1. **Report of the Select Committee on Land and Mineral Resources (DMR) on the International Study Tour undertaken, dated 28 November 2017**

The Select Committee on Land and Mineral Resources undertook an International Study Tour to Australia from 21 – 28 October 2017 reports as follows:

**1. Background and Introduction**

During recent State of the Nation Addresses, the President of South Africa, the Hon. Mr Jacob Zuma, focused repeatedly on a number of key challenges, including challenge of food security. It is on the basis of this focus, and the relevance of 5 of the 9 points of the President’s 9-Point Plan listed below to the oversight role of the Select Committee on Land and Mineral Resources, that the study tour has been proposed. These are:

* Resolving the energy challenge;
* Revitalising agriculture and the agro-processing value chain;
* Advancing beneficiation or adding value to our mineral wealth;
* More effective implementation of a higher impact Industrial Policy Action Plan;
* Encouraging private sector investment;
* Moderating workplace conflict;
* Unlocking the potential of small, medium and micro enterprises (SMMEs), cooperatives, township and rural enterprises;
* State reform and boosting the role of state owned companies, information and communications technology (ICT) infrastructure or broadband roll-out, water, sanitation and transport infrastructure; as well as
* Operation Phakisa aimed growing the ocean economy and other sectors.

Linked to the SONA references, government is currently in the process of developing its Aquaculture Lab strategies as part of Operation Phakisa, and the Department of Agriculture, Forestry and Fisheries is in the process of finalising its Aquaculture Act, together meant to create an enabling environment for aquaculture in South Africa. The Aquaculture Act, in particular, is of interest to the committee as it is a comprehensive piece of legislation designed to facilitate the development and regulation of an aquaculture sector within a complex legal environment. Aquaculture practice is different from many other industries as a result of the number of pieces of legislation that could potentially impact on it.

The list below highlights the Departments and pieces of legislation relevant to aquaculture:

**Department of Agriculture, Forestry and Fisheries**

* Marine Living Resources Act, 1998 (Act No. 18 of 1998).
* Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947).
* The Animal Diseases Act, 1984 (Act No 35 of 1984).
* The Genetically Modified Organisms Act, 1997 (Act No. 15 of 1997).
* The Animal Improvement Act, 1998 (Act No. 62 of 1998).
* Animals Protection Act (Act No 71 of 1962).
* Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983).
* Agricultural Pests Act, 1983 (Act No. 36 of 1983).
* Animal Diseases Act, 1984 (Act No. 35 of 1984).
* Animal Improvement Act, 1998 (Act No. 62 of 1998).
* The Genetically Modified Organisms Act, 1997 (Act No.15 of 1997), (GMO Amendment Bill).

**Department of Environmental Affairs**

* The Biodiversity Act, 2004 (Act No. 10 of 2004).
* The National Environmental Management Act, 1998 (Act No. 107 of 1998).
* The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
* The National Environmental Management: Protected Areas Act, 2003 (Act No. 10 of 2003).
* The National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008).
* The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).
* The Sea Birds and Seals Protection Act, 1973 (Act No. 46 of 1973).
* The Seashore Act, 1935 (Act No. 21 of 1935).

**Department of Health**

* The Health Act, 1977 (Act No. 63 of 1977).
* The Medicines and Related Substances Control Act, 1965 (Act No. 101 of 1965).
* The Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Act No. 54 of 1972).

**The Department of Water Affairs**

* The Water Services Act, 1997 (Act No. 108 of 1997).
* The National Water Act, 1998 (Act No. 36 of 1998).
* The National Regulator for Compulsory Specifications
* The National Regulator for Compulsory Specifications Act, 2008 (Act No. 5 of 2008).

**The South African Bureau of Standards**

* Standards Act, 2008 (Act No. 8 of 2008).

As a result of the massive amount of legislation that could impact on the aquaculture sector, any piece of legislation that is designed to govern and facilitate such an industry need to be comprehensive and complex. The Aquaculture Act, in its current draft format, makes provision for the required institutional arrangements, the development of national and provincial aquaculture strategies, licensing and permitting requirements, the development and regulation of aquaculture zones, and the required environmental and quality control mechanisms required to retain environmental sustainability and food health in the industry. South Africa has not developed its aquaculture sector or regulatory environment to this degree yet, and therefore it was considered important to study similar developments conducted in a country such as Australia, which shares significant environmental and market characteristics with South Africa.

