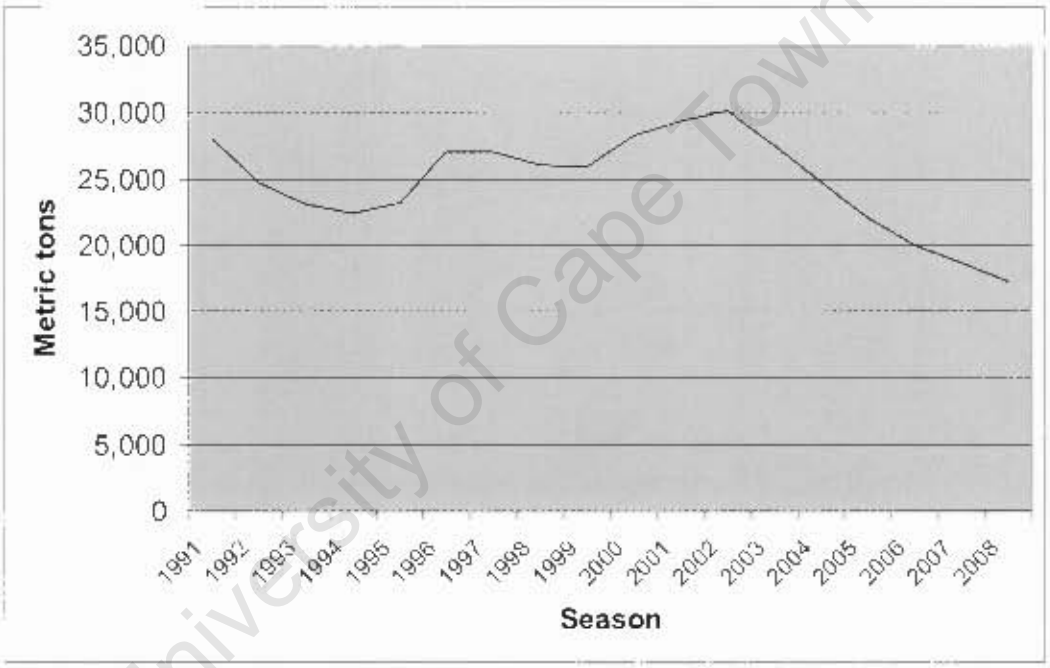
the DEAT 2007 Status Report, these figures are currently at 3% and 9% of pristine levels (i.e. 1870 biomass) respectively. The current model aims to increase exploitable biomass by 20% between 2006 and 2014 (D. Grant, pers. comm.).

Figure 3: WCRL (Mf) exploitable biomass (>75mm) for the period 1991 - 2008



Source: MARAM

It was reported by Heydorn (1969) that larger rock lobsters chase away smaller ones away from hoop nets, and also that much smaller lobsters cannot be caught by hoop nets or traps. Nevertheless, an important variable to consider when examining the resource stock is discard mortality. This is the percentage of undersized rock lobsters which die after being caught and returned to the water. This is worsened by high-grading of catch by the fishermen who hold on to

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undersized lobsters caught, anticipating larger sized lobsters later in the day. These smaller lobsters may be weakened or dead when returned to the ocean. The conservation benefits of a minimum size limit will depend on this level of discard mortality (Bohnsack, 1999).

It has been suggested that future OMPs should consider re-weighting of the variable inputs, as well as trying to include environmental factors and a spatially disaggregated model of the resource stock as the resource cannot be treated as homogenous (Johnston and Butterworth, 2005). There is little migration between populated regions, and different lobster populations have varying growth and natural survivorship rates. The low growth rates and high natural survivorship result in potential new policies and methods to control the resource stock taking time to have an effect (Johnston, 1991).

The revised OMP-2007 recommends TAC levels by region, rather than for the total resource (DEAT, 2007). The OMP-2007 used the inputs described, including the extremely low figures for trap and hoopnet CPUE of the past few years (S. Holloway, pers. comm.), in order to calculate projections for future exploitable biomass and TAC levels. The positive trend of these projections can be seen in Figure 4 below. It should be noted that without these additional inputs, a simple linear trend (least squares) using data obtained from MARAM reveals falling exploitable biomass levels over the same period.

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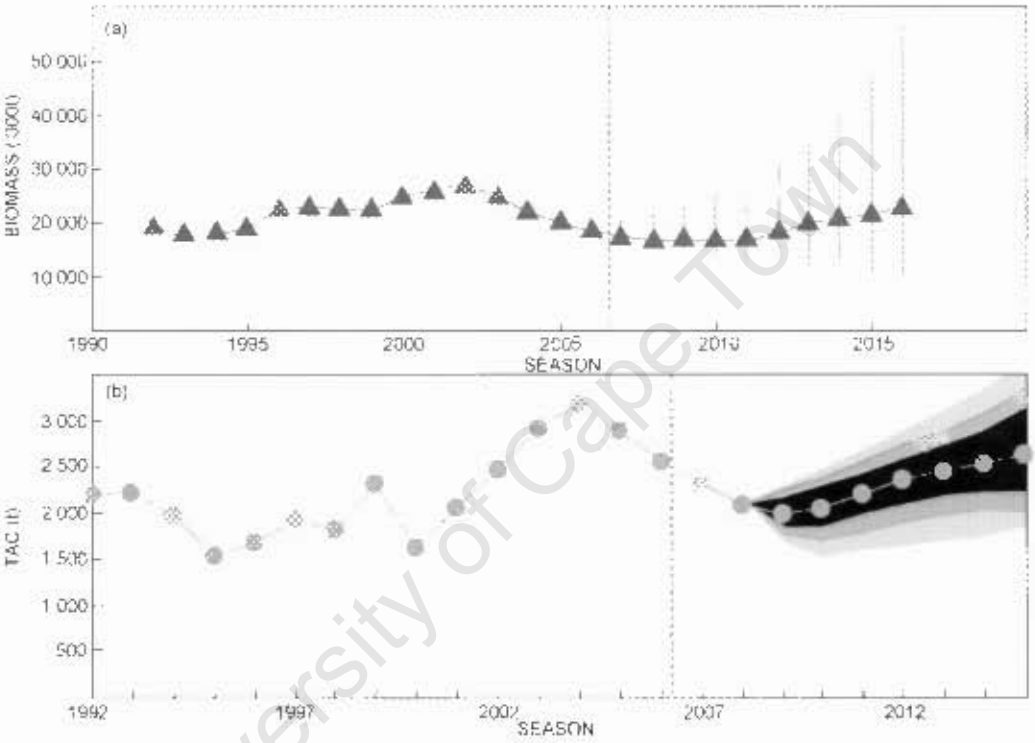
Figure 4: (a) Projection under OMP-2007 for exploitable biomass (male >75mm CL), including the median, the 5th and the 95th percentile: (b) Projection of commercial TAC, illustrating the median, 50th (black), 75th (dark grey) and 90th (light grey) percentiles.



