



BENCHMARKING SURVEY OF THE SOUTH AFRICAN AQUACULTURE (MARINE & FRESHWATER) SECTOR

BY:

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We hope this benchmarking survey will go far in supporting decision-making in the interests of the development of the aquaculture sector in South African.

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Abbreviations and Acronyms

AASA	Aquaculture Association of South Africa
ACSA	Airports Company of South Africa
AFASA	Abalone Farmers Association of Southern Africa
AISA	Aquaculture Institute of South Africa
BEE	Black Economic Empowerment
BMP's	Best Management Practices
CSIR	Council for Scientific and Industrial Research
DBSA	Development Bank of South Africa
DoA	Provincial Department of Agriculture
DEAT: MCM	National Department of Environmental Affairs and Tourism, Branch Marine and Coastal Management
DEDT	Provincial Department of Economic Development and Tourism
DST	National Department of Science and Technology
Dti: TISA	National Department of Trade and Industry, Branch Trade and Investment South Africa
DWAF	National Department of Forestry and Water Affairs
EIA	Environmental Impact Assessment
EXCO	Executive Committee
FAO	Food and Agriculture Organisation of the United Nations
IDC	Industrial Development Corporation
MEDS	Western Cape Micro-Economic Development Strategy
NAWG	Northern Aquaculture Working Group
NDA	National Department of Agriculture
PDC	Provincial Development Council
SABS	South African Bureau of Standards
SACFA	South African Crocodile Farming Association
SAKTA	South African Koi Traders Association
SAWG	Southern Aquaculture Working Group
SPV	Special Purpose Vehicle



1. Introduction

Sector development requires research to inform the planning of industry interventions and support. In particular, research should be the starting point for any cluster development activity within a sector. Clustering defines an approach to sector development where “firms and others within a concentrated geographical area co-operate towards common goals, and establish close linkages and working alliances to improve their collective competitiveness.”¹ The clustering approach has merit for the aquaculture sector in South Africa which is embarking on the planning of national and regional sector development strategies. These processes require relevant industry data. However, there is little systematic reporting on aquaculture production in South Africa. This study addresses the need for the collection of timely data and provides a baseline for the benchmarking and ongoing collecting and reporting of aquaculture data.

1.1 Objective of Study and Definition

The objective of the study is to benchmark the South African Aquaculture Sector and is linked to the accompanying two case studies (one marine and the other fresh water) which were conducted in the Western Cape. A benchmark of the sector is important in that it provides reliable industry statistics, insight into the sector’s contribution to economic development and insight into the value chain in order to establish the developmental opportunities within the sector.

The focus of the study was on the marine and freshwater aquaculture producers only and did not aim to capture the secondary services (such as net producers, cage producers, suppliers of PVC, plastics, building material etc) related to the aquaculture sector. For the purposes of this report, aquaculture producers are defined as those industry players involved in “the controlled production/farming of aquatic species for human consumption, industrial use and recreational purposes.”²

1.2 Methodology

The research was initiated toward the end of March 2006 and was concluded toward the end of July 2006. The research programme included the following phases:

- Phase 1: Sourcing and developing a database of aquaculture producers, questionnaire development and the review of the survey tool by AISA and the Western Cape Aquaculture Review Committee during March and April.³
- Phase 2: Surveying of aquaculture producers from April to May, including the capturing of survey submissions to spreadsheets.
- Phase 3: Data analysis and reporting during May, June, and July.⁴

The survey methods used to deploy the questionnaire were email and fax. Telephonic follow-up was used to verify receipt of the questionnaire and encourage the submission of surveys. This process was also used to update the Aquaculture Producer Database by verifying contact details or capturing new contact details. A further SMS (short message service) campaign was used to verify aquaculture producers’ details.

1.3 Survey Statistics

The survey statistics are set out in the tables below. The Table below illustrates that the Aquaculture Database prior to initiating the survey included 234 entries drawn from all the regions in South Africa and including both freshwater and marine stakeholders.

These entries were drawn from several sources, namely: Aquaculture Institute of South Africa (AISA), Aquaculture Association of South Africa (AASA), AASA 7th Bi-Annual Conference 2005 Conference Handbook, Northern Aquaculture Working Group (NAWG), the Southern Aquaculture Working Group

¹ See Cluster Navigators, *Managing Clusters: Cluster Facilitation Manual*, Cape Cluster Training Workshop, December 2001.

² See Danie Brink, “Overview of Aquaculture in South Africa: 2003”, Report by Division of Aquaculture, University of Stellenbosch, nd, p.1.

³ The questionnaire is provided as Annexure I of this report.

⁴ It should be noted that separate report was delivered to the National Department of Water and Forestry Affairs on 5 June 2006, reporting on matters pertaining to production and water utilization within the South African aquaculture industry.



(SAWG), South African Koi Traders Association (SAKTA), consultations with industry role-players, and various published reports.

The 234 data entries provided the total survey population for the study. However, verification of these entries resulted in a total of 139 entries (59.4% of the original data set) as 87 entries could not be verified and 8 duplicate entries were removed.

TOTAL SURVEY POPULATION	n	%
Initial database	234	100.0%
Could not verify contacts	87	37.2%
Verified survey contacts	147	62.8%
Duplicates removed from database	8	3.4%
TOTAL POPULATION SURVEYED	139	59.4%

There was significant support from industry for the research programme. Of the 139 survey participants, 64 participants returned their completed surveys, 35 participants indicated that the survey was not applicable to them (due to the fact that their aquaculture farms were not yet operational, operations closed, they were not producers but involved in other areas of industry, the academia, or government). Despite repeated telephonic follow-up, 40 participations did not return their surveys. The main reason lies largely in the demands of production and not in their unwillingness to engage in the research programme.⁵

In total 99 entries responded, a response rate of 71.2%.

All regions in South Africa were represented in this sample and the sample included both marine and freshwater producers.

TOTAL SURVEY PARTICIPANTS	n	%
Total producers who submitted surveys	64	46.0%
Total producers not yet in operation	8	5.8%
Total producers no longer in production	7	5.0%
Total who were not producers (other industry)	16	11.5%
Total who were not producers (government and academia)	4	2.9%
Total sample who did not respond to survey	40	28.8%
TOTAL RESPONDANTS	99	71.2%
TOTAL SURVEYED	139	100.0%

The authors of this document request that when the statistics of this document are quoted, that it is done so by mentioning the restrictions. For example, data of employment was not provided by all the producers. Where appropriate, these restrictions are pointed out.

1.4 Overview of Report

This chapter has provided an introduction to the research. In the next chapter we briefly review international and local studies on the aquaculture industry. Then in Chapters 3, 4 and 5 we set out the survey findings to provide benchmark data on South African aquaculture producers. These chapters address aquaculture production, job creation, the nature of enterprise development as well as industry perceptions on the state of the sector. All data is reported in percentages against the total number survey respondents (n=64), or, unless otherwise indicated, as percentages per marine or freshwater sub-sector. These chapters on research findings are followed by concluding remarks and recommendations.

⁵ South African Crocodile Farming Association (SACFA) has been informed by the Department of Agriculture that crocodile farming falls under "Game" legislation and as such SACFA members, and crocodile farming generally, do not feel that they fall under the aquaculture sector in South Africa. They therefore did not participate in the survey. Nevertheless, it should be pointed out that internationally crocodile farming falls under FOA reporting on the aquaculture sector. There were some concerns from other aquaculture producers who did not participate in the research that certain government departments had not acted cooperatively with industry in the past and may use the research in a similar manner.



2. Review of Selected Literature

Several studies and reports on aquaculture production were reviewed in order to design the survey questionnaire. These included both South African and international sources and due to time constraints were sourced from AISA's own library and the Internet. While a bibliographical overview on available literature is outside the remit of this report, it is worth noting the most recent studies that inform a broad understanding of developments in the South African aquaculture sector.

At the highest level of information is the statistical data provided by the Food and Agriculture Organisation of the United Nations (FAO) which describes annual aquaculture production by species per country.⁶ In the Western Cape Province, data is supplied via the Department of Agriculture (DoA), usually by means of consultations with industry associations. The FAO from time to time also approaches various other agencies, departments (national and provincial) and associations in order to update their data. However, it is generally accepted within industry and support agencies that this data does not fully reflect the actual production outputs in values and volumes of South African aquaculture production.

There are three key South African studies that should be consulted along with this study in creating a sector development plan for aquaculture in South Africa. The first is the section on mariculture which forms part of the report commissioned as a baseline study in 2003 by the Marine and Coast Management and entitled: "An Economic and Sectoral Study of the South African Fishing Industry."⁷ The report relies on the year 2000 production figures. Three salient points emerge from this report: one is that government's focus on marine aquaculture (mariculture) is to promote food security as part of the poverty alleviation for coastal communities; the second was that "most of South Africa's harvest fisheries are fully utilised, thus one of the few economic growth opportunities based on living marine resources is the farming of species in sea water; and, third, that while marine production was identified in the Marine Living Resources Act of 1998 (MLRA) as sector requiring government interventions, the role of Directorate of Marine and Coastal Management (MCM) has only been regulatory as it lacked the "capacity to perform a developmental function."

The second report is the sector study of aquaculture commissioned by Trade and Investment South Africa (TISA) in 2002.⁸ This report aims to qualify the export and trade promotion opportunities for the aquaculture cluster in South Africa and analyses how South African aquaculture fits into the global market. It provides a comprehensive schema of the national aquaculture industry and draws on FOA data as well as the sectoral study mentioned above and consultation with selected industry role-players.

The third report was commissioned in 2004 by the Western Cape Department of Economic Development & Tourism in support of the regional government's development of micro-economic strategies for the fishing and aquaculture sectors, focused on sector development in the Western Cape.⁹ Again, this report relied on existing sources, namely the MCM and the TISA reports for developing an economic development strategy for aquaculture in the Western Cape, albeit a view of aquaculture as the little sister of the catch fishing industry. Nevertheless, this document does provide a clear view of what the key economic considerations are for sector development, namely: contribution to regional gross domestic product, job creation, and the transformation of the industry to include broad-based black economic empowerment interventions.

In addition to these studies there are several others which could also add insights into how the aquaculture sector has developed in the previous decade. At a macro-level, the year 2000 article by Hoffman, Swart and Brink reports on 1998 national aquaculture production data.¹⁰ Similarly, Brink's overview report on 2003 production and industry trends points to new developments in the sector. Brink also notes that the "timely

⁶ Food and Agriculture Organisation of the United Nations (FAO). *Aquaculture production by species, environment and fishing areas: South Africa*. Fishstat AQ-NS1, FOA. 2006.

⁷ Sauer, W, Hecht, T., Britz, P.J., and Mather, D. (eds). "An Economic and Sectoral Study of the South African Fishing Industry. Volume 2. Fishery Profiles." Report prepared by Rhodes University for Marine and Coastal Management, Department of Environment Affairs and Tourism, 2003, pp. 293 - 308. The quotes are from p.293.

⁸ Trade and Investment South Africa. "A Study of the South Africa Aquaculture Industry – A South African Perspective." Master Document. Trade and Investment South Africa and Letsema, 2002.

⁹ Karaan, M. and S. Rossouw. "A baseline assessment of the fishing and aquaculture industry in the Western Cape." Report for the Western Cape Microeconomic Strategy Project by Department of Agricultural Economics, Stellenbosch University, 2004.

¹⁰ Hoffman, L.C., J.J. Swart and D. Brink. "The 1998 production and status of aquaculture in South Africa." *Water SA*. Vol. 26, No.1, January 2000.



collection, reporting and dissemination of reliable production statistics on aquaculture in South and Southern Africa is a problem that needs to be addressed by the industry and governing authorities.”¹¹

Other studies focus on specific sectors within aquaculture. Disa, for example, assesses supply-chain issues faced by emergent black mussel farmers.¹² Gordon and Cook, on the other hand, while turning to the international market, assess how South Africa’s abalone sub-sector has contributed to the global aquaculture market.¹³ This latter publication falls within a general set out internationally focused literature that aims to focus the role of aquaculture on market issues as well as its contribution to the development of third world regions, specifically in relation to food security issues.¹⁴

The challenge emerging out of this national literature is that the reporting on aquaculture production, and the industry dynamics, is not systemised within any South African government or agency unit focused on the annual collection of statistical data. Although the FOA process gears toward this reporting, the level of reporting required for the development of the aquaculture sector, inclusive of freshwater and marine production, is insufficient.

What follows in this benchmark report may offer a route to the standardisation of sector related information collection in support of government and industry stakeholders seeking to address the development of aquaculture in South Africa.

¹¹ Danie Brink, “Overview of Aquaculture in South Africa: 2003”, Report by Division of Aquaculture, University of Stellenbosch, nd, p.5.

¹² Sakhumzi Disa. “The impact of asset and time specificity in supply chains of emergent farmers: A case of Masiza Mussel Growers.” *Eisenburg Journal*. Vol. 3, 2005.

¹³ H. Roy Gordon and Peter A. Cook. “World abalone fisheries and aquaculture update: supply and market dynamics.” *Journal of Shellfisheries Research*, Vol. 23, No. 4, 15 December 2004.

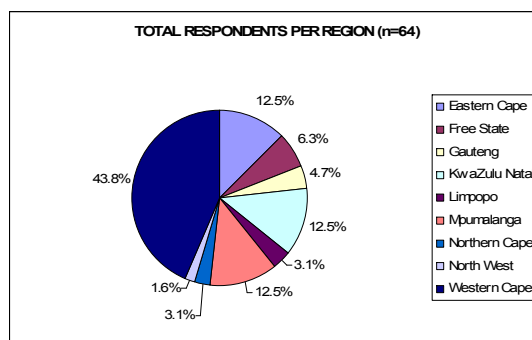
¹⁴ For example see Brugère Cécile and Neil Ridler. “Global Aquaculture Outlook in the Next Decades: An Analysis of National Aquaculture Production Forecasts to 2030.” FAO Fisheries Circular No. 1001, 2004, Stomal, Bozena and Jean-Yves Weigel. “Aquaculture Economics in Africa and the Middle East: A Regional Assessment.” In A.T. Charles, et al. *Aquaculture Economics in Developing Countries: Regional Assessments and an Annotated Bibliography*. FAO Fisheries Circular. No. 932. Rome, FAO. 1997, and Sethi, S. N., K. N. Mohanta, B.K. Das, S.C. Mukherjee and S. Soni. “Responsible Fisheries and Sustainable Aquaculture – A Pledge for 21st Century.” Central Institute of Fisheries Education, Versova, nd.

3. Aquaculture Production in South Africa

3.1 Geographic Distribution

The aquaculture sector, inclusive of both marine and freshwater production, is geographically distributed across all nine provinces in South Africa. However, it is the coastal region of the Western Cape, and the marine sub-sector specifically, that provides the economic hub for aquaculture production in the country and the most significant contribution to GDP in terms of exports.

The distribution of aquaculture producers surveyed (n=64) is centred on the Western Cape (43.8%) followed by Mpumalanga, KwaZulu Natal and the Eastern Cape (12.5% each). This is clearly illustrated in Table 1 and the adjoining graph. From Table 1 it is further worth noting that all the coastal regions have both marine and freshwater representation in equal or near to equal proportion, except KwaZulu Natal which has one marine producer against seven freshwater producers among the respondents

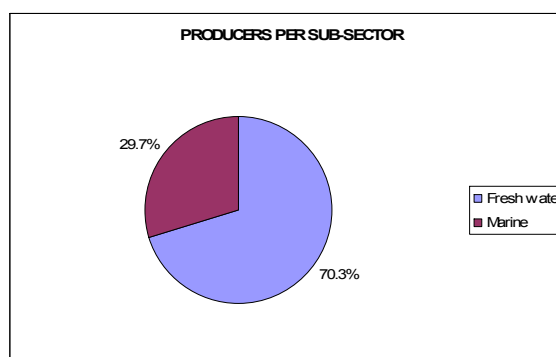


Regions	Freshwater	Marine	n=64	%
Eastern Cape	4	4	8	12.5%
Free State	4	0	4	6.3%
Gauteng	3	0	3	4.7%
KwaZulu Natal	7	1	8	12.5%
Limpopo	2	0	2	3.1%
Mpumalanga	8	0	8	12.5%
Northern Cape	1	1	2	3.1%
North West	1	0	1	1.6%
Western Cape	15	13	28	43.8%
Total all regions	45	19	64	100.0%

3.2 Sub-Sector

Of the 64 respondents, 45 producers (70.3%) were from the freshwater sub-sector and 19 producers (29.7%) were from the marine sub-sector as indicated by adjacent graph and Table 2 below.

Total	Freshwater	Marine
n=64	45	19
%= 100	70.3%	29.7%



3.3 Species Farmed

Marine producers generally focus on the production of one species while freshwater producers tend to farm several species. However, the concept of integrated marine aquaculture is currently explored. Unlike other freshwater producers, trout producers have a tendency to only farm trout. The freshwater aquaculture sub-sector is a vibrant inland aquaculture activity representing more producers and several more species than marine producers. Table 3 and 4 describe the range of species farmed within the South African aquaculture sector.

As per Table 3, the predominant marine species is abalone with 20.3% (or 68.4% of all marine producers) reporting production followed by oysters (7.8% of all respondents, or 26.3% of marine producers), finfish and seaweed (3.1% of the total respondents or 10.5% of marine producers) each. Mussels and prawns were respectively reported as farmed by 1.6% of all respondents. In terms of the regional distribution of marine production: abalone, oysters and finfish are found in the Western Cape and Eastern Cape. Oysters are also farmed in the Northern Cape. Mussels and seaweed are only farmed in the Western Cape while prawns are planned for KwaZulu Natal.

Marine Species	Scientific names	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
Abalone	<i>Haliotis midae</i>	11	2	0	0	13	68.4%	20.3%
Finfish	-	1	1	0	0	2	10.5%	3.1%
Kuruma prawn	<i>Penaeus japonicus</i>	0	0	1	0	1	5.3%	1.6%
Mediterranean mussel	<i>Mytilus galloprovincialis</i>	1	0	0	0	1	5.3%	1.6%
Pacific cupped oysters	<i>Crassostrea gigas</i>	2	2	0	1	5	26.3%	7.8%
Seaweed	<i>Gracilaria spp</i>	2	0	0	0	2	10.5%	3.1%
Brown Eel	<i>Anguilla mossambica</i>	0	0	0	0	0	0.0%	0.0%

Note 1: multiple responses

There are significantly more freshwater species farmed than marine. Taken together, ornamental fish and tropical ornamentals are reported as farmed by 28.1% of all respondents (or 40% of freshwater producers) (see Table 4). Trout (Rainbow and brown trout) production was reported by 31.3% of survey respondents (or 44.4% of freshwater producers) and rates as the most farmed product. Koi carp were produced by 17.2% of all respondents (or 24.4% of freshwater producers), while finfish were each reported among 14.1% (20.0% of freshwater respondents). Other species reported farmed, in order of frequency of reporting, were: tilapia (12.5%)¹⁵, goldfish (12.5%), North African catfish (9.4%), carp (7.8%), marron (7.8%) and bass (1.6%). A Free State producer reported growing yabby (*Cherax albidus*) as well as redclaw crayfish (*Cherax quadricarinatus*) alongside marron or blue crayfish (*Cherax tenuimanus*). Although there is a larger population of crocodile farmers in South Africa (see footnote 5 above), only one producer indicated farming Nile crocodiles in the Western Cape.

¹⁵ No distinction was made by respondents as to whether they farmed Mozambique Tilapia or Nile Tilapia.

TABLE 4: FRESHWATER SPECIES FARMED

Freshwater Species	Scientific names	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
North African Catfish	<i>Clarias garipinus</i>	2	1	0	0	1	0	1	1	0	6	13.3%	9.4%
Finfish		4	1	0	1	0	1	1	1	0	9	20.0%	14.1%
Carp	<i>Cyprinus carpio</i>	1	0	1	0	1	1	1	0	0	5	11.1%	7.8%
Goldfish	<i>Carrasius auratus</i>	1	1	1	0	2	1	0	2	0	8	17.8%	12.5%
Rhinofishes nei	<i>Labeo spp</i>	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
Mullets nei	<i>Mugilidae</i>	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
Ornamental fish	<i>Ornamental fish spp</i>	4	2	2	0	1	0	1	1	0	11	24.4%	17.2%
Ornamental fish (tropicals)	<i>Ornamental fish spp</i>	2	2	1	0	0	1	1	0	0	7	15.6%	10.9%
Indian white prawn / Shrimp	<i>Penaes indicus</i>	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
Trout (Rainbow Trout and brown trout)	<i>Oncorhynchus mykiss</i>	9	1	3	0	0	1	0	6	0	20	44.4%	31.3%
Largemouth black bass	<i>Micropterus salmoides</i>	0	0	0	0	0	0	0	1	0	1	2.2%	1.6%
Eel	-	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
Koi Carp	<i>Koi carp (Cyprinus carpio)</i>	2	0	2	1	2	0	1	2	1	11	24.4%	17.2%
Marron crayfish	<i>Cherax tenuimanus</i>	2	2	0	0	1	0	0	0	0	5	11.1%	7.8%
Nile Crocodile	-	1	0	0	0	0	0	0	0	0	1	2.2%	1.6%
Mozambique Tilapia / Nile Tilapia	<i>Oreochromis mossambicus / Oreochromis niloticus (Oreochromis spp)</i>	4	1	1	0	0	1	1	0	0	8	17.8%	12.5%
Water blommetjie	<i>Plantae aquatica</i>	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%

Note 1: multiple responses

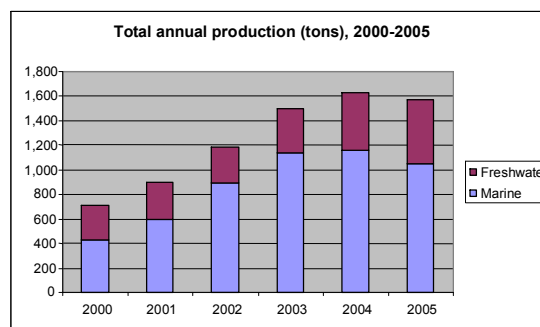
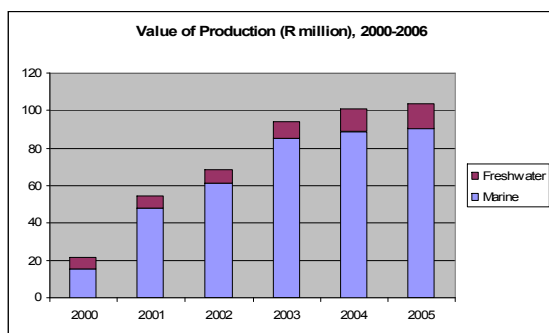
From a regional reporting perspective, ornamentals are farmed in all regions except in the North West and Northern Cape. There is a similar trend for goldfish, although there are also no farming reported in Limpopo. Koi carp are farmed in all regions except the Eastern Cape and Gauteng.

Trout farming occurs in the Western Cape, Eastern Cape, KwaZulu Natal, Gauteng and Mpumalanga. Tilapia is farmed (albeit at times experimental) in the Western Cape, Eastern Cape, KwaZulu Natal, Gauteng and Limpopo. North African catfish are farmed in the Western Cape, Eastern Cape, Free State, Limpopo, and Mpumalanga.

Finfish are farmed in all regions except in, North West, KwaZulu Natal and the Free State. Carp is reported as farmed in the Western Cape, KwaZulu Natal, Free State, Gauteng and Limpopo. Marron is grown in the Western and Eastern Cape as well as the Free State. Bass is reported among one producer in Mpumalanga.

3.4 Trends in the Value and Volume of Production (2000-2005)

Production trends indicate that although the marine sub-sector is significantly smaller than the freshwater sub-sector, it contributes far more to production figures in terms of value and volume.



The graphs above and Tables 6 and 7 below show evidence that aquaculture production per sub-sector increased significantly from 2002 to 2003. Although marine production has steadied since 2003 and dropped in 2005, freshwater production has continued to grow. Nevertheless, marine production is consistently higher. In 2005, it was more than 200% in terms of the volume of production, than freshwater production. This is more so the case since 2003 than in 2000 and 2001. It should be noted that not all the producers answered the volume and value sections, the reporting on the value and volume of production occurred among only 40.6% of respondents. This makes for some difficulty in determining, with confidence, the trends in the total volume and value of aquaculture production in South Africa.

TABLE 6: VOLUMES PRODUCED IN METRIC TONS (2000 – 2005)

Sub-sector	2000	2001	2002	2003	2004	2005
Marine	426.2	598.9	887.52	1139.01	1158.74	1052.185
Freshwater	285.9	304.9	299.36	353.79	474.05	519.12
Total volumes	712.10	903.80	1,186.88	1,492.80	1,632.79	1,571.31

TABLE 7: VALUE OF PRODUCTION IN MILLIONS OF RANDS (2000 – 2005)

Sub-sector	2000	2001	2002	2003	2004	2005
Marine	15.7	48.1	61.1	85.5	88.6	90.5
Freshwater	6.1	6.2	7.2	8.4	12.2	13.5
Total value	21.8	54.3	68.3	93.9	100.8	104.0

In turning to the volume of production per marine species as per Table 8, abalone production has increased nearly four-fold since 2000. Mussel production showed steady growth until 2004, but then dropped in 2005 to volumes similar to that of 2002. Oyster production peaked in 2003, after a rapid increase in production volumes between 2000 and 2003, with a decline toward 2005.

In Table 8, freshwater production per species shows the following trends. Marron production is only reported for 2005. Trout output fluctuates year-on-year with the best production figures in 2004. Tilapia figures were only reported for 2004 and 2005, with a significant increase in production over the year. In terms of individual fish produced, a steady increase in Koi carp is shown toward 2002 and thereafter there is a drop in volumes in 2003 before a steady recovery in 2004 and 2005. Ornamental fish (inclusive of tropicals) demonstrate a similar trend to Koi carp, although the 2002 figures are lower than 2001. No goldfish, or other species, were reported on by respondents.

TABLE 8: VOLUME OF PRODUCTION IN METRIC TONS PER SPECIES (2000 – 2005)

Species	PRODUCTION IN METRIC TONS					
	2000	2001	2002	2003	2004	2005
Abalone	116.1	238.1	321.12	344.41	400.5	508.14
Mussels	300	300	400	600	600	400.00
Oysters	10.1	60.8	166.4	194.6	158.24	144.05
Marron	0	0	0	0	0	2
Trout	285.9	304.9	299.36	353.79	472.05	467.12
Tilapia	0	0	0	0	2	50
Total volumes	712.10	903.80	1,186.88	1,492.80	1,632.79	1,571.31
<i>Koi Carp *</i>	<i>0.59</i>	<i>0.53</i>	<i>0.63</i>	<i>0.49</i>	<i>0.53</i>	<i>0.58</i>
<i>Goldfish *</i>	-	-	-	-	-	-
<i>Ornamental fish *</i>	<i>0.02</i>	<i>0.03</i>	<i>0.15</i>	<i>0.26</i>	<i>0.29</i>	<i>0.31</i>
Total individuals	0.61	0.56	0.78	0.75	0.82	0.89

* Number of individual fish in millions

3.5 Production Volumes and Values for 2005

Production volumes and values for 2005 have been segmented per sub-sector (see graphs below), per species (Table 10) as well as per region (Tables 11 and 12). These tables provide a view of current production as reported by the survey sample, noting again that the response rate by respondents for providing production data was 40.6%.

The total combined value of production for both marine and freshwater production in South Africa in 2005 was R104.2 million. Marine production contributed R90.5 million and freshwater production R13.8 million. This is interesting as there are 70.3% freshwater producers and 29.7% marine producers (see page 8) Production volumes, excluding individual fish, was 1,571.31 metric tons in 2005, of which marine contributed 1,052.19 metric tons and freshwater production 519.12 metric tons. The number of individual fish produced in 2005 was reported as 310,000, however, this reporting was for ornamentals (including tropicals) only.

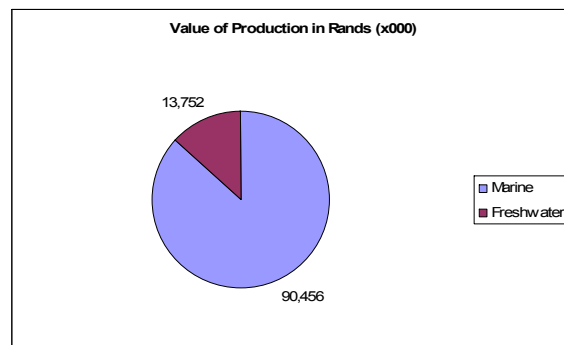
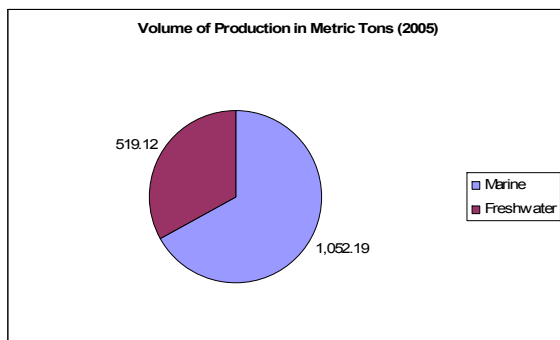


Table 10 below illustrates that abalone, mussels and trout contribute the most to overall production volumes in the South African aquaculture sector. The value of abalone contributes the most to the overall economic potential of the sector. However, comparatively, trout generates more value in Rands per ton than mussels. Collectively Oysters, tilapia, ornamental and marron contributes a fair amount to production. Compared to all other individual fish production figures, ornamentals provide substantially more value in Rands than Koi carp or goldfish.

