2019
Strategic Environmental Assessment for Marine and Freshwater Aquaculture Development in South Africa

APPENDIX C-3

Project Description Report








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PROJECT DESCRIPTION

Strategic Environmental Assessment for Aquaculture Development in South Africa

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Strategic Environmental Assessment for Aquaculture Development in South Africa	
Chapter 1: Project Description	
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1 PURPOSE OF THIS DOCUMENT

This Project Description Chapter is an early output from the Strategic Environmental Assessment (SEA) for Aquaculture Development in South Africa, being conducted by CSIR on behalf of the national Department of Environmental Affairs (DEA), the national Department of Agriculture, Forestry and Fisheries (DAFF), Operation Phakisa and other lead government departments and agencies involved in aquaculture. An early step in the SEA process was to conduct a literature review to collate relevant baseline information for use in the SEA. This Chapter provides a succinct summary of the literature. It must be noted that the outcomes from the literature review related to spatial data and mapping and siting criteria, in particular the identification of siting criteria, are captured in the documents on the spatial outputs from the SEA.

The **key purpose** of this Chapter is to:

- provide a consistent reference for definitions of key terms and concepts to be used in the SEA, in particular with regards to the aquaculture environments being considered and the aquaculture production systems;
- provide an overview of the priority marine and freshwater species to be considered and the main environmental and socio-economic impacts associated with aquaculture production for these species;
- present a typical aquaculture value chain, as relevant to South Africa, in order to demarcate the components of this value chain included in the scope of the SEA; and
- provide a link to key environmental law and authorisations applicable to aquaculture in South Africa.

2 OVERVIEW OF AQUACULTURE

2.1 International context

The global community is facing one of the world's greatest challenges – how to feed more than an estimated nine billion people by 2050 in a context of climate change, economic and financial uncertainty, and growing competition for natural resources (FAO, 2016). Fisheries and aquaculture is continuing to make crucial contributions to global food security and nutrition (protein) in the use of natural resources so as to ensure sustainable development in economic, social and environmental terms (DAFF, 2012a).

Globally aquaculture is practised in more than 200 countries and territories, with Asia accounting for about 89% of world aquaculture production for human consumption in the past two decades. World aquaculture production, both freshwater and marine, has increased from a total of 58 million tonnes in 2009 to approximately 74 million tonnes in 2014, with China representing more than 60% of world aquaculture production (FAO, 2016). China is the largest exporter of fish and fishery products and it is also a major importer of processed aquaculture goods from other countries mainly driven by the growing domestic consumption of species not produced locally (FAO, 2016). Norway is presently the second largest exporter of farmed fish, followed by Vietnam and Thailand. Since 2014, the European Union (EU) has established as the largest single market for fish imports, followed by the United States of America and Japan (FAO, 2016).

By 2014, a total of 580 species and/or species groups are being farmed around the world, including 362 finfishes (including hybrids), 104 molluscs, 62 crustaceans, 6 frogs and reptiles, 9 aquatic invertebrates, and 37 aquatic plants (FAO, 2016). Even though inland finfish culture in earthen ponds is the largest aquaculture contributor to food security and nutrition in the developing world, cage culture of finfish is increasingly being introduced to places where conditions allow. Overwhelmingly dominated by seaweeds in terms of volume, aquatic plant farming is presently practised in about 50 countries (FAO, 2016).

2.2 South African context

South Africa has suitable environmental conditions for aquaculture development, but opportunities for commercial production of various cultured species are still in an early developmental stage (Britz & Venter, 2016). The local aquaculture sector, involving both marine and freshwater species has generally performed below its potential and remains a minor contributor to national fishery products and the country's Gross Domestic Product (GDP) (DAFF, 2015a; FAO, 2016).

The gross value of aquaculture production is dependent on the species and quantities produced, as well as the prices received by farmers. In South Africa the technology and services are well established for species such as trout, crocodiles, catfish, abalone, prawns, oysters and mussels, but are still lacking for species such as eel, tilapia, kob, tuna, salmon and seaweed. The gross value of aquaculture production has however been moving at an increasing trend with minor fluctuations during the period 2005 to 2015 (DAFF, 2015a).

South African aquaculture products are marketed both locally and internationally, depending on the specific species. The abalone industry markets the bulk of their stock in Asia, whereas the trout industry mainly markets their products locally. Products such as Pacific oysters are exported in limited quantities, while many of the other experimental species such as Dusky kob primarily targets the local market (DAFF, 2015a).