* 1. **Delegation**

The delegation consisted of the following members of Parliament, Mr OJ Sefako (Chairperson, ANC), Ms ZV Ncitha (ANC), Ms E Prins (ANC), Mr AJ Nyambi (ANC), Mr EM Mlambo (ANC), Mr A Singh (ANC), Mr P Parkies (ANC), Ms C Labuschagne (DA), Mr JWW Julius (DA), Mr CFB Smit (DA), Mr LB Gaehler (UDM), Ms NP Mokgosi (EFF) and Parliamentary support staff, Mr AA Bawa (Committee Secretary), Mr JG Jooste (Researcher), and Ms A Zindlani (Committee Assistant).

* 1. **Aims and objectives**

The aim and objective of the study tour was to learn and gain insight / first-hand knowledge about aquaculture policy, legislation and industry development actions taken by Australia. These can then, during the deliberations that will follow in the committee when the Aquaculture Act is tabled, be used to better assess the strengths and weaknesses of South Africa’s own Aquaculture Policy / Act. This long-awaited piece of legislation is supposed to fill the gap in legislative framework, policy and industry support that is long overdue. Most countries with a long history of exploiting marine resources as a food source have a long-standing track record of initiating the development of aquaculture in order to substitute dwindling wild-caught marine and freshwater resources. South Africa has some established aquaculture industry, but these are minuscule compared to capture fisheries. Part of the challenge is the lack of legislative support and guidance for the industry. The Department of Agriculture, Forestry and Fisheries (DAFF) Identified this lack of an “enabling environment” for aquaculture, but the process of drafting the Act required has taken some time. In the interim, Operation Phakisa was initiated. Aimed at encouraging the “Blue Economy” which also includes aquaculture, Operation Phakisa called for the rapid implementation of projects that could stimulate the economy of coastal communities. It is, however, concerning that Operation Phakisa is forging ahead with aquaculture developments, as the Aquaculture Act is not yet finalized and by its own admissions, DAFF is aware of the challenges aquaculture is facing without the required legislative and policy support.

South Africa has some potential for aquaculture development, but the fledgling industry faces significant obstacles. Countries with South Africa’s environmental conditions and geography is not the world’s biggest aquaculture producers. A cold tropical or sub-tropical climate with abundant water (for inland production) and a sheltered coastline (for sea-based farming) creates ideal conditions. South Africa possesses very little such attributes compared to top aquaculture producers. Having indigenous fish species at your disposal is also of great benefit – China alone cultures over 200 species commercially, although a smaller amount is statistically significant. There are less than 200 indigenous freshwater fish species in South Africa in total, of which the majority are not large enough to consider for commercial aquaculture. This underlines the difference in aquaculture potential between South Africa and global trend setters. South Africa has a far more limited number of fish species with potential for commercial aquaculture. Even fewer have been adequately studied in order to develop a knowledge base for aquaculture potential. Ideally, these matters need to be addressed as urgently as the need to evaluate policy and legislation.

This is, however, where the Select Committee of Land and Mineral Resources (The Committee) has identified some challenges which motivates the proposal of this study tour. Without the required legislative support, the dominant environmental management legislation that South Africa has put into place, including the suite of National Environmental Management legislation, severely inhibits the development of aquaculture through stringent regulation of listed activities that require costly assessments, operating permits and controlled environments. The industry support mechanisms required by the aquaculture industry to thrive and expand is also not in place. South Africa has very few indigenous fish species that has any potential to be used in aquaculture. Most potential species have not been researched properly and where experimentation has begun, the industry is not totally market ready or competitive. As a result, South Africa will likely be in need of considering alien species, which will place that operator in direct, and costly, exposure to environmental legislation.

**Constraints identified are:**

* Shortage of expertise and aquaculture professionals.
* Lack of technical skills and technical support or extension services.
* High feed, equipment and technology costs.
* Lack of veterinary services and disease management.
* Poor government understanding and support.
* Lack of species choice and good seed stock.
* Complex resource–based legislation.
* Inaccessible financial sector and poor financial support services.
* Uncoordinated institutional environment;
* Lack of appropriate technology;
* Difficulties in obtaining suitable culture sites;
* Inadequate public sector support measure to pioneer farmers;
* High production costs;
* Lack of local quality feed; and
* Lack of access to suitable water quantity and quality for freshwater aquaculture
* Lack of marketing services, marketing structures and market penetration.
* Climatic variability and seasonality.

**Opportunities that may exist include:**

* There is high demand for affordable protein and shortages in traditional fisheries products.
* Aquaculture is moving onto Government agenda.
* High potential for agricultural diversification.
* Good natural resources.
* Good infrastructure.
* Potential for export opportunities.
* Linkages with tourism.
* Growing economy and good economic climate.