Marine Species	Metric tons	Value (x R000)
Abalone	508.14	81,902
Mussels	400.00	4,000
Oysters	144.05	4,554
Total	1,052.19	90,456
Freshwater Species	Metric tons	Value (x R000)
Marron	2	260
Trout	467.12	11,715
Tilapia	50	750
Koi Carp	-	103
Goldfish	-	100
Ornamental fish	0.31 *	824
Total	519.12	13,752

* Number of individual fish in millions

Regional production data demonstrates that the Western Cape contributes the most to the national aquaculture GDP both in terms of marine and freshwater production. As noted in Table 11, the volume of production in 2005 by the marine sub-sector was 982.3 metric tons and 324 metric tons for the freshwater sub-sector. However, KwaZulu Natal's individual freshwater fish production exceeds that of the Western Cape. The other main producer supplying individual fish is Gauteng. In terms of overall freshwater production, excluding the Western Cape, Limpopo and KwaZulu Natal contribute substantially to national production volumes. The Free State and North West did not report on production volumes.

Sub-sector	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West
Marine	982.3	71.6	-	15.21	-	-	-	-	-
Freshwater	324	10	25	-	-	10	30	21.9	-
Freshwater (individuals)	129,384	4,000	188,654	1,000	-	100,000	40,000	-	-
Total (tons)	1,306	82	25	15	0	10	30	22	0

In terms of the value of production, as shown in Table 12, noting that not all regions provided data, the Western Cape follows the production volume trends as the single largest contributor to the value of aquaculture production, both in terms of the marine and freshwater sub-sectors. The Eastern Cape is the second largest producer in terms of value (R6.27 million) with both marine and freshwater production. It is followed by Gauteng with R5.15 million in production value for freshwater products (mainly individual fish sales). Mpumalanga and KwaZulu Natal also make sizable contributions the national aquaculture sector. The Northern Cape's contribution is largely marine production based.

TABLE 12: VALUE OF PRODUCTION IN 2005

Sub-sector	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West
Marine	84,111,685	5,974,256	-	370,000	-	-	-	-	-
Freshwater	7,914,185	200,000	550,000	-	-	150,000	-	581,155	-
Freshwater (individuals)	266,696	100,000	318,413	3,000	100,000	5,000,000	-	360,000	-
Total (R)	92,292,566	6,274,256	868,413	373,000	100,000	5,150,000	0	941,155	0

3.6 Operational Capacity

With total production trends stabling in 2004 and dipping in 2005 (see section 3.4 above), it should be noted that the ceiling for aquaculture production in South Africa has not been reached. Only 12.5% of the respondents reported that their farms are operating at full (100%) capacity (see Table 13). Five of these are marine farms in the Western Cape, one is a Western Cape freshwater producer and a further two are freshwater producers in KwaZulu Natal (see Tables 14 and 15).

TABLE 13: OPERATIONAL CAPACITY OF FARMS

Percentage capacity of production	Freshwater	Marine	n= 64	%
>10%	8	3	11	17.2%
20%	3	1	4	6.3%
30%	5	0	5	7.8%
40%	3	2	5	7.8%
50%	4	0	4	6.3%
60%	6	1	7	10.9%
70%	2	2	4	6.3%
80%	5	2	7	10.9%
90%	3	1	4	6.3%
100%	3	5	8	12.5%
No response	3	2	5	7.8%

The potential for increasing production yield is therefore reported by 79.7% of aquaculture producers in South Africa. This potential to increase production volumes varies: 34.4% indicated current operational capacity as between 50 to 90% while a further 39.1% reported operations running at below 50% capacity. 17.2% were operating at less than 10% production capacity.

Comparing marine and freshwater operations (see graph adjacent), it can be seen that generally, marine producers are operating at above 60% capacity with some instances of operational capacity reported below 20%. These are largely start-up operations based in the Western Cape and KwaZulu Natal. Freshwater producers, including new farms, show a trend for an operating capacity of 60% or less. Those freshwater farms operating at a capacity of 20% or less are located in the Western Cape, Eastern Cape, Free State, Gauteng, Limpopo, Mpumalanga and the North West.

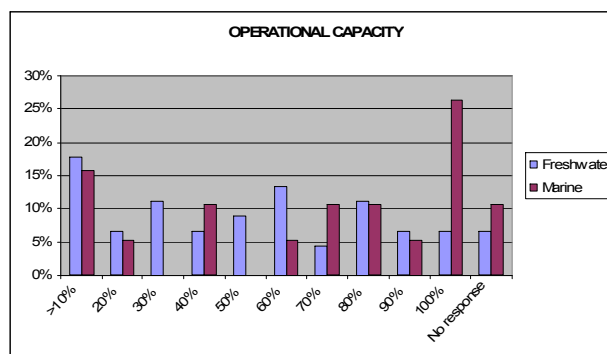


TABLE 14: OPERATIONAL CAPACITY (MARINE PER REGION)

Percentage capacity of production	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (=64)
>10%	2	0	1	0	3	15.8%	4.7%
20%	1	0	0	0	1	5.3%	1.6%
30%	0	0	0	0	0	0.0%	0.0%
40%	0	2	0	0	2	10.5%	3.1%
50%	0	0	0	0	0	0.0%	0.0%
60%	1	0	0	0	1	5.3%	1.6%
70%	2	0	0	0	2	10.5%	3.1%
80%	1	1	0	0	2	10.5%	3.1%
90%	1	0	0	0	1	5.3%	1.6%
100%	5	0	0	0	5	26.3%	7.8%
No response	0	1	0	1	2	10.5%	3.1%

TABLE 15: OPERATIONAL CAPACITY (FRESHWATER PER REGION)

Percentage capacity of production	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
>10%	2	2	0	0	1	1	1	1	0	8	17.8%	12.5%
20%	2	0	0	0	0	0	0	0	1	3	6.7%	4.7%
30%	2	0	1	1	1	0	0	0	0	5	11.1%	7.8%
40%	0	0	1	0	1	0	0	1	0	3	6.7%	4.7%
50%	1	0	0	0	1	1	0	1	0	4	8.9%	6.3%
60%	3	0	1	0	0	0	0	2	0	6	13.3%	9.4%
70%	1	0	0	0	0	0	0	1	0	2	4.4%	3.1%
80%	2	1	1	0	0	0	1	0	0	5	11.1%	7.8%
90%	0	0	1	0	0	1		1	0	3	6.7%	4.7%
100%	1	0	2	0	0	0	0	0	0	3	6.7%	4.7%
No response	1	1	0	0	0	0	0	1	0	3	6.7%	4.7%

3.7 Sales to the Domestic Market

59.4% of producers (survey sample n=64) indicated that they supply product to the domestic market of which 12.5% were marine producers and 46.9% were freshwater producers.

Overall, freshwater sales to the domestic market in 2005 totalled R9.9 million and marine sales R9.1 million, totalling R19 million (see Tables 16 and 17). The Western Cape's sales to the domestic market were significantly more than any other region. Respondents from the Western Cape reported sales of 814.85 metric tons (R15.97 million), with freshwater supply providing R7.4 million in sales, excluding individual freshwater fish sales of 127,820 (R0.98 million), compared to marine sales of R7.6 million. It should be noted that Mpumalanga and KwaZulu Natal both showed individual fish yields above that of the Western Cape.

Gauteng respondents reported domestic sales of 116.18 tons of freshwater product and 90,000 individual fish, totalling R1 million in sales. While KwaZulu Natal's freshwater production yield of 98.75 tons and 135,086 individual fish was significantly more than the Eastern Cape, it was the Eastern Cape's supply of marine product of 49.19 tons at R1.2 million that placed the Eastern Cape as the second highest contributor to domestic aquaculture sales. In terms of the value of production, the Northern Cape's marine supply and KwaZulu Natal's freshwater supply are key to the national spend on aquaculture products.

TABLE 16: VOLUME (TONS) OF SUPPLY TO DOMESTIC MARKET (2005)

Sub-sector	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total sales in metric tons
Marine	500.85	49.19	0.00	15.21	0.00	0.00	0.00	0.00	0.00	565.25
Freshwater	314.00	10.00	98.75	0.00	0.00	116.18	30.00	33.10	0.00	602.03
Freshwater (individual fish)	127,820	4,000	135,086	0	0	90,000	40,000	402,712	0	799,618
Total	814.85	59.19	98.75	15.21	0.00	116.18	30.00	33.10	0.00	1,167.28

TABLE 17: RAND VALUE OF SUPPLY TO DOMESTIC MARKET (2005)

Sub-sector	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total Rand value of sales
Marine	7,556,715	1,184,000	0	370,000	0	0	0	0	0	9,110,715
Freshwater	7,429,678	-	-	-	-	-	-	-	-	7,429,678
Freshwater (individual fish)	982,309	10,000	334,334	0	0	1,000,000	10,000	124,915	0	2,461,558
Total	15,968,702	1,194,000	334,334	370,000	0	1,000,000	10,000	124,915	0	19,001,951

Domestic sale volume trends were also segmented to ascertain which sub-sector per region supplies to South African markets (as per Tables 18 and 19). The marine domestic market in 2005 was clearly dominated by the Western Cape, which supplied primarily to the local market in the Western Cape, that is, 308.94 tons (R4.9 million) out of a total of 500.85 tons (R7.6 million) sold in the domestic market. Western Cape marine supply to Gauteng was reported as 167 tons (R1.9 million). Western Cape producers also supplied Mpumalanga, the Eastern Cape and KwaZulu Natal. The Eastern Cape supplied the local market with 13.12 tons (0.4 million) and 36 tons (R0.8 million) to the Gauteng market. The Northern Cape sold its 15.21 ton yield (R0.4 million) to the Western Cape.

TABLE 18: REGIONAL MARINE PRODUCER SALE VOLUMES TO DOMESTIC MARKET (2005)

Region supplying	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape
Western Cape	308.94	-	-	15.21
Eastern Cape	4.03	13.12	-	-
KwaZulu Natal	4.19	-	-	-
Northern Cape	-	-	-	-
Free State	-	-	-	-
Gauteng	169	36	-	-
Limpopo	-	-	-	-
Mpumalanga	15	-	-	-
North West	-	-	-	-
Total	500.85	49.19	0.00	15.21

Region supplying	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape
Western Cape	4,852,715	-	-	370,000
Eastern Cape	153,000	388,400	-	-
KwaZulu Natal	159,000	-	-	-
Northern Cape	-	-	-	-
Free State	-	-	-	-
Gauteng	1,930,000	795,600	-	-
Limpopo	-	-	-	-
Mpumalanga	462,000	-	-	-
North West	-	-	-	-
Total	7,556,715	1,184,000	0	370,000

Tables 20 and 21 set out the freshwater supply to the domestic market. Production yield per ton and individual fish sales are set out separately in these tables. Overall, the general trend is for a region to supply more product locally than to other regions. However, this is not the case with Mpumalanga and Limpopo. Both these region show more sales in Gauteng than all the other regions they supply put together. The North West supplies only to the Mpumalanga market.

Western Cape sales are again directed primarily to the local market (R8.2 million), with some sales of individual fish to the Eastern Cape, KwaZulu Natal, Free State, and Gauteng. Gauteng supplies product to a value of R4.8 million to all regions, except the Eastern Cape, Northern Cape and the North West, although the bulk of its sales are local. Mpumalanga also has a wide market reach with sale of over R1 million, except no sales were reported in the Western Cape, Northern Cape and Limpopo. Outside of its own borders, KwaZulu Natal has established markets in the Western Cape, Gauteng and Mpumalanga, making for R3.1 million in domestic sales.

Region supplying	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West
Western Cape	314.00	6.00	-	-	-	-	-	-	-
	105,656 *	-	12,865	-	-	10,000	-	-	-
Eastern Cape	-	2.00	-	-	-	-	-	-	-
	10,074 *	4,000	-	-	-	-	-	27,458	-
KwaZulu Natal	-	0.50	75.50	-	-	0.43	-	-	-
	6,885 *	-	102,923	-	-	10,000	-	59,491	-
Northern Cape	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
Free State	-	1.00	-	-	-	0.85	-	-	-
	196 *	-	-	-	-	-	-	4,576	-
Gauteng	-	0.50	-	-	-	56.00	-	-	-
	5,008 *	-	19,298	-	-	60,000	35,000	279,152	-
Limpopo	-	-	-	-	-	50	30	-	-
	-	-	-	-	-	-	5,000	-	-
Mpumalanga	-	-	23	-	-	8.9	-	33.1	-
	-	-	-	-	-	10,000	-	27,457	-
North West	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	4,576	-
Total tons	314.00	10.00	98.75	0.00	0.00	116.18	30.00	33.10	0.00
Total individual fish *	127,820	4,000	135,086	0	0	90,000	40,000	402,712	0

TABLE 21: REGIONAL FRESHWATER PRODUCER SALE VALUES TO DOMESTIC MARKET (2005)

Region supplying	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West
Western Cape	7,429,678	240,000	-	-	20,000	-	-	-	-
	727,504		31,841	-	-	500,000	-	-	-
Eastern Cape		80,000	-	-	25,000	-	-	-	-
	31,891	10,000	-	-	-	-	-	-	-
KwaZulu Natal	-	20,000	2,221,000	-	20,000	512,525	-	-	-
	15,954	-	254,730	-	-	-	-	-	-
Northern Cape	-	-	-	-	25,000	-	-	-	-
	-	-	-	-	-	-	-	-	-
Free State	-	40,000	-	-	10,000	25,050	-	-	-
	7,960	-	-	-	-	-	-	-	-
Gauteng	-	20,000	-	-	5,000	3,200,400	70,000	-	-
	199,000	-	47,762	-	-	-	-	70,000	-
Limpopo	-	-	-	-	-	-	450,000	-	-
	-	-	-	-	-	-	10,000	-	-
Mpumalanga	-	-	643,500	-	-	10,000	-	911,155	-
	-	-	-	-	-	500,000	-	-	-
North West	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	54,915	-
Total tons	7,429,678	400,000	2,864,500	-	105,000	3,747,975	520,000	911,155	-
Total individuals	982,309	10,000	334,334	-	-	1,000,000	10,000	124,915	-

3.8 Exporting Activities

32.8% of all respondents (both freshwater and marine sub-sectors) indicated that they export aquaculture products. 20.3% of all respondents were marine producers and 12.5% freshwater producers (see Tables 22 and 23).

The majority of exporters are from the Western Cape, and include 17.2% marine producers and 6.3% freshwater producers. The other regions that export are the Eastern Cape (both marine and freshwater producers reported exporting activity), KwaZulu Natal, Free State and Gauteng.

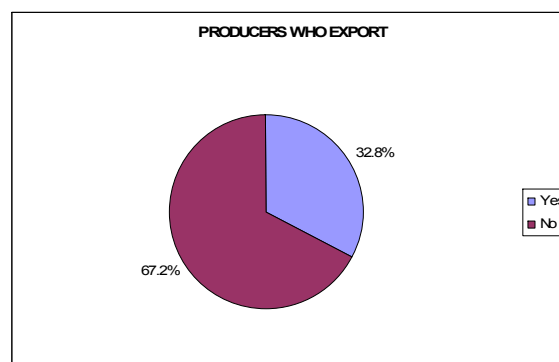


TABLE 22: MARINE PRODUCERS PER REGION WHO EXPORT

EXPORT	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	%(n=19)	%(n=64)
Yes	11	2	0	0	13	68.4%	20.3%
No	2	2	1	1	6	31.6%	9.4%

EXPORT	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
Yes	4	1	1	0	1	1	0	0	0	8	17.8%	12.5%
No	11	3	6	1	3	2	2	8	1	37	82.2%	57.8%

As per Tables 24, 25 and 26, exporting activity has been evident for several years. One marine producer from the Western Cape reported exporting for 16 years. An Eastern Cape freshwater producer and a Western Cape marine producer both indicated exporting for 11 years. 20.3% of all respondents have been exporting for 5 to 9 years. 7.8% indicated that they have been exporting for less than 5 years; these respondents were from KwaZulu Natal, Free State and Gauteng. A further 3.1%, a freshwater producer and a marine producer both from the Western Cape, noted that they plan to export in the next year. Eastern Cape exporting activity has been occurring among one freshwater and two marine producers, all of who have been exporting for 5 or more years.

Years exporting	Freshwater	Marine	n=64	%
Pending	1	1	2	3.1%
1	1	0	1	1.6%
2	1	1	2	3.1%
4	1	1	2	3.1%
5	1	3	4	6.3%
6	1	0	1	1.6%
7	0	2	2	3.1%
8	0	2	2	3.1%
9	1	1	2	3.1%
11	1	1	2	3.1%
16	0	1	1	1.6%
Total	8	13	21	32.8%

Years exporting	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
Pending	1	0	0	0	1	5.3%	1.6%
1	0	0	0	0	0	0.0%	0.0%
2	1	0	0	0	1	5.3%	1.6%
4	1	0	0	0	1	5.3%	1.6%
5	2	1	0	0	3	15.8%	4.7%
6	0	0	0	0	0	0.0%	0.0%
7	1	1	0	0	2	10.5%	3.1%
8	2	0	0	0	2	10.5%	3.1%
9	1	0	0	0	1	5.3%	1.6%
11	1	0	0	0	1	5.3%	1.6%
16	1	0	0	0	1	5.3%	1.6%

TABLE 26: NUMBER OF YEARS EXPORTING AMONG FRESHWATER PRODUCERS PER REGION

Years exporting	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
Pending	1	0	0	0	0	0	0	0	0	1	2.2%	1.6%
1	0	0	0	0	0	1	0	0	0	1	2.2%	1.6%
2	0	0	0	0	1	0	0	0	0	1	2.2%	1.6%
4	0	0	1	0	0	0	0	0	0	1	2.2%	1.6%
5	1	0	0	0	0	0	0	0	0	1	2.2%	1.6%
6	1	0	0	0	0	0	0	0	0	1	2.2%	1.6%
7	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
8	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
9	1	0	0	0	0	0	0	0	0	1	2.2%	1.6%
11	0	1	0	0	0	0	0	0	0	1	2.2%	1.6%
16	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%

The three exporting regions in 2005 were: the Western Cape, Eastern Cape and Gauteng (see Table 27 below).

**TABLE 27:
SUPPLY TO EXPORT MARKETS IN METRIC TONS AND RAND VALUE (2005)**

Sub-sector	Western Cape (Tons / Rands)		Eastern Cape (Tons / Rands)		Gauteng (Tons / Rands)	
	Marine	18,673.94	25,679,143	4.80	1,245,417	0.00
Marine (individuals)	480,000	-		-	-	-
Freshwater	0.00	0.00	0.00	-	0.00	-
Freshwater (individuals)	1,571	63,680	0	8,000	5,000	-
Total	18,673.94	25,742,823	4.80	1,253,417	0.00	-

It is encouraging to see that even with a small number of producers exporting, that a significant portion of produce (a total of R26.99 million in exports) is exported. In terms of volumes of production, marine yield of 18,678.74 tons was reported, the majority of this from the Western Cape. A further 480,000 individuals were indicated as exported from the Western Cape. A total of 6,571 individual fish were exported and an export value of R71,680 reported, although there was no clear correspondence between numbers and value of fish production in this instance.

Tables 28 and 29 set out the exporting activity per region and export market. Marine exports focused on Africa and Asia, although Asia comprised the larger market share with R26.6 million (18,678.74 tons) in export sales. The Western Cape was responsible for exporting to both Africa and Asia, whereas the Eastern Cape demonstrated export activity of 4.8 tons to Asia. No exporting of marine products to Europe and America are currently taking place due to the fact that South Africa's phyto-sanitation monitoring programme is not compliant with the stringent European and American regulations.

**TABLE 28:
SUPPLY TO EXPORT MARKETS IN METRIC TONS AND RAND VALUE
BY MARINE PRODUCERS PER REGION (2005)**

Export markets	Western Cape (Tons / Rands)		Eastern Cape (Tons / Rands)	
	Africa	480,000.00*	288,000.00	-
Americas	-	-	-	-
Asia	18,673.94	25,391,142.50	4.80	1,245,417.00
Europe	-	-	-	-
Middle East	-	-	-	-
Oceania	-	-	-	-
Total	18,673.94	25,679,143	4.80	1,245,417

* Number of Individual abalone exported.

Among freshwater producers, individual fish export activity was reported by producers in the Western Cape who supplied the African market, Gauteng who supplied the Asian and the Eastern Cape who supplied markets in Europe and the Americas.¹⁶ Exports to Asia made up the largest number of individual fish sales.

**TABLE 29:
SUPPLY TO EXPORT MARKETS IN METRIC TONS AND RAND VALUE BY
FRESHWATER PRODUCERS PER REGION (2005)**

Export markets	Western Cape (Tons / Rands)		Gauteng (Tons / Rands)		Eastern Cape (Tons / Rands)	
	Africa	-	-	-	-	-
	1,571	63,680	-	-	-	-
Americas	-	-	-	-	-	-
	-	-	-	-	-	4,000
Asia	-	-	-	-	-	-
	-	-	5000	-	-	-
Europe	-	-	-	-	-	-
	-	-	-	-	-	4,000
Middle East	-	-	-	-	-	-
	-	-	-	-	-	-
Oceania	-	-	-	-	-	-
	-	-	-	-	-	-
Total tons	-	-	-	-	-	-
Total individuals	1,571	63,680	5,000	-	-	8,000

* Only individual fish numbers were reported.

3.9 Importing Activities

39.1% of respondents indicated that they import products from other countries to support their aquaculture operations. Of the 39.1%, 29.7% were freshwater producers and 9.4% marine producers (see Table 30).

TABLE 30: IMPORTING

Import	Freshwater	Marine	n=64	%
Yes	19	6	25	39.1%
No	26	13	39	60.9%
Total	45	19	64	100%

All the marine producing regions, except KwaZulu Natal reported importing activities (see Table 31). As per Table 32, the types of product imported for marine operation are: live abalone, oyster seed, artificial food, oyster larvae and equipment.

¹⁶ Reference to Americas includes North, Central and South Americas. The product exported to the Americas was reported as Malawi Childs.

TABLE 31: IMPORTING ACTIVITIES OF MARINE PRODUCERS PER REGION

Import	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
Yes	3	2	0	1	6	31.6%	9.4%
No	10	2	1	0	13	68.4%	20.3%

TABLE 32: PRODUCTS IMPORTED BY MARINE PRODUCERS

Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape
Live abalone	Oyster Seed	-	Oyster Seed
Oyster seed (2)	Artificial food	-	Oyster larvae
-	-	-	Equipment

Freshwater producers across all regions, except the Northern Cape and the North West, reported importing activities (see Table 33). Table 34 sets out the range of products imported among freshwater producers. These include: aqua feed ingredients, species specific feed, live fish, ova and equipment. While country of imports was not asked in the survey, one trout producer indicated importing ova from Denmark.

TABLE 33: IMPORTING ACTIVITIES OF FRESHWATER PRODUCERS PER REGION

Import	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
Yes	6	2	3	0	2	3	1	2	0	19	42.2%	29.7%
No	9	2	4	1	2	0	1	6	1	26	57.8%	40.6%

TABLE 34: PRODUCTS IMPORTED BY FRESHWATER PRODUCERS

Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West
Ingredients for aquafeeds	Live ornamental fish	Live ornamental fish	-	African catfish	Koi brood stock	Blower motors	Aerators	-
Trout feed	Ram pumps	Artemia	-	Carp	Dry goods	Oxygen purifiers	Trout ova	-
Koi feed	Brine shrimp	Pumps	-	Goldfish (2)	Tilapia	pumps	-	-
Parent Koi	Aeration diffusers	Heaters	-	-	Tiger Prawns	-	-	-
Trout ova (3)	All hardware	-	-	-	Autofeeders	-	-	-
Specialist machinery	-	-	-	-	Deadtors	-	-	-
Recirculation equipment	-	-	-	-	-	-	-	-

4. Enterprise Development

The aquaculture enterprises reported on in this benchmark research include the larger industrial, mainly marine, operations as well as small-scale commercial farms and those who participate in aquaculture for recreational reasons. This chapter sets out those factors that provide a view of the state of enterprise development within the South African aquaculture sector.

4.1 Formalisation of Operations

The formalisation of operations is primarily determined by whether the farm is formally registered as a commercial or related entity. As shown in the adjoining graph and Table 35, 51.6% of all respondents indicated that their operations were registered as propriety limited (Pty Ltd) firms. 23.4% were close corporations, most of which freshwater producers. This indicates a high level of business formalisation among aquaculture producers. Associated to this is a further 14.1% of respondents who indicated that they were registered as sole traders. Other forms of registration noted by respondents were: cooperatives (1.6%), partnership (1.6%) and a university associated research facility (1.6%). 3.1% of operations were reported as not registered and a further 3.1% offered no response.

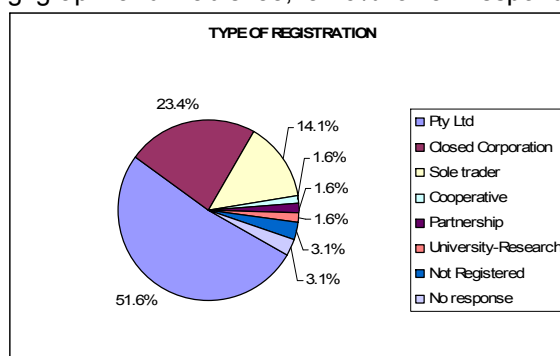


TABLE 35: REGISTRATION OF OPERATIONS

Entity type	Freshwater	Marine	n = 64	%
Pty Ltd	18	15	33	51.6%
Closed Corporation	13	2	15	23.4%
Sole trader	9	0	9	14.1%
Cooperative	1	0	1	1.6%
Partnership	1	0	1	1.6%
University-Research	1	0	1	1.6%
Not Registered	2	0	2	3.1%
No response	0	2	2	3.1%
Total	45	19	64	100.0%

The marine sub-sector is highly formalised with 23.4% of respondents (that is 78.9% of all marine producers) reporting their business registration as a propriety limited firm. Closed corporations, the only other entity type noted among marine respondents, were reported by a further 3.1% of all respondents (see Table 36). Closed corporations were reported in the Eastern Cape and North Cape but no closed corporations were reported in the Western Cape.

TABLE 36: REGISTRATION OF MARINE OPERATIONS

Entity type	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (=64)
Pty Ltd	12	2	1	0	15	78.9%	23.4%
Closed Corporation	0	1	0	1	2	10.5%	3.1%
Sole trader	0	0	0	0	0	0.0%	0.0%
Cooperative	0	0	0	0	0	0.0%	0.0%
Partnership	0	0	0	0	0	0.0%	0.0%
University-Research	0	0	0	0	0	0.0%	0.0%
Not Registered	0	0	0	0	0	0.0%	0.0%
No response	1	1	0	0	2	10.5%	3.1%
Total	13	4	1	1	19	100.0%	29.7%

In turning to freshwater producers, as per Table 37, the full range of entity registration types was noted. Again, propriety limited firm was in the majority (28.1% of all respondents, and 40.0% of all freshwater producers). Respondents from the Western Cape and Mpumalanga reported more Pty Ltd firms than the

other regions. Closed corporations (20.3%) make up the second most frequently reported business registration with all regions, except Limpopo and North West, reporting this entity type. These were followed by sole traders (14.1%) in KwaZulu Natal, Western Cape, Free State and Mpumalanga. Cooperatives, partnerships and research-facilities make up 1.6% each, located either in the Western Cape or Eastern Cape.

Entity type	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (=45)	% (=64)
Pty Ltd	8	1	0	0	0	2	1	5	1	18	40.0%	28.1%
Closed Corporation	3	2	3	1	1	1	0	2	0	13	28.9%	20.3%
Sole trader	2	0	4	0	2	0	0	1	0	9	20.0%	14.1%
Cooperative	1	0	0	0	0	0	0	0	0	1	2.2%	1.6%
Partnership	0	1	0	0	0	0	0	0	0	1	2.2%	1.6%
University-Research	1	0	0	0	0	0	0	0	0	1	2.2%	1.6%
Not Registered	0	0	0	0	1	0	1	0	0	2	4.4%	3.1%
No response	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
	15	4	7	1	4	3	2	8	1	45	100.0%	70.3%

4.2 Years in operation

A review of the number of years of operation among aquaculture firms provides a good indication of the age of the sector (see Table 38). While 9.4% of respondents indicated that they have been operating for more than 25 years, the most frequent scores were in the 1 to 5 years (31.3%), 6 to 10 years (17.2%) and 11 to 15 years (23.4%) of operations. A few enterprises (7.8%) reported operations of between 20 and 25 years. A further 9.4% indicated that the operation had only begun producing, and was within its first year of trading.

Years	Freshwater	Marine	n=64	%
< 1	4	2	6	9.4%
1 – 5	17	3	20	31.3%
6 – 10	6	5	11	17.2%
11 – 15	9	6	15	23.4%
16 - 20	2	1	3	4.7%
21 - 25	2	0	2	3.1%
> 25	5	1	6	9.4%
no response	0	1	1	1.6%
Total	45	19	64	100.0%

Another view of the data is that there are more aquaculture opportunities identified in the freshwater sub-sector than in marine in the last 5 years (that is since 2001) with 21 firms entering the market. However, there were comparable opportunities in both marine and freshwater production 6 to 10 years (1996 to 2000) and 11 to 15 years ago (1991 to 1995). This demonstrates that the growth of the aquaculture industry in South Africa occurred in the 1990s, specifically the early 1990s.