Source: DEAT (2007)

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Declines in exploitable biomass are seen to be a consequence of decreasing somatic growth rates as well as historic over-harvesting of the WCRL (Brouwer, 2005). The WCRL grows at different rates on an individual, annual and geographical level (Cockcroft and Goosen, 1995).

The prominent decrease in growth rates of the WCRL since the late 1980s (Cockcroft and Goosen, 1995; Pollock et al., 1997) as well as a shrinkage in

moulting that became apparent in the early 1990s has not been sufficiently explained. The shrinkage (negative growth) has been credited to climate change and poor environmental conditions, such as the rising occurrence of red tide events. This increase in red tides is worrying for the rock lobster industry as they are associated with considerable mortality of the lobsters following mass strandings, or walk-outs (Cockcroft et al., 1998). The lobsters are weakened by the resultant lack of oxygen, and are not strong enough to move out with the tides. This leaves them stranded on the beach or rocks. Around 100 tons of lobster was lost to strandings in the 1970s, 600 tons in the 1980s and 2,100 tons in the 1990s (Cape Times, 2006). The red tide in 1997, for example, led to the death of roughly 2,000 tons of stranded rock lobsters, estimated by Pitcher (1998) at a market loss of US $50 million.

Another explanation given for the dramatic decline in somatic growth rates observed in the early 1990s was the reduced productivity in the Benguela region, linked to the El Nino events of 1990 to 1993 (Pollock et al., 1997).

Pollock et al. (1997) posited that growth rate and food abundance as well as quality are linked. This suggestion was confirmed by Mayfield et al. (2000b) who examined the diet of adult male WCRL in eight sites on the South African west coast. This study concluded the main reason for the slow growth of WCRL was inadequate food availability and quality. This brings back the importance of the

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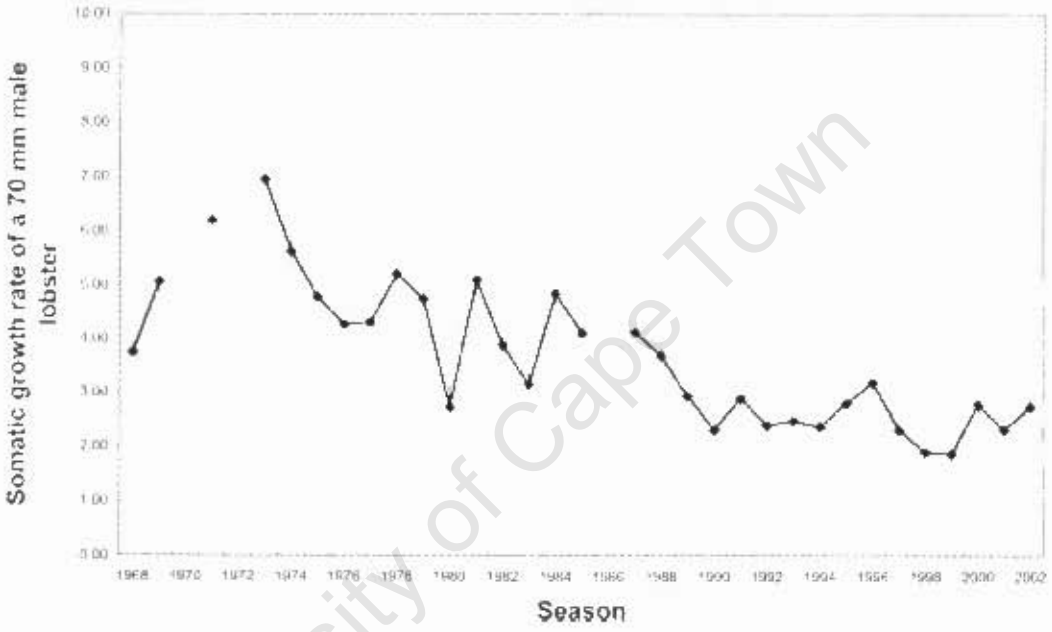
consideration of ecosystem models in calculating future TAC levels in the OMP system.

Figure 5: Somatic growth rate in mm of 70mm male WCRL.



Source: Adapted from Johnston and Butterworth (2005)

Other factors affecting somatic growth rates and productivity include tag-related injuries (Dubula et al., 2005) and appendage loss from trapping, sorting and discarding of undersized lobsters (Brouwer et al., 2006). It is estimated that around 35-40% of the commercial catch is below 75mm CL (Schoeman et al., 2002).