A second concern is South Africa’s water scarcity. Where freshwater aquaculture is going to be considered, it will have to be water-wise as well as compliant with environmental legislation. This combination will result, without legislative support from DAFF, in a situation where low cost options studied abroad and used as reference in Operation Phakisa planning is not applicable to the local reality. The third concern is that the South African industry is not developed to the level that Operation Phakisa may be expecting, particularly in terms of research into suitable species, their culture, and the cost-effective operation of a production facility. As South Africa is so far behind industry leaders in terms of support industries and market development, there is a real risk that it would not be economically viable to operate an aquaculture facility that produces the same products as those that can be imported frozen from major producers. Those industries doing well in South Africa at present are experts at producing niche or fresh produce. There are few if any companies that can produce in South Africa at a rate cheaper than current import costs for aquaculture products.

The final concern is that South Africa is not an ideal setting for aquaculture. Operation Phakisa makes some comparisons in its industry profile with other countries in order to determine the potential size of the industry. Very little of these direct comparisons are applicable to the South African scenario. The country has a high energy ocean with a very straight coastline, providing very little shelter from storm swells. The shallow coastal shelf amplifies the risk of storms, while also creating unfavourable environmental occurrences such as upwelling events, which can cause harmful conditions at aquaculture facilities. The most lucrative aquaculture sectors can operate in sheltered waters with an annual temperature averaging around 10⁰C. There are not really any part of the South African coastline that offers those opportunities. Warm-water aquaculture opportunities does exist, but then species cultured become more niche-market orientated. A comparison is needed between South Africa and a country with similar climate, water scarcity, and strong environmental legislation.

It was thus proposed that the Committee visit an established and rapidly developing aquaculture country. In terms of a country that has a large amount of similarities to our own in terms of climate, water scarcity and mature environmental legislation, Australia is an ideal country to visit. It has a flourishing aquaculture industry with dedicated organs of state focusing on policy development, research and industry support. Operation Phakisa also drew some parallels between South Africa and Australia, suggesting that this study can benefit the country in terms of the acquisition of knowledge on how this country developed policy, legislation and research capacity to grow and support an environmentally sustainable aquaculture industry. The similarities between the climate and water scarcity of Australia and South Africa should also assist in studying freshwater aquaculture production systems that will likely be suitable to South Africa.

**2. Meetings and Site Visits**

**2.1. Presentation by the Department of Agriculture and Water Resources (DAWR) –**

 **Fisheries Branch – Canberra**

The presentation by the Australian Department ofAgriculture and Water Resources highlighted that the value and production of aquaculture has increased substantially over the past decade, with the forecast of global growth expected to continue. The presenter further explained that unlike in the past, Australia is now focusing on premium products that generates more interests within the fish market at home and also of an economic value when exporting to other countries. Australia’s marine exclusive zone is the world’s 3rd largest spanning 13,3 million sq km, also having the 7th largest coastline which spans 34 218 km as well as being ranked 54th in the world for fishing and aquaculture production. The Australians thus see their aquaculture programme as an opportunity to increase sustainable growth of their industry through exporting their knowledge and technology in order to increase global production. The 2014 – 15 Australian fishing statistics reveal that oceanic wild catch amounted to 1.61 billion ($ AUD) or 151,439 tonnes of fish versus aquaculture harvests of 1.19 billion ($ AUD) or 91,036 tonnes of fish.

In South Australia, aquaculture is regulated through:

* Aquaculture Act 2001
* Aquaculture Regulations 2005
* Aquaculture Zone Policies
* Aquaculture leases/licences (production, research, pilot, and emergency leases)
* Livestock Act 1997

Other key legislation with concurrence, approval or referral obligations includes:

* Environment Protection Act 1993
* Native Title (South Australia) Act 1994
* Development Act1993

The primary responsibility of regulating land based and marine aquaculture projects such as planning, leasing, and licensing; land management; and most environmental controls is entrusted with the various states and territories. The Australian government has oversight / authority over aquaculture as well as aquaculture in Commonwealth waters; environmental approval for any development of national significance as well as national programmes for aquaculture research. Their responsibility in all aquaculture related projects and research remains the management of biosecurity; aquatic animal health; food safety and market access and trade.