In the marine sub-sector as set out in Table 39 below, all the coast regions show evidence of new market entrants within the last 5 years. KwaZulu Natal and the Western Cape both have firms operating for less than a year. The Western Cape is the most mature marine production region in South Africa with several enterprises in operation for 6 to 15 years and two respondents indicating that their enterprises were in operation for over 16 years, one of which over 25 years. Two respondents in Eastern Cape noted that they had been operating for 11 to 15 years.

TABLE 39: YEARS IN OPERATION OF MARINE PRODUCERS PER REGION

Years	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (=64)
< 1	1	0	1	0	2	10.5%	3.1%
1 – 5	1	1	0	1	3	15.8%	4.7%
6 – 10	5	0	0	0	5	26.3%	7.8%
11 – 15	4	2	0	0	6	31.6%	9.4%
16 - 20	1	0	0	0	1	5.3%	1.6%
21 - 25	0	0	0	0	0	0.0%	0.0%
> 25	1	0	0	0	1	5.3%	1.6%
no response	0	1	0	0	1	5.3%	1.6%

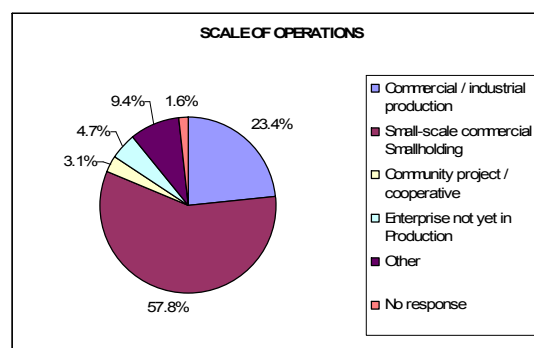
The responses from the freshwater sub-sector with regards to years in operation are provided in Table 40 below. New entrants into the sector that started their operations within the last year were evident in the Eastern Cape, Free State and Mpumalanga. Enterprises operating for 1 to 5 years were reported on for most regions, especially the Western Cape but not in Mpumalanga, demonstrating a growth in new aquaculture farms nationally over this time period. Longer standing players in the sector were visible most of the regions, especially the Western Cape, KwaZulu Natal, Mpumalanga. Seven producers (10.9%) reported operations of over 20 years. These were located in KwaZulu Natal, Limpopo and Mpumalanga.

TABLE 40: YEARS IN OPERATION OF FRESHWATER PRODUCERS PER REGION

Years	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (=45)	% (=64)
< 1	0	2	0	0	1	0	0	1	0	4	8.9%	6.3%
1 – 5	9	1	2	1	1	1	1	0	1	17	37.8%	26.6%
6 – 10	3	1	1	0	1	0	0	0	0	6	13.3%	9.4%
11 – 15	2	0	1	0	1	2	0	3	0	9	20.0%	14.1%
16 - 20	1	0	0	0	0	0	0	1	0	2	4.4%	3.1%
21 - 25	0	0	1	0	0	0	1	0	0	2	4.4%	3.1%
> 25	0	0	2	0	0	0	0	3	0	5	11.1%	7.8%
no response	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%

4.3 Scale of Production

Most operations reported on in this survey fall into the category of small-scale commercial / smallholding (that is, with a turnover of less than 5 million per annum). These made up 57.8% of farms. Commercial / industrial production with a turnover of more than R5 million per annum, was indicated by 23.4% of respondents. 4.7% noted that their operation was not yet in production (start-up phase). 3.1% were involved in a community project or cooperative.



Other operations, which made up 9.4% of responses, were: production for private use, recreational use, tourism use, wholesale, or not specified (see graph above and Table 41 below).

Nature of operation	Freshwater	Marine	n=64	%
Commercial / industrial production (> R5m p.a. turnover)	5	10	15	23.4%
Small-scale commercial / Smallholding (< R5m p.a. turnover)	30	7	37	57.8%
Community project / cooperative	2	1	2	3.1%
Enterprise not yet in production (Start-up phase)	2	1	3	4.7%
Wholesaler of produce	1	0	1	1.6%
Production for private use	1	0	1	1.6%
Production for recreational use (hobbyist)	2	0	2	3.1%
Production for tourism industry	1	0	1	1.6%
Other (unspecified)	1	0	1	1.6%
No response	0	1	1	1.6%

The scale of marine production, as shown in Table 42, is reported among largely commercial/industrial operations - 15.6% of all respondents (52.6% of marine producers). These were located in the Western and Eastern Cape. A further 10.9% (or 36.8% of the marine sample) indicated involvement in small-scale commercial/smallholding operations and geographically distributed along all the coastal zones except KwaZulu Natal. One Western Cape respondent (1.6%) indicated operating a community project/cooperative. However, it should be noted that a further two marine producers indicated that they also included reporting on community-based initiatives that fell within their farming operations. Both located in the Western Cape. The only KwaZulu Natal operation reported on was a start-up enterprise that is not yet in production.

Nature of operation	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
Commercial / industrial production (> R5m p.a. turnover)	8	2	0	0	10	52.6%	15.6%
Small-scale commercial / Smallholding (< R5m p.a. turnover)	4	2	0	1	7	36.8%	10.9%
Community project / cooperative	1	0	0	0	1	5.3%	1.6%
Enterprise not yet in Production	0	0	1	0	1	5.3%	1.6%

As per Table 43, freshwater production is mainly small-scale commercial/smallholding operations - with 46.9% of all respondents (or 66.7% of freshwater producers) reporting operating farms in this category. All regions, except the Northern Cape, reported small-scale commercial/smallholding operations, with higher instances of these farms in the Western Cape, Mpumalanga and KwaZulu Natal. Commercial/industrial farms made up 7.8% (or 11.1% of freshwater producers) and were found in the Western Cape, KwaZulu Natal and Gauteng. Community projects were noted by two respondents (3.1%), one in the Western Cape and the other in KwaZulu Natal. One respondent from the Eastern Cape and another from the Free State reported that their farm was not yet in operation. The remaining 9.4% of respondents indicated that aquaculture production was for private use (Mpumalanga), recreational use (Free State and Northern Cape), tourism use (Mpumalanga), wholesale (KwaZulu Natal), or was not specified (Mpumalanga).

TABLE 43: SCALE OF PRODUCTION OF FRESHWATER OPERATIONS PER REGION

Nature of operation	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
Commercial / industrial production (> R5m p.a. turnover)	3	0	1	0	0	1	0	0	0	5	11.1%	7.8%
Small-scale commercial / Smallholding (< R5m p.a. turnover)	11	3	4	0	2	1	2	6	1	30	66.7%	46.9%
Community project / cooperative	1	0	1	0	0	0	0	0	0	2	4.4%	3.1%
Enterprise not yet in Production	0	1	0	0	1	0	0	0	0	2	4.4%	3.1%
Wholesaler of produce	0	0	1	0	0	0	0	0	0	1	2.2%	1.6%
Production for private use	0	0	0	0	0	0	0	1	0	1	2.2%	1.6%
Production for recreational use	0	0	0	1	1	0	0	0	0	2	4.4%	3.1%
Production for tourism industry	0	0	0	0	0	0	0	1	0	1	2.2%	1.6%
Other	0	0	0	0	0	0	0	1	0	1	2.2%	1.6%

4.4 Funding Sources of Enterprises

Private capital was reported by the majority of respondents (84.4%) as the source of funding for their enterprises (see Table 44). This was followed by domestic investment and loans (15.6%). Government assistance (7.8%) and foreign investment (1.6%) were reported only among freshwater producers. No foreign aid was reported.

TABLE 44: SOURCES OF FUNDING

Funding	Freshwater	Marine	n=64	%
Domestic Investment and Loans	6	4	10	15.6%
Foreign investment	1	0	1	1.6%
Foreign aid	0	0	0	0.0%
Government Assistance	5	0	5	7.8%
Private Capital	36	18	54	84.4%

Note: multiple responses.

From a regional perspective (see Table 45), marine producers along the South African coastline all reported injecting private capital into their operations. Domestic loans were reported for the Western Cape, Eastern Cape and KwaZulu Natal but not the Northern Cape. No government assistance, foreign investment or foreign aid was noted among these marine survey respondents.

Funding	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
Domestic Investment and Loans	2	1	1	0	4	21.1%	6.3%
Foreign investment	0	0	0	0	0	0.0%	0.0%
Foreign aid	0	0	0	0	0	0.0%	0.0%
Government Assistance	0	0	0	0	0	0.0%	0.0%
Private Capital	12	4	1	1	18	94.7%	28.1%

Note: multiple responses.

Freshwater producers, as per Table 46, however did report receiving government assistance (7.8%) and foreign investment (1.6%) but not foreign aid. A respondent from the Western Cape indicated receiving foreign investment and respondents from the Western Cape, KwaZulu Natal and Free State noted receiving government assistance for their aquaculture operations. Domestic loans, reported among 9.4% of survey participants (or 13.3% of freshwater producers), were evident in the Western Cape, KwaZulu Natal and Free State. The investment of private capital in freshwater operations was reported in all regions by 80.0% of freshwater producers (56.3% of the total survey sample).

Funding	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
Domestic Investment and Loans	4	0	1	0	1	0	0	0	0	6	13.3%	9.4%
Foreign investment	1	0	0	0	0	0	0	0	0	1	2.2%	1.6%
Foreign aid	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
Government Assistance	3	0	1	0	1	0	0	0	0	5	11.1%	7.8%
Private Capital	9	4	5	1	3	3	2	8	1	36	80.0%	56.3%

Note: multiple responses.

A further question was asked as to the nature of investment in aquaculture operations (see Tables 47 and 48). Three marine producers (4.7%) from the Western Cape and one (1.6%) freshwater producer from Mpumalanga reported investment in their firms by catch (fishing) industry companies. This make for 6.3% of all aquaculture producers which reported some form of investment by the fishing industry in aquaculture. However, it should be noted that while investment in marine producers is in the form of “capital” or “venture capital”, the investment in the Mpumalanga producer was in the form of “sound management” practices.

Investment	Freshwater	Marine	n=64	%
Yes	1	3	4	6.3%
No	44	16	64	93.8%

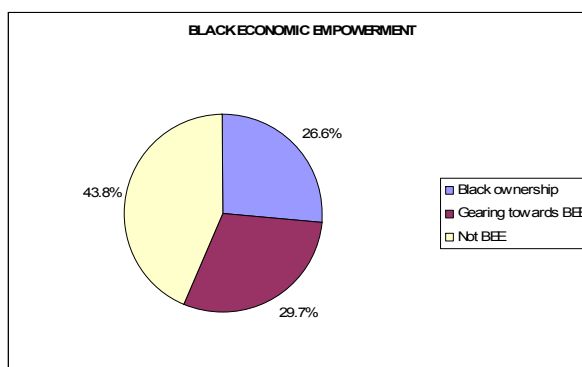
**TABLE 48:
CATCH INDUSTRY INVESTMENT IN AQUACULTURE PER REGION**

Investment	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Mpumalanga	Total	% (n=64)
Yes	3	0	0	0	1	4	6.3%

4.5 Black Economic Empowerment

There is evidence that transformation at an ownership level has occurred in the South African aquaculture industry. 56.3% of producers are geared or are gearing toward BEE while 43.8% don't have a BEE component at present (see adjoining graph).

A total of 26.6% of all producers' surveyed reported black economic empowerment (BEE) at ownership level within enterprises (see Table 49). 9.4 % indicated that their firms were black owned (that is, 75.1 to 100% ownership by black persons). 1.6% reported black empowered firms (50.1-75% black ownership), 7.8% that their firms were black influenced (25.1-50% black ownership) and a further 7.8% indicated that the percentage black economic empowerment at ownership level was less than 25%.



The commitment to transformation within the aquaculture sector was also noted in the 12.5% of respondents who indicated that while their enterprises were, at the time of the survey, not black empowered they were engaged in planning for black ownership in their enterprise. A further 17.2% of the respondents reported that they were interested in seeking a BEE partner (some of which are listed on the AISA website). The remaining 43.8% of the survey sample did not indicate any move towards black economic empowerment within their operations.

TABLE 49: BLACK ECONOMIC EMPOWERMENT

% BEE ownership	Freshwater	Marine	n=64	%
Black owned (75.1- 100% black ownership)	4	2	6	9.4%
Black empowered (50.1- 75% black ownership)	0	1	1	1.6%
Black influenced (25.1- 50% black ownership)	0	5	5	7.8%
Less than 25% black ownership	3	2	5	7.8%
Total BEE firms				26.6%
Not BEE but planning for BEE ownership	4	4	8	12.5%
Not BEE but are interested in seeking a BEE partner	8	3	11	17.2%
Total firms gearing to BEE				29.7%
No BEE	26	2	28	43.8%

The black economic empowerment trends among marine producers show the distribution of black owned firms among 3.1% of the total survey sample (and 10.5% of the marine producers) within the Western Cape and KwaZulu Natal (see Table 50). 1.6% black empowered firms are located in the Western Cape and a further 26.3% of marine producers operations reported black influenced firms in the Western Cape. 10.5% of marine producers, all located in the Western Cape, noted less than 25% black economic empowerment at ownership level. Planning for BEE or an interest in BEE was reported among 11.0% (6.3% + 4.7%) of all

respondents (or 36.9% of marine producers) located in the Western Cape, Eastern Cape and Northern Cape. 10.5% (or 3.1% of the total sample) noted no black economic empowerment.

% BEE ownership	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
Black owned (75.1-100% black ownership)	1	0	1	0	2	10.5%	3.1%
Black empowered (50.1-75% black ownership)	1	0	0	0	1	5.3%	1.6%
Black influenced (25.1-50% black ownership)	5	0	0	0	5	26.3%	7.8%
Less than 25% black ownership	2	0	0	0	2	10.5%	3.1%
Not BEE but planning for BEE ownership	2	1	0	1	4	21.1%	6.3%
Not BEE but are interested in seeking a BEE partner	0	3	0	0	3	15.8%	4.7%
No BEE	2	0	0	0	2	10.5%	3.1%

The black economic empowerment trends among freshwater producers show the distribution of black owned firms among 6.3% of the total survey sample (and 8.9% of the freshwater producers) within the Western Cape and Mpumalanga (see Table 51). There were no black empowered or black influenced firms reported among the freshwater producers. A producer in the Western Cape, Limpopo and Mpumalanga each indicated less than 25% black economic empowerment at ownership level. The planning for BEE or an interest in BEE was reported among 18.8% (8.9% + 17.8%) of respondents (26.7% of freshwater sample) from the Western Cape, KwaZulu Natal, Gauteng, Free State, Mpumalanga and North West. 57.8% (or 40.6% of the total sample) noted no black economic empowerment.

% BEE ownership	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
Black owned (75.1- 100% black ownership)	3	0	0	0	0	0	0	1	0	4	8.9%	6.3%
Black empowered (50.1-75% black ownership)	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
Black influenced (25.1-50% black ownership)	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
Less than 25% black ownership	1	0	0	0	0	0	1	1	0	3	6.7%	4.7%
Not BEE but planning for BEE ownership	3	0	0	0	0	1	0	0	0	4	8.9%	6.3%
Not BEE but are interested in seeking a BEE partner	1	0	3	0	2	0	0	1	1	8	17.8%	12.5%
No BEE	7	4	4	1	2	2	1	5	0	26	57.8%	40.6%

4.6 Full-Time Employment Patterns

Employment patterns within the aquaculture sector, as reported among the survey sample, shows that there is an overall steady increase in full-time (permanent) jobs within the sector since 2001 to 2005 (see adjoining graph and Table 52). It should be noted that only 34.4% of the total sample submitted employment data for 2001 to 2005.

From the employment data that was submitted, full-time employment in 2005 (see graph and Table 52) totals 810 (double that of 2001). Black persons, including Black African, Coloured and Indian, make up 658 of all employees, predominately within the semi-skilled and unskilled occupational categories. 26 black persons fill professional and skilled occupations and 32 middle service jobs. Jobs held by white persons totalled 152, with 95 of these in professional and skilled jobs and 20 in middle service positions. 69 of these were professional (managerial) positions. 37 white persons were reported as holding semi-skilled and unskilled aquaculture jobs.

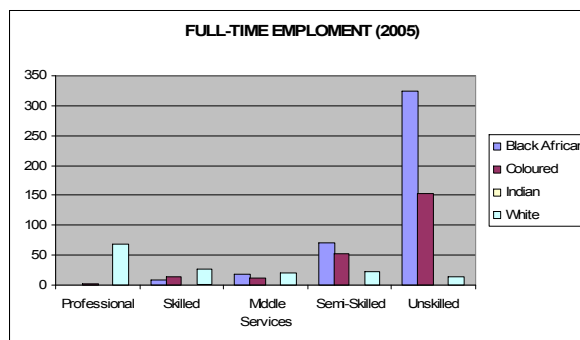
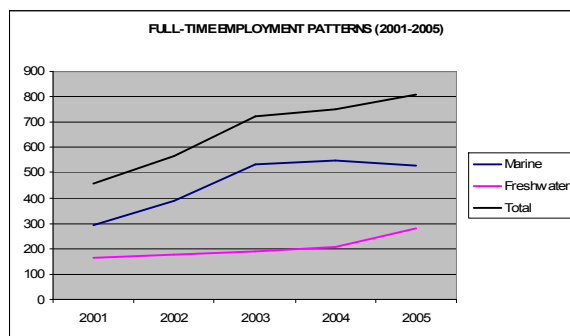


TABLE 52: FULL-TIME EMPLOYMENT PATTERNS (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	53	0	0	0	53	0	0	0	65	0	0	0	68	0	0	0	69	3	0
Skilled	5	11	14	0	8	9	15	0	12	17	13	0	8	23	10	0	8	26	15	0
Middle Services	11	22	11	0	13	24	8	0	14	26	12	0	16	27	13	0	19	20	12	1
Semi-Skilled	47	13	28	0	50	16	28	0	67	18	44	0	70	22	43	0	71	22	52	0
Unskilled	159	13	70	0	237	13	91	0	324	16	97	0	327	13	113	0	324	15	153	0
Total per group	222	112	123	0	308	115	142	0	417	142	166	0	421	153	179	0	422	152	235	1
Total for year	457				565				725				753				810			

While marine producers demonstrate high levels of job creation from 2001 to 2004, there is a slight drop in 2005. In 2005, 303 black persons and 91 with white persons were employed in the marine sub-sector (see Table 53).

TABLE 53: FULL-TIME EMPLOYMENT PATTERNS FOR MARINE PRODUCERS (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	25	0	0	0	24	0	0	0	33	0	0	0	33	0	0	0	27	0	0
Skilled	0	9	11	0	2	8	12	0	6	13	10	0	1	18	7	0	0	17	10	0
Middle Services	7	16	6	0	9	18	3	0	10	20	8	0	11	21	9	0	14	15	7	0
Semi-Skilled	6	12	14	0	6	14	15	0	18	17	30	0	23	21	32	0	20	17	36	0
Unskilled	126	13	47	0	196	13	68	0	276	16	76	0	274	13	83	0	264	15	87	0
Total per group	139	75	78	0	213	77	98	0	310	99	124	0	309	106	131	0	298	91	140	0
Total for year	292				388				533				546				529			

Jobs within the freshwater sub-sector show a steady increase from 2001 to 2005. In 2005, 220 black persons were employed and 61 white persons (see Table 54).

TABLE 54: FULL-TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	28	0	0	0	29	0	0	0	32	0	0	0	35	0	0	0	42	3	0
Skilled	5	2	3	0	6	1	3	0	6	4	3	0	7	5	3	0	8	9	5	0
Middle Services	4	6	5	0	4	6	5	0	4	6	4	0	5	6	4	0	5	5	5	1
Semi-Skilled	41	1	14	0	44	2	13	0	49	1	14	0	47	1	11	0	51	5	16	0
Unskilled	33	0	23	0	41	0	23	0	48	0	21	0	53	0	30	0	60	0	66	0
<i>Total per group</i>	83	37	45	0	95	38	44	0	107	43	42	0	112	47	48	0	124	61	95	1
Total for year	165				177				192				207				281			

Detailed employment patterns per region and sub-sector are set out for marine producers in self-explanatory Tables 55 to 57¹⁷ and freshwater producers in self-explanatory Tables 58 to 66. The Western Cape in both sub-sectors provides the most full-time employment opportunities.

TABLE 55: FULL-TIME EMPLOYMENT PATTERNS FOR MARINE PRODUCERS IN WESTERN CAPE (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	19	0	0	0	17	0	0	0	21	0	0	0	22	0	0	0	18	0	0
Skilled	0	4	11	0	2	4	12	0	6	7	10	0	1	13	7	0	0	13	10	0
Middle Services	4	14	4	0	6	15	1	0	6	15	6	0	6	16	7	0	5	10	5	0
Semi-Skilled	6	12	14	0	6	14	15	0	8	17	24	0	13	21	26	0	12	17	27	0
Unskilled	123	13	47	0	192	13	68	0	152	16	74	0	166	13	82	0	179	13	85	0
<i>Total per group</i>	133	62	76	0	206	63	96	0	172	76	114	0	186	85	122	0	196	71	127	0
Total for year	271				365				362				393				394			

TABLE 56: FULL-TIME EMPLOYMENT PATTERNS FOR MARINE PRODUCERS IN EASTERN CAPE (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	6	0	0	0	6	0	0	0	11	0	0	0	10	0	0	0	8	0	0
Skilled	0	5	0	0	0	4	0	0	0	6	0	0	0	5	0	0	0	4	0	0
Middle Services	3	2	2	0	3	2	2	0	4	4	2	0	5	4	2	0	9	4	2	0
Semi-Skilled	0	0	0	0	0	0	0	0	10	0	6	0	10	0	6	0	8	0	9	0
Unskilled	2	0	0	0	2	0	0	0	122	0	2	0	106	0	1	0	84	1	1	0
<i>Total per group</i>	5	13	2	0	5	12	2	0	136	21	10	0	121	19	9	0	101	17	12	0
Total for year	20				19				167				149				130			

TABLE 57: FULL-TIME EMPLOYMENT PATTERNS FOR MARINE PRODUCERS IN NORTHERN CAPE (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0
Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle Services	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0
Semi-Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unskilled	1	0	0	0	2	0	0	0	2	0	0	0	2	0	0	0	1	1	1	0
<i>Total per group</i>	1	0	0	0	2	2	0	0	2	2	0	0	2	2	0	0	1	3	1	0
Total for year	1				4				4				4				5			

¹⁷ No reporting was provided for KwaZulu Natal for the years 2001 to 2005.

TABLE 58: FULL-TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN WESTERN CAPE (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	9	0	0	0	9	0	0	0	10	0	0	0	12	0	0	0	15	2	0
Skilled	0	1	3	0	0	0	3	0	0	0	3	0	0	0	3	0	0	3	4	0
Middle Services	1	2	5	0	1	2	5	0	1	3	4	0	1	3	4	0	1	2	5	0
Semi-Skilled	1	0	14	0	2	0	13	0	9	0	14	0	11	0	11	0	12	0	16	0
Unskilled	2	0	23	0	2	0	23	0	2	0	21	0	5	0	30	0	5	0	66	0
<i>Total per group</i>	4	12	45	0	5	11	44	0	12	13	42	0	17	15	48	0	18	20	93	0
Total for year	61				60				67				80				131			

TABLE 59: FULL-TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN EASTERN CAPE (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	4	0	0
Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Middle Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Semi-Skilled	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	5	0	0
Unskilled	1	0	0	0	1	0	0	0	1	0	0	0	2	0	0	0	5	0	0	0
<i>Total per group</i>	2	1	0	0	2	1	0	0	2	1	0	0	3	1	0	0	5	10	0	0
Total for year	5				3				3				4				15			

TABLE 60: FULL-TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN FREE STATE (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	2	0	0	0	2	0	0	0	2	0	0	0	2	0	0	0	2	0	0
Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Middle Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Semi-Skilled	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	0	0	0
Unskilled	4	0	0	0	4	0	0	0	4	0	0	0	3	0	0	0	2	0	0	0
<i>Total per group</i>	5	3	0	0	5	3	0	0	5	3	0	0	4	3	0	0	3	4	0	0
Total for year	8				8				8				7				7			

TABLE 61: FULL-TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN GAUTENG (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	1	0	0	0	1	0	0	0	2	0	0	0	2	0	0	0	3	0	0
Skilled	1	0	0	0	1	0	0	0	1	1	0	0	1	1	0	0	1	1	0	0
Middle Services	2	0	0	0	2	0	0	0	2	0	0	0	2	0	0	0	2	0	0	0
Semi-Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Unskilled	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	8	0	0	0
<i>Total per group</i>	3	1	0	0	3	1	0	0	6	3	0	0	6	3	0	0	13	4	0	0
Total for year	4				4				9				9				17			

TABLE 62: FULL-TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN KWAZULU NATAL (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	3	0	0	0	3	0	0	0	4	0	0	0	5	0	0	0	5	0	0
Skilled	2	0	0	0	3	0	0	0	3	0	0	0	4	0	0	0	5	0	0	0
Middle Services	0	1	0	0	0	1	0	0	0	1	0	0	1	1	0	0	1	0	0	1
Semi-Skilled	12	0	0	0	12	0	0	0	12	0	0	0	12	0	0	0	14	0	0	0
Unskilled	19	0	0	0	19	0	0	0	19	0	0	0	21	0	0	0	19	0	0	0
<i>Total per group</i>	33	4	0	0	34	4	0	0	34	5	0	0	38	6	0	0	39	5	0	1
Total for year	37				38				39				44				45			

TABLE 63: FULL-TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN LIMPOPO (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0
Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Middle Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Semi-Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unskilled	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0
<i>Total per group</i>	0	1	0	0	0	1	0	0	1	1	0	0	1	2	0	0	1	2	0	0
Total for year	1				1				2				3				3			

TABLE 64: FULL-TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN MPUMALANGA (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	8	0	0	0	9	0	0	0	9	0	0	0	9	0	0	0	10	0	0
Skilled	2	1	0	0	2	1	0	0	2	3	0	0	2	3	0	0	2	2	0	0
Middle Services	1	3	0	0	1	3	0	0	1	2	0	0	1	2	0	0	1	3	0	0
Semi-Skilled	26	0	0	0	28	1	0	0	26	0	0	0	22	0	0	0	22	0	0	0
Unskilled	5	0	0	0	13	0	0	0	14	0	0	0	14	0	0	0	14	0	0	0
<i>Total per group</i>	34	12	0	0	44	14	0	0	43	14	0	0	39	14	0	0	39	15	0	0
Total for year	46				58				57				53				54			

TABLE 65: FULL-TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN NORTHERN CAPE (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0
Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Semi-Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unskilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Total per group</i>	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0
Total for year	1				1				1				1				1			

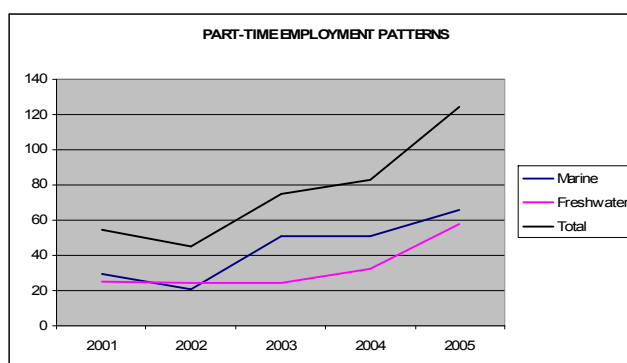
TABLE 66: FULL-TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN NORTH WEST (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	2	0	0	0	2	0	0	0	2	0	0	0	2	0	0	0	2	0	0
Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Semi-Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unskilled	2	0	0	0	2	0	0	0	4	0	0	0	4	0	0	0	6	0	0	0
<i>Total per group</i>	2	2	0	0	2	2	0	0	4	2	0	0	4	2	0	0	6	2	0	0
Total for year	4				4				6				6				8			

4.7 Part-Time Employment Patterns

Part-time employment patterns (as shown in the graph and Tables 67 to 69 below) for the aquaculture sector shows a steady increase in jobs created seasonally to 2005 after a dip in opportunities in 2002. While part-time employment opportunities in the marine industry seem to have grown faster from 2002 to 2003, there is a steady growth in part-time freshwater industry jobs as of 2003.

In 2005 a total of 124 part-time jobs were created, of which two white persons were professionals, one white person was in skilled occupation, one coloured person and nine black African persons within the middle services, five semi-skilled



jobs among black African persons and 4 among coloured persons, and the remaining 102 jobs among unskilled black African and coloured workers (see Table 67 below).

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2	0	0
Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Middle Services	3	0	0	0	3	0	0	0	4	0	0	0	4	2	0	0	9	0	1	0
Semi-Skilled	5	1	0	0	3	0	0	0	4	1	0	0	4	1	2	0	5	0	4	0
Unskilled	20	0	25	0	21	0	18	0	42	3	20	0	46	4	18	0	77	0	25	0
<i>Total per group</i>	28	1	25	0	27	0	18	0	50	5	20	0	54	9	20	0	91	3	30	0
Total for year	54				45				75				83				124			

Tables 68 and 69 set out the part-time employment patterns per occupation category per sub-sector for the years 2001 to 2005. In both sub-sectors, job opportunities peaked in 2005.