Beside these environmental and human factors, another argument is the genetic versus behavioural hypotheses, both difficult to demonstrate (John Field, pers.

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comm.). The genetic hypothesis is that the fast-growing lobsters are caught first so those genes disappear from the gene pool. The behavioural argument is that lobsters are cannibalistic and big lobsters are territorial, thinning out the small ones which feed on smaller food items such as mussels. If the small lobsters are thinned out there is less competition for food and the small lobsters fight harder for a limited food supply, and grow slower[3]. Field (pers. comm.) favours this behavioural argument which is shorter term and more direct, but does not rule out the genetic hypothesis too.

There is also an argument for ridding the WCRL industry of minimum size limits (G. Branch, pers. comm.). In the long run, Branch (pers. comm.) believes the reductions in these size limits have saved the industry but there is no biological rationale for any further reductions, or for restricting catches to the male of the species.

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4. Marine Protected Areas

I. Introduction

The rise in coastal communities in South Africa and across the world has led to a surge in popular interest in marine protected areas. An MPA, as defined by Childress (1997), is an area where all forms of fishing and extraction of any kind

[3] This has been demonstrated in some fish populations by K.H. Mann in the 1960s in the River Thames

is prohibited. In South Africa, a marine protected area is considered to be a no-take reserve, but in reality serves a range of functions (G. Branch, pers. comm.). There are seven no-take reserves in South Africa (for example, the new Table Mountain National Park) with others having lower forms of protection.

There is much literature on successes of marine reserves in New Zealand and Tasmania (Edgar and Barrett, 1999; Kelly et al., 2000; MacDiarmid and Breen, 1992 quoted in Bohnsack (1999)). Belief in marine reserves, however, is not universal. It is clear that they cannot work equally well for all species (for example, pelagic). With several studies in other countries showing that smaller-sized reserves do not work well for rock lobsters due to their migration patterns (Mayfield et al., 2005), the question is how well this type of conservation can work for the South African WCRL. Several MPAs exist in the Western Cape province protecting marine life; some banning the exploitation of WCRL are believed to be misplaced and ineffective, such as the St. Helena Bay sanctuary (Brouwer, 2005). Due to declining stocks and the south-east movement of the WCRL, Western Cape MPAs need to be very large if there is to be any chance of stock recovery (G. Branch, pers. comm.).

Stump (2005) posits that the potential impacts on lobster catch rates of setting up MPAs are influenced by four main factors: spillover and higher larval production, biological changes in the resource, change of fishermen's behaviour and effort levels, and any management amendments to fisheries policy.

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II. MPAs: Costs and Benefits

Hilborn et al. (2004) maintain that marine reserves must be employed on a case-by-case basis with effective monitoring; otherwise their implementation may lead to false expectations, disincentives and loss of credibility. Hannesson et al. (2000) are even more negative in their arguments, suggesting that marine reserves are simply a means of allocating fishing areas, and have no effect on incentives for fishing or on the institutional arrangements of countries in place which result in over-fishing. Gell and Roberts (2003) propose that marine reserves should be considered a necessary, but not sufficient, part of a country's fishery management plan. Care should be taken to combine the protected areas with other capacity control measures, such as quotas and minimum size limits. Important elements for sustainability of fisheries include reduced effort, less destructive fishing gear and improved fishing allocation rights.

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An extensive examination of MPAs can be found in Salm and Clark (2000) with a review of the criteria to be used in the establishment of the reserves. Variables to be considered include social (social acceptance and concerns, recreation, conflicts of interest, research and education, culture), economic (sustainability of species and fisheries, economic benefits, potential tourism), ecological (biodiversity, productivity, vulnerability) and practical (importance, size, effectiveness). Mayfield et al. (2005) advise setting up reserves providing full protection (rather than single-species reserves), relocating the existing sanctuaries in order to allow

for an ecosystem-based approach, and considering all appropriate factors (such as the occurrence of red tides).

MPAs, if inappropriately place and managed, may have a detrimental effect. Hilborn et al. (2004) posit that the reallocation of effort accompanying the closure of a fishing area will result in potential harm to target and non-target species as well as the ecosystem in the open area adjacent to the reserve.

III. MPAs and Rock Lobster Stocks

Several studies have shown that MPAs create larger fish stocks, increasing the brood store (Branch and Odendaal, 2003; Halpern, 2003). Numerous studies have shown rock lobster sizes and quantities to generally be larger inside marine reserves than in unprotected fishing grounds close by (Edgar and Barrett, 1999; Kelly et al., 2000; MacDiarmid and Breen, 1992). There have, however, been questions contesting increased yields in areas bordering the reserves via supply of larvae and adult fish (Branch and Clark, 2006).

Halpern and Warner (2002) provide one explanation as to how fish yields may rise in the open areas near or adjacent to the marine reserves. As a result of increased size and abundance of fish protected inside the reserve, those larger fish can swim outside of the reserve where they are caught. Also, the bigger fish in the

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protected area may lay more eggs and hence more larvae may end up in the unprotected areas. Childress (1997) labels this the spillover effect.

An explanation for a spillover effect in the case of rock lobsters is put forward by Kelly et al. (2000). The increasing number of rock lobsters inside the closed area may diminish food sources and habitat areas, thereby forcing them to relocate to nearby unprotected areas. These potential stock increases will ultimately depend on the design of the reserve and the larval dispersal patterns of the fish (Botsford et al., 2001).

There have also been studies showing an increase in trap CPUE in fishing grounds surrounding marine reserves (Kelly et al., 2002; Roberts et al., 2001), and experimental CPUE being much greater inside protected areas than in surrounding fishing grounds (Bennett and Attwood, 1993; Cowley et al., 2002).