The Australian National Aquaculture Strategy was released on 28 September 2017 and was developed in collaboration with state and territory governments and industry with the intention / aim of increasing the value of Australian aquaculture to 2 billion ($AUD) by the year 2027. Although aquaculture generally occurs in state waters, all aquaculture activities occurring in commonwealth waters would be the responsibility of the Australian Government. Because of the increasing awareness and interest shown by aquaculture operators the government of Australia has committed to delegate aquaculture regulations within commonwealth waters to state governments. Both the commonwealth, state and territorial governments share the responsibility of and for environmental regulations with the Australian government being responsible for multiple jurisdictions, international obligations as well as matters of national significance. The Australian Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) sets out the assessment and approval processes for activities impacting on protected areas to ensure ecological sustainability, with state and territory governments conducting their own environmental assessments and approvals as well. This Act further allows for a strategic assessment and approval of a variety of policy, plans and programs and is particularly useful when significant economic development occurs.

An important aspect that the committee was briefed on was the development, by both the Federal government as well as in specific cases, State Government Departments, effective Biosecurity measures tailor-made for the aquaculture sector. As aquaculture takes place in “open” systems, it has the potential to introduce diseases from farmed organisms to the environment, or alternatively, cultured organisms can be infected by naturally occurring diseases from the surrounding environment. As the official government strategy is to concentrate aquaculture into zones where leases are offered to prospective farmers, it is the responsibility of the Australian government to develop, update and enforce bio-security protocols for aquaculture practitioners.

Biosecurity describes the systems put in place to protect your farm from diseases. These systems will reduce the risk of damaging diseases entering your farm, can prevent health issues emerging within the farm, and can reduce impacts of disease when it occurs

The Australian aquaculture biosecurity strategy aims to:

* reduce the risk of diseases being introduced into a farm (entry-level biosecurity)
* reduce the risk of diseases spreading within a farm (internal biosecurity)
* reduce the risk of diseases escaping from one farm and contaminating adjacent farms or the natural environment (exit-level biosecurity)
* have emergency response protocols in place for serious disease outbreaks (all three levels of biosecurity).

The committee was briefed on the development of two concurrent plans to ensure biosecurity in the aquaculture sector. These are Aquaplan and Aquavetplan

**AQUAPLAN - Australia's National Strategic Plan for Aquatic Animal Health**

​​​​AQUAPLAN is Australia’s National Strategic Plan for Aquatic Animal Health. The plan outlines objectives and priorities to enhance Australia’s management of aquatic animal health. AQUAPLAN is a collaborative initiative that is developed and implemented by the Australian and state and territory governments and aquatic animal industries. The Department of Agriculture and Water Resources coordinates the development and implementation of AQUAPLAN. National implementation of AQUAPLAN activities and projects is overseen by the Animal Health Committee (AHC) and its Sub-Committee on Aquatic Animal Health (SCAAH) in close collaboration with industry. Australia has had two previous five-year AQUAPLANs. AQUAPLAN 2014–2019 is Australia’s current national strategic plan for aquatic animal health.

**AQUAPLAN 2014-2019**

AQUAPLAN 2014–2019 is Australia’s third national strategic plan for aquatic animal health. It outlines the priorities to strengthen Australia’s arrangements for managing aquatic animal health, and to support sustainability, productivity, and market access—and ultimately the profitability of Australia’s aquatic animal industries.

AQUAPLAN 2014–2019 has five objectives:

1. Improving regional and enterprise-level biosecurity
2. Strengthening emergency disease preparedness and response capability
3. Enhancing surveillance and diagnostic services
4. Improving availability of appropriate veterinary medicines
5. Improving education, training and awareness

Each AQUAPLAN 2014–2019 objective is supported by activities to address specific aquatic animal health management issues associated with infectious diseases of finfish, molluscs and crustaceans. The plan covers aquatic animal health issues relevant to aquaculture, commercial fisheries, recreational fisheries, the ornamental fish industry, the tourism industry and the environment. AQUAPLAN 2014–2019 excludes management of environmental toxins and microorganisms that may affect food safety (for example, algal blooms), chemical pollutants affecting the health of aquatic ecosystems, and invasive aquatic pests. Each chapter is focused on one of the five objectives. At the end of each chapter a table provides details about specific activities, the expected activity outcomes, organisations responsible for progressing each activity and the resource or financial implications.