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Middle Services	3	0	0	0	3	0	0	0	4	0	0	0	4	2	0	0	9	0	0	0
Semi-Skilled	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	0	1	0	4	0
Unskilled	13	0	13	0	12	0	6	0	33	3	10	0	29	4	8	0	42	0	9	0
<i>Total per group</i>	16	0	13	0	15	0	6	0	37	4	10	0	33	8	10	0	52	1	13	0
Total for year	29				21				51				51				66			

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2	0	0
Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Semi-Skilled	5	1	0	0	3	0	0	0	4	0	0	0	4	0	0	0	4	0	0	0
Unskilled	7	0	12	0	9	0	12	0	9	0	10	0	17	0	10	0	35	0	16	0
<i>Total per group</i>	12	1	12	0	12	0	12	0	13	1	10	0	21	1	10	0	39	2	17	0
Total for year	25				24				24				32				58			

Tables 70 to 78 segment the part-time employment data per sub-sector, occupational category and historical racial classification per region.¹⁸ Again, the most part-time job opportunities in both sub-sectors were provided by the Western Cape.

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle Services	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0
Semi-Skilled	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
Unskilled	13	0	13	0	12	0	6	0	16	3	9	0	18	4	7	0	33	0	9	0
<i>Total per group</i>	13	0	13	0	12	0	6	0	16	4	9	0	18	7	7	0	34	0	9	0
Total for year	26				18				29				32				43			

¹⁸ No reporting provided for 2001 to 2005 for marine producers in KwaZulu Natal.

TABLE 71: PART-TIME EMPLOYMENT PATTERNS FOR MARINE PRODUCERS IN EASTERN CAPE (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Middle Services	3	0	0	0	3	0	0	0	4	0	0	0	4	0	0	0	8	0	0	0
Semi-Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	4	0
Unskilled	0	0	0	0	0	0	0	0	17	0	1	0	11	0	1	0	9	0	0	0
<i>Total per group</i>	3	0	0		3	0	0	0	21	0	1	€0	15	1	3	0	18	1	4	0
Total for year	3				3				22				19				23			

TABLE 73: PART -TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN WESTERN CAPE (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2	0	0
Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Semi-Skilled	1	0	0	0	1	0	0	0	2	0	0	0	2	0	0	0	2	0	0	0
Unskilled	2	0	12	0	2	0	12	0	2	0	10	0	10	0	10	0	11	0	16	0
<i>Total per group</i>	3	0	12	0	3	0	12	0	4	1	10	0	12	1	10	0	13	2	17	0
Total for year	15				15				15				23				32			

TABLE 74: PART -TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN EASTERN CAPE (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional																				
Skilled																				
Middle Services																				
Semi-Skilled																				
Unskilled					2				2				2				2			
<i>Total per group</i>					2				2				2				2			
Total for year	0				2				2				2				2			

TABLE 75: PART -TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN FREE STATE (2001 – 2005)

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional																				
Skilled																				
Middle Services																				
Semi-Skilled	2	1																		
Unskilled																				
<i>Total per group</i>	2	1																		
Total for year	3																			

TABLE 76: PART -TIME EMPLOYMENT PATTERNS FOR FRESHWATER PRODUCERS IN GAUTENG (2001 – 2005)

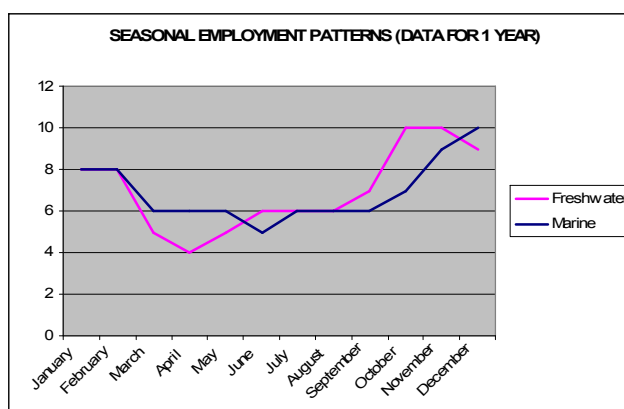
Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional																				
Skilled																				
Middle Services																				
Semi-Skilled																				
Unskilled																	15			
<i>Total per group</i>																	15			
Total for year																	15			

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional																				
Skilled																				
Middle Services																				
Semi-Skilled																				
Unskilled	1				1				1				1				3			
<i>Total per group</i>	1				1				1				1				3			
Total for year	1				1				1				1				3			

Employment category	2001				2002				2003				2004				2005			
	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I	B	W	C	I
Professional																				
Skilled																				
Middle Services																				
Semi-Skilled	2				2				2				2				2			
Unskilled	4				4				4				4				4			
<i>Total per group</i>	6				6				6				6				6			
Total for year	6				6				6				6				6			

4.8 Seasonality and Employment Patterns

29.7% of all survey respondents reported employing temporary workers on a seasonal basis over the course of a year. However, on a month-to-month basis the number of respondents hiring temporary staff fluctuates. The season of September through to February shows the peak of seasonal employment and a trough in March though to September. The trend per sub-sector indicates that the employment of temporary workers for freshwater operations drops off earlier in the year (in April) than marine producers, where the trough is in June (see Table 79 and adjoining graph). The freshwater sub-sector employment of temporary staff peaks October and November while the marine sub-sector employment peaks in December.



Months	Freshwater	Marine	n=64	%
January	8	8	16	25.0%
February	8	8	16	25.0%
March	5	6	11	17.2%
April	4	6	10	15.6%
May	5	6	11	17.2%
June	6	5	11	17.2%
July	6	6	12	18.8%
August	6	6	12	18.8%
September	7	6	13	20.3%
October	10	7	17	26.6%
November	10	9	19	29.7%
December	9	10	19	29.7%

The regional trends among marine producers demonstrate that all coastal regions report seasonal employment patterns (see Table 80). However, a KwaZulu Natal producer only employs temporary staff during June and July. Temporary employment peaks in the months of November and December.

Months	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
January	6	1	0	1	8	42.1%	12.5%
February	6	1	0	1	8	42.1%	12.5%
March	4	1	0	1	6	31.6%	9.4%
April	3	1	1	1	6	31.6%	9.4%
May	3	1	1	1	6	31.6%	9.4%
June	3	1	0	1	5	26.3%	7.8%
July	4	1	0	1	6	31.6%	9.4%
August	4	1	0	1	6	31.6%	9.4%
September	4	1	0	1	6	31.6%	9.4%
October	5	1	0	1	7	36.8%	10.9%
November	6	2	0	1	9	47.4%	14.1%
December	7	2	0	1	10	52.6%	15.6%

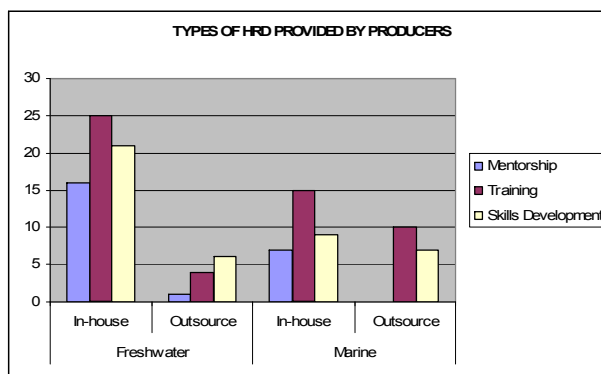
Freshwater producers in the Western Cape, KwaZulu Natal, Gauteng, and Mpumalanga all reported seasonal employment patterns, with October, November and December as peak temporary employment periods. Western Cape dynamics show that one out of seven farms (10.9% of all producers) employs temporary staff in the month of April.

SEASONALITY	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
January	5	0	1	0	0	1	0	1	0	8	17.8%	12.5%
February	5	0	2	0	0	0	0	1	0	8	17.8%	12.5%
March	2	0	2	0	0	0	0	1	0	5	11.1%	7.8%
April	1	0	2	0	0	0	0	1	0	4	8.9%	6.3%
May	3	0	1	0	0	0	0	1	0	5	11.1%	7.8%
June	3	0	1	0	0	0	0	1	1	6	13.3%	9.4%
July	3	0	1	0	0	0	0	1	1	6	13.3%	9.4%
August	4	0	1	0	0	0	0	1	0	6	13.3%	9.4%
September	4	0	1	0	0	1	0	1	0	7	15.6%	10.9%
October	7	0	1	0	0	1	0	1	0	10	22.2%	15.6%
November	7	0	1	0	0	1	0	1	0	10	22.2%	15.6%
December	5	0	2	0	0	1	0	1	0	9	20.0%	14.1%

4.9 Skills Development, Training and Needs for National Qualifications

73.4% of all respondents (of which 25.0% were marine producers and 48.4% freshwater producers) indicated offering human resource development or skills development programmes to employees (see Table 82 and adjoining graph).

Respondents from all regions reported human resource development or skills development programmes, except for a marine producer in the Northern Cape (see Tables 83 and 84).



Training provided	Freshwater	Marine	n=64	%
Yes	31	16	47	73.4%
No	14	3	17	26.6%

Training provided	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
Yes	13	2	1	0	16	84.2%	25.0%
No	0	2	0	1	3	15.8%	4.7%

Training provided	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
Yes	11	2	6	1	1	3	2	4	1	31	68.9%	48.4%
No	4	2	1	0	3	0	0	4	0	14	31.1%	21.9%

In turning to the nature of human resource development programmes offered by producers, Table 85 demonstrates that more operations conduct in-house programmes to provide staff with technical training or other work-related skills rather than outsourcing it. This trend also applies to mentorship programmes offered by producers. Anecdotal evidence indicates that aquaculture producers look to in-house training as there are few organisations outside of industry that can offer mentoring, training or skill development programmes to meet their specific technical (scientific and business) requirements.

Types of programmes	Freshwater		Marine		n = 64		%	
	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource
Mentorship	16	1	7	0	23	1	35.9%	1.6%
Training	25	4	15	10	40	14	62.5%	21.9%
Skills Development	21	6	9	7	30	13	46.9%	20.3%

Among marine producers (see Table 86), mentorship programmes are offered in-house by 36.8% (or 10.9% of the total sample) of enterprises. Training and skills development programmes are offered as both

outsourced and in-house programmes. The majority of marine producers offer training programmes (that is, 39.1%, or 15.6% of the total survey sample).

Types of programmes	Western Cape		Eastern Cape		KwaZulu Natal		Northern Cape		Total		% (n=19)		% (n=64)	
	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource
Mentorship	6	0	0	0	1	0	0	0	7	0	36.8%	0.0%	10.9%	0.0%
Training	12	8	2	1	1	1	0	0	15	10	78.9%	52.6%	39.1%	15.6%
Skills Development	7	5	1	1	1	1	0	0	9	7	47.4%	36.8%	25.0%	10.9%

Freshwater producers offer outsourced mentoring in one instance and 35.6% (or 25.0% of the total sample) offer in-house mentorship programmes. Training programmes were the most frequently mentioned type of human resource development programme offered by freshwater producers. Skill development was reported by 55.6% of these producers (39.1% of which offer in-house training), and a further 8.9% of freshwater producers offer outsourced training programmes to staff. Skills development programmes were offered as in-house programmes by 47.6% of freshwater producers (32.8% of all respondents). It should be noted that although a freshwater producer reported providing training or skills development in Table 84 above, that this was not reflected in Table 87 below.

Types of programmes	Western Cape		Eastern Cape		KwaZulu Natal		Northern Cape		Free State		Gauteng		Limpopo		Mpumalanga		North West		Total		% (n=45)		% (n=64)		
	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource	In-house	Outsource	
Mentorship	8	1	0	0	5	0	0	0	1	0	1	0	1	0	0	0	0	0	0	16	1	35.6%	2.2%	25.0%	1.6%
Training	8	1	2	0	5	0	0	0	1	0	2	0	2	0	4	3	1	0	25	4	55.6%	8.9%	39.1%	6.3%	
Skills Development	9	2	1	3	6	0	0	0	0	0	2	0	2	0	1	1	0	0	21	6	46.7%	13.3%	32.8%	9.4%	

Respondents were also asked to indicate their current (2006) and future (2007 to 2006) training and skills requirements. These responses are set out in Table 88 below and can be grouped into the following sets of training and skills needs, noting that these range across occupational categories and address professional, skilled, semi-skilled and unskilled human resource development needs.

- **Current:** scientific training per species, disease monitoring, natural resource management, management and supervisor training, technical training in aquaculture production, technical training in use of aquaculture equipment, as well as basic business skills, accounting, HIV/AIDS in the workplace, computer skills, artisan skills, driving skills, language skills and literacy skills.
- **Future:** the same set of requirements as listed for current is again noted by respondents. However, there is a further emphasis on supporting professional (management) and scientific expertise.

TABLE 88: TRAINING AND SKILLS REQUIREMENTS (CURRENT AND FUTURE)	
Current skills/ training requirements	Future skills/training requirements (2007-9)
Fish diseases, hatchery management	Fish diseases, hatchery management
Training of supervisors, training of production [staff]	Continuous training of production, technical and admin staff
Good working knowledge of trout farming	-
Basic aquaculture knowledge, technical training.	Technical training
Literate + technical skills	Professional +Managerial , technical, literate, secretarial
All SETA levels with Aquaculture specialisation	Food processors, farm aquaculture technicians, farm supervisors, storekeepers, machinery operators, computer literacy, biologists, chemists, microbiologists.
-	Working with Skills for Africa to develop Diploma in Aquaculture
Basic recirculation aquaculture	Basic recirculation aquaculture
Aquaculture experience	2 Full-time staff projected
Construction, welding and other artisan skills	We will continue with in-house training in on-the-job situations.
Literacy & mariculture skills	Literacy & mariculture skills
Training in water quality, disease identification and treatment and species identification	Will continue above training on ongoing basis
Animal husbandry skills	Animal husbandry skills
Hatchery manager, recirculating system management – all training done in-house	Hatchery manager, recirculating system management – all training done in-house. 3 – 5 staff for the above
Life skills training, including basic business skills, hygiene, management skills, language skills - Xhosa.	Life skills, hygiene, HIV/AIDS awareness, business skills, management skills, basic aquaculture skills
Matric, Personnel Management, Drivers licence	Matric, Personnel Management, Drivers licence
Training as mariculturalists	Training as mariculturalists
Trainers must be competent biological scientist who understands the species and the requirements of the species cultured. They must also have the mindset to teach their skills to people who have a much lower level of education who take time to grasp the concepts been put across.	Trainers must be competent biological scientist who understands the species and the requirements of the species cultured. They must also have the mindset to teach their skills to people who have a much lower level of education who take time to grasp the concepts been put across.
Training on fish diseases and treatment for new managers. Driver training. More HIV/AIDS training. Supervisor training on management.	Training on fish diseases and treatment for new managers. Driver training. More HIV/AIDS training. Supervisor training on management.
Technical Training, Specialised skills, Computer Training	Technical Training, Specialised Skills, Computer Training
Basic Business Principles, Technical Training, Specialized Skills, Computer Training, Accounting	Basic Business Principles, Technical Training, Specialized Skills, Computer Training, Accounting, Literacy
Basic management skills for staff in key positions	Basic management skills for staff in key positions. Training of semi skilled labourers.
Basic Education, Business and organisational skills	
Fish Management, Dam Management	Fish Management, Dam Management
-	Looking for buyer of business-closing in 60 days
BSc IT (Rotterdam)	-
Literacy and numeracy, maintenance, basic plumbing, Basic business skills/ understanding, HIV/AIDS	Literacy, numeracy, basic business principles, hatchery management, grow-out management, maintenance, seaweed culture

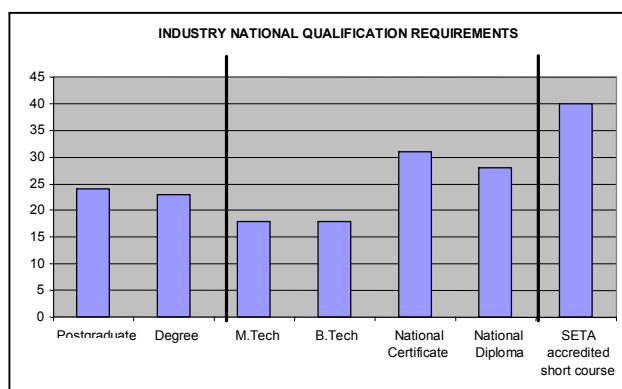
In Table 88 there were already calls for Seta Education and Training Authority (SETA) related courses in aquaculture as well as an indication that a Diploma in Aquaculture was in development via collaboration between a producer and the Skills for Africa training organisation.



It should be noted that no formal technical Aquaculture qualification is available in the form of a Technikon diploma. At the University of Stellenbosch a BSc Agric (four year) degree with a major in Aquaculture is available. At both Rhodes University, University of the North and the University of Stellenbosch there is Post-Graduate courses (honours, masters, and Phd). A certificate programme (distance training) at the University of Stellenbosch and a private short-course training programme are also available. It should also be noted that there is a community-based aquaculture operation in the Western Cape that provides short course training to farmers involved in the cooperative. The cooperative has strong linkages to the Division of Aquaculture at the University of Stellenbosch who have developed the trout farming training material used for this training.

In investigating industry's national qualification needs further, respondents were also asked to list the qualifications needs they felt would support the skills and expertise needs of the aquaculture sector in South Africa. Table 89 and the adjoining graph illustrate these responses.

In grouping the responses per tertiary qualifications (university, technikon), and Further Education and Training (FET) colleges, it is noted that a post-graduate diploma and degree fall within the university category, and M.Tech, B.Tech degrees and National Certificates fall with the technikon category as do National Diploma and short courses, although these could also be offered by FET colleges.



Short courses could also be offered by universities as well as by accredited private training providers.

There were strong calls by 62.5% of all respondents for SETA accredited short course that provided technical and business training in aquaculture production. There were more frequent calls for National Certificate (48.4%) and National Diploma (43.8%) training qualifications than B.Tech and M.Tech qualifications as offered as degree programmes within technikons (28.1% each). There were calls for university qualifications offered at both bachelor degree (35.9%) and postgraduate diploma (37.5%) levels.

Qualifications	Freshwater	Marine	n=64	%
Postgraduate diploma	19	5	24	37.5%
Degree	19	4	23	35.9%
M.Tech	15	3	18	28.1%
B.Tech	15	3	18	28.1%
National Certificate	21	10	31	48.4%
National Diploma	21	7	28	43.8%
SETA accredited short course	28	12	40	62.5%

Note: multiple responses.

The general industry calls for levels of national qualifications are reflected in responses segmented per sub-sector (see Tables 90 and 91), with short course and National Certificate qualifications listed as the top two called for national qualifications. From a regional perspective, marine producers in the Western Cape and KwaZulu Natal call for higher levels of qualifications than producers in the Eastern Cape. Freshwater producers demonstrate a similar trend and include all other regions except the North West which calls for a degree qualification.

TABLE 90: NATIONAL QUALIFICATION NEEDS IDENTIFIED BY MARINE PRODUCERS PER REGION

Qualifications	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
Postgraduate diploma	4	0	1	0	5	26.3%	7.8%
Degree	3	0	1	0	4	21.1%	6.3%
M.Tech	3	0	0	0	3	15.8%	4.7%
B.Tech	3	0	0	0	3	15.8%	4.7%
National Certificate	8	1	1	0	10	52.6%	15.6%
National Diploma	5	1	1	0	7	36.8%	10.9%
SETA accredited short course	9	2	1	0	12	63.2%	18.8%

Note: multiple responses.

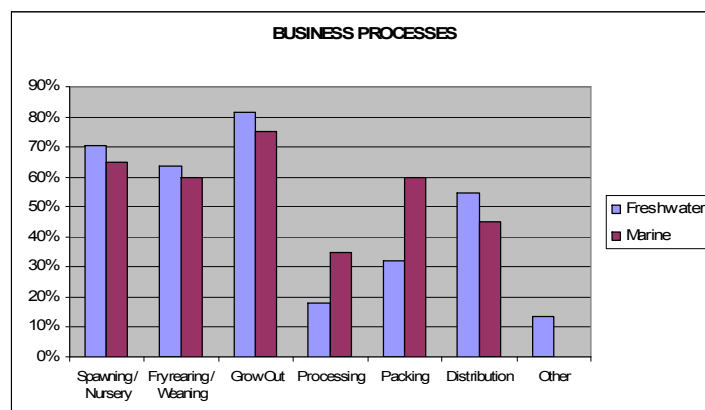
TABLE 91: NATIONAL QUALIFICATION NEEDS IDENTIFIED BY FRESHWATER PRODUCERS PER REGION

Qualifications	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
Postgraduate diploma	10	0	2	1	1	2	1	2	0	19	42.2%	29.7%
Degree	10	0	2	1	1	2	1	1	1	19	42.2%	29.7%
M.Tech	7	0	3	1	1	2	1	0	0	15	33.3%	23.4%
B.Tech	7	0	2	1	1	2	1	1	0	15	33.3%	23.4%
National Certificate	10	2	1	1	2	3	1	1	0	21	46.7%	32.8%
National Diploma	10	2	1	1	2	3	1	1	0	21	46.7%	32.8%
SETA accredited short course	10	2	2	1	2	2	2	7	0	28	62.2%	43.8%

Note: multiple responses.

4.10 Business processes

The expected aquaculture business processes were reported by the survey sample, as per Table 92, namely: spawning (64.1%), fry rearing/weaning (62.5%), and grow out (79.7%). A further 4.7% indicated nursery business processes (which have been graphed alongside within spawning), while 3.1% noted aquafeed production and 1.6% the use of aquaponics as part of their operation. 3.1% of respondents noted that their engagement in aquaculture was for recreational reasons. Post-production activities included processing (23.4%), packing (40.6%), distribution (51.6%) and international marketing (1.6%).



Business process	Freshwater	Marine	n= 64	%
Spawning	29	12	41	64.1%
Nursery	2	1	3	4.7%
Aquafeed	2	0	2	3.1%
Aquaponics	1	0	1	1.6%
Fry rearing / Weaning	28	12	40	62.5%
Grow Out	36	15	51	79.7%
Processing	8	7	15	23.4%
Packing	14	12	26	40.6%
Distribution	24	9	33	51.6%
International Marketing	1	0	1	1.6%
Recreational	2	0	2	3.1%

Note: multiple responses.

Among marine producers, as shown in Table 93, spawning and fry rearing / weaning were reported by 18.8% of respondents respectively, which is 63.2% of marine respondents. All coastal regions were involved in fry rearing / weaning and only the Northern Cape did not report spawning processes. Aquaponics was noted by one respondent (1.6%) in the Eastern Cape. Grow out business processes were reported among Western Cape, Eastern Cape and KwaZulu Natal marine producers. Grow out was the most frequently mentioned business process within the sub-sector, it was mentioned by 34.4% of the survey sample (or 78.9% of the marine producer sample). In terms of post-production business operations handled by the operation, 10.9% (36.8% of marine producers) reported processing, 18.8% (63.2%) packing, and 14.1% (47.4%) distribution. Post-production activities were reported in all regions except the Northern Cape.

Business processes	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (=64)
Spawning	9	2	1	0	12	63.2%	18.8%
Nursery	0	0	0	0	0	0.0%	0.0%
Aquafeed	0	0	0	0	0	0.0%	0.0%
Aquaponics	0	1	0	0	1	5.3%	1.6%
Fry rearing / Weaning	8	2	1	1	12	63.2%	18.8%
Grow Out	11	3	1	0	15	78.9%	23.4%
Processing	5	1	1	0	7	36.8%	10.9%
Packing	9	2	1	0	12	63.2%	18.8%
Distribution	7	2	0	0	9	47.4%	14.1%
International Marketing	0	0	0	0	0	0.0%	0.0%
Recreational	0	0	0	0	0	0.0%	0.0%

Note: multiple responses.

Among freshwater producers, as shown in Table 94, spawning and fry rearing / weaning were reported by 45.3% and 43.8% of respondents respectively, which is 64.4% and 43.8% of freshwater respondents. All regions were involved in fry rearing / weaning and only the Northern Cape did not report spawning processes. Aquaponics was noted by two respondents (3.1%) in the Eastern Cape and Free State. Grow out business processes were reported for all regions, except the Northern Cape. Grow out was the most frequently mentioned business process within the sub-sector, it was mentioned by 56.3% of the survey sample (or 80.0% of the freshwater producer sample). Nursery activities were mentioned by 3.1% of respondents, both of which were located in the Western Cape. One respondent reported aquafeed production in the Western Cape. Recreational production was reported by two (3.1%) respondents in Mpumalanga. In terms of post-production business operations handled by the operation, 12.5% (17.8% of freshwater producers) reported processing, 21.9% (31.1%) packing, 37.5% (53.3%) distribution, and international marketing 1.6% (2.2%). All post-production activities were evident in the Western Cape. Respondents from KwaZulu Natal and Mpumalanga reported all processes except for international marketing. Processing was reported in five regions, packing in six regions, and distribution in seven regions.

TABLE 94: BUSINESS PROCESSES OF FRESHWATER OPERATIONS PER REGION

Business processes	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
Spawning	9	3	6	0	2	3	2	3	1	29	64.4%	45.3%
Nursery	2	0	0	0	0	0	0	0	0	2	4.4%	3.1%
Aquafeed	1	0	0	0	0	0	0	0	0	1	2.2%	1.6%
Aquaponics	0	1	0	0	1	0	0	0	0	2	4.4%	3.1%
Fry rearing / Weaning	9	3	4	1	1	3	2	4	1	28	62.2%	43.8%
Grow Out	13	3	7	0	3	2	1	6	1	36	80.0%	56.3%
Processing	3	1	2	0	1	0	0	1	0	8	17.8%	12.5%
Packing	5	0	4	0	1	1	0	2	1	14	31.1%	21.9%
Distribution	6	2	6	0	3	3	1	3	0	24	53.3%	37.5%
International Marketing	1	0	0	0	0	0	0	0	0	1	2.2%	1.6%
Recreational	0	0	0	0	0	0	0	2	0	2	4.4%	3.1%

Note: multiple responses.

4.11 Farming methods

Although it is noted that farming methods differ between marine and freshwater aquaculture production (as well as between the farming of differing species), the data is presented in comparative format in Table 95 and the adjoining graph to illustrate divergences in farming methods but also to indicate where both marine and freshwater production use the same method of farming.

Farming methods reported on by both marine and freshwater producers are: baskets, cages, recirculation, tanks, trays in ponds, earth ponds, and raceways. The most frequently mentioned farming method within both sub-sectors are tanks (56.3%), recirculation (32.8%) and raceways (31.3%).

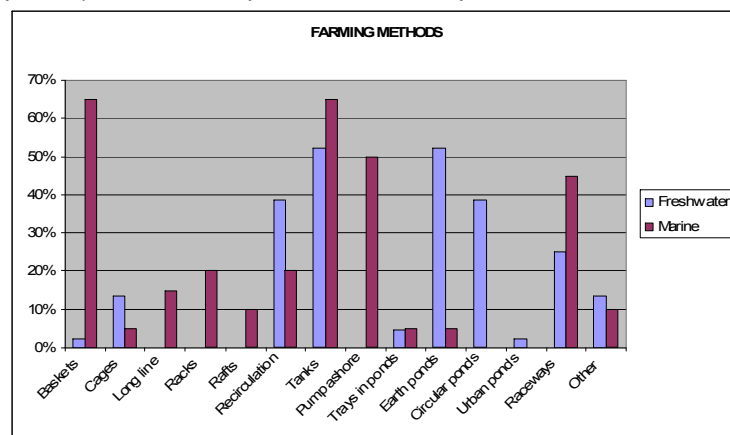


TABLE 95: FARMING METHODS

Methods	Freshwater	Marine	n=64	%
Baskets	1	13	14	21.9%
Cages	6	1	7	10.9%
Long line	0	3	3	4.7%
Racks	0	4	4	6.3%
Rafts	0	2	2	3.1%
Recirculation	17	4	21	32.8%
Tanks	23	13	36	56.3%
Pump ashore	0	10	10	15.6%
Trays in ponds	2	1	3	4.7%
Earth ponds	23	1	24	37.5%
Circular ponds	17	0	17	26.6%
Urban ponds	1	0	1	1.6%
Raceways	11	9	20	31.3%
Open rafts-open sea	0	1	1	1.6%
Lined 2Ha ponds	0	1	1	1.6%

Glass Tanks	2	0	2	3.1%
Tunnel	1	0	1	1.6%
Flow through	1	0	1	1.6%
Concrete Ponds	1	0	1	1.6%
Recreational	1	0	1	1.6%

Note: multiple responses.

Among marine farming methods, as set out Table 96 below, basket and tanks are ranked the most popular holding facility (68.4% respectively that is, 20.3% of all survey respondents). Pump ashore (52.6% of marine producers and 15.6% of all respondents) rank next most used farming method. This is followed by raceways as mentioned by 47.4% of marine respondents (14.1% of all respondents). Recirculation based farming methods are reported by 21.1% of marine respondents (6.3% of the survey sample). A wider range of farming methods is demonstrated in the Western Cape than the other regions, largely determined by more marine species farmed in that region than in the Northern Cape, Eastern Cape and KwaZulu Natal.

Methods	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (=64)
Baskets	9	3	0	1	13	68.4%	20.3%
Cages	1	0	0	0	1	5.3%	1.6%
Long line	2	0	0	1	3	15.8%	4.7%
Racks	4	0	0	0	4	21.1%	6.3%
Rafts	1	0	0	1	2	10.5%	3.1%
Recirculation	3	0	1	0	4	21.1%	6.3%
Tanks	9	2	1	1	13	68.4%	20.3%
Pump ashore	7	2	1	0	10	52.6%	15.6%
Trays in ponds	0	0	1	0	1	5.3%	1.6%
Earth ponds	0	0	0	1	1	5.3%	1.6%
Raceways	7	1	0	1	9	47.4%	14.1%
Open rafts-open sea	1	0	0	0	1	5.3%	1.6%
Lined 2Ha ponds	0	0	1	0	1	5.3%	1.6%

Note: multiple responses.