There is ample scientific knowledge to be gained by setting up a marine reserve. The closed area serves as a control for variables such as age, size and sex composition of the fish stocks (Hilborn et al., 2004). Lobster population responses to lack of fishing pressure may also be investigated (Childress, 1997).

The West Coast rock lobster preys on a wide range of benthic organisms (those organisms living on, in, or surrounding the seabed) and the large recorded decline in biomass of the rock lobster is likely to impact the ecosystem (Brouwer, 2005).

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An illustration of the effects of the rock lobster's predation is the reduction in juvenile abalone and sea urchins in the area east of Cape Hangklip. This decline, while partly as a result of large-scale poaching, corresponds to the arrival of the lobsters into this area (a commercial rock lobster fishery was set up in this area in 2003). The urchins in this region being preyed upon by the rock lobsters have led to a near collapse of juvenile abalone stocks (Branch and Clark, 2006).

The marine reserve is therefore useful in examining reduced fishing pressure on habitats and ecosystem structures. Improvements in quality and amount of prey for the rock lobsters may enhance their diet, boosting growth rates (Kelly et al., 2000).

A two-year survey on marine reserve effects on the WCRL fishery, conducted by Mayfield et al. (2005), revealed that three rock lobster sanctuaries on the west coast (Saldanha Bay, St. Helena Bay and Table Bay) failed to generate higher lobster catches than in adjacent fishing areas. Mayfield et al. (2005) found that the average size of the lobsters caught in the sanctuaries were not generally greater than those from adjacent fishing areas. They also found that female lobsters did not produce a larger number of eggs inside the sanctuaries than outside (i.e. fecundity did not differ greatly). Nevertheless, they found the lobster sizes and abundance of lobsters greater in Betty's Bay marine reserve than nearby fishing areas.

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IV. Community Impacts and the Potential for Co-management

It is vital to examine the social implications of marine reserves on small-scale fishing communities and other stakeholders in the industry. Care must be taken not to exclude these traditional fishers and challenge their livelihoods. For example, closure of a fishing ground will result in local fishers having to travel further out to a new, unfamiliar harvesting ground, potentially increasing the risk both to the fishers and their vessels (Hilborn et al., 2004). The existing effort will then be spread over a smaller fishing area, intensifying harvests in areas outside the protected area (G. Branch, pers. comm.).

Many of these small-scale communities do not have the capacity for alternative sources of employment or income. Furthermore the potential economic and social benefits of well-placed and effectively managed MPAs do not go back to the communities (Sunde and Isaacs, 2008). Forced relocations and discriminatory access provisions under apartheid added to the negative experiences of local communities. Sunde and Isaacs (2008), investigating the efficacy of five MPAs in South Africa, found that this was compounded by the effects of limited consultation and participation in decision-making processes. There needs to be greater organisation and allocation of responsibility among these small-scale fishers, spread diffusely across the country (G. Branch, pers. comm.).

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Such effects on small fishing communities have led to arguments promoting co-management. Co-management involves a partnership between government and other stakeholders in the industry (Branch and Clark, 2006). The participation of various user groups should result from commitment of all parties, and hence greater confidence in the consultation and decision-making process, leading to management success (ibid.). This will only work if there is patience and goodwill on both sides (G. Branch, pers. comm.).

V. State of MPAs in South Africa

South Africa's Exclusive Economic Zone (EEZ) is an area up to 200 nautical miles from coastline to sea and its resources are managed by the country. The EEZ is divided into five bioregions: the Namaqua, South Western Cape, Agulhas, Natal and Delagoa Bioregions. The portion of the country's coastline currently within a protected area is a little below 20%, with some 9% protected by no-take MPAs; the rest is protected by limited-extraction and closed MPAs. This level of protection follows the declaration of four new MPAs since 2004: Aliwal Shoal, Pondoland, Bird Island Group and the Table Mountain National Park (Fishing Industry Handbook, 2007).

There have been many arguments for varying levels of protection for habitats, ranging from 10-30%. Several conservation groups recommend habitat protection of 20% by the year 2020 (Bohnsack, 1999).

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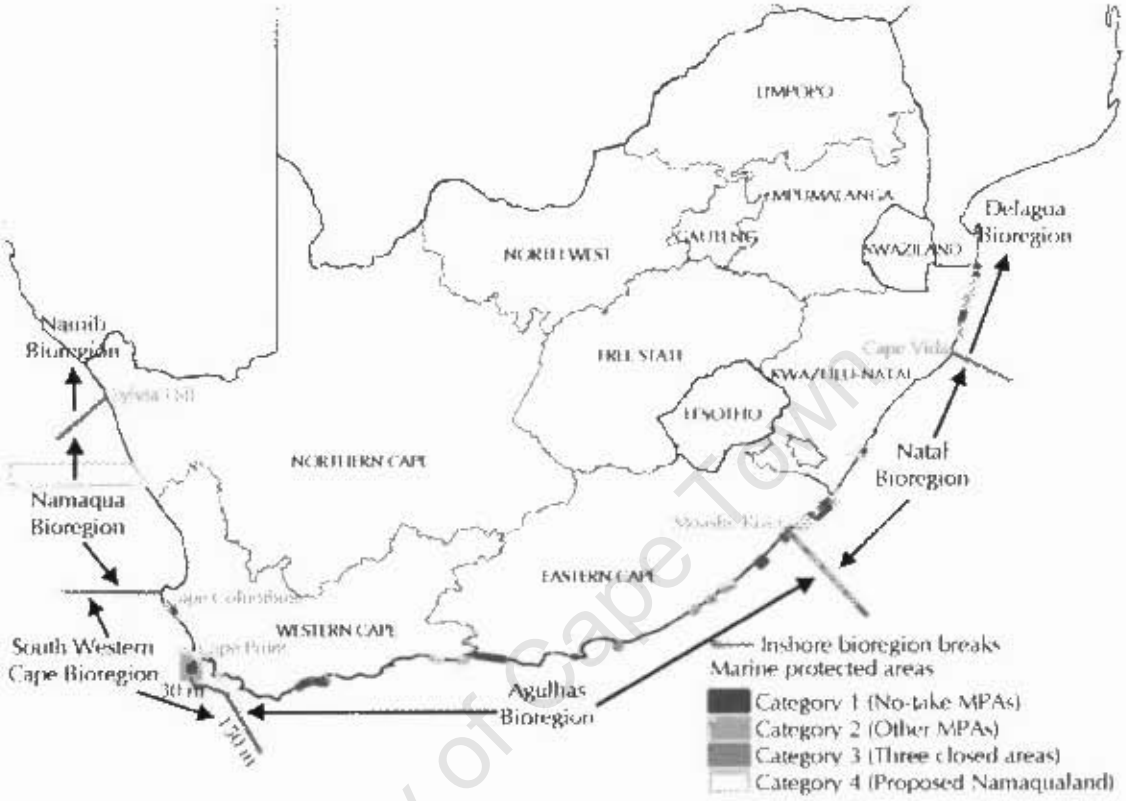
Figure 6: Marine Protected Areas in South Africa