​​AQUAVETPLAN is the Australian Aquatic Veterinary Emerge​ncy Plan. It is a series of manuals that outline Australia’s approach to national disease preparedness and proposes the technical response and control strategies to be activated in a national aquatic animal disease emergency. The Department of Agriculture and Water Resources manages the development and maintenance of AQUAVETPLAN manuals. The manuals are authored by Australian aquatic animal health experts with extensive stakeholder consultation. Each manual undergoes a formal endorsement process through government and relevant industry sectors. Manuals are prepared during ‘peace time’ so that the information is readily available in the event of an actual emergency. AQUAVETPLAN manuals are working documents that are updated as required to ensure they take into account new research, experience, and emerging disease threats

The Aquavetplan is a comprehensive aquaculture strategy that includes the following:

* Training Resources;
* Diagnostic Resources;
* Agency support plan;
* Disease strategy manuals;
* Management manuals;
* Operational procedure manuals; and an
* Enterprise manual

The combined efforts of government in developing the two plans are substantial. The comprehensive plans for part of the Australian government’s strategy to support, and to ensure as far as possible, that aquaculture businesses have every chance in being successful.

**Aquaculture research and development**

Australia’s investment into aquaculture research has been substantial in their effort to become the global exporter of aquaculture products. Hence the formation of the Fisheries Research and Development Corporation (FRDC) which is a statutory authority that manages investment by the [Australian Government](https://en.wikipedia.org/wiki/Australian_Government) and the Australian fishing and aquaculture industry. The owner (i.e. sole shareholder) of FRDC is the Commonwealth Government that has entered into partnership with the fishing industry. The FRDC has four ministerially declared representative organisations.

* + National Seafood Industry Alliance (representing the seafood industry)
	+ Recfish Australia (representing recreational and sport fishers)
	+ Commonwealth Fisheries Association (representing commercial operators’ in
	+ Commonwealth)
	+ National Aquaculture Council (representing the aquaculture industry)

The FRDC is one of fifteen Australian rural research and development corporations managing investment by the [Australian Government](https://en.wikipedia.org/wiki/Australian_Government) and primary industries that during the past 25 years has been crucial to the doubling of the productivity of the agriculture, fisheries and forestry sectors. At its inception in 1992, the Corporation's major focus was on research concerning the management of commercial wild-catch fisheries and, to a lesser extent, aquaculture. Since then, the scope has widened greatly to encompass economic, environmental and social aspects of the entire fishing and aquaculture industry – that is, the recreational and indigenous customary sectors in addition to the commercial wild-catch and aquaculture sectors.

The FRDC is unique among the corporations in balancing its investment between natural resource management and industry productivity and development. Therefore, a significant proportion of funding is directed at research that has a public good benefit. In fulfilling its role of planning, investing in and managing fisheries research, development and extension (RD&E) activities in Australia, the FRDC provides leadership and coordination of the monitoring, evaluating and reporting on RD&E activities and facilitates the dissemination, extension and commercialisation of research results to end-users. The FRDC achieves this through coordinating investment by government and industry, and involving stakeholders to set and address RD&E priorities. The FRDC also monitors and evaluates the adoption of RD&E outputs that informs future decisions.

* + 1. **Engagement with the Department**

Engagements with officials from the DAWR proved invaluable with them highlighting that most of the countries’ aquaculture equity was invested in aquaculture project leases and licenses. In order for a farm / project to be deemed successful, warranting further government investment, the farm has to produce in excess of 5000 tonnes per annum. It was further explained that a particular farm / project typically has a large lease area assigned to it in order to make it possible for production areas to lie fallow. This spreads the impacts of aquaculture over a wider area, reducing pressure on any one site. This practice reduces the risk of disease outbreak. Most of the discussions centred around Australia’s aquaculture legislation; government vs private investment; viability and location of fresh water aquaculture; job creation; and transformation.

Discussions revealed that Australia’s legislation grew with the industry and that besides abalone farming, all knowledge informing current legislation was initially imported from abroad and modified for the Australian context. At present, Tasmania is the state with a dedicated aquaculture policy and legislation. Most other States (territories) are working towards emulating this model, as these states have comparatively more complex legislative environments within which compliance for aquaculture operators can take much longer to obtain. Due to time constraints and the need to visit research sites studying species applicable to the South African context, Tasmania was not visited. It has a massive salmon culture industry that is Australia’s most lucrative sector, but salmon culture relies on water around or below 10⁰C.

In terms of policy and legislative matters, the national government model was sufficient to indicate to the delegates how involved government has been in developing a “one stop shop” of policy and legislation in order to ensure that aquaculture development is fostered. This example is applicable to the South African context, where agriculture, water resources, environmental management and port infrastructure are mostly national or concurrent competencies, and therefore more applicable to national legislation and the management actions of the executive.