The most frequently mentioned farming method among freshwater producers, as shown in Table 97, are tanks and earth ponds, as indicated by 51.1% of freshwater respondents (or 35.9% of all survey respondents). The use of recirculation methods and circular ponds are the next highest ranked farming methods, respectively 37.8% of freshwater producers (or 26.6% of the survey sample). Raceways were reported among 24.4% of freshwater producers (17.2% of all participants). KwaZulu Natal followed by the Eastern Cape and then Western Cape and Mpumalanga demonstrate the widest range of farming methods used in freshwater aquaculture production in South Africa.

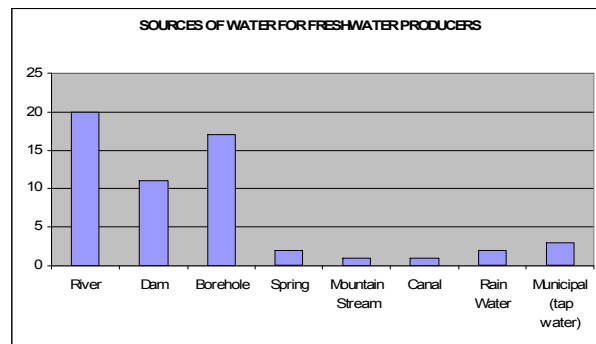
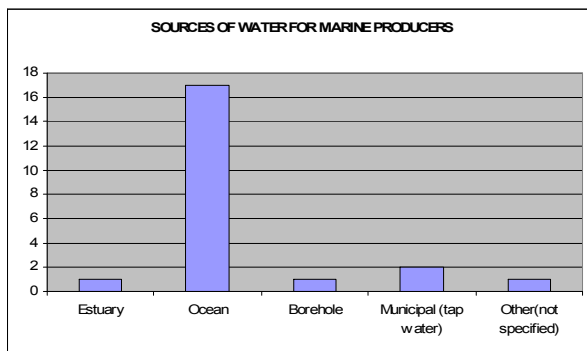
TABLE 97: FARMING METHODS OF FRESHWATER PRODUCERS PER REGION

FARMING METHODS	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
Baskets	0	0	0	0	0	0	0	1	0	1	2.2%	1.6%
Cages	3	1	1	0	0	0	1	0	0	6	13.3%	9.4%
Recirculation	7	2	1	0	3	1	1	2	0	17	37.8%	26.6%
Tanks	9	2	4	0	4	1	2	1	0	23	51.1%	35.9%
Trays in ponds	0	0	1	0	1	0	0	0	0	2	4.4%	3.1%
Earth ponds	7	1	4	1	2	2	0	5	1	23	51.1%	35.9%
Circular ponds	5	1	5	0	3	1	0	2	0	17	37.8%	26.6%
Urban ponds	0	0	0	0	0	0	1	0	0	1	2.2%	1.6%
Raceways	4	1	2	0	0	2	1	1	0	11	24.4%	17.2%
Glass Tanks	0	1	1	0	0	0	0	0	0	2	4.4%	3.1%
Tunnel	0	1	0	0	0	0	0	0	0	1	2.2%	1.6%
Flow through	1	0	0	0	0	0	0	0	0	1	2.2%	1.6%
Concrete Ponds	0	0	1	0	0	0	0	0	0	1	2.2%	1.6%
Recreational	0	0	0	0	0	0	0	1	0	1	2.2%	1.6%

Note: multiple responses.

4.12 Aquaculture Operations and the Environment

Farming methods raises the question as to how aquaculture operations affect the environment. As set out on Table 98, both marine and freshwater producers reported the use of municipal (tap) water (7.8% of all respondents) and borehole water (28.1% of all respondents). Otherwise, for obvious reasons, the water source for marine and freshwater aquaculture is different.



Marine producers (see Table 99 and associated graph) draw their water source primarily from the ocean (26.6%) and in one instance an estuary in the Eastern Cape (1.6%).

Freshwater producers (see Table 100 and associated graph) draw water for their operations from a range of water sources, namely: rivers (31.3%), dams (17.2%), natural springs (3.1%), rain water (3.1%), mountain streams (1.6%), and canals (1.6%). Borehole water sources are in use across regions followed by rivers and dams in five and four regions respectively.

Source of water supply	Freshwater	Marine	n=64	%
River	20	0	20	31.3%
Dam	11	0	11	17.2%
Estuary	0	1	1	1.6%
Ocean	0	17	17	26.6%
Borehole	17	1	18	28.1%
Spring	2	0	2	3.1%
Mountain Stream	1	0	1	1.6%
Canal	1	0	1	1.6%
Rain Water	2	0	2	3.1%
Municipal (tap water)	3	2	5	7.8%
Other(not specified)	0	1	1	1.6%

Note: multiple responses.

Source of water supply	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
River	0	0	0	0	0	0.0%	0.0%
Dam	0	0	0	0	0	0.0%	0.0%
Estuary	1	0	0	0	1	5.3%	1.6%
Ocean	13	2	1	1	17	89.5%	26.6%
Borehole	0	0	1	0	1	5.3%	1.6%
Spring	0	0	0	0	0	0.0%	0.0%
Mountain Stream	0	0	0	0	0	0.0%	0.0%
Canal	0	0	0	0	0	0.0%	0.0%
Rain Water	0	0	0	0	0	0.0%	0.0%
Municipal (tap water)	1	1	0	0	2	10.5%	3.1%
Other(not specified)	0	1	0	0	1	5.3%	1.6%

Note: multiple responses.

Source of water supply	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
River	7	0	4	1	0	2	0	6	0	20	44.4%	31.3%
Dam	6	3	1	0	0	0	0	0	1	11	24.4%	17.2%
Estuary	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
Ocean	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
Borehole	5	0	3	0	3	2	2	1	1	17	37.8%	26.6%
Spring	0	1	0	0	0	0	0	1	0	2	4.4%	3.1%
Mountain Stream	0	0	0	0	0	0	0	1	0	1	2.2%	1.6%
Canal	0	0	0	0	0	0	0	1	0	1	2.2%	1.6%
Rain Water	1	0	1	0	0	0	0	0	0	2	4.4%	3.1%

Municipal (tap water)	1	1	1	0	0	0	0	0	0	3	6.7%	4.7%
Other (not specified)	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%

Note: multiple responses.

When assessing aquaculturist's environmental management practices, 35.9% of all respondents indicated that they had implemented out-flow water treatment plans and a further 15.6% noted that they had planned for the implementation of a water treatment plan for their operations (see Table 101). Overall, more freshwater producers reported water treatment plans than marine producers (see Tables 102 and 103). In one instance the marine respondent reported that a water treatment plan was not required as water leaving the farm flowed from the farm to adjacent mining operations and did not return to the ocean.

Water treatment	Freshwater	Marine	n=64	%
No information available	19	12	31	48.4%
Planned	6	4	10	15.6%
Implemented	20	3	23	35.9%

Water treatment	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
No information available	9	2	0	1	12	63.2%	18.8%
Planned	2	1	1	0	4	21.1%	6.3%
Implemented	2	1	0	0	3	15.8%	4.7%

Water treatment	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
No information available	5	2	4	1	2	1	1	2	1	19	42.2%	29.7%
Planned	2	0	0	1	1	0	1	1	0	6	13.3%	9.4%
Implemented	8	2	3	0	0	2	0	5	0	20	44.4%	31.3%

In the attempt to illustrate that Aquaculture is a non-consumptive activity (concern rather lies with the quality of the water leaving the farm), some respondents (in most cases the small operators with smaller cash-flows) did not have the equipment to measure their water use (in- and out-flow) and therefore could not provide information on their water utilisation within their operations. Nevertheless, of the 56.3% of all respondents who provided information on water use, 20.3% were marine producers and 35.9% were freshwater producers (see Tables 104, 105 and 106).

Water use	Freshwater	Marine	n=64	%
Reported on water use	23	13	36	56.3%
No information available	22	6	28	43.8%

TABLE 105: WATER UTILISATION OF MARINE PRODUCERS PER REGION

Water use	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
Reported on water use	9	2	1	1	13	68.4%	20.3%
No information available	4	2	0	0	6	31.6%	9.4%

TABLE 106: WATER UTILISATION OF FRESHWATER PRODUCERS PER REGION

Water use	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
Reported on water use	7	2	4	1	2	2	2	2	1	23	51.1%	35.9%
No information available	8	2	3	0	2	1	0	6	0	22	48.9%	34.4%

The key findings in terms of water utilisation among aquaculture farms, as set out in Table 107a and 107b which noted respondents reporting on maximum and minimum water in-flow and out-flow from their operations, is that there is little water loss, if any. In other words, there were few instances reported where aquaculture production actually consumes water during farming operations. This is particularly pertinent among freshwater aquaculture operations where freshwater sources are used in aquaculture farming.

TABLE 107a: WATER UTILISATION (MEASURING WATER FLOWS IN/OUT OF OPERATIONS)

Water flows into operations (Maximum)	Water flows out of operations (Maximum)	Water flows into operations (Minimum)	Water flows out of operations (Minimum)
MARINE PRODUCTION			
Tidal flow	Tidal flow	Tidal flow	Tidal flow
1 x 360,000 kl	No records provided	3600 kl (ocean); 360kl (freshwater)	-
360,000 m ³	Water does not return to ocean. Water is shared with mining operations. Waterflows into farm then out to mining works, then ends in a slime dam.	180,000 m ³	Water does return to ocean.
2400 kl/hour	2400 kl/hour	1600kl/hour	1600kl/hour
1250 kl/hour	3000 kl/hour	-	-
80 m ³ / hour	80 m ³ / hour	30 m ³ / hour	30 m ³ / hour
1250 kl	1250 kl	750 kl	750 kl
40 kl/hour	40 kl/hour	35kl/hour	35kl/hour
120.3 kl/hour	120.3 kl/hour	100 kl/hour	100 kl/hour
1200 kl	1200 kl	800 kl	800 kl
3000 kl/hour	3000 kl/hour	1500 kl/hour	1500 kl/hour
1350 kl	1350 kl	900 kl	900 kl
1600 l/hour	1600 l/hour	1600 l/hour	1600 l/hour
5000 kl/hour	5000 kl/hour	5000 kl/hour	5000 kl/hour



TABLE 107b: WATER UTILISATION (MEASURING WATER FLOWS IN/OUT OF OPERATIONS)			
Water flows into operations (Maximum)	Water flows out of operations (Maximum)	Water flows into operations (Minimum)	Water flows out of operations (Minimum)
FRESHWATER PRODUCTION			
86 kl/day	86 kl/day	50 kl/day	50 kl/day
5 kl/day	5 kl/day	1 kl/day	1 kl/day
10 kl	10 kl	10 kl	10 kl
10kl/week	5kl/week	5 kl/week	2kl/week
10 kl	-	-	-
1225 kl	1225 kl	25 kl	25 kl
700 lk/h	700 kl/h	700kl/h	700kl/h
20 kl/day	18 kl/day	8 kl/day	7 lk/day
30 kl	25 kl	-	-
300 kl	300 kl	100 kl	100 kl
30 kl/day	30 kl/day	5 kl/day	5kl/day
6 kl/month	6 kl/month	3 kl/month	3 kl/month
450 l/second	450 l/second	50 l/second	50 l/second
80 kl	Flows out when ponds drained, about 500 kl/week. Not a flow through system.	60kl	Flows out when ponds drained, about 500 kl/week. Not a flow through system.
300 kl	10 kl	100 kl	0 kl
1000 kl	0 kl	0 kl	0 kl
720 cu/hr	720 cu/hr	360 cu/hr	360 cu/hr
75 kl	0.01 kl	0.02 kl	0 kl
25 dams of 500,000 kl each	0 kl	0 kl	0 kl
10 kl	10 kl	0.5 kl	0.5kl
120 kl/hr	120 kl/hr	30 kl/hr	30 kl/hr
10,000 kl/year	10,000 kl/year	10,000 kl/year	10,000 kl/year
Recirculation system with capacity of 300 kl	Recirculation system with capacity of 300 kl	Recirculation system with capacity of 300 kl	Recirculation system with capacity of 300 kl
2500 kl/day	2500 kl/day	600 kl/day	600kl/day
2000 kl	2000 kl	2000 kl	2000 kl

5. The State of the Aquaculture Sector – Industry Perspectives

In this chapter industry perspectives on the state of the South African aquaculture sectors are set out. These include quantitative insights based on survey participants rating key environmental issues, barriers to entry to the sector, government support for the sector and sector development activities. The chapter concludes with comments/insights from respondents which provide additional anecdotal commentary on the state of the industry and concerns specific to their aquaculture operation.

5.1 Environmental Issues

Survey respondents rated the level of importance associated with several key environmental related issues. While Table 108 set out respondents' overall scoring, the adjoining graphs summarises the tabulated data by means of a weighted average of score across rating categories. These scores provide a means to rank the overall importance of environmental issues to the national aquaculture industry.¹⁹

The top five most important environmental issues to address are: quantity of water supply, quality of water supply, site location, disease management, and feed practices.

The issue ranked lower was water use permits. Caution should however be exercised on the interpretation of the low ranking of permits in that although respondents realise the importance thereof, there is a feeling that if government felt that having permits is so important the turn around time in issuing the permits would have been faster. Since it isn't, some respondents might feel that they then operate regardless.

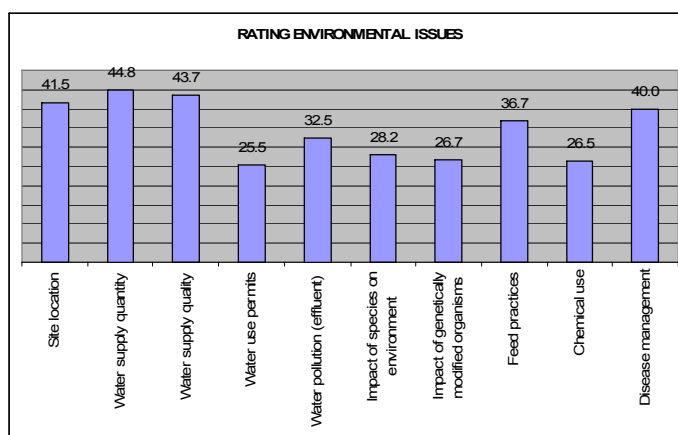


TABLE 108: RATING ENVIRONMENTAL ISSUES

Environmental issues	1-Not important	2-Little importance	3-Neutral	4-Some importance	5-Very important	Total response rate to question	% response rate	Weighted average	Ranking
Site location	4	2	4	11	37	58	90.6%	41.5	3
Water supply quantity	2	4	8	5	43	62	96.9%	44.8	1
Water supply quality	2	2	7	5	43	59	92.2%	43.7	2
Water use permits	15	7	15	1	15	53	82.8%	25.5	9
Water pollution (effluent)	9	8	7	11	21	56	87.5%	32.5	6
Impact of species on environment	18	4	6	15	13	56	87.5%	28.2	7
Impact of genetically modified organisms	27	3	3	7	18	58	90.6%	26.7	7
Feed practices	11	3	2	8	33	57	89.1%	36.7	5
Chemical use	19	9	5	3	19	55	85.9%	26.5	8
Disease management	4	4	5	7	37	57	89.1%	40.0	4

¹⁹ This same methodology is used through out this chapter to assess the relative importance of industry perspectives.

Among marine producers, the ranking of environmental issues is similar to the overall trends outlined above for the industry in general, except that water pollution is ranked within the top five issues to be addressed within this sub-sector. The detailed data set for marine producers is set out in Table 109 below and the ranking described in the adjoining graph.

The top five environmental issues ranked by marine producers are: site location, quality of water supply, quantity of water supply, disease management, and water pollution. The issue ranked lowest was the impact of species on the environment.

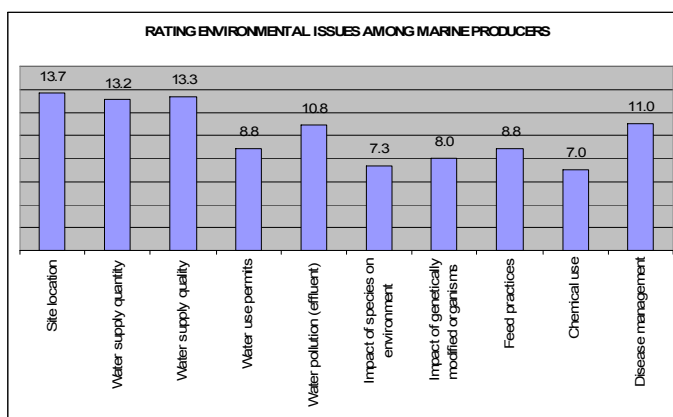


TABLE 109: RATING ENVIRONMENTAL ISSUES BY MARINE PRODUCERS

Environmental issues	Not important	Little importance	Neutral	Some importance	Very important	Total response rate to question	% response rate (n=19)	% response rate (n=64)	Weighted average
Site location	1	1	1	4	12	19	100.0%	29.7%	13.7
Water supply quantity	1	2	2	2	12	19	100.0%	29.7%	13.2
Water supply quality	0	1	1	0	15	17	89.5%	26.6%	13.3
Water use permits	4	2	5	0	6	17	89.5%	26.6%	8.8
Water pollution (effluent)	3	3	1	2	9	18	94.7%	28.1%	10.8
Impact of species on environment	6	2	2	2	4	16	84.2%	25.0%	7.3
Impact of genetically modified organisms	9	0	2	2	5	18	94.7%	28.1%	8.0
Feed practices	5	1	1	2	7	16	84.2%	25.0%	8.8
Chemical use	8	0	3	0	5	16	84.2%	25.0%	7.0
Disease management	1	1	2	3	9	16	84.2%	25.0%	11.0

Among freshwater producers, the ranking of environmental issues is similar to the overall trends outlined above for the industry in general. The detailed data set for freshwater producers is set out in Table 110 below and the ranking described in the adjoining graph.

The top five environmental issues ranked by freshwater producers are: quantity of water supply, quality of water supply, disease management, feed practices, and site location. The issue ranked lowest was water use permits.

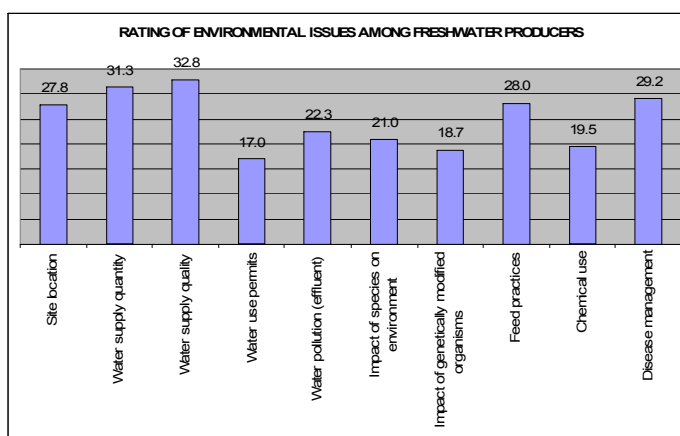


TABLE 110: RATING ENVIRONMENTAL ISSUES BY FRESHWATER PRODUCERS

Environmental issues	Not important	Little importance	Neutral	Some importance	Very important	Total response rate to question	% response rate (n=45)	% response rate (n=64)	Weighted average
Site location	3	1	3	7	25	39	86.7%	60.9%	27.8
Water supply quantity	1	2	6	5	29	43	95.6%	67.2%	31.3
Water supply quality	2	1	0	2	37	42	93.3%	65.6%	32.8
Water use permits	11	5	9	1	10	36	80.0%	56.3%	17.0
Water pollution (effluent)	6	4	5	10	13	38	84.4%	59.4%	22.3
Impact of species on environment	12	2	4	12	10	40	88.9%	62.5%	21.0
Impact of genetically modified organisms	18	3	1	5	13	40	88.9%	62.5%	18.7
Feed practices	6	1	2	6	26	41	91.1%	64.1%	28.0
Chemical use	11	9	2	3	14	39	86.7%	60.9%	19.5
Disease management	3	2	3	6	27	41	91.1%	64.1%	29.2

5.2 Environmental Regulatory Issues

Respondents rated the importance of several environmental regulatory issues. Table 111 set out the detailed data for all industry respondents and the ranking described in the adjoining graph.

The top five ranked environmental regulatory issues are: best practice management guidelines, sanitation programmes, veterinary programmes, legislation (policy and act), and biodiversity regulations. The lowest ranked issues are nodes.

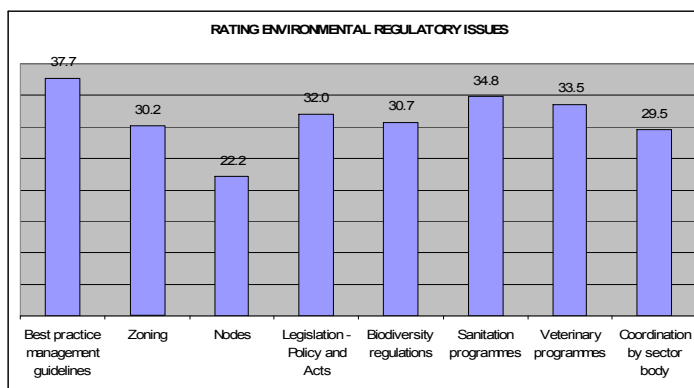


TABLE 111: RATING ENVIRONMENTAL REGULATORY ISSUES

Regulatory issues	1-Not important	2-Little importance	3-Neutral	4-Some importance	5-Very important	Total response rate to question	% response rate	Weighted average	Ranking
Best practice management guidelines	2	2	6	18	26	54	84.4%	37.7	1
Zoning	6	3	9	18	14	50	78.1%	30.2	6
Nodes	8	4	11	11	8	42	65.6%	22.2	8
Legislation - Policy and Acts	3	5	16	9	19	52	81.3%	32.0	4
Biodiversity regulations	3	4	10	12	19	48	75.0%	30.7	5
Sanitation programmes	6	2	10	11	25	54	84.4%	34.8	2

Veterinary programmes	4	1	11	8	26	50	78.1%	33.5	3
Coordination by sector body	6	4	15	12	14	51	79.7%	29.5	7

Among marine producers, the ranking of environmental regulatory issues is similar to the overall trends outlined above for the industry in general, except that zoning (zoning of aquaculture land/sites) as an issue fall within the top five ranking. The detailed data set for marine producers is set out in Table 112 below and the ranking described in the adjoining graph.

The top five environmental regulatory issues ranked by marine producers are: best practice management guidelines, sanitation programmes, zoning, legislation (policy and act), and veterinary programmes. The lowest ranked issue was coordination by sector body.

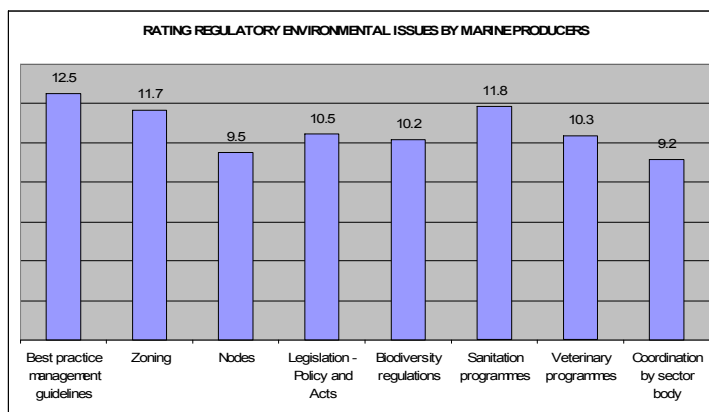


TABLE 112: RATING ENVIRONMENTAL REGULATORY ISSUES BY MARINE PRODUCERS

REGULATORY ISSUES	Not important	Little importance	Neutral	Some importance	Very important	Total response rate to question	% response rate (n=19)	% response rate (n=64)	Weighted average
Best practice management guidelines	2	0	2	8	7	19	100.0%	29.7%	12.5
Zoning	3	0	3	7	6	19	100.0%	29.7%	11.7
Nodes	4	1	2	5	5	17	89.5%	26.6%	9.5
Legislation - Policy and Acts	2	2	6	1	7	18	94.7%	28.1%	10.5
Biodiversity regulations	1	3	6	4	4	18	94.7%	28.1%	10.2
Sanitation programmes	3	1	3	3	9	19	100.0%	29.7%	11.8
Veterinary programmes	3	1	4	0	9	17	89.5%	26.6%	10.3
Coordination by sector body	3	1	5	5	3	17	89.5%	26.6%	9.2

Among freshwater producers, the ranking of environmental regulatory issues is similar to the overall trends outlined above for the industry in general. The detailed data set for freshwater producers is set out in Table 113 below and the ranking described in the adjoining graph.

The top five environmental regulatory issues ranked by freshwater producers are: best practice management guidelines, veterinary programmes, sanitation programmes, legislation (policy and act), and biodiversity regulations. Zoning (of aquaculture sites but also that of species per area which links with biodiversity regulations) however is almost at the same ranking as biodiversity regulations. The lowest ranked issue was nodes.

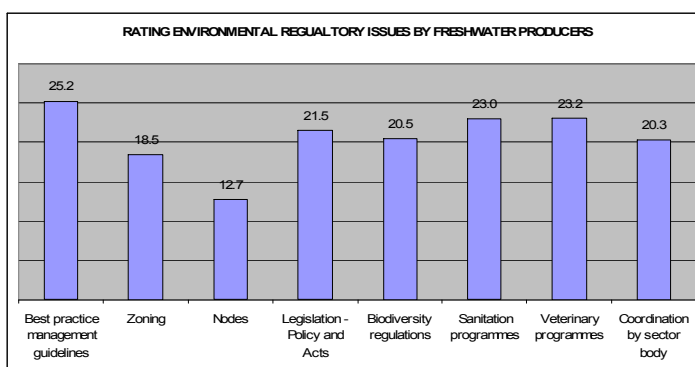


TABLE 113: RATING ENVIRONMENTAL REGULATORY ISSUES BY FRESHWATER PRODUCERS

Regulatory issues	Not important	Little importance	Neutral	Some importance	Very important	Total response rate to question	% response rate (n=45)	% response rate (n=64)	Weighted average
Best practice management guidelines	0	2	4	10	19	35	77.8%	54.7%	25.2
Zoning	3	3	6	11	8	31	68.9%	48.4%	18.5
Nodes	4	3	9	6	3	25	55.6%	39.1%	12.7
Legislation - Policy and Acts	1	3	10	8	12	34	75.6%	53.1%	21.5
Biodiversity regulations	2	1	4	8	15	30	66.7%	46.9%	20.5
Sanitation programmes	3	1	7	8	16	35	77.8%	54.7%	23.0
Veterinary programmes	1	0	7	8	17	33	73.3%	51.6%	23.2
Coordination by sector body	3	3	10	7	11	34	75.6%	53.1%	20.3

5.3 Barriers to Entry into the Aquaculture Sector

Respondents rated the importance of several barriers to entry into the aquaculture sector. Table 114 set out the detailed data for all industry respondents and the ranking described in the adjoining graph.

The top five ranked barriers to entry were: environmental regulatory requirements, site selection, access to research and technology development, access to finances, and permitting (note here permitting was viewed as being a barrier as apposed to section 5.1 above). The lowest ranked issue is extension services.

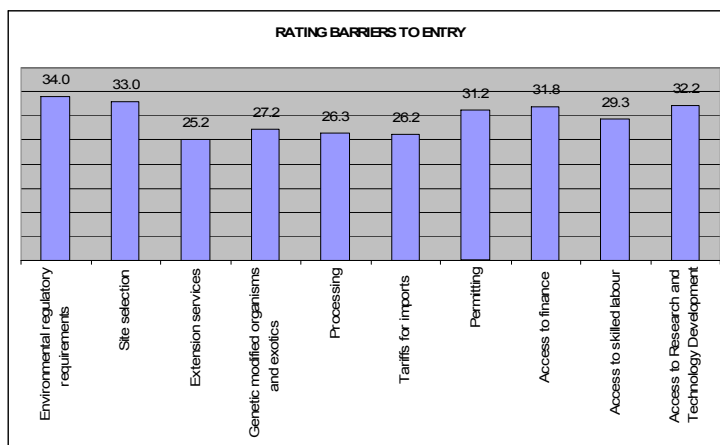


TABLE 114: RATING BARRIERS TO ENTRY INTO THE AQUACULTURE SECTOR

barriers to entry	1-Not important	2-Little importance	3- Neutral	4-Some importance	5-Very important	Total response rate to question	% response rate	Weighted average	Ranking
Environmental regulatory requirements	4	6	5	17	21	53	82.8%	34.0	1
Site selection	7	7	6	11	23	54	84.4%	33.0	2
Extension services	15	3	12	11	10	51	79.7%	25.2	9
Genetic modified organisms and exotics	15	6	11	7	15	54	84.4%	27.2	7
Processing	11	4	9	8	16	48	75.0%	26.3	8
Tariffs for imports	14	5	12	3	17	51	79.7%	26.2	9
Permitting	6	5	4	6	27	48	75.0%	31.2	5

Access to finance	6	2	10	9	23	50	78.1%	31.8	4
Access to skilled labour	7	3	14	14	13	51	79.7%	29.3	6
Access to Research and Technology Development	3	2	8	18	18	49	76.6%	32.2	3

Among marine producers, the ranking of barriers to entry into aquaculture is similar to the overall trends outlined above for the industry in general, except that processing falls within the top five ranking. The detailed data set for marine producers is set out in Table 115 below and the ranking described in the adjoining graph.