Source: DEAT (2006)

Since the introduction of the Marine Living Resources Act (MLRA) in 1998, the network of MPAs has increased. Another important national legislation ruling MPAs is the Protected Areas Act of 2003. Branch and Clark (2006) point out several important developments. The length of coastline protected by MPAs has increased in four of the five bioregions; the length of coastline being no-take areas (9.1%) and limited-take areas (12.3%) has increased since 1997 from 6.9% and 5.2% respectively. At the same time, the amount of coastline falling under single-species protection (category 3) has declined. There has been declining belief in

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single-species reserves with scientists advocating multiple-use MPAs, particularly no-take zones (G. Branch, pers. comm.).

South Africa's EEZ currently falling under some protection is only 1.4% (Branch and Clark, 2006). This bias toward inshore areas shows a misrepresentation of the current MPA network. Currently there are no protected areas reaching further than 30km offshore. However, in 2004 a 50km-long MPA was proposed in the Namaqua bioregion of the Northern Cape, extending to the edge of the EEZ. This is considered by some as controversial, with very limited potential effects due to dwindling stocks (G. Branch, pers. comm.).

There have not been many studies proving benefits of offshore MPAs, though one such example of improved fish stocks may be found in Murawski et al. (2005). Including offshore protection is considered a priority following the country's National Spatial Biodiversity Assessment (Lombard et al., 2004 quoted in Sink and Atwood (2008)). Development of this offshore MPA network is guided by the Offshore Marine Protected Areas Project, aimed at improving offshore environments and resources and promoting sustainability and recovery of these habitats and fish stocks (Sink and Attwood, 2008).

A survey of Marine Protected Areas in South Africa was carried put by the World Wildlife Fund (WWF), finding many failings and inefficiencies in management (Lemm and Attwood, 2003). Problems include insufficient funding, staff

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inefficiency, lack of scientific knowledge on the resource status and inadequate monitoring. Another major setback is the lack of direct involvement in MCM's enforcement within the MPAs, thereby lacking information to allocate fishing permits inside these areas (ibid.).

The inefficacy and misplacement of some marine reserves may be attributed to early MPAs being proclaimed on conservation grounds alone. Use of biological criteria, without taking account social information (difficult to quantify), led to suboptimal protection allocations (G. Branch, pers. comm.).

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5. Key Findings and General Discussion

I. Introduction

Declining fish stocks, migration of the rock lobster populations and the restructuring of industry in compliance with BEE regulations, all contribute to the decline of the WCRL fisheries. Furthermore, in the poorer coastal areas of South Africa, fishing-based incomes from the industry and accompanying businesses provide a large contribution to the incomes of the residents of these small communities. Due to the seasonal employment of the fishers based on fishing times and permit allocations, and the limited alternative economic opportunities available to the fishers, these coastal communities generally have high levels of poverty.

Lower production levels in the factories and associated processing operations, resulting from falling TAC levels or a lower acquisition of fishing rights, may lead to shutting these productions down resulting in job losses (Sauer et al., 2003). Those individuals possessing managerial and marketing skills leave, while those poorer fishermen left behind lack these skills, organisation and access to credit (Isaacs, 2006). These small scale fishers lack the infrastructure and ability to market and distribute the rock lobster effectively and efficiently. Furthermore they may prefer cash-in-hand and will not try to raise their selling prices to make extra profits, rather choosing to lower prices and provide household income.

Moreover, those remaining subsistent fishermen who are unsuccessful in acquiring fishing rights will be excluded from the industry. This may increase poaching in order to survive, further harming the sustainability of the rock lobster industry (van Sittert et al., 2006).

Alleviating poverty in these communities involves reversing stock depletion. The lobster resource can only recover if stricter conservation methods are imposed. This, however, will result in short term impoverishment of fishing communities due to lower income. If scientists can show stock migration between offshore and inshore WCRL stocks on the west coast then cutting the commercial take may benefit nearshore fishermen. Spiny lobsters have been shown to migrate long distances along sea bed columns elsewhere in the world; for example, Booth

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(1997) shows long distance migrations along the shore in New Zealand. The relevance of this needs to be further researched in South Africa.