The Australian counterparts admitted that they would have preferred one National Act, but had to settle for a Federal Act, with individual federal states working towards developing a similar structure in its legislative environment. In answering the question pertaining to the responsibility of project success, the delegation was informed that in South Australia and Tasmania a fund is set up with both government and private partnership investing in this fund to ensure project viability and sustainability. It was important to note, however, that the states invest heavily in developing the infrastructure, policy and research (training) capacity is put in place. Funding is not directed towards propping up unsustainable farming ventures, although significant resources will be directed towards ensuring that solutions are found for challenges experienced by commercial farmers. Examples of such research and development efforts include research into poly-culture that would make farms more profitable, research into commercialising new species and research into creating more cost-effective feeds. The DAWR explained that typically during the establishment of a new aquaculture venture, government provides the funding for the infrastructure and remains the sole owner of said infrastructure. The government department(s) involved with the research has to comply with all legislation, and also has to apply for rights to operate the research farm. Once commercial success is achieved, the development of aquaculture zones around the experimental site is undertaken, and tenders are sought for companies to take over the commercial operation of the farm.

They further explained that in order to keep environmental and ecological costs in check as well as minimise the risk of diseases, it is best to farm / harvest indigenous species. The DAWR also explained that in Australia no inland / fresh water aquaculture projects are established near natural water sources so as to avoid water contamination. Estuaries and marine environments, however, are utilised for aquaculture. The reason for this was that water coming out of the fish farms / projects must be of the same quality as the water in the river, dams and streams to prevent contamination of the natural water sources.

In response to questions pertaining to the empowerment of the indigenous inhabitants, the delegation was informed that in each zone cleared and approved for aquaculture, 50% of opportunities go to the indigenous people. The DAWR further stated that projects in these areas are generally more expensive as these indigenous people live in far remotely isolated areas where water is a scarce commodity. It was also mentioned that a method of trying to combat / offset the high cost of the projects, only projects in indigenous areas can harvest certain species of fish that are not necessarily indigenous to the area.

The DAWR also explained that the one sector that enjoys extensive funding is their bio-security division, as empowering and capacitating this sector is a major priority in protecting their natural resources. It was explained that the National Bio-Security Plan feeds into individual state plans, with each state having its own early detection programme and response protocols, working hand in hand in a collaborative network.

* 1. **Presentation by the Department of Agriculture and Fisheries (DAF) – Queensland Government – Brisbane**

The presentation stated that in Brisbane most of the aquaculture projects are land based projects that are either discharge (cleaned water released back into its natural source) or non-discharge (tanks) systems with a few salt discharge systems situated near the coast.

The current value of the industry in Queensland in 2015 – 16 was approximately 120 million ($AUD), equating to roughly 7783 tonnes harvested from predominantly land based aquaculture farms. The most important aquaculture sectors are prawn and barramundi harvestings which employs 528 full time workers with 56% working in the prawn farming sector. Queensland currently has no cage culture operations but boasts a suitable climate for cultivating a wide range of species, as well as coastal areas suitable for land based farms. The state also has a highly developed transport infrastructure in all the major centres and is also very well positioned to access global markets.

Challenges experienced in the state of Queensland relates to the regulatory framework governing aquaculture that have some of the most complex licensing requirements. The lack of planning to accommodate the growth of the aquaculture industry is also a concern coupled with the fact the wastewater discharge limits are more significant than anywhere else, due to the high water quality requirements in the GBR region. The DAF further explained that due to regulatory constraints locations to set up aquaculture farms are limited, which is why most farms are located in central and north Queensland where cyclones pose serious risks as well. Adverse economic factors such as higher wage and electricity costs vs cheaper Asian competitors also way in on the price of the end product.

In 2014, the Queensland government compiled and produced a report reviewing the aquaculture regulations, with the report recommending a regulatory approach which facilitates the expansion of the aquaculture industry in Queensland. A number of key recommendations were endorsed by the Queensland Government to facilitate expansion of aquaculture in Queensland while addressing environmental concerns. The recommendations endorsed by the Government included:

* the creation of terrestrial aquaculture development areas (ADAs), including the identification of 450 hectares suitable for aquaculture operations;
* developing assessment codes which contain the regulatory conditions for aquaculture in that area for each ADA;
* providing certainty about the future price and availability of environmental offsets; and
* investigating the potential for marine aquaculture development areas.
	+ 1. **Engagement with the Department**

Discussion between the delegation and officials from the DAF focused on the lease agreements for the farms; fish demand vs supply and the creation of indirect jobs. The DAF explained that the average lease agreement on fish farms in the Queensland area is approximately 5 years for small farms, where after the whole licensing process has to be redone. In response to the questions posed about the relatively small farms being operated, the DAF responded by stating that the demand in the state was relatively small. Indirect jobs, as explained by the DAF, was created further down the food chain in the industry.