The top five barriers to entry ranked by marine producers are: permitting, site selection, environmental regulatory requirements, processing, and access to finances. The lowest ranked issue was genetic modified organisms and exotics.

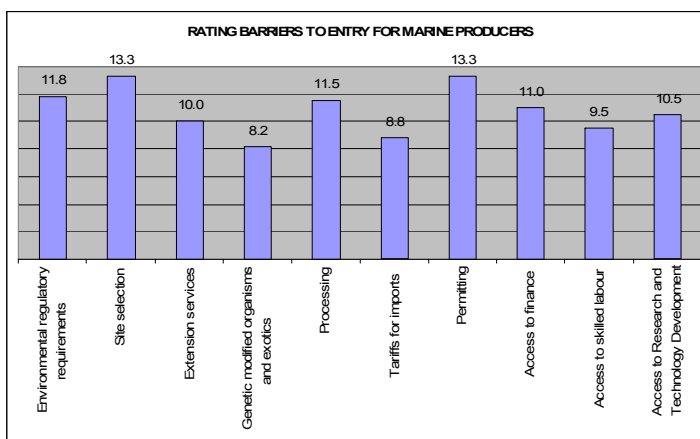
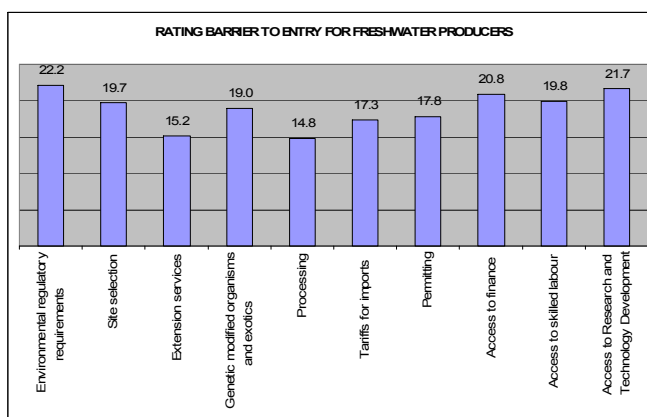


TABLE 115: RATING BARRIERS TO ENTRY INTO THE AQUACULTURE SECTOR BY MARINE PRODUCERS

Barriers to entry	Not important	Little importance	Neutral	Some importance	Very important	Total response rate to question	% response rate (n=19)	% response rate (n=64)	Weighted average
Environmental regulatory requirements	1	1	4	9	4	19	100.0%	29.7%	11.8
Site selection	1	1	2	4	11	19	100.0%	29.7%	13.3
Extension services	5	0	5	5	4	19	100.0%	29.7%	10.0
Genetic modified organisms and exotics	6	2	6	4	1	19	100.0%	29.7%	8.2
Processing	1	1	5	4	7	18	94.7%	28.1%	11.5
Tariffs for imports	6	1	7	1	4	19	100.0%	29.7%	8.8
Permitting	1	1	0	3	13	18	94.7%	28.1%	13.3
Access to finance	1	2	4	1	9	17	89.5%	26.6%	11.0
Access to skilled labour	2	2	7	5	2	18	94.7%	28.1%	9.5
Access to Research and Technology Development	2	1	4	8	3	18	94.7%	28.1%	10.5

Among freshwater producers, the ranking of barriers to entry to aquaculture is similar to the overall trends outlined above for the industry in general, except that access to skilled labour falls within the top five issues to be addressed. The detailed data set for marine producers is set out in Table 116 below and the ranking described in the adjoining graph.



The top five barriers to entry ranked by freshwater producers are: environmental regulatory requirements, access to research and technology development, access to finances, access to skilled labour and site selection. The lowest ranked issue was processing. The low ranking of extension services initially might come as a surprise but it is important for the reader to remember that even though many freshwater producers have expressed the need of government support through extension services, here they do not view it as a barrier to entry.

TABLE 116: RATING BARRIERS TO ENTRY INTO THE AQUACULTURE SECTOR BY FRESHWATER PRODUCERS

Barriers to entry	Importance Rating					Total response rate to question	% response rate (n=45)	% response rate (n=64)	Weighted average
	Not important	Little importance	Neutral	Some importance	Very important				
Environmental regulatory requirements	3	5	1	8	17	34	75.6%	53.1%	22.2
Site selection	6	6	4	7	12	35	77.8%	54.7%	19.7
Extension services	10	3	7	6	6	32	71.1%	50.0%	15.2
Genetic modified organisms and exotics	9	4	5	3	14	35	77.8%	54.7%	19.0
Processing	10	3	4	4	9	30	66.7%	46.9%	14.8
Tariffs for imports	8	4	5	2	13	32	71.1%	50.0%	17.3
Permitting	5	4	4	3	14	30	66.7%	46.9%	17.8
Access to finance	5	0	6	8	14	33	73.3%	51.6%	20.8
Access to skilled labour	5	1	7	9	11	33	73.3%	51.6%	19.8
Access to Research and Technology Development	1	1	4	10	15	31	68.9%	48.4%	21.7

5.4 Government Support

Respondents rated the importance of government support for the aquaculture sector. Table 117 set out the detailed data for all industry respondents and the ranking described in the adjoining graph.

The top five ranked issues pertaining to required government support were: permitting, promotion of the aquaculture industry, development of a strategic plan for the sector, capacity building and facilitating finance and investment. The lowest ranked issue is technology development and transfer.

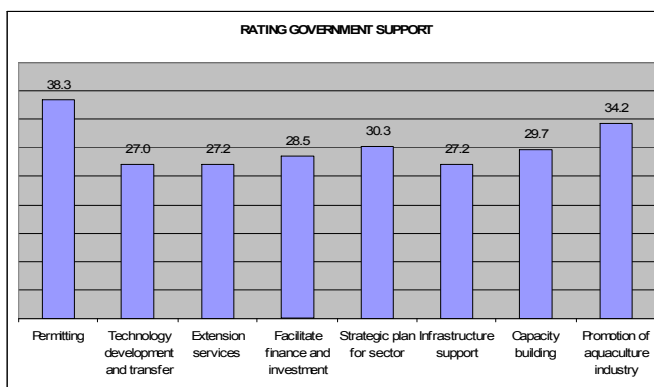


TABLE 117: RATING GOVERNMENT SUPPORT

Government support	1-Not important	2-Little importance	3-Neutral	4-Some importance	5-Very important	Total response rate to question	% response rate	Weighted average	Ranking
Permitting	7	3	9	10	30	59	92.2%	38.3	1
Technology development and transfer	7	6	14	9	13	49	76.6%	27.0	7
Extension services	11	8	12	10	12	53	82.8%	27.2	5
Facilitate finance and investment	13	1	11	12	15	52	81.3%	28.5	4
Strategic plan for sector	10	2	12	8	20	52	81.3%	30.3	3
Infrastructure support	12	4	10	7	17	50	78.1%	27.2	6
Capacity building	11	2	10	12	17	52	81.3%	29.7	4
Promotion of aquaculture industry	5	1	8	11	26	51	79.7%	34.2	2

Among marine producers, the ranking of government support requirements for the aquaculture sector is similar to the overall trends outlined above for the industry in general, except that technology development and transfer is an issue that falls within the top five ranking. The detailed data set for marine producers is set out in Table 118 below and the ranking described in the adjoining graph.

The top five issues pertaining to required government support ranked by marine producers are: permitting, promotion of aquaculture industry, development of a strategic plan for the sector, capacity building and technology development and transfer. The lowest ranked issue was facilitating finance and investment.

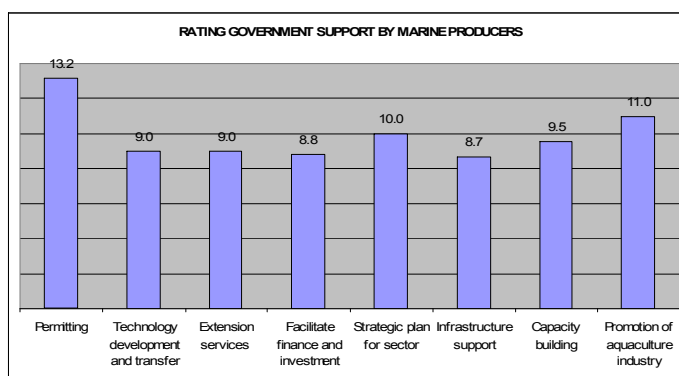
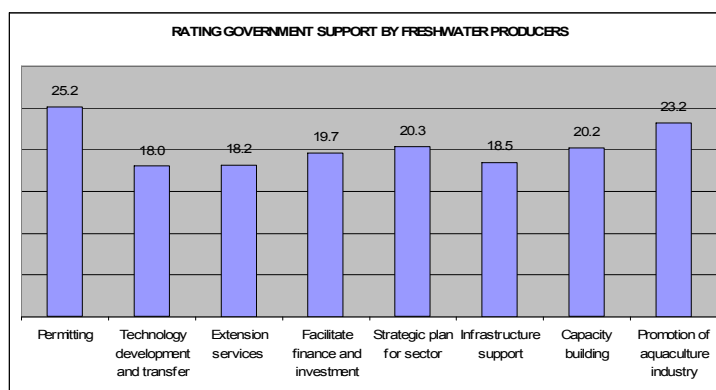


TABLE 118: RATING GOVERNMENT SUPPORT BY MARINE PRODUCERS

GOVERNMENT SUPPORT	Not important	Little importance	Neutral	Some importance	Very important	Total response rate to question	% response rate (n=19)	% response rate (n=64)	Weighted average
Permitting	3	0	1	2	13	19	100.0%	29.7%	13.2
Technology development and transfer	5	2	3	4	4	18	94.7%	28.1%	9.0
Extension services	5	2	4	7	1	19	100.0%	29.7%	9.0
Facilitate finance and investment	6	1	2	6	3	18	94.7%	28.1%	8.8
Strategic plan for sector	5	0	3	4	6	18	94.7%	28.1%	10.0
Infrastructure support	6	1	4	3	4	18	94.7%	28.1%	8.7
Capacity building	5	0	3	7	3	18	94.7%	28.1%	9.5
Promotion of aquaculture industry	3	1	2	5	7	18	94.7%	28.1%	11.0

Among freshwater producers, the ranking of government support requirements for the aquaculture sector is similar to the overall trends outlined above for the industry in general, except that infrastructure support falls within the top five issues to be addressed. The detailed data set for marine producers is set out in Table 119 below and the ranking described in the adjoining graph.



The top five issues pertaining to required government support ranked by freshwater producers are: permitting, promotion of aquaculture industry, development of a strategic plan for the sector, capacity building, facilitating finance and investment, and infrastructure support. The lowest ranked issue was technology development and transfer.

TABLE 119: RATING GOVERNMENT SUPPORT BY FRESHWATER PRODUCERS

Government support	Not important	Little importance	Neutral	Some importance	Very important	Total response rate to question	% response rate (n=45)	% response rate (n=64)	Weighted average
Permitting	4	3	8	8	17	40	88.9%	62.5%	25.2
Technology development and transfer	2	4	11	5	9	31	68.9%	48.4%	18.0
Extension services	6	6	8	3	11	34	75.6%	53.1%	18.2
Facilitate finance and investment	7	0	9	6	12	34	75.6%	53.1%	19.7
Strategic plan for sector	5	2	9	4	14	34	75.6%	53.1%	20.3
Infrastructure support	6	3	6	4	13	32	71.1%	50.0%	18.5



Capacity building	6	2	7	5	14	34	75.6%	53.1%	20.2
Promotion of aquaculture industry	2	0	6	6	19	33	73.3%	51.6%	23.2

5.5 Membership to Industry Bodies

Survey participants reported that they held membership, or were affiliated to, a wide range of industry associations or bodies. Membership to the Aquaculture Association of Southern Africa (AASA) was mentioned by 40.6% of respondents. AASA received more mentions than any other association and included both marine (12.5%) and freshwater (28.1%) producers (see Tables 120, 121 and 122 below).

Among marine producers there was fair representation of the Abalone Farmers Association of South Africa (17.2% of all respondents) and the Mussel and Oyster Forum (3.1%). Freshwater producers reported membership of South African Koi Keepers Society (17.2% of all respondents), South African Koi Traders Association (12.5%), Western Cape Trout Farmers Association (10.9%) as well as several other species specific associations.

It is therefore clear that the South African Aquaculture Sector is well-structured via species specific representative bodies that themselves have representation on AASA and form the AASA EXCO.

Industry bodies	Freshwater	Marine	n=64	%
Abalone Farmers Association of Southern Africa	0	11	11	17.2%
Aquaculture Association of Southern Africa	18	8	26	40.6%
Catfish SA	2	0	2	3.1%
Mpumalanga Trout Producers Forum	5	0	5	7.8%
Mussel and Oyster Forum	0	2	2	3.1%
South African Koi Keepers Society	11	0	11	17.2%
South African Koi Traders Association	8	0	8	12.5%
South Africa Pet Traders Association	6	0	6	9.4%
Tilapia Association of South Africa	6	0	6	9.4%
Western Cape Trout Farmers Association	7	0	7	10.9%
Western Cape Tilapia Growers Association	1	0	1	1.6%
Other	3	1	4	6.3%

Industry bodies	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Total	% (n=19)	% (n=64)
Abalone Farmers Association of South Africa	10	1	0	0	11	57.9%	17.2%
Aquaculture Association of Southern Africa	5	1	1	1	8	42.1%	12.5%
Mussel and Oyster Forum	1	0	0	1	2	10.5%	3.1%
Other	0	0	1	0	1	5.3%	1.6%

Note: "Other" industry bodies affiliated to were PFDA, ACC.

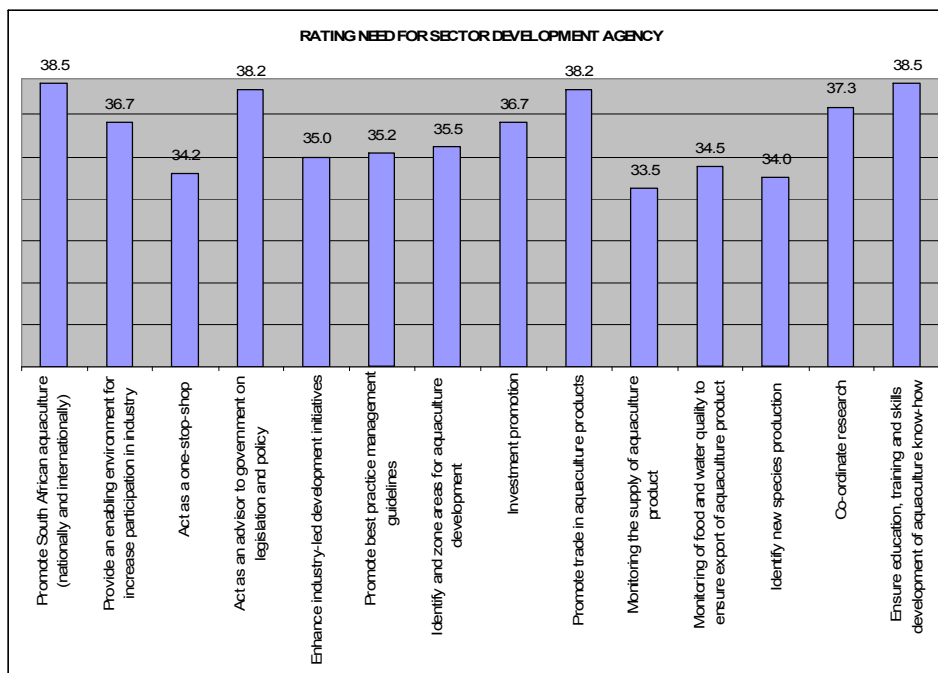
Industry bodies	Western Cape	Eastern Cape	KwaZulu Natal	Northern Cape	Free State	Gauteng	Limpopo	Mpumalanga	North West	Total	% (n=45)	% (n=64)
Aquaculture Association of Southern Africa	9	2	1	0	2	2	1	1	0	18	40.0%	28.1%
Catfish SA	0	0	0	0	1	0	0	1	0	2	4.4%	3.1%
Mpumalanga Trout Producers Forum	0	0	0	0	0	1	0	4	0	5	11.1%	7.8%
South African Koi Keepers Society	3	1	2	1	1	1	1	0	1	11	24.4%	17.2%
South African Koi Traders Association	2	0	2	0	1	1	0	1	1	8	17.8%	12.5%
South Africa Pet Traders Association (SAPTA)	0	1	3	0	0	1	1	0	0	6	13.3%	9.4%
Tilapia Association of South Africa	3	0	1	0	0	1	1	0	0	6	13.3%	9.4%
Western Cape Trout Farmers Association	7	0	0	0	0	0	0	0	0	7	15.6%	10.9%
Western Cape Tilapia Growers Association	1	0	0	0	0	0	0	0	0	1	2.2%	1.6%
Other	1	1	0	0	0	0	1	0	0	3	6.7%	4.7%

Note: "Other" industry bodies respondents' affiliated to were NAWG, SAWG, WAS, AES, ZNA (Japan) and KBI (UK).

It is worth mentioning that the workgroups (with secretariats situated within the DoA and NDA), mentioned in the footnote of Table 122, play a very important role in exchanging information and discussing issues that is of importance to the sector as a whole. Both the Northern Aquaculture Workgroup (NAWG) and the Southern Aquaculture Workgroup (SAWG) have members from not only the primary and secondary industry but also government.

5.6 Need for Sector Development Agency

Respondents rated the importance of the need for a sector development agency specifically for the aquaculture sector. Table 123 sets out the detailed data for all industry respondents and the ranking is described in the graph below.



All questions scored by participants fall within a close range, indicating an overall high support in favour of a sector development agency with high ranking of all components of the activities listed. However, some were seen more important than others.

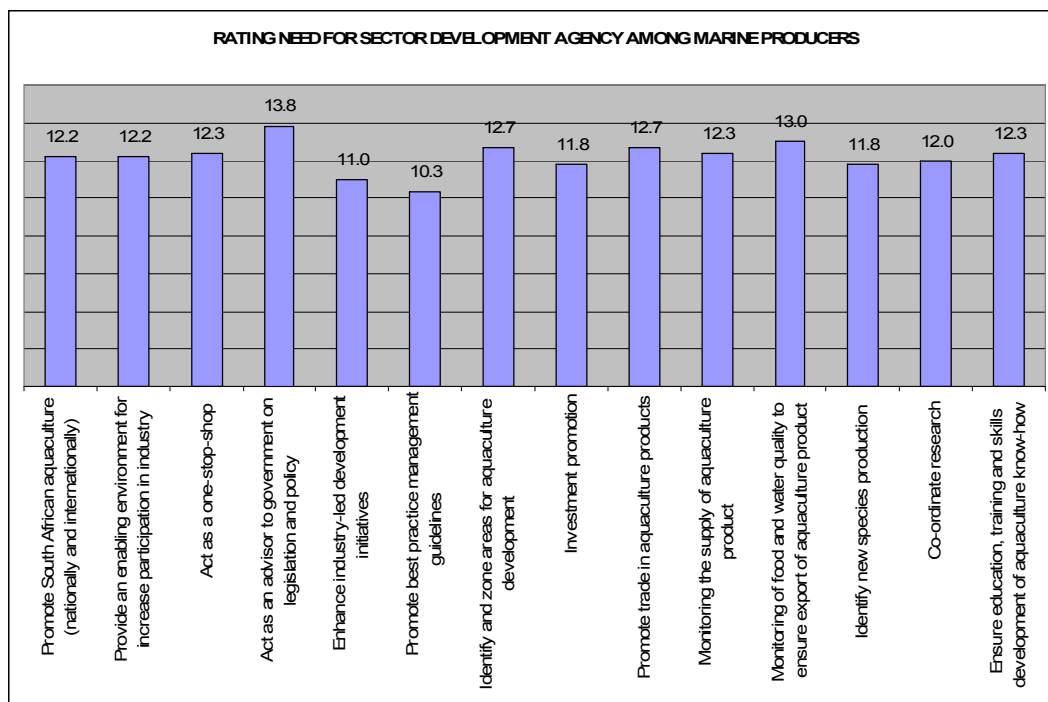
The top five ranked sector development needs were: promote South African aquaculture (nationally and internationally), ensure education, training and skills development of aquaculture know-how, act as an advisor to government on legislation and policy, promote trade in aquaculture products, and co-ordinate research. The lowest ranked role was the monitoring the supply of aquaculture product.

TABLE 123: RATING ROLE OF SECTOR DEVELOPMENT

Sector development	1-Not important	2-Little importance	3-Neutral	4-Some importance	5-Very important	Total response rate to question	% response rate	Weighted average	Ranking
Promote South African aquaculture (nationally and internationally)	2	4	4	11	33	54	84.4%	38.5	1
Provide an enabling environment for increase participation in industry	3	2	6	15	27	53	82.8%	36.7	4
Act as a one-stop-shop	6	2	8	14	23	53	82.8%	34.2	9
Act as an advisor to government on legislation and policy	2	3	4	16	29	54	84.4%	38.2	3
Enhance industry-led development initiatives	6	2	8	14	24	54	84.4%	35.0	7
Promote best practice management guidelines	3	3	6	16	24	52	81.3%	35.2	6
Identify and zone areas for aquaculture development	3	4	8	17	22	54	84.4%	35.5	5
Investment promotion	4	1	9	8	31	53	82.8%	36.7	4

Promote trade in aquaculture products	3	2	7	9	33	54	84.4%	38.2	3
Monitoring the supply of aquaculture product	2	2	13	9	24	50	78.1%	33.5	11
Monitoring of food and water quality to ensure export of aquaculture product	0	6	15	10	22	53	82.8%	34.5	8
Identify new species production	4	3	9	13	23	52	81.3%	34.0	10
Co-ordinate research	4	1	7	13	29	54	84.4%	37.3	2
Ensure education, training and skills development of aquaculture know-how	2	2	6	13	31	54	84.4%	38.5	1
Other	0	0	0	0	3	3	4.7%	0.0	0

Among marine producers, the ranking of the needs for sector development intervention in the aquaculture sector is detailed in the data set for marine producers as per Table 124 below and the ranking described in the graph below.

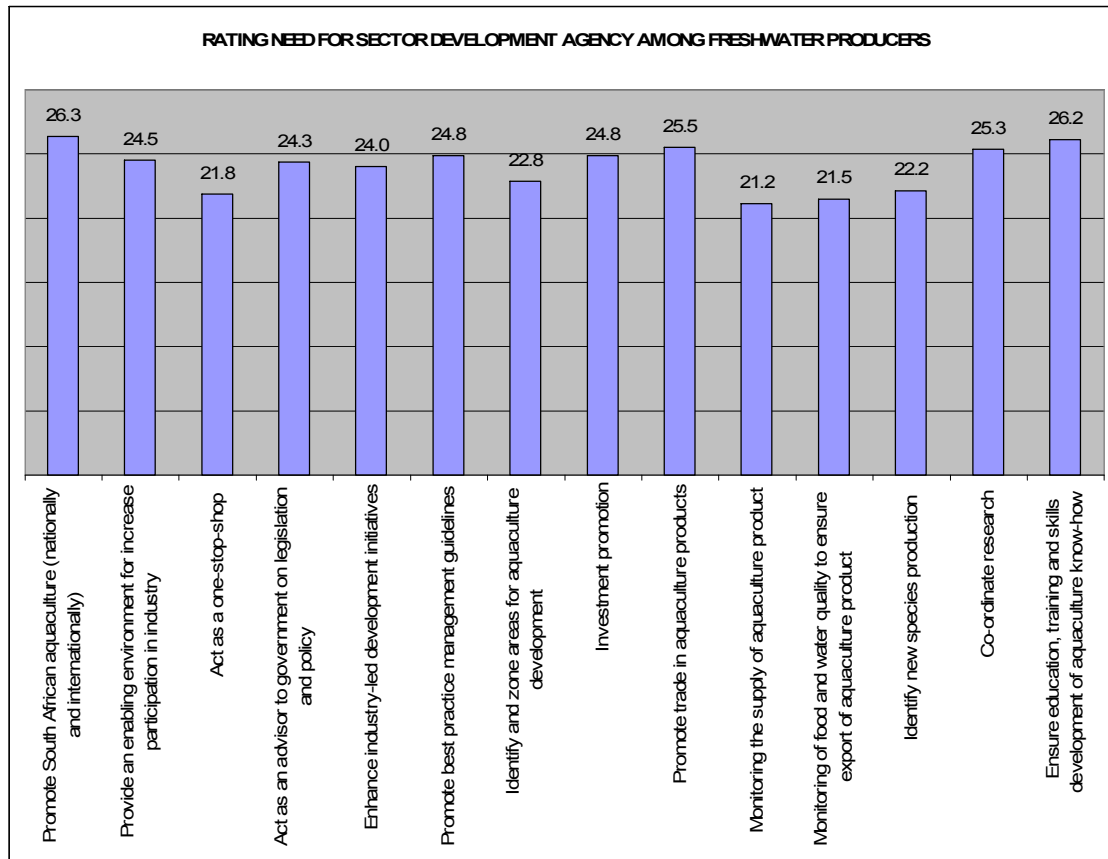


The top five sector development needs ranked by marine producers are: act as an advisor to government on legislation and policy, monitoring of food and water quality to ensure export of aquaculture product, promote trade in aquaculture products, identify and zone areas for aquaculture development, and act as a one-stop-shop. The lowest ranked role was the promotion of best practice management guidelines.

TABLE 124: RATING ROLE OF SECTOR DEVELOPMENT BY MARINE PRODUCERS

Sector development	Not important	Little importance	Neutral	Some importance	Very important	Total response rate to question	% response rate (n=19)	% response rate (n=64)	Weighted average
Promote South African aquaculture (nationally and internationally)	1	1	3	4	9	18	94.7%	28.1%	12.2
Provide an enabling environment for increase participation in industry	1	1	3	9	5	19	100.0%	29.7%	12.2
Act as a one-stop-shop	3	0	1	7	8	19	100.0%	29.7%	12.3
Act as an advisor to government on legislation and policy	0	0	2	8	9	19	100.0%	29.7%	13.8
Enhance industry-led development initiatives	4	0	3	7	5	19	100.0%	29.7%	11.0
Promote best practice management guidelines	2	0	4	7	4	17	89.5%	26.6%	10.3
Identify and zone areas for aquaculture development	1	1	3	6	8	19	100.0%	29.7%	12.7
Investment promotion	2	0	5	1	10	18	94.7%	28.1%	11.8
Promote trade in aquaculture products	2	0	1	4	11	18	94.7%	28.1%	12.7
Monitoring the supply of aquaculture product	1	0	3	6	8	18	94.7%	28.1%	12.3
Monitoring of food and water quality to ensure export of aquaculture product	0	2	5	6	7	20	105.3%	31.3%	13.0
Identify new species production	2	0	2	7	7	18	94.7%	28.1%	11.8
Co-ordinate research	2	0	2	6	8	18	94.7%	28.1%	12.0
Ensure education, training and skills development of aquaculture know-how	1	1	2	5	9	18	94.7%	28.1%	12.3
Other	0	0	0	0	0	0	0.0%	0.0%	0.0

Among freshwater producers, the ranking of the needs for sector development intervention in the aquaculture sector is detailed in the data set for freshwater producers as per Table 125 below and the ranking described in the graph below.



The top five sector development needs ranked by freshwater producers are: Promote South African aquaculture (nationally and internationally), ensure education, training and skills development of aquaculture know-how, promote trade in aquaculture products, co-ordinate research, and act as an advisor to government on legislation and policy. The lowest ranked role was monitoring the supply of aquaculture product.

TABLE 125: RATING ROLE OF SECTOR DEVELOPMENT BY FRESHWATER PRODUCERS

Sector development	Rating					Total response rate to question	% response rate (n=45)	% response rate (n=64)	Weighted average
	Not important	Little importance	Neutral	Some importance	Very important				
Promote South African aquaculture (nationally and internationally)	1	3	1	7	24	36	80.0%	56.3%	26.3
Provide an enabling environment for increase participation in industry	2	1	3	6	22	34	75.6%	53.1%	24.5
Act as a one-stop-shop	3	2	7	7	15	34	75.6%	53.1%	21.8

Act as an advisor to government on legislation and policy	2	3	2	8	20	35	77.8%	54.7%	24.3
Enhance industry-led development initiatives	2	2	5	7	19	35	77.8%	54.7%	24.0
Promote best practice management guidelines	1	3	2	9	20	35	77.8%	54.7%	24.8
Identify and zone areas for aquaculture development	2	3	5	11	14	35	77.8%	54.7%	22.8
Investment promotion	2	1	4	7	21	35	77.8%	54.7%	24.8
Promote trade in aquaculture products	1	2	6	5	22	36	80.0%	56.3%	25.5
Monitoring the supply of aquaculture product	1	2	10	3	16	32	71.1%	50.0%	21.2
Monitoring of food and water quality to ensure export of aquaculture product	0	4	10	4	15	33	73.3%	51.6%	21.5
Identify new species production	2	3	7	6	16	34	75.6%	53.1%	22.2
Co-ordinate research	2	1	5	7	21	36	80.0%	56.3%	25.3
Ensure education, training and skills development of aquaculture know-how	1	1	4	8	22	36	80.0%	56.3%	26.2
Other	0	0	0	0	3	3	6.7%	4.7%	2.5

5.7 Additional Commentary from Aquaculture Producers

Several respondents provided additional commentary on the state of the industry. These responses are set out below as general comments on the reasons for farm closure as well as specific commentary arranged per region and sub-sector. The comments are not necessarily supported by AISA but are provided in order to give industry the opportunity to raise their viewpoints and concerns. It is also the view of AISA that, with a positive mind-set, one can at times turn the problems pin-pointed by industry into opportunities and often with some discussion very good ideas/projects are born (see such examples under the 'Recommendations' section).