II. Allocations of Permits between Fisheries

The subsistence sector was recognised in the MLRA with the fishers able to obtain access rights, where previously they had fished using recreational permits or had poached. The subsistent fishers were permitted to harvest and sell four rock lobsters per day. Subsequent classification of subsistence fishermen of WCRL as small-scale commercial fishers, phased in after the 2000/2001 season, was recommended by the Subsistence Fisheries Task Group (SFTG), appointed by MCM in December 1998. This was done subsequent to MCM finding the MLRA guidelines inadequate for establishing a new subsistence management system. The SFTG advised that subsistence fishing for rock lobsters and abalone were not suitable because of their high value; it would be economically beneficial to export rather than consume these species (Isaacs, 2006).

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The intention was to improve the standards of living of these subsistence fishermen and not trap the fishers in poverty. This categorisation was meant to improve fishing effort and allow the fishermen to sell their catches, earning incomes and having more stable livelihoods (Schumann and Macinko, 2007). It was estimated that this reclassification and the subsequent allocation of limited

commercial rights would bring in R39 million to historically disadvantaged communities.

The permits assigned annually to the offshore and nearshore commercial fisheries were changed in 2001 to medium term rights. These rights were allocated for a period of up to four years, providing a guaranteed income until 2005. The commercial nearshore rights were allocated between 200 to 1,500 kg; the offshore sector granted allocations of more than two tons (Isaacs, 2006). One factor influencing quota sizes was whether the applicant owned a suitable vessel.

The modification of rights to a medium term basis was done with the intention of stabilising the rock lobster industry and building stable foreign markets for lobster products. The new system of rights allocation required completion of complex application forms in English, beyond the basic education level of most coastal fishermen. The fishers also needed to demonstrate certain business and financial skills in order to be awarded fishing rights. Levies on catches were also introduced. Previously, application fees were at a flat rate of R100. This increased to a non-refundable R500 for limited commercial rights and R6,000 for full commercial rights (Branch and Clark, 2006). This was done in order to remove undeserving individuals and those simply trying their luck.

These factors, together with stricter selection criteria and improved verification measures, reduced the number of applications by around 50% (Branch and Clark,

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2006). Without the appropriate support and training, this would prevent poverty stricken and poorly educated fishers from earning a living. This in turn would detract from transformation in the industry and accompanying economic growth.

The limited rights holders argue that their quota level is not enough to last the whole fishing season. When the quotas are filled, their limited financial and trade skills prevent them from earning a supplemental income. These fishermen argue that the low quota is not feasible in providing incentives for investments in the industry (Isaacs et al., 2005). Frequently the fishers in the coastal communities have insufficient resources individually, needing to band together and apply for a permit as a group. This will require splitting profits from the single limited quota, restricting their incomes (Sowman, 2006). Pooling resources also reduces the spirit of entrepreneurship.

The beginning of 2006 saw the introduction of 8 to 15 year commercial long-term fishing rights. As a guide to the allocation process, a set of 19 fishery-specific policies and one general policy were introduced (*General Policy on the Allocation and Management of Long Term Commercial Fishing Rights 2005, DEAT Branch MCM*). These were completed after a large public participation process involving numerous meetings with, and comments from, various stakeholders in the fishing industry. The Department of Environmental Affairs and Tourism at the time estimated the value of these rights at around R70 billion.

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In order to allocate these long term rights, applicants are selected by a scoring method. Categories include transformation (relating to ownership and participation), safety, job creation and investment in the industry (Fishing Industry Handbook, 2006). The authorities allocating the permits evaluate the performance of the rights holders annually and may withdraw the permit allocations if compliance is not satisfactory. The level of transparency of the Department is high; detailed list of rights applicants for each fishing zone are published and made publicly available.

The Department, in the allocation process, wished to address the serious issue of 'paper quotas', where the quotas of rights holders are caught by poor fishers while those holding the rights earn substantial returns through processing and marketing of the resource (Fishing Industry Handbook, 2006; Isaacs, 2006). A clause was included in the General Policy to ensure these paper quotas would not exist.

The new allocations of long term rights come with many benefits to the industry and its stakeholders. The lengthy period of the rights provide an incentive for individuals and companies in the industry to invest in vessels, factories and other capital equipment. The previous annual permits were accompanied by uncertainty in reallocation for subsequent seasons. Better stability and predictability should help raise profits for established industry participants by maintaining those good national and international markets built over the years, as well as guaranteeing incomes for the workforce both in direct and indirect capacities (Cockcroft and

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Payne, 1999). Greater reliability of rights allocations should also help secure incomes for the poorer small-scale fishermen.

As with any rights allocation processes there will also be disadvantages and disputes among stakeholders. As evidenced by the high ratio of applications to successful rights holders, there will always be a majority excluded (George Branch, pers. comm.).

The complications and inefficiencies in allocating the long term rights in late 2006 resulted in rights holders starting their fishing seasons later in the year than usual. Furthermore, MCM only released 80% of the quotas, with the remainder pending for the appeals process. These factors together resulted in the limited commercial rights holders unable to fish their entire quota in that season.

The nearshore right holders had perceived discrimination in the allocation process, where their permit only allowed them to harvest a single species (whereas the large companies harvest multiple species), and where small quotas filled too quickly resulted in unemployment for the remainder of the fishing season (Fishing Industry Handbook, 2005). An attempt to rectify this was introduced in the allocations of long term rights, a process which began in 2005, where each of the 19 fisheries were grouped into four clusters according to level of organisation and capital intensity of the fishery. The WCRL nearshore sector is classified as Cluster C. The new system of rights entitles rights holders in Clusters

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C and D to hold multiple rights. For example, an individual holding fishing rights for commercial nearshore rock lobster is automatically permitted to catch snoek (provided he has the appropriate vessel to do so).

The rights application process had a number of flaws. Along with the high application fees for these rights, new entrants often needed to pay fees to consultants and lawyers for assistance in filling out the application forms, and sometimes ended up in profit-sharing deals (Isaacs, 2006). Another pitfall in the completion of these complex application forms is the lack of help and deliberate misleading by community leaders, themselves wanting to acquire fishing rights (ibid.).