South Africa has exported 1 661 tonnes of aquaculture products in 2014 yielding an export value of R 755 million. The main destination of South African fish and aquatic invertebrates in 2014 was Spain commanding 17%, followed by Italy with 14% of South Africa's fish and aquatic invertebrate exports. Hong Kong was third highest commander with only 9% share of South Africa's exports, followed by Portugal, United States, Vietnam, Australia and China each with a share of between 4% and 6% (DAFF, 2015b).

The quantity and value of fish and aquatic invertebrates to South Africa have been steadily increasing from 2005 to 2007 and again in 2009 to 2014. It has been profitable to import aquaculture products from 2005 to 2014 since greater quantities were imported at less value. On average 70 000 tonnes per annum of fish and aquatic invertebrates worth R 1.36 billion has been imported to South Africa during the past decade (DAFF, 2015b). The total quantity of aquaculture products that were imported during 2014 was 5 827 tons to the value of R 240 million (DAFF, 2015a).

2.3 Priority species cultured

2.3.1 Marine

Marine species being cultured in South Africa during 2014, either pilot scale or commercially, included abalone (*Haliotis midae*), Pacific oyster (*Crassostrea gigas*), mussels (*Mytilus galloprovincialis* and *Chromomytilus meridionalis*), dusky kob (*Argyrosomus japonicus*), seaweed (*Ulva* spp. and *Gracilaria* spp.), whiteleg shrimp (*Litopenaeus vannamei*), yellowtail (*Seriola lalandi*), mangrove snapper (*Lutjanus argentimaculatus*), spotted grunter (*Pomadasys commersonnii*), yellow belly rockcod (*Epinephelus marginatus*) and bloodworm (*Arenicola loveni*), white stumpnose (*Rhabdosargus globiceps*), south coast sea urchin (*Tripneustes gratilla*), octopus (*Octopus vulgaris*), Atlantic salmon (*Salmo salar*) and the South African scallop (*Pecten sulcicostatus*), as well as a number of ornamental species (DAFF, 2015a).

2.3.2 Freshwater

Freshwater species being cultured in South Africa during 2014 included rainbow and brown trout (*Oncorhynchus mykiss* and *Salmo trutta*), Mozambique and Nile tilapia (*Oreochromis mossambicus* and *Oreochromis niloticus*), Redbreast tilapia (*Tilapia rendalli*), African sharptooth catfish (*Clarias gariepinus*), carp (*Cyprinus carpio*), marron crayfish (*Cherax tenuimanus*) and a number of ornamental species (DAFF, 2015a).

2.4 Aquaculture production

2.4.1 Quantities

During 2014 South Africa's total aquaculture production (excluding seaweed, carp, and ornamentals) was 5 210 tons (DAFF, 2015a). The mussel sub-sector lead in terms of production with a total of 1 682 tons, followed by the trout sub-sector with 1 497 tons and abalone with 1 307 tons. The Western Cape was the dominant province in terms of production and recorded a total of 3 793 tons (DAFF, 2015a).

Marine aquaculture contributed 3 418 tons towards the total production accounting 66% of the total production and increasing by 432 tons (15%) from 2013. The freshwater aquaculture industry contributed 1 792 tons of the total production accounting for 34% of the total production and decreasing by 24 tons (13%) in 2014. The sector has demonstrated an overall growth rate of 9% from 2005 to 2014 (DAFF, 2015a).

2.4.2 Employment

In 2011, the South African marine aquaculture industry has recorded a total of 1 607 employees on a permanent basis. The majority of jobs were created by the abalone sub-sector accounting for 1 219 employees, followed by the oyster sub-sector with 157 people, the finfish sub-sector employed 152 people and the mussel sub-sector accounted for 79 job opportunities (DAFF, 2015b). Employment numbers for the freshwater aquaculture industry in South Africa are currently undetermined.

2.4.3 Aquaculture facilities

2.4.3.1 Marine

According to DAFF records, a total of 57 aquaculture facilities farming with various marine species are registered in South Africa, of which 15 farms are currently not operational (DAFF Marine Rights Register, November 2017). The Western Cape Province has the highest number of mariculture farms (39), followed by the Eastern Cape (11), Northern Cape (4), KwaZulu-Natal (2) and Gauteng (1) (DAFF Marine Rights Register, November 2017).