* + 1. **Bribie Island**

At Bribie Island, research and development focused heavily on the prawn industry needs. Aspects such as improving discharge water quality and disease prevention has been researched in the recent past, but unfortunately, for the delegation, disease outbreak in the area resulted in most of the prawn research facilities being placed under quarantine.

The committee members were, however, able to see the research work carried out in terms of developing polyculture at prawn farms. Many commercial prawn farmers were looking for ways in which to utilise their farms better, and wanted to develop fish culture in the same ponds that prawn are kept in. The aquaculture research facility at Bribie Island was involved with the commercialisation of the culture of a warm water species, Cobia, which showed significant aquaculture potential in many areas of the world. Of interest to the delegation was the fact that Cobia is endemic to the warmer East Coast of South Africa, and is therefore a suitable species to consider for local aquaculture development in the north of the Eastern Cape and in KZN.

The current project was conceived as a “hatchery to plate” project across the whole production chain. It was aimed at moving Australian Cobia aquaculture from pilot towards commercialisation. The project was undertaken in conjunction with a large, successful prawn

farming company, Pacific Reef Fisheries (PRF) based in Ayr, north Queensland. The strategy therefore involved the integration of Cobia aquaculture into an existing prawn aquaculture business, and addressing some specific research outcomes related to this. There was also

a need to address some generic research questions related to pond-based Cobia production, as well as to investigate aspects of post-harvest product development and consumer acceptance of this emerging species.

A new method of brood stock maturation assessment was developed, based on the quantification of all stages of oocytes in an ovarian biopsy sample. An essential part of the project was to facilitate the development of PRF’s hatchery, nursery and grow-out production capabilities through the provision of stock, training of staff and development of on-farm expertise. A comprehensive assessment of the effectiveness of two commercially aqua feeds was also completed.

An expert consumer panel was commissioned to undertake a detailed assessment of the flavour and textural characteristics of fresh Cobia, and to compare Cobia with other similar products. This demonstrated Cobia to be equivalent to Atlantic Salmon and superior to Yellowtail Kingfish in terms of overall appeal, flavour and texture. A hot-smoked Cobia product was also developed, and this had a number of favourable characteristics as good as, or better than similar Atlantic Salmon products.

* 1. **Port Stephens Fisheries Institute**

The Port Stephens Fisheries institute is responsible for a wide range of projects focusing on ecosystem management, fisheries and aquaculture. The aquaculture research group develops technology for new or existing aquaculture industries. Key facilities used for this research at the PSFI include a mollusc hatchery, a quarantine mollusc hatchery, marine fish brood stock centre, marine fish hatchery, marine fish nursery facilities and grow-out tanks and ponds.  Facilities for commercial and pilot-scale research are available as well as replicated, small-scale facilities for applied research.  Research directions are developed in consultation with representatives from industry through the Aquaculture Research Advisory Committee.  The delegation was briefed on the focus of aquaculture research at the facility, which includes:

Oysters

* Developing and improving hatchery and nursery techniques for Sydney rock, Pacific, Pearl and Flat oysters, as well as other molluscs (eg. pipis).
* Genetically improving Sydney rock oysters (eg for disease resistance, faster growth and improved condition).
* Researching the impacts of human activities and climate change on oysters.

Marine Fish

* Improving methods for hatchery production of mulloway, Australian bass, yellowtail kingfish and southern bluefin tuna.
* Producing Australian bass and mulloway for stock enhancement.
* Investigating potential of inland saline water for aquaculture.

Algal Production

* Production of live algae for PSFI and industry.
* Mass culture 7-12 algal species.

Nutrition, Diet Development

* Developing and improving diets for fish and prawns.
* Currently focused on mulloway and yellowtail kingfish growout diets.
* Replacing fishmeal with Australian agriculture ingredients.
* Producing more cost-effective, environmentally friendly feeds.

The aquaculture research unit has an international role in assisting with developing and managing the aquaculture projects funded by the Australian Council for International Agricultural Research. The delegation was very interested in the aquaculture development role that the unit described, as the scientists at Port Stephens were confident that they have the ability to train individuals with an attention to detail, rather than people with university qualifications, to become successful at aquaculture.

The committee was also interested in the work being carried out in terms of testing a special offshore cage for the culture of two fish species that also occur in South Africa: yellowtail and kob (kabeljou). The researcher at Port Stephens have developed commercially viable feed, culture methods and equipment for the culture of these species in challenging marine environments similar to that experienced along the South African South and East Coasts. It was felt that the experience of the scientists at the facility could be of benefit to the South African marine aquaculture sector.