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III. Perceptions of Stakeholders

Stakeholders are those individuals or groups of people involved or affected by a particular project or program. Stakeholders can help support a resource or be a threat to the development and management of the resource, and so should be justly considered and represented in management decision-making.

Participation and compliance of stakeholders will depend on their own perceptions of fishery management programs and their effects not only on the resource stocks, but also on the effects of the management scheme on the income and well-being of the stakeholder.

Calculating appropriate TAC levels and the accompanying permit allocations to the commercial offshore, commercial nearshore and recreational fisheries, comes with tradeoffs. Setting catch levels necessary to secure the future of the resource conflicts with current job security and sustainability of livelihoods. Poorer fishermen who are not allocated rights may not be undeserving; there are simply not enough lobsters in the waters.

Declining TAC levels have been accompanied by increases in small-scale quota holders in an attempt for more just redistribution of access to the WCRL. This rise in number of rights holders has several implications for the industry and the resources.

The top-down approach used in the industry is seen to have led to a lack of legality of the structure. Small-scale fishermen who are denied fishing rights will feel they have been prejudiced, leading to a disregard for industry regulations (van Sittert et al., 2006). There has been a rise in legal challenges in court due to perceptions of illegitimacy by bona fide artisanal fishers (van Sittert et al., 2006).

There is also a need for increased monitoring and patrolling to prevent compliance problems such as poaching, since quotas allocated to small-scale fishermen are relatively small. It is predicted that poaching will intensify massively in the next few years (G. Branch, pers. comm.). Fines handed out to small-scale fishers for undersized lobsters or exceeding daily catch limits are

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usually high relative to income earned, and the fish are confiscated. Unpaid fines may result in jail time, losing families their breadwinner. These fishermen need to feed their family, pay for school fees and afford basic necessities such as electricity and shelter (Jacobs, 2007). These effects compounded may further increase poaching levels in order to make ends meet.

These issues have surfaced many times over the years, with traditional and subsistence fishers being allocated interim relief measures in different fishing areas over a number of seasons.

In 2004, for example, a group of these small-scale fishers went to court against government, declaring that their historical and cultural links to the sea and its resources should be recognised. They also claimed that transformation in the small coastal communities had not occurred to their benefit, with large established companies being favoured (Isaacs et al., 2007). A new process of developing a small-scale fishery policy began in May 2007.

Most recently, clashes between parties in the rock lobster industry were demonstrated in a legal dispute between the commercial fishers in the WCRL fishery and those artisanal fishermen not categorised as commercial or recreational fishers.

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Around 1,000 bona fide artisanal fishermen (small-scale fishers who are historically connected to the sea and its resources) received an interim relief order in 2007, after contesting to having been unfairly excluded from securing an income by not receiving long-term fishing rights. They claimed that they had to compete directly with new black entrants, who had no historical involvement in the fishing industry (van Sittert et al., 2006). This interim relief would last six months and permit the fishers to catch and sell four WCRLs a day in season, as well as a mix of other line fish species. This harvesting might take place outside the fishing season, and monitoring and control would be difficult (D. Grant, pers. comm.).

After the relief period ended and with no formalised small-scale fishery policy in place, several large commercial companies (including the West Coast Rock Lobster Association, the coordinating body of the industry participants) and rights holders took the Minister of Environmental Affairs and Tourism, MCM and 1,242 small-scale and subsistent fishermen to court in August 2008. They argued that the relief provided to the traditional fishers would contribute to TAC levels being exceeded, weakening the industry. Although everyone wishes to receive fishing rights, this would not be sustainable for the resource, currently at 8% of pre-exploitation biomass (D. Grant, pers. comm.). They highlighted the need to protect the long term rights of members, and questioned the legality of the discretionary powers of the minister in permitting fishing to individuals without rights.

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This court case ended with the Cape High Court ruling against the commercial industry's application against the Minister. The judge also highlighted the importance of developing a new framework for a small-scale fishery policy. (World Fishing, 2008)

Developing the small scale fishery policy is a difficult and lengthy process. The fishermen who must be involved in this process are fairly unorganised and geographically widespread. Access of the local communities to the decision making process will provide environmental, economic and social benefits. This may be seen chiefly through the empowerment of the small-scale fishers and their subsequent acceptance of the management programs. The Department has been working together with two non-governmental organisations, Masifundise and Coastal Links, in the hopes of allocating rights to the poorest fishers in the coastal communities; namely those bona fide traditional and subsistent fishermen. Otherwise, few organisations exist whose work is limited to poor fishers (Isaacs, 2006).

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IV. Transformation in the Industry

Employment in the industry and the allocation of fishing rights have either met or are close to meeting transformation and redistribution targets (Branch and Clark, 2006). This improvement in the commercial industry must be coupled with benefits to the poorer small scale fishermen in the communities along the west

coast, including a greater percentage of the workforce and TAC levels accounted for by Historically Disadvantaged Individuals.

In allocating these fishing rights, it is the voice of the poorer fishers that often goes unheard. For example, during the initial allocation process of long-term rights a number of fishers considered illegitimate the successful applicants, claiming they did not meet the strict criteria required and had cheated the system (Cape Argus, 2005). These types of views serve to undermine any successful transformation in the industry. There have been many articles in the Cape Argus and Cape Times over the years of small-scale and traditional fishermen explaining their grievances (example: Cape Argus, 2007).

It is essential that disparities in salaries be examined, as well as initiating training and education programs in small-scale communities (Branch and Clark, 2006). There should also be guidance to facilitate community members to pursue alternative employment opportunities such as mariculture and tourism. This will require business and technical training, mostly directed at the younger population, ensuring long-term socio-economic stability of these coastal communities.