5.7.1 Reasons for Farm Closures

A number of industry players provided comments, during the surveying process, on reasons for the closure of aquaculture farms in South Africa. There were several reasons put forward, namely:

- The bureaucratic processes imposed by government departments that impact negatively on the setting up and operating of aquaculture farms.
- Costly and timeous processes to secure permits, specifically for marine related production.
- Inter-departmental politics among government bodies in stalling the production process where new marine farming techniques or species are concerned, especially where government agencies (in this case Marine and Coastal Management) do not accept feasibility studies that were not commissioned by the agency itself.



- One oyster farm on the West Coast of the Western Cape was no longer in operation as a result of an agriculture farmer purchasing the land adjoining his farm on which the aquaculture operation was based. The farmer did not wish to continue aquaculture production.
- An aquaculture operation in Saldahna was closed down after an iron ore company revoked the land lease rights to the farm.

5.7.2 *Comments from Freshwater Producers in the Western Cape*

- The expansion of our project is currently restricted by a lack of funding, infrastructure and water supply.
- The expansion of our project is currently restricted by a lack of funding from commercial banks and poor service from the authorities in regards to the statutory approval process, especially by the Department of Water Affairs.
- Your questionnaire is understandably drawn up predominantly with the food-producing side of aquaculture in mind, so many of the answers from a tropical fish producers point of view, will seem unusual. My apologies for late submission. We had some storm damage which demanded priority.
- I applied for permits in 2004 and I'm still waiting
- We are an established trout farm, so we do not have any problem at the moment with regulations or permits, but I gather it is extremely difficult for new entrants to the industry.
- The values and volumes of Ornamental fish, including Koi Carp, goldfish etc. cannot be standardised to metric tons. These farmers sell individual fish and the price and size differs continually. A fish can be 3cm, 9cm, or 11cm, affecting the value, as well as whether sold to domestic or international market. For a 11cm Koi, the domestic value might be R14.50, and R9 international, but the difference then becomes the quantity ordered and consistency of that demand. International buyers preferred in this business. The process of exporting is a tedious one but financially more viable if the farmer has the control and system in place to produce for the overseas market. Our koi business has this system in place, and the most important aspect of the business is time, preparation and knowledge. It is suggested that farmers need to be educated in the process of exporting before attempting it, otherwise they are guaranteed failure.
- The transaction costs within the value chain need to be addressed.

5.7.3 *Comments from Marine Producers in the Western Cape*

- We need government to take marine producers seriously and help to improve its status as a source of revenue for the country. They should put more effort into research and development and less into restricting marketing, especially on the local market. Government should make a concerted effort into lifting the trade embargo of shellfish to Europe and expedite the process.
- Acquiring import/export permits is still a major problem, it seldom takes less than a month to acquire a permit and then the permits are only valid for three months. We see good potential for scallop culture on our system but cannot get access to local stocks or information.
- Some of the problems experienced by role players in the industry are the non-cooperative approach by governments i.e. issuing of permits, unfair allocation of rights and absolutely no information as to what government is planning w.r.t. aquaculture, regulations, new strategies, support measures in place for, especially, new and upcoming enterprises.



5.7.4 *Comments from Freshwater Producers in the Eastern Cape*

- The ornamental fish industry is market-driven and is one of the few sectors of the industry that succeeds due to this.
- Only ornamentals were sold last year – still building stock of the others. On Q11.2 - sector development roles: This is EXACTLY what AISA should be doing as there is currently no support from government to the industry, only regulations. There is huge potential but government needs to slow down on regulating the industry to death and rather focus on facilitating the development of responsible, sustainable aquaculture within the region. AISA can fill a pivotal position here by coordinating the regulatory framework into a single one-stop-shop where all permitting can be done. Furthermore, AI-SA can promote the industry via workshops, trade fairs, etc.
- We are a lodge accommodating 20 pax. We offer, out of one dam, recreational fly-fishing of rainbow trout. At present we have approximately 200 rainbow trout (1.2kg). We offer catch and release.

5.7.5 *Comments from Marine Producer in the Eastern Cape*

- Delays caused by different government departments e.g. No permit is issued without a written lease from Portnet. No lease is issued without a permit, -now what? No permit without all the SARS approvals, Safety certificates,-no import permit -no spat - no production - no more business as the season has passed and the market missed. Importation of oysters from France and Namibia are subsidized and has big influence on local market.

5.7.6 *Comments from Marine Producer in the Northern Cape*

- Consider operation as a micro-enterprise (turnover of under R1m).

Water unitization: ocean water is a shared resource use in conjunction with adjacent mining operations. No water flows back to ocean after aquaculture use, instead water flows to mining operations then to slime dams.

Permitting is seen as significant barrier to entry, especially in the fact that the permit has to be re-applied for every three months. In amidst all this, personnel at MCM changed and/or provided incorrect information, or delayed processes through inefficiencies, resulting in respondent having to chase for a signature by coming personally to Cape Town, whilst still losing half-month of permit time, and causing delays in importing goods for farm. Rather would like to see a permit for marine producers farming in general for a basket of species. This will enable farmers to respond to market demand, promote entrepreneurial initiative and innovation, and decrease the bureaucratic process of the current permitting process.

Additional AISA sector development roles should be 1) an active role in deregulating aquaculture and 2) begins to focus on SME development policy for aquaculture (as opposed to current focus on larger, commercial interests).

The Namaqualand coast has particular challenges specific to its location: 1) red tide is not so prevalent in Namaqualand as further south along the West Coast, 2) the fact that the coastline is mostly owned and policed by De Beers' mining interests means that poaching of abalone is reduced (although it does occur), 3) the mines own the land and the farmers have to gain use rights from the large mining houses, who then hold the aquaculture permitting rights and land rights for the area, resulting in farmers with weak tenure and permitting rights even though they are operating. As a result, it means that the farm finds itself in a position where the landholder begins to negotiate a BEE deal due to pressures on it as a corporate (due to the Mining Charter) in a context where the owner of operation has little control over the process. 4) MCM has only one 60-odd year old inspector for the whole coastline, who cannot monitor all productions, quality, and is ineffective in policing poaching. 5) There is a general perception among local workers that poaching is theft from farms, but this is in an area where employment is high. However, in other areas where employment is low, poaching does occur and is not well policed, or even a blind eye is cast over poaching activities by law enforcement.



Respondent noted that the cost of monitoring product supply and food/water quality should not be solely at the cost of the enterprise but the cost should lie with AISA / other body. Individual farmers cannot push up process of product as market demands certain pricing. However, if monitoring to be part of enterprises operations, then there should be concessions/incentives to the farmers, alternatively if monitoring is shared among several geographically close farms, then the cost of monitoring comes down (cost adds about 30% to overall production cost).

The other aspect of limited resources to undertake monitoring means that data cannot be processed quickly enough before a product has to go to market. The regulatory process usually results in a late return of data. In respect to entrepreneurship, government should not undermine individual farmers whose intellectual property is based on experimenting with new species. They should not be made to share this IP without some capital benefit or supporting competition from within the sector or even government/academic projects that maximised on their entrepreneurs start-up lessons before that operator has had time to make farm commercially viable.

Respondent noted that legislation does not take into account the interests of "micro-businesses", that industry is over regulated ("some of us are mere farmers"), that an independent body should be in place for industry to bring ideas/voice concerns about government processes and industry activities, possibly even establishing an ombudsman for the industry.

Respondent was involved in a further Port Nolloth farm where they experimented with ranching, and were ahead of efforts in Chile and USA a decade or so back. However, due to government processes (permitting, monitoring of quality and water, under-resourced personnel in Namaqualand, calls for feasibility studies by MCM, and EIAs), and the fact that this was experimental farming and that the lead time for ranching project is 10-15 years, all have negatively impacted on the Port North Sea Farm operation, possibility even leading to it needing to close operations. Closure would not be due to the fact that the farm cannot produce but due to government processes and procedures disabling production as well as local political differences between MCM and other government bodies. For example, in meeting government demands for a feasibility report, a PhD candidate researched the ranching method and was awarded a PhD from Rhodes. He was appointed to write the report by the IDC, the directors of the company to date still have not seen the results of the feasibility study. However, this independent report was not accepted by MCM, largely as they did not play a role in commissioning the report nor seem to trust the researcher. Rather their researcher wrote a summary of findings based on the feasibility report. Despite all this, an EIA was then called for, a process seen as both obstructionist and not part of initial steps to get permitting for ranching.

There are opportunities for entrepreneurs to take advantage of further by-products as a result of oyster farming, for e.g. the harvesting of mussels, selling fish, harvesting macro algae for feed.

5.7.7 *Comments from Freshwater Producer in the Free State*

- Presently the business is not operating. We are still waiting for the strategic plan [for sector]. We hope everything will run smoothly with the relationships we are building with Aquaculture roleplayers.
- I'm stopping aquaculture. For years I have tried. Spent a lot of money. No help. No advice etc. Permits from Nature Conservation for fresh water crayfish always a problem.

5.7.8 *Comments from Freshwater Producer in Gauteng*

- Feed costs are the single most prohibitive factor restricting the success of Tilapia culture in South Africa. Unless there is industry collaboration and government support (in terms of feed subsidisation) Tilapia will remain uncompetitive to other countries.



5.7.9 *Comments from Freshwater Producers in KwaZulu Natal:*

- I am an aquaculture consultant/facilitator involved in farming. It's high time there was an effective and efficient system when it comes to government regulatory bodies such as DEAT, KZN wildlife. Permit applications, EIA's and other requirements get lost in the red tape and ineffectiveness of these government bodies. Aquaculture is a whole new avenue these departments have had to deal with and quite frankly I don't think they have the necessary training or comprehension of the requirements for aquaculture to take place. I have had site inspections from DEAT where the officers were clueless as to what they were meant to be looking at. They had no idea what fish were in the ponds, I could have been farming piranhas and they would have been none the wiser. Noted in Q10.4 that permitting "takes forever", technology transfer and development as well as extension services were "non-existent".
- I am a very small Koi breeder and many of the questions do not apply. I have answered them to the best of my ability.
- DWAF needs to look at the entire river catchment system and then prioritise the issues which lead to the degradation of water quality. Focus might then shift away from the harmful effects of aquaculture to the real issues which need attention.
- The diverse nature of the Ornamental fish sector of aquaculture lends itself ideally to the promotion of BEE projects and rural community upliftment. The way in which such initiatives are to be tackled should be investigated very carefully. A lot can be learnt from the failed satellite farmer scheme that was implemented at Amatikulu Hatchery in the early 1990's. This was purely a private sector initiative with substantial funding from the SBDC and IDC. There was no input or backing from government; if this had been present this project would still be thriving today. From reading numerous papers from the FAO, and similar organisations, on the development of aquaculture projects, throughout Africa, for sustainable development; I have come to the conclusion that this type of aquaculture does not succeed. Besides putting food on the table the people on the ground want to put money in their pockets and thus aquaculture projects have to be economically viable in order to succeed. To achieve this, one needs to look at luxury aquaculture products. I feel that products such as Tilapia and Clarias will have their day but that day is not now. Thus future funding and focus should be directed towards luxury products.

5.7.10 *Comments from Freshwater Producers in Limpopo*

- It is important for government to assume a supporting rather than a leading role: Identify the needs and problems of the farmer – by site visits, not with the purpose to intimidate and impede, but to place SA on a competitive footing. Officials that have the power to say “no”, must also have the power to say “yes”, and follow REALISTIC guidelines.
- It is necessary to understand that anything that does not help, hinders development. I have tabled a suggestion of simplifying the application process for aquaculture permits (for water-use, EIA, collecting stock, permit to farm, breed, transport, standards of processing, waste disposal, etc.) by placing the onus for performance on the officials rather than expecting the farmer to spend unproductive time on completing endless forms and meeting with officials at their offices: Send the guys out into the field, give them a feeling for what goes on in a fish farm, and what the problems are: Farmers can't spend time at conferences, symposia, discussion groups and other relatively frivolous activities, whilst his operation goes to the dogs. It takes at least 3x as much effort to build up a new business, and has 90% risk of failure in the sector we are in. If you accept that profitability is determined roughly 30% by feed source & quality/price, 34% by Genetics of stock/Production system and 36% by MANAGEMENT, it is easy to see why a farmer cannot afford to be away for extended periods. In CRAS systems, potential of losing the entire stock within 30 minutes of a power failure is a very real possibility.
- We also need more applied research rather than basic research – let the farmers identify the needs, not research leaders pursue their own pet projects after lengthy desertions on the potential merits. With the limited water resources and limiting temperatures, combined with the drive to more environmentally acceptable methods of production, it is imperative that realistic guidelines for farming various species be drawn up. It seems logical that a country like South Africa will have to focus on using existing supplies more carefully, i.e. use irrigation water first in CRAS to produce fish,

and fertilise with the organic waste products. No practical experience is available on an industry-wide scale, and entry financial barriers make it impossible for all but the mining houses and I&J's of this world to do meaningful in-house research. The question should be: What can the Government do to fast-track development in Aquaculture, and the answer lies in assisting (or aiding and abetting ;-) fish farmers and operators to become effective competitors – if SA can even catch up with Zimbabwe in terms of *Oreochromis* production, it will be meaningful progress.

- Government involvement at this point in SA reminds me more of a nuisance visitor in a workshop, standing around doing nothing useful, and asking importunate questions that keeps the crew from doing their jobs. Don't interfere, assist. The present method of writing long-winded, mostly impractical theoretical treatises on proposed legislations, that seldom if ever fosters development, and then expecting comment from producers – that are invariably detrimentally affected by the proposals, should be replaced by researcher coming on-board in production units to get face-to-face with the real world that they are trying to sort neatly into convenient trays.
- An infant industry like Aquaculture needs nurturing, not harsh discipline, and guidance by competent business brains, rather than academic inputs on idealistic aspirations of control. If we are serious about food security (for the Nation, not households) we need to look at proven methods of co-operative development programmes that led to the development of the most successful agri-businesses in the country.
- I've been in the country now since September 2005. Firstly I do not understand why I and the previous owner are included in this survey, as we are end-user of the fishing industry. We buy trout on a very small scale and stock the weirs for fly-fishers. Having said that, I'd like to comment on the questions from 7 onward. My experience with the present local government powers/agencies has not been pleasant nor enlightening. This experience is also reflected in the contact I have had with several parastatels and banks. In my opinion, these agencies need to attend seriously to job-training and business ethics BEFORE they consider influencing the (economic) environment. After years of experience in technical production management in Europe, I am amazed at the poor job-skills of the operational level of the abovementioned agencies. This can only be a liability if these agencies increase their power. My own answer for question 8.1 is hence not race, but merit based.
- Under proper guidance, South Africa could become an important exporter of tropical ornamental fish instead of a user country. Local bred fish are of superior quality compared with their imported equivalent (mainly Far East).

5.7.11 Comments from Freshwater Producers in Mpumalanga

- Use of temporary staff depends on when fish are ready/when required. BEE is not applicable as aquaculture is a small part of overall operation. It is impossible to measure water use. 'Extension services' are not really a barrier to entry. 'Permitting' and 'technology development and transfer' applied as government measures important to their operation.
- The main issue is financing and co-operative aquaculture. These two issues are severely neglected. No financial institution wants to finance aquaculture. I have tried all of them. Skills and knowledge are wasted if preparation can not meet financial opportunity. I idled 15 years in Aquaculture (my only income in the "NEW SOUTH AFRICA") only because of limited facilities and a lifesaving sound knowledge base. Business growth is a myth without a financial injection. I would like to see investment trust change in future.
- One of our customers, to whom this is copied, mentioned that the Government would do well to investigate what went wrong at Amatikulu Hatchery, in Natal. If you are not acquainted with it, I am sure Neil Stellard would be well placed to advise. Another point, albeit an obvious one: if the government wants to stimulate aquaculture, there is no point in investing in aquaculture farms if those farmers' lives are not provided with more protection. The owner of our farm was killed in 1996 and we very narrowly escaped death 2 years ago on the same farm. The police have done very little to catch the attackers, although their clear intention was to kill us - if I had not been trained in self-defence I would not be typing this today. This, the police say, is because they are overloaded - which they are and we sympathise but the Govt needs to do something about it, we all know. This comment can apply to every single person in SA, I know, but farmers are especially vulnerable with no local police stations and no visible policing of their areas, and the old commando structures disbanded. And the point of view that farmers abuse their workers so it is no wonder they are always



being attacked certainly does not apply to us. I have worked in development my entire working life and am a trained HR Consultant by profession. Our farm is entirely labour law compliant and we do the best we can for our workers within financial constraints. Our information is that the attackers in our area are thugs from local townships who target farms and then retreat back to the townships with their spoils, leaving rural workers with traumatised employers - and often dead employers and no jobs.

- Netting for bird lines. With your contacts with various government departments you may be in a position to enquire: A friend from New Zealand suggested to us many years ago that we try to get hold of the fishing nets confiscated by govt. from illegal fishing vessels to use over our ponds as bird lines as the costs of covering our ponds is prohibitive. All our many enquiries over the years have met a dead end. Apparently, in New Zealand they either destroy such nets or give them away. Do you have any idea what happens in SA? If the relevant authority could be persuaded to make them available to the aquaculture industry, it would assist us in being environmentally sound, provided they either passed on nets about to be destroyed or made them available at affordable prices. I hope I'm not inundating you but it would be great if we could make productive use out of a resource that may be wasted at the moment - but we are not sure about this - can't get the info.



6. Conclusions

This benchmarking report has provided a summary of the detailed tabulated findings of the survey of aquaculture producers in South Africa. We now turn to concluding remarks on the data as set out in Chapters 3, 4 and 5, and address aquaculture production, enterprise development and the state of the aquaculture industry in the sections below.

6.1 Production

- The aquaculture sector, inclusive of both marine and freshwater production, is geographically distributed across all nine provinces in South Africa.
- The total combined value of production for both marine and freshwater production in South Africa in 2005 was R104.2 million. Marine production, primarily abalone, contributed R90.5 million and freshwater production, primarily ornamentals and trout, contributed R13.8 million.
- Production volumes, excluding individual fish, were 1,571.31 metric tons in 2005, of which marine contributed 1,052.19 metric tons and freshwater production 519.12 metric tons.
- Although there are numerically more freshwater farms, the marine producers contribute more to production in terms of volumes and values in the sector.
- The potential for increasing production yield is reported by 79.7% of aquaculture producers in South Africa therefore providing a positive indicator for potential sector growth.
- 32.8% of all respondents indicated that they export aquaculture product, mainly to Asia but also to Africa, Europe and the Americas.
- 39.1% of all respondents indicated that they import product to support their aquaculture operations.
- The Western Cape has the largest number of marine and freshwater producers in the country. However, it is the coastal region of the Western Cape, and the marine sub-sector specifically, that provides the economic hub for aquaculture production in the country and the most significant contribution to GDP in terms of exports.

6.2 Enterprise Development

- There is a high level of business formalisation in the South African aquaculture industry. 51.6% of all operations are registered as propriety limited (Pty Ltd) companies and a further 23.4% as close corporations. The marine sub-sector is more highly formalised than the freshwater sector with more Pty Ltd firms.
- The aquaculture sector, while showing evidence for farms older than 25 years, is a fairly young sector. Most have been operating for less than 10 years.
- There seems to be more aquaculture opportunities identified in the freshwater sub-sector than among marine producers in the last 5 years (that is since 2001) with 21 firms entering the market.
- Unlike the mainly larger marine operations, freshwater operations support commercial, recreational as well as subsistence farming.
- 57.8% of all farms fall into the category of small-scale commercial / smallholding (that is, with a turnover of less than R5 million per annum). Commercial / industrial production, with a turnover of more than R5 million per annum, was made up by 23.4% of operations.
- Currently, the source of funding for aquaculture enterprises more commonly identified was private capital.
- 6.3% of all aquaculture producers reported some form of investment by the fishing industry in their aquaculture operations.



- 56.3% of producers are geared or are gearing toward black economic empowerment (BEE) while 43.8% do not have a BEE component at present. A total of 26.6% of all producers' surveyed reported BEE at ownership level within aquaculture enterprises.
- Employment patterns with the aquaculture industry show that there is a steady increase in full-time (permanent) jobs within the sector from 2001 to 2005.
- In 2005, full-time employment totalled 810, and part-time totalled 124.
- Part-time employment patterns for the aquaculture sector shows a steady increase in jobs created seasonally to 2005 after a dip in opportunities in 2002.
- 29.7% of all survey respondents reported employing temporary workers on a seasonal basis. However, on a month-to-month basis the number of respondent hiring temporary staff fluctuates. The season of October through to February shows the peak of seasonal employment.
- 73.4% of all respondents indicated offering human resource development or skills development programmes to employees. More operations conduct in-house programmes to provide staff with technical training or other work-related skills than use outsource partners to provide the required training or skills development programmes. This trend also applies to mentorship programmes offered by producers.
- The aquaculture training and skills needs identified by producers range across occupational categories and address professional, skilled, semi-skilled and unskilled human resource development needs.
- 62.5% of respondents called for SETA accredited short courses that provided technical and business training in aquaculture production.
- The primary business processes reported among all producers were spawning, fry rearing / weaning and grow out.
- The most frequently mentioned farming method within both sub-sectors are tanks, recirculation and raceways. Among marine farming methods, basket and tanks are ranked highest with the most mentions followed by and pump ashore as preferred farming methods. The most frequently mentioned farming method among freshwater producers are tanks and earth ponds followed by the use of recirculation pumps and circular ponds.
- Marine producers draw their water source primarily from the ocean and in one instance an estuary. Freshwater producers draw water for their operations from a range of water sources, namely: rivers, dams, natural springs, rain water, mountain streams, and canals (1.6%). The use of municipal (tap) water and borehole water was common among all respondent and regions.
- In assessing natural resource management planning, 35.9% of all respondents indicated that they had implemented water treatment plans.
- Although many respondents did not have the systems to measure their water in-flow and out-flow and therefore could not provide information on their water utilisation within their operations, over half of the respondents did provide data on water utilisation for aquaculture production. In reporting on the maximum and minimum water in-flow and out-flow from their operations, there is evidence that there is little water loss, if any, during aquaculture activities. In other words, there were few instances reported where aquaculture production actual consumes water during farming operations.

6.3 Sector Development

- Survey participants reported that they held membership, or were affiliated to, a wide range of industry associations or bodies demonstrating that both the marine and freshwater sub-sectors show that the South African aquaculture industry is well-structured via species specific representative bodies that themselves have representation on AASA's EXCO.



- Key environmental issues to be addressed are: quantity of water supply, quality of water supply, site location, disease management, and feed practices. Among marine producers a further issue of water pollution also needs to be addressed.
- Key environmental regulatory issues to be addressed are: best practice management guidelines, sanitation programmes, veterinary programmes, legislation (policy and act), and biodiversity regulations. Among marine producers a further issue of zoning also needs to be addressed.
- Key barriers to entry into the aquaculture sector that need to be addressed are: environmental regulatory requirements, site selection, access to research and technology development, access to finances, and permitting. Among marine producers a further issue of processing also needs to be addressed and among freshwater producers a further issue of access to skilled labour needs to be addressed.
- Key issues pertaining to required government support that need to be addressed are: permitting, promotion of the aquaculture industry, development of a strategic plan for the sector, capacity building and facilitating finance and investment. Among marine producers a further issue of technology development and transfer also needs to be addressed and among freshwater producers a further issue of infrastructure support needs to be addressed.
- The need for a sector development agency was supported by industry. The key areas for sector development interventions identified were: promote South African aquaculture (nationally and internationally), ensure education, training and skills development of aquaculture know-how, act as an advisor to government on legislation and policy, promote trade in aquaculture products, and co-ordinate research. Among marine producers these needs also included: monitoring of food and water quality to ensure export of aquaculture product, identify and zone areas for aquaculture development, and act as a one-stop-shop.



7. Recommendations

We hope that the content of this document will provide all concerned with a better understanding and insight of the South African Aquaculture Sector and that National Government and the provincial departments of the nine provinces, as well as the agencies geared toward development will use it as a basic platform from which to plan their developmental strategies, strategic plans and interventions. The intention is to make the content of this document available to the FAO in an effort to update the statistical information available on the South African Aquaculture Sector. This document will also be made available on AISA's website (www.ai-sa.org.za) on the 'Publications' page, under the section 'Reports'.

With a clearer understanding of the industry and the issues preventing the industry from growing to its full potential, the question remains: "How do we collectively and cooperatively address these issues? Several recommendations follow below together with examples of how the Western Cape Province is currently addressing some of these issues:

7.1 Consultations with Aquaculture stakeholders on survey findings

A rich data set informs this report. It is recommended that AISA facilitate stakeholder engagements/presentations among government, associations and industry on the implications of this data for sector development and planning so as to draw out further implications from the research for the South African aquaculture sector.

7.2 Aquaculture Legislation (policy and act)

Existing legislation, originally drafted for entirely different purposes than the regulation of Aquaculture, currently effectively impacts on the establishment or conduct of Aquaculture activities. The current legislative situation is perceived by potential investors as sufficiently fragmented and cumbersome to largely deter Aquaculture Sector development from taking place. It should therefore be a central priority of Government to streamline legislation by drafting a National Aquaculture policy and putting in a place a separate Aquaculture Act in which aquaculture-related provisions contained in existing legislation (modified where appropriate) will be incorporated or referred to.

In 2003, NDA mandated AASA to run an open and transparent workshop in order to draft a policy document for both marine and freshwater aquaculture. This draft policy was handed to NDA who then made changes internally. This document was submitted at a MinMech meeting where it was approved. During 2005, DEAT:MCM drafted a marine aquaculture policy while NDA were almost at the point of gazetting their policy toward the end of 2005. It was at this point and out of concern that two different policies will further fragment the Aquaculture Sector, when AASA, SAWG, NAWG and AISA approached NDA to convene a policy workshop.

The National Department of Agriculture (NDA) initiated and convened the first National Aquaculture Sector Workgroup (ASWG) in November 2005 were all the national departments involved with aquaculture, the provincial departments of all nine provinces involved with aquaculture and the chairpersons of AASA, NAWG, SAWG and AISA were invited to take part in transparent discussions around a National Aquaculture Policy. The outcome of this meeting was that NDA and DEAT:MCM will amalgamate the two policies so that one National Aquaculture Policy can be drafted. Since then, DEAT:MCM has taken the lead in the amalgamation process.

It is recommended that once inter-governmental commenting on this document has finished, that another national ASWG meeting is arranged where the document can be discussed and thereafter be opened to the public for a public comment process.

7.3 Aquaculture Strategic Plan

To date, there has been no national integrated aquaculture (marine & freshwater) strategic plan. It is recommended that a national Aquaculture Strategic Plan is developed to identify specific outcome based interventions to ensure the development of sustainable aquaculture in South Africa. Such a strategic plan should take the National Aquaculture Policy (currently undertaken jointly by the National Departments of Agriculture and Environmental Affairs & Tourism) into consideration. Strategic plans on provincial level should follow and link in with a national initiative.

Example (addressing 7.3):

- ◆ *The Water Research Commission (WRC) in association with the Department of Agriculture (NDA) is currently in the process of finalizing strategic plans for aquaculture development in North West, Limpopo, Free State, Mpumalanga and KwaZulu Natal. There is also talk of extending this to the Northern Cape.*



- ◆ *In the Western Cape; the Provincial Development Council (PDC), DEDT and AISA are planning the first workshop in order to obtain a common vision amongst stakeholders to develop a Fishing & Aquaculture Strategic Plan for the Western Cape.*

7.4 Ongoing Benchmarking Research

The reporting on aquaculture production and industry dynamics (focused on the collection of statistical data) is not systemised within any South African government or agency unit. This report provides a benchmark of the South Africa aquaculture producers. It is recommended that the collecting of industry statistics be conducted bi-annually and should be a collaborative programme between AISA, government, economic development agencies. The research should be standardised and the reported to the FAO of the United Nations.

As part of that process, there is a need for an annual update bibliography of all sources, published and unpublished pertaining to aquaculture. This resource should be housed centrally for all stakeholders to access. AISA should provide a link to this resource on their website.

7.5 GIS Mapping

It is recommended that a GIS mapping exercise be undertaken to develop a spatial overview of the national aquaculture industry. This mapping process can be initiated by using the postal codes provided by producers in the database. A further step would be to visit farms and capture GPS coordinates in order to map and zone areas for aquaculture activity, as well as zoning species specific areas.

There is a need to identify, secure, and where appropriate promote suitable, species specific, sites for future investment opportunities. The lack of “ready to invest” sites zoned for aquaculture is seen as one of the most significant impediments to rapid growth and investment. The process to gain approval for access to sites is time consuming and costly and involves the evaluation of a variety of issues across physical, biological, ecological, economic, social and legal dimensions. Identification of sites that have full or partial approval for aquaculture will have significant impact on the marketability of aquaculture, and subsequent investment and development.

Example (addressing 7.4 & 7.5):

AISA is working with the Western Cape provincial DoA to develop an integrated inter-governmental Aquaculture Development approach. This project is due to start August 2006 and will include a baseline survey (with the aim to updating the Western Cape component of the Benchmarking survey every 2 years), mapping aquaculture initiatives & zoning for aquaculture so that an integrated inter-governmental aquaculture development approach is taken in the Western Cape. The map generated by this project will be accessible to industry and government.