* + 1. **Visit to the Tailor Made Fish Farm PTY Ltd (TMFF)**

The Tailor Made Fish Farm has been operating as a fully functional production system for over 19 years and have developed an easy to operate, land-based modular fish production system that is both sustainable and environmentally responsible. Production of 'year-round' premium quality fish and vegetables is achieved through compact and controlled production areas using much less water than conventional methods, with additional benefit and cash stream are enjoyed by utilizing wastewater from the fish production as a resource to produce a second crop of fresh vegetables.

This efficient combination of fish & vegetable production has two major advantages, firstly water use is minimized, and secondly waste water release is prevented to a large degree through the utilization of vegetables as a biological filter. Wastewater from fish production are filtered through vegetable beds instead of being discharged into the environment. All fish production equipment has been developed on farm by TMFF. TMFF designed technology has been embraced by their clients from the commercial and government sector, as well as leading Universities and Educational Facilities.

Tailor Made Fish Farms, unlike many of its competitors, successfully operate a commercial scale food production system that offer a complete service from feasibility studies to supply & installation of proven cutting edge technology encompassing comprehensive training and after sales support and backup. The Australian Marine Conservation Society (AMCS) are strong advocates for the pursuit of environmentally and socially sensitive aquaculture developments and recommend that in light of all the well-documented problems associated with 'open' fish farms, only 'closed loop', non-polluting, on-land aquaculture facilities that do not release pollutants into the sea or rivers should be considered. TMFF's system design and operation is in line with these recommendations.

Fish species selected by Tailor Made Fish Farms for grow-out in their controlled land-based system is Barramundi (Lates calcarifer) because of its universal market appeal and suitability for culture under this type of production technique. However, the system can support almost any species. Optimum growing conditions for any species can be achieved in these systems, as they are life support systems for aquatic life where their growing conditions, unlike in the wild, can be controlled. The feasibility of alternate species can be determined by 3 major key points: i.e. the time taken for the selected species to reach its acceptable market size; the sale price the market is willing to pay for the product and the availability of the seed stock (fingerlings).

Optimal use of our precious water resources should be a consideration in any new venture. By combining fish and vegetable production the use of this limited resource is minimised and production outputs maximised under controlled growing conditions. The TMFF System ensures efficient water use along with a quicker growing product that is cleaner and healthier with the need to use heavy chemicals normally associated with intensive production methods negated.

Delivery of fresh product can be tailored to suit the individual customer needs, by supplying both live and chilled markets with produce that can be grown right on the market doorstep, all year round. TMFF is committed to supplying environmentally responsible, sustainable food production systems to meet the growing demand for fresh, clean food throughout the world.

1. **Recommendations**

The committee intends to study the outcomes of the study tour closely when the Aquaculture Act is reviewed, with a particular intent to study the policy provisions for enabling aquaculture development while shouldering as much of the work towards legal compliance and infrastructure development as possible. The committee noted that the Australian model, while not perfect in terms of National (federal) and provincial (state) synergy in legislation, provides a clear example of state involvement in developing aquaculture zones, ensuring legal compliance, environmental sustainability and economic viability.

The Australian experience further emphasised the need for strong technical support from government in terms of market access and market stimulation, as well as dedicated research and development support in order to ensure that companies are able to capitalise on local markets and opportunities.

The committee further recommends that discussions are held with the Department of Agriculture, Forestry and Fisheries, as well as its research support institutions regarding aspects of the Australian industry that could benefit South Africa.

In particular, the committee proposes investigating closer ties between South African counterparts and the research institutions at Bribie Island and Port Stephens, with the aim to investigate the following:

1. Investigating the possibility of developing Cobia aquaculture along the Eastern Cape and KZN coastlines;
2. Studying the Australian experience regarding developing cost-effective feeds for their kingfish (yellowtail) and Mulloway (cob) and culture technology in order to determine whether the local industry can benefit;
3. Investigating the opportunity to study and potentially use the “fortress cage” technology under development in Australia. These nearshore and offshore fish cages hold great potential for high-energy shores and could play a role in South African Aquaculture.
4. Investigating the possibility of facilitating farmer and student training between DAFF and the Port Stephens facility; and
5. Liaising with DAFF and the DRDLR in terms of their plans for small-scale family-based aquaculture development, and to investigate the possibility of developing small-scale aquaculture systems for freshwater environments as were observed at the barramundi farm of Taylor Made Fish Farms.

**Report to be Considered.**