6. Conclusions

There have been great levels of internal and external transformation in the South African fishing industry, and the WCRL serves as a prime example. However, the

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continuing marginalisation of small-scale fishing communities and perceptions of illegitimacy in the long-term rights allocation process continue to threaten sustainability of the resource stock. The socio-political nature of ongoing conflicts between industry and the small-scale fishing communities may be observed in the many media references to interviews of these stakeholders, and the court battles contesting permit allocations.

Along with arguments described earlier with regards to shifting permits from the larger established companies to small-scale fishermen, comes the task of quantifying the resulting loss of income by the large companies versus the gains by coastal fishing communities. Further research must assess whether this wealth redistribution would be even-handed to all parties.

There have been decades of over-exploitation, falling somatic growth rates and increased levels of poaching. Concerns over falling stock levels and low percentages of harvestable and spawning biomass have been addressed by conservative management of the resource stock. Cutting TAC levels is a necessary requirement for investment in the future of the WCRL resource. However, the effects on both the large firms via employment of fishermen and maintaining company profits, and those effects on the West Coast communities who are heavily dependent on fishing and its associated industries, must not be ignored.

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These direct and indirect effects need to be quantified in order to fully understand their implications on the resource and those dependent on it. In order to do a socio-economic impact assessment, both an Economic Impact Analysis (measuring the total economic impact of a change in policy) and a Cost Benefit Analysis (measuring the social impacts of the same change) are required. With the involvement of government, scientists and the public, factors to take into account include environmental, economic and social (such as migration patterns, employment and quality of life)

The conservative resource-oriented approach also serves to undermine any social and cultural implications in the case of MPA management. Traditional livelihoods of small-scale fishermen are challenged by setting up marine reserves purely for biological and conservation purposes. The inefficacy of several MPAs in the country, and specifically for the rock lobster, must be addressed. There is need for further research to examine proper placement of new MPAs and the reallocation of existing ineffective marine reserves to meet both biological and social needs. In addition, these new or altered MPAs should provide important economic benefits in order to be viable. These include sustainability of the WCRL (as well as other species) and increased tourism in the recreational fishery (and its associated benefits).

Sustainability of both the resource and fishery-based livelihoods must be considered in the policymaking process, including the current drafting of a small-

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scale fisheries policy. While this is being undertaken, other strategies should be put forward by all interested and affected parties. One such strategy may be to address the dire situation of rock lobster harvesting more holistically. Rather than allocate a greater number of permits to poorer fishermen in the west coast communities (which could simply lead to a local depletion of the resource), another approach may be to explore alternative livelihood strategies. This is vital considering the general promotion of increased no-take marine reserves.

At present, low levels of education and lack of skills prevent these fishermen from seeking alternative sources of income. Alternative livelihood opportunities such as fishing-related employment (for example, mariculture) and tourism will require skills development and training. If these can be directly mostly at the younger generations, this will help to ensure the long-term socio-economic stability of these coastal communities.

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7. Appendices

List of key informants:

Prof. John Field, Marine Research Institute, UCT (email)

Donald Grant, SA Inshore Fishing Industry Association (telephonic discussion)

Dr. Susan Holloway, Research Officer, Marine Resource Assessment and Management group, UCT (personal interview)

Prof. George Branch, Zoology Department, UCT (personal interview and email)

Kalie Pauw, Senior Researcher, Development Policy Research Unit, UCT (brief discussion and email)

Dr. Kim Prochazka, Director: Resources Research, DEAT MCM (email)

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Tables:

Table 1: WCRL (MT) Catch and Biomass for the period 1991 - 2008

	Commercial catch	Recreational catch estimate	Poaching estimate	Exploitable biomass (>75mm)
1991	2480	455	500	28009.95215
1992	2176	469	500	24700.40039
1993	2197	391	500	23095.62329
1994	1966	336	500	22391.44177
1995	1516	379	500	23191.56824
1996	1674	496	500	27035.39789
1997	1918	340	500	27016.20703
1998	1792	249	500	26101.61450
1999	2315	360	500	25972.34106
2000	1609	404	500	28274.75665
2001	2073	468	500	29317.83997
2002	2462	583	500	30176.52997
2003	2918	320	500	27498.76685
2004	3205	320	500	24686.86737
2005	2875	320	500	22054.32990
2006	2207	300	500	19975.30469
2007	2314	257	500	18694.03613
2008	2083	257	500	17214.98138

Note: 1991 refers to 1991/1992 season.

Source: MARAM

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Table 2: Somatic growth rate in mm of 70mm male WCRL (average Areas 1-12) for the period 1992 - 2007

	A1-2	A3-4	A5-6	A7	A8-12
1992	4.223	3.367	4.058	2.654	2.716
1993	2.936	3.693	4.383	4.241	3.041
1994	3.32	3.921	4.611	3.755	3.269
1995	3.787	4.116	4.806	4.777	3.464
1996	4.56	4.903	5.593	6.518	4.251
1997	3.756	3.63	4.32	4.637	2.978
1998	3.653	3.096	3.787	3.926	2.445
1999	5.436	3.411	4.101	3.613	2.759
2000	4.082	4.538	5.228	5.241	3.886
2001	5.138	3.952	4.643	4.24	3.301
2002	4.064	3.987	4.677	4.853	3.335
2003	3.796	3.253	3.943	2.707	2.601
2004	6.532	4.002	4.692	4.537	3.35
2005	2.762	3.362	4.052	3.286	2.711
2006	2.802	3.188	3.878	3.062	2.536
2007	3.666	2.205	2.895	3.149	1.553

Note: 1992 refers to 1992/1993 season.

Source: MARAM

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