The progress and outcomes of the project will be reviewed and discussed by the Western Cape Aquaculture Review Committee.

7.6 Best Management Practice (BMP) Guidelines

BMP's are not only necessary to ensure, for example, competitiveness of the industry and consumer safety but also to reduce threats to the environment and closures by regulatory authorities and consumers. Urgently required are BMP's on the minimum requirements necessary to ensure

- ◆ the conservation of the environment
- ◆ food safety for the consumer (processing and packaging of products)
- ◆ disease free animals

The regulatory authorities should, in partnership with the South African Bureau of Standards (SABS) and industry work towards drafting these guidelines.

7.7 Water treatment planning, scarce water resources, water utilisation

Although this document indicated that aquaculture is not consuming water, the quality and availability thereof is very important. When mapping and zoning were to take place (see example in section 7.4 and 7.5), the project team should consider issues such as the availability of water resources (river systems, dams) and the quality thereof.

7.8 Time consuming application processes for EIA's, permits etc.

With the current system, a single farmer has to engage across all three spheres of government in order to start a business. To obtain a site, the ‘want-to be farmer’ has to engage with local government or Port-Net (in the case of marine farming) for land lease or water lease respectively. An EIA has to be approved from



provincial government, a permit to farm or transport animals has to be obtained from provincial government (in the case of freshwater farming) and from national government (in the case of marine farming). To export, permits/certifications must be obtained from local (Health), provincial (DoA) and national government (DEAT: MCM) as well as the SABS (see also section 7.15). The entire application process is time consuming, complicated (with a range of regulatory departments spanning across all three spheres of government) and expensive. A user friendly, timely and streamlined approval system is required.

7.9 Capacitating/training of government officials

Currently the capacity within government departments to effectively deal with aquaculture is inadequate. Where government departments do not have officials that have formal training in aquaculture, the approval of applications, the assessment of systems etc, staff with the necessary training should be employed and training should be made available to these officials

7.10 Inter-departmental politics vs. inter-departmental cooperation

Authorities that are misinformed or unclear on processes can easily avoid misunderstandings and unnecessary delays in issuing permits by communication and agreeing on a cooperative protocol.

Example (addressing 7.6 – 7.10)

- ◆ *Department of Environmental Affairs & Development Planning (DEA&DP) with assistance from AISA have recognized the need to develop measures and guidelines to manage and promote sustainable aquaculture. The deliverables of this project is a position statement for DEA&DP on aquaculture, an Environmental BMP Guideline for aquaculture, clarity on permitting processes/authorisation protocols in the Western Cape (flow-charts to be placed on AISA's website) and capacitating & training of government officials on these protocols.*
- ◆ *The progress and outcomes of the project are reviewed and discussed by the Western Cape Aquaculture Review Committee. Any enquiries received by the various WC provincial departments with regards to starting a business are referred to AISA and its website. It is envisaged that this group will meet every two months to discuss projects and improve coordination and cooperation within the Western Cape.*
- ◆ *On a higher level, the Western Cape Premier's Office Chief Directorate: Governance and Integration has recently formed the Inter-governmental Fishing & Aquaculture Task Team with its main aim is to coordinate the cooperation of the provincial departments through the MEDS (which was drafted by the DETD).*

All three the above are inter-linked.

7.11 Cross-sector Linkages

The marketing and promotion of aquaculture produce in South Africa requires a programme of identifying and evaluating industry cross-linkages. For example, an assessment should be made of those regional and local tourism initiatives (such as festivals, destination development planning, design of aquaculture related craft and design of aquaculture routes) that would promote specific aquaculture products. Other linkages with the mining, wine and other agricultural sectors should look to addressing seasonality.

7.12 Seasonality of employment

Seasonality of employment is not only common in aquaculture but also in various other sectors. The possibility of sectors cooperating to reduce this seasonality should be investigated. The possibility, especially in the case of the freshwater aquaculture sub-sector of farming with multiple species (a winter species as well as a summer species) should be investigated in order to overcome seasonality. The possibilities stemming from these investigations should be captured within strategic plans (such as those discussed in section 7.3).

7.13 Promotion of the Aquaculture Sector

The responsibility of promoting the sector lies across organisations, government departments and industry and it is recommended that a cooperative approach is taken to address this issue. Various options are possible and should be discussed amongst stakeholders such as festivals, aquaculture routes similar to wine routes, promotional advertising etc. It is also recommended that a project to give the aquaculture sector some positive publicity be discussed amongst the SPV's such as the Cape Film Commission. Such a project could then feature on, for example, Special Assignment or 50/50.

7.14 Cluster Development as a means for Sector Planning

The concept of cluster development, as a policy initiative supporting economic development, is a useful framework for developing the national aquaculture sector and should be considered in any sector planning.



As noted in the introduction, clustering addresses sector development in which “firms and others within a concentrated geographical area co-operate towards common goals, and establish close linkages and working alliances to improve their collective competitiveness.”²⁰ Clustering operates at the national, regional and local levels and strategies to support industry clustering across these levels require coordination by a sector development agency.

Nevertheless, a distinction should be made between geographic industrial clustering and strategic networking.²¹ Geographic clustering focus on the local level and addresses supporting infrastructure, inter-firm linkages, job creation and access to skilled labour, and strengthening linkages with locally based suppliers and services. The next step is looking at inter-cluster linkages between regions to provide an overall national cluster strategy for aquaculture. This implies encouraging strategic networking between small- and industrial-scale aquaculture enterprises, the formation of “co-operative relationships between both competitors and links in the supply chain.”²² Strategic networking also looks at strengthening linkages between universities and research organisations (knowledge production) as well as government agencies and commercialisation agents (enabling participants and intermediaries as well as the provision of market information).²³ The overall aim of clustering is directed towards industry innovation, growing the domestic market and international competitiveness.

However, it should be noted that “clusters start naturally, but the development of clusters does not need to be left to chance.”²⁴ In terms of the character of the South African Aquaculture Sector and the predominance of marine and freshwater production volume and value residing in the Western Cape, it is recommended that the drive for aquaculture’s sector development (that is aquaculture industrial cluster development support programme) should come from a sector development agency near to the economic hub of the sector in the Western Cape.

Example (addressing 7.11 – 7.14):

- ◆ *In the Western Cape, DEDT has a Special Purpose Vehicle (SPV) programme and through this programme the SPV’s such as the Boatbuilding Initiative, Cape Oil and Gas Initiative, Cape Craft & Design Institute, Wesgro, AISA etc. were born. To assist the SPV’s to think laterally and find commonalities (such as joint promotional projects, overcoming seasonality in employment), the SPV forum has been called and will be meeting from August 2006.*
- ◆ *DEDT recently convened a Cluster workshop to update and inform all the SPV’s on the advantages of cluster development and the expert in DEDT on cluster development agreed to address the SAWG at their next meeting with regards to cluster development as a means of sector planning.*
- ◆ *Even though the project with the Airports Company of South Africa (ACSA), City of Cape Town and Cape Town Routes Unlimited to showcase approximately eight different sectors (one of which the aquaculture sector) at the Cape Town International airport has been halted until further notice by the City of Cape Town, the example is nevertheless a good example how various organisations can work together to reach the same goal.*

7.15 Research & technology development, AND transfer

Historically, research and technology development have been driven by the interest of researchers at research facilities and often unknowingly projects are duplicated. To ensure that funds are spent more wisely and that the research is industry needs driven, it is recommended that more consultation between parties take place and that a research coordination function is incorporated into a sector development agency (such as AISA) or a government department (such as the National Department of Science and Technology – DST). The strength of research institutions should be considered when research projects are funded; in so doing various components of the same project can be addressed without duplication. It would also be a useful exercise for workgroups (such as SAWG and NAWG) and the species associations to compile a sensible ‘wish-list’ of research projects with which to approach research institutions. Research and the development of technology often does not reach industry merely because South Africa does not have a well-funded

²⁰ See Cluster Navigators, *Managing Clusters*.

²¹ See Mike Morris, Justin Barnes and Nikki Dunne, “From Import Substituting Industrialisation to Globalised International Competitiveness: Industrial Restructuring in a South African City,” in Bill Freund and Vishnu Padayachee (Eds), *(D)urban Vortex: South African City in Transition*, (Pietermaritzburg: University of Natal Press, 2002), p. 114-117.

²² Mike Morris, Justin Barnes and Nikki Dunne, “From Import Substituting Industrialisation to Globalised International Competitiveness, p.116.

²³ Innovation Lab Australia, 2002, p.1.

²⁴ Cluster Navigators, *Managing Clusters*, p.10.



vehicle with which to transfer that technology to farm level in the form of, for example, of pilot projects. Methods of how to transfer technology should be investigated.

Example (addressing 7.15)

The Abalone Farmers Association of Southern Africa (AFASA - secretariat based in the Western Cape) is formalised in such a way that every member pays a fee toward a communal fund. Acknowledging the fact that competition does exist between the farmers, together they identify research projects that is too big to be undertaken by one farmer only. Projects are written into short project proposals and negotiated with research institutions whilst offering on-farm research facilities and co-funding.

7.16 Skills Audit

A further, more detailed, study should be undertaken to conduct a skills audit of the South African Aquaculture Sector. This should go further in assessing training and skills development needs for human resource development within the industry (and government) in order to guide government and tertiary educational institutions as to the training requirements and job creation opportunities within the sector. Scarce skills should be investigated and training in these areas should be support (see also section 7.17, 7.18).

7.17 Health and food safety of Aquaculture organisms to ensure consumer safety

The proposed collective responsibility by the national DEAT: MCM, the provincial DoA, local Health authorities, SABS and even testing laboratories such as the CSIR urgently requires formalisation and coordination. The lack thereof, the need for capacity, training in scarce skills (such toxin analysis, molecular genetics, disease diagnoses) specific to aquaculture, and the lack of high-tech and expensive equipment are currently the main reasons for South Africa not being able to export to the European Union and America. According to the survey the coordination and even monitoring should reside with a sector body such as AISA, whereas the regulation thereof should remain the regulatory responsibility of DEAT: MCM and DoA with the SABS as the competent authority.

Further to this dilemma are the costs involved with the analysis of samples (samples must be tested for toxins produced by phytoplankton, presence of phytoplankton species, diseases, heavy-metals etc.), the time involved in the analysing samples, the costs and time involved the collection of samples; all of which are considered in an EU audit. In a country with a huge aquaculture industry such as New Zealand, a Food and Water quality programme is sponsored largely by the industry. On the contrary, in a country with a small aquaculture industry such as Ireland it is sponsored largely by government. In South Africa, stakeholders (inclusive of the DTI and industry who financially played a major role in initiating such a programme) might consider discussions around sponsoring a Food and Water quality programme based on a slip-scale subsidy (i.e. the larger the company income the smaller the subsidy and vice versa). The costs involved in such a programme are considerable and a good example of how cautious regulators should be when applying regulations, since the possibility exist that small-scale farmers could close down if careful consideration is not given to how regulations are applied.

7.18 Feed development

Nutrition and feeding strategies play a central and essential role in the aquaculture sector and feed development must be undertaken by understanding the dietary requirements of cultured species, including their application to practical culture conditions. Developing species-specific broodstock and larval diets are particularly important. A small scale farmer can at times experience situations where the costs involved in importing feeds exceeds the profit obtained from selling his/her product, a fatal situation for a SMME. The support for researching the production, the ingredients of feeds and the ratios thereof and the skills involved in doing so are minimal in South Africa. Government and industry should engage to discuss these issues.

7.19 Export knowledge and training

Knowledge of how to go about exporting is often also a stumbling block. Training workshops should be provided by sector development agencies.

Example (addressing 7.19)

In the Western Cape, one of the SPV's namely Wesgro (responsible for trade and investment in the Western Cape) regularly run beginner and advanced export training workshops.

7.20 Funding assistance and Investment



As stated earlier, currently the main source of funding in the sector is private capital with a very small percentage of domestic investment and loans as well government assistance. There is a great need within industry for the facilitation of financing and investment. After the AASA conference where AISA convened a Finance Workshop, AISA invited financial institutions such as ABSA, Wesgro, industry, government (DEDT and DTI), the Development Bank of South Africa (DBSA) and the IDC to a follow-up workshop in order to discuss how they feel about financing aquaculture initiative, what it is they require when applicants apply for funding and how better we can assist them when considering financing aquaculture initiatives. Although the DTI, DBSA and IDC could not attend the workshop they sent Powerpoint presentations to address the issues above. Institutions such as ABSA, IDC and the Dti have information on their websites guiding applicants to the information they require from applicants in their business plans (reference to these sites are available on AISA's website). There is a general feeling of caution when receiving aquaculture applications as a result of past failures, and these institutions indicated that an effort should be made in documenting the success stories, hence the documentation of the two case studies accompanying the Benchmarking Survey. A lack of general information about the sector, such as the information presented in this report were also pointed out, and it is recommended that a booklet be published which can be used to promote the sector and inform/educate potential investors and financing institutions. In the Western Cape, Wesgro actively works toward attracting investment (and has on several occasions liaised with AISA in this regard). On a national level this responsibility lies with the DTI.

7.21 Infrastructure support

Concern has been raised about infrastructure support and it is recommended that industry familiarise themselves with incentives provided by the DTI, information in this regard is available on AISA's website.

7.22 Value adding to products

There is certainly a great need to investigate how value can be added to products before selling the product. These possibilities should be supported by stakeholders and linked with strategic plans being developed for the various provinces.

7.23 Market Research

It is common knowledge that sector development should be market driven yet there is a total lack of market information and market research in South Africa. It is recommended that sector development agencies investigate possibilities in this regard and that the issue around market research is addressed within strategic plans currently being developed in order to improve the industry's access to local and overseas markets.

7.24 Small Enterprise Development and SMME opportunities

Due to negative publicity in the past, there is a need to document successful case studies of small and medium enterprise development and cooperative initiatives within the industry. These case studies would offer insights into opportunities for entry into the aquaculture sector as well as highlight the challenges and business support needs of emergent aquaculture farmers. They would also inform how the aquaculture cluster would support small enterprise development and develop appropriate enabling policy. There is a further need to discuss and investigate the feasibility of SMME opportunities such as the harvesting of by-products present when farming with oysters, using shells for craft such as buttons (examples from the ostrich industry can also be investigated) and jewellery, making confiscated nets from illegal fishing activities available to the aquaculture sector as bird netting.

Further small business opportunities within the aquaculture supply chain should also be assessed (for example, transporting product, harvesting of associated species on an existing farm, processing B-grade product, or retailing product as an alternative to catch industry product in the rural areas as an additional protein source). These are discussed in more detail in the document containing the two case studies that were conducted in conjunction with the Benchmarking Survey.

7.25 Lack of communication, availability of information geared toward sector development

Concerns from industry exist with regard to misunderstandings that take place when authorities do not communicate (i.e. permits not being issued without water lease and vice versa), government not being transparent with what they are planning with regard to aquaculture and the lack of information necessary for sector development and new entrants. It is recommended that all stakeholders (including government) make a genuine attempt to attend meetings such as the NAWG, SAWG, MCM mariculture liaison meetings, that new entrants join species specific associations, that industry takes the responsibility upon themselves to read the Aquaculture Newsletter (co-produced by AASA and AISA) and visit AISA's website where they will find the necessary information to assist them in their way forward.

7.26 Safety of farmers/farm killings/HIV&AIDS

Issues such as the safety of farmers and HIV & AIDS are of importance to every South African. It is recommended that farmers collectively use forums and workgroups (such as NAWG) to take their concerns



and fears with regard to their safety on their farms to government and politicians for discussion. They should further involve themselves with initiatives were the communities and the police forces work together to ensure their safety. Farmers could also take responsibility of educating their workers by explaining the that the farm workers could loose their jobs if farm owners have to sell their farms, and that they should assist the farm owner to ensure safety on the farm for the owner and the worker. With regard to HIV & AIDS in the workplace, it is recommended that farmers obtain free brochures from government and clinics to place it in the workplace in order to educate themselves and workers. Farmers should also ensure that their workers are aware of the closest clinics were treatment can be obtained.

7.27 Farm visits

There is a concern among some industry members that regulating authorities visit farms without prior notice. It is recommended that authorities make arrangements with farmers prior to visiting the farms and that industry receive government within a cooperative manner.

7.28 Need for a sector development agency (see section 5.6)

The need for a sector development agency specifically for aquaculture was supported by industry. Although all areas were scored almost equally as high, the key areas for sector development interventions identified were: promote South African aquaculture (nationally and internationally), ensure education, training and skills development of aquaculture know-how, act as an advisor to government on legislation and policy, promote trade in aquaculture products, and co-ordinate research. Among marine producers these needs also included: monitoring of food and water quality to ensure export of aquaculture product, identify and zone areas for aquaculture development, and act as a one-stop-shop.

In conclusion, it might well be that not all agree with the recommendations made above or that some of the examples will have to be slightly adopted to work within the other provinces, but the objective here was to stimulate ideas and people to cooperatively and collectively work toward developing the sector. It is however very encouraging that some provinces (such as KwaZulu Natal) made contact with AISA regarding the examples listed here (and on AISA's website in the form of projects) in order to set-up similar initiatives in their own provinces.



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Annexure I – Cover letter and Questionnaire of the Benchmarking survey

Dear Stakeholder

24 April 2006

Re: Aquaculture Sector Benchmarking Survey

The objective of this study is to benchmark the Aquaculture Sector in order to provide reliable industry statistics, insight into the sector's contribution to economic development and insight into the value chain in order to establish the developmental opportunities within the sector.

Your responses are crucial to our gaining a clear understanding of the freshwater and marine aquaculture sector. All information collected will be treated as confidential and only aggregated data will be publicised.

The study has been initiated by the Aquaculture Institute of South Africa (AISA) in response to stakeholder demands for relevant and reliable industry statistics. Financial support is provided by the DEDT and DWAF. This benchmarking survey will be used to inform policy and sector development strategies aimed at supporting the Aquaculture Industry. The findings will be available as a public resource and inform FAO country reports.

Please ensure that your responses are submitted by no later than **3 May 2006**. If you can think of any other party that in your opinion should complete this questionnaire, please feel free to let us know so that we can contact them. Should you have any queries regarding this questionnaire, please contact:

Dr. Lizeth Botes (PhD)

Acting CEO

Aquaculture Institute of South Africa (AISA)

Email: lbotes@ai-sa.org.za



QUESTIONNAIRE - 2006 AQUACULTURE INDUSTRY BENCHMARKING STUDY

PLEASE ANSWER ALL QUESTIONS IN THIS SURVEY.

1. RESPONDENT PROFILE

1.1 Your name:

1.2 The name of your company / project:

1.3 What is your job title (position) in the company / project?

1.4 Please could you confirm your company / project contact details:

Physical Address:
Postal Address:
Telephone number:
Cell phone number:
Fax number:
Email address:
Website address:

2 COMPANY / PROJECT PROFILE

2.1 Company / project registration

Pty Ltd	Closed Corporation	Sole trader	Cooperative	Trust	Not registered
Other (please specify):					

Indicate answer with "X" or specify registration.

2.2 How many years has company / project been in operation?

< 1	1 – 5	6 – 10	11 – 15	16 - 20	21 - 25	> 25
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Indicate answer with "X".

2.3 In what sub-sector of the aquaculture industry do you operate?

Marine	Freshwater
Other (please specify):	

Indicate answer with "X" or specify sub-sector.



2.4 What species do you farm?

Marine	Abalone		Finfish	
	Eel		Mussels	
	Ornamental fish		Oysters	
	Prawns		Seaweed	
	Other (please specify):			

Indicate answer with "X" or specify other species farmed.

Freshwater	African Catfish		Bass	
	Carp		Eel	
	Goldfish		Koi Carp	
	Labeo		Marron	
	Mullet		Nile Crocodile	
	Ornamental fish (various)		Rainbow Trout	
	Shrimp		Tilapia	
	Trout		Water Hawthorne(Waterblommetjies)	
	Other (please specify):			

Indicate answer with "X" or specify other species farmed.

2.5 How would you describe the scale of your operations?

Commercial / industrial production (> R5m p.a. turnover)	Small-scale commercial / Smallholding (< R5m p.a. turnover)	Community project / cooperative
Other (please specify):		

Indicate answer with "X" or specify scale of operations.

3 ENTERPRISE VALUE CHAIN

3.1 Which business processes are included within your company's / project's operations?

Spawning	Fry rearing / Weaning	Grading
Grow Out	Processing	Packing
Distribution	Other (please specify):	

Indicate answer with "X" or specify business process.

3.4 What farming method/s does the company / project use? (question continues on p.3)

Baskets	Yes	No
Cages	Yes	No
Long line	Yes	No
Racks	Yes	No
Rafts	Yes	No
Recirculation	Yes	No
Tanks	Yes	No
Pump ashore	Yes	No
Trays in ponds	Yes	No
Earth ponds	Yes	No



Circular ponds	Yes	No
Urban ponds	Yes	No
Raceways	Yes	No
Other (please indicate):		

Indicate answer with "X" or specify farming method.

4 VALUE AND VOLUME OF PRODUCTION

4.1 What were the total volumes (in metric tonnes) and the total values (annual turnover) of production of species for the years 2000 - 2005?

Year	Species	Volume (metric tonnes)*	Value (R's)	Total (%)
2005				
2004				
2003				
2002				
2001				
2000				

*In the case of ornamental fish and crocodiles, please indicate individuals produced.

4.2 Is your company / project operating at full capacity (100%)? If no, please indicate percentage capacity utilisation for production:

>10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
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Indicate answer with "X".

5 MARKETS (DOMESTIC, EXPORT AND IMPORT)

5.1 Please indicated the percentage volume and value of production per species supplied to the domestic market:

Market	Species	% Volume (metric tonnes)*
Eastern Cape		
Free State		
Gauteng		
KwaZulu Natal		
Limpopo Province		
Mpumalanga		
Northern Cape		
North West		
Western Cape		

*In the case of ornamental fish and crocodiles, please indicate individuals produced.

5.2 If you export, when did you begin exporting?

Species	Year



5.3 Which exports markets do you supply product?

Region	Species	% Volume (metric tonnes)
Africa		
Americas (North, Latin, South)		
Asia		
Europe		
Middle East		
Oceania (Australia / New Zealand)		

5.4 Do you import aquaculture products?

Yes	No
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5.5 If yes, what products do you import?

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6 EMPLOYMENT

6.1 What are your past, current and future year-on-year *permanent* employment trends per skill level* and historical racial classification**? (A permanent employee works full-time for the company / project).

Year	Professional				Skilled				Middle Services				Semi-skilled				Unskilled				Total
	B	C	I	W	B	C	I	W	B	C	I	W	B	C	I	W	B	C	I	W	
2001																					
2002																					
2003																					
2004																					
2005																					
2006																					
2007																					
2008																					
2009																					

Please indicate number of employees per category per year.

* Definitions: professional = upper management, scientist; Skilled = technicians, artisans; middle services = clerical, semi-skilled = secondary, some secondary education, unskilled = no formal training.

** As per Statistics South Africa categories: B = Black South Africans, C = Coloured, I = Indian, and W = White.



6.2 What are your past, current and future year-on-year *temporary* employment trends per skill level and historical racial classification? (A temporary employee works for the company / project on a part-time basis or as per seasonal requirements, e.g. harvesting).

Year	Professional				Skilled				Middle Services				Semi-skilled				Unskilled				Total
	B	C	I	W	B	C	I	W	B	C	I	W	B	C	I	W	B	C	I	W	
2001																					
2002																					
2003																					
2004																					
2005																					
2006																					
2007																					
2008																					
2009																					

Please indicate number of employees per category per year.

6.3 Please indicated which months of the year you use part-time (temporary) employees:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
-----	-----	-----	-----	-----	-----	-----	-----	------	-----	-----	-----

Indicate answer with "X".

7 HUMAN RESOURCE DEVELOPMENT AND SKILLS DEVELOPMENT

7.1 Does the company / project offer human resource development and skills development programmes to its staff?

Yes	No
-----	----

7.2 If yes to 7.1, what programmes are offered? Please indicated whether the programme is conducted in-house or outsource to a training organisation:

Mentorship	In-house	Outsource
Training	In-house	Outsource
Skills development	In-house	Outsource

Indicate answer with "X".

7.3 Please indicate your current training/skills requirements:

7.4 Please indicate your future training/skills requirements for 2007 - 2009:

7.5 Do you perceive the need for a National Qualification Framework for the aquaculture sector that includes the development of one or more of the training options listed below?

Postgraduate diploma	Yes	No
Degree	Yes	No
M.Tech	Yes	No
B.Tech	Yes	No
National Certificate	Yes	No
National Diploma	Yes	No
SETA accredited short course	Yes	No

Indicate answer with "X".



8 BLACK ECONOMIC EMPOWERMENT (OWNERSHIP)

8.1 What is the BEE status of your company?

Black owned (75.1- 100% black ownership)	Black empowered (50.1-75% black ownership)	Black influenced (25.1-50% black ownership)
Less than 25% black ownership	None, but we are planning for BEE ownership	None, but we are interested in seeking a BEE partner

Indicate answer with "X".

9 ENVIRONMENTAL MANAGEMENT

9.1 Please describe the source of your water supply:

River	Dam	Estuary	Ocean
Borehole	Municipal water (tap water)	Other water supply :	

Indicate answer with "X" or specify other water source.

9.2 Please indicate whether you have a water treatment plan for effluent:

None	Planned	Implemented
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Indicate answer with "X".

9.3 In order to understand aquaculture's non-consumptive use of water supply, how much water (in kilolitres) flows in and out of your operations

Maximum	In (kl)	Out (kl)
Marine		
Freshwater		
Minimum	In (kl)	Out (kl)
Marine		
Freshwater		

9.4 Please rate the importance of the following environmental issues to the operation of your company / project today.

Environmental Issues	1	2	3	4	5
Site location					
Water supply quantity					
Water supply quality					
Water use permits					
Water pollution (effluent)					
Impact of species on environment					
Impact of genetically modified organisms on environment					
Feed practices					
Chemical use					
Disease management					

Rating: 1 = not important, 2 = little importance, 3 = neutral, 4 = some importance, 5 = very important.



9.5 Please rate the importance of the following regulatory issues for environment management in general:

Regulatory Issues	1	2	3	4	5
Best practice management guidelines					
Zoning					
Nodes					
Legislation - Policy and Acts					
Biodiversity regulations					
Sanitation programmes					
Veterinary programmes					
Coordination by sector body					

Rating: 1 = not important, 2 = little importance, 3 = neutral, 4 = some importance, 5 = very important.

10 ENTERPRISE DEVELOPMENT

10.1 Please indicate your current sources of financing:

Domestic Investment and Loans	Foreign investment	Foreign aid	Government Assistance	Private Capital

Indicate answer with "X".

10.2 Have catch fishing industry owners invested in your aquaculture company / project to prevent loss of natural resources? If yes, please describe the nature of this investment:

Yes	No
Nature of investment:	

Indicate answer with "X" and/or indicate nature of investment.

10.3 Please rate the importance of the following barriers to entry your company / project currently faces in running an aquaculture operation:

Barriers to entry	1	2	3	4	5
Environmental regulatory requirements (e.g. EIAs)					
Site selection (zoning, leasing, discharge permits)					
Extension services					
Genetic modified organisms and exotics (importing permits, disease and pest control)					
Processing (SABS approval, public health issues, bans on exports)					
Tariffs for imports (protect domestic market)					
Permitting (time takes to issue, farming and capture of fish)					
Access to finance					
Access to skilled labour					
Access to Research and Technology Development					

Rating: 1 = not important, 2 = little importance, 3 = neutral, 4 = some importance, 5 = very important.

10.4 Please rate the importance of the following government support measure for your company / project:

Government support	1	2	3	4	5



Permitting					
Technology development and transfer					
Extension services					
Facilitate finance and investment					
Strategic plan for sector					
Infrastructure support					
Capacity building					
Promotion of aquaculture industry					

Rating: 1 = not important, 2 = little importance, 3 = neutral, 4 = some importance, 5 = very important.

11 SECTOR DEVELOPMENT

11.1 Please indicate which aquaculture industry bodies you are affiliated to:

Aquaculture Industry Bodies	Yes
Abalone Farmers Association of SA	
Aquaculture Association of Southern Africa	
Catfish SA	
Mpumalanga Trout Producers Forum	
Mussel and Oyster Forum	
South African Koi Keepers' Society	
South African Koi Traders Association	
South Africa Pet Traders Association (SAPTA)	
Tilapia Association of South Africa	
Western Cape Trout Farmers Association	
Other (please specify):	



11.2 Please rate the importance of the role of sector development activities to the running of your company / project today:

Sector Development Activities	1	2	3	4	5
Promote South African aquaculture (nationally and internationally)					
Provide an enabling environment for increase participation in industry					
Act as a one-stop-shop (offering a range of non-commercial services to industry)					
Act as an advisor to government on legislation and policy					
Enhance industry-led development initiatives					
Promote best practice management guidelines (environment and social)					
Identify and zone areas for aquaculture development					
Investment promotion					
Promote trade in aquaculture products					
Monitoring the supply of aquaculture product (safe and high quality)					
Monitoring of food and water quality to ensure export of aquaculture product					
Identify new species production (natural resource replenishment, market demand)					
Co-ordinate research (national and international)					
Ensure education, training and skills development of aquaculture know-how					
Other (please specify)					

Rating: 1 = not important, 2 = little importance, 3 = neutral, 4 = some importance, 5 = very important

12 Further Comments

Additional comments on industry issues that you would like to draw to our attention:

THANK YOU FOR YOUR TIME