2.4.3.2 Freshwater

Based on DAFF records a total number of 194 freshwater aquaculture farms were recorded during 2014 (DAFF, 2015a); however, DAFF records dated 2016 indicated that the number of operational farms has declined to a total of 152 (Urban-Econ, 2017). Mpumalanga has the highest number of farms with a total of 33 farms, followed by Gauteng and the Western Cape with 31 and 20 farms respectively. A total of 20 farms were recorded in Limpopo, 15 farms in North West and 15 farms in KwaZulu-Natal. The Eastern Cape, Northern Cape and Free State provinces are still developing its freshwater aquaculture industries and collectively constituted the remaining 18 farms (**this data is to be confirmed with DAFF*).

3 AQUACULTURE ENVIRONMENTS CONSIDERED FOR ASSESSMENT

The aquaculture environments included in the scope for this study are marine (i.e. offshore, nearshore and land-based) and freshwater (i.e. inland and land-based).

3.1 Marine aquaculture

3.1.1 Offshore

Offshore aquaculture environments are defined as South African terrestrial marine waters within a distance of twelve nautical miles (~22 km) from the shoreline as described in the Maritime Zones Act of

1994. "Offshore" for purposes of this assessment is thus delimited as open ocean areas located more than 3 km from the shoreline, but less than 20 km along the entire South African coast.

3.1.2 Nearshore

Nearshore aquaculture environments are considered South African internal coastal marine waters, exclusive economic zones, the continental shelf, and natural bays and harbours as described in the Maritime Zones Act of 1994. For purposes of this assessment "nearshore" is thus defined as the coastal marine waters situated along the entire South African coast within 3 km from the shoreline.

3.1.3 Land-based

Land-based aquaculture entails the cultivation of fish in large land-based tank systems, including raceways, ponds and irrigated or flow-through systems with very high water throughput rates of seawater pumped either directly or via closed systems that recirculate "used" water that has been cleaned through biological processes. Recirculating aquaculture systems (RAS) are a well-defined technology and widely used internationally (Funge-Smith & Phillips, 2001; Newman, 2012).

3.2 Freshwater aquaculture

3.2.1 Inland

Inland freshwater aquaculture environments constitute any suitable watercourse as defined in terms of the National Water Act No. 36 of 1998; including rivers, natural channels in which water flows regularly or intermittently, or a wetland, lake, pond or dam into which, or from which, water flows (NWA, 1998). It is important to note that the SEA assumes no regulatory streamlining for instream aquaculture as stipulated above, except in the case of dam and pond cage culture.

3.2.2 Land-based

Land-based aquaculture entails the cultivation of fish in small or large land-based systems, including raceways, ponds, tanks constructed of a range of materials and irrigated or flow-through systems with varying freshwater throughput rates of either water pumped directly or via closed RAS.

4 PRODUCTION SYSTEMS USED IN SOUTH AFRICAN AQUACULTURE

Aquaculture systems range from very extensive, through semi-intensive and highly intensive to hyper-intensive. Farming systems are also diverse, for example water-based, land-based, recycling and integrated aquaculture systems (Funge-Smith & Phillips, 2001; Hinrichsen, 2008). There are several factors that drive aquaculture, covering a spectrum from the needs of people (the provision of local employment, food security and the alleviation of poverty) to the needs of industries (with particular emphasis on profits, productivity and consistent-quality products) (Funge-Smith & Phillips, 2001; FAO, 2016). **Appendix 3** and **Appendix 4** contain summaries of aquaculture production systems typically used in the South African aquaculture industry.

Consequently, the requirements for sustainable aquaculture development include both technological and people based approaches. From this range of choices, the design and selection of appropriate culture systems can be selected based on which most effectively meets social needs and best fits the opportunities and constraints of the local environment (Funge-Smith & Phillips, 2001).

The production systems relevant to this assessment are discussed below and comprise the following:

- Cage culture;

- Pond culture;
- Longlines, racks and rafts;
- Flow-through, including raceways; and
- Tank culture.

4.1 Cage culture

Cage culture entails a rearing facility enclosed on the bottom as well as on the sides by wooden, mesh or net screens. It allows natural water exchange through the lateral sides and in most cases below the cage (WCADI, 2012). Cage culture typically involves floating structures made of steel, wood and plastic which is developed into the floating, flexible, plastic circle design cages most commonly used globally (Figure 1) (DAFF, 2012b). Finfish cage culture types include nearshore gravity net cages or pens, and open water floating, submersible and/or semi-submersible cages. The production of fish in cages is increasing globally as the technologies are now well developed in Europe, parts of South America (Chile in particular) and China (FAO, 2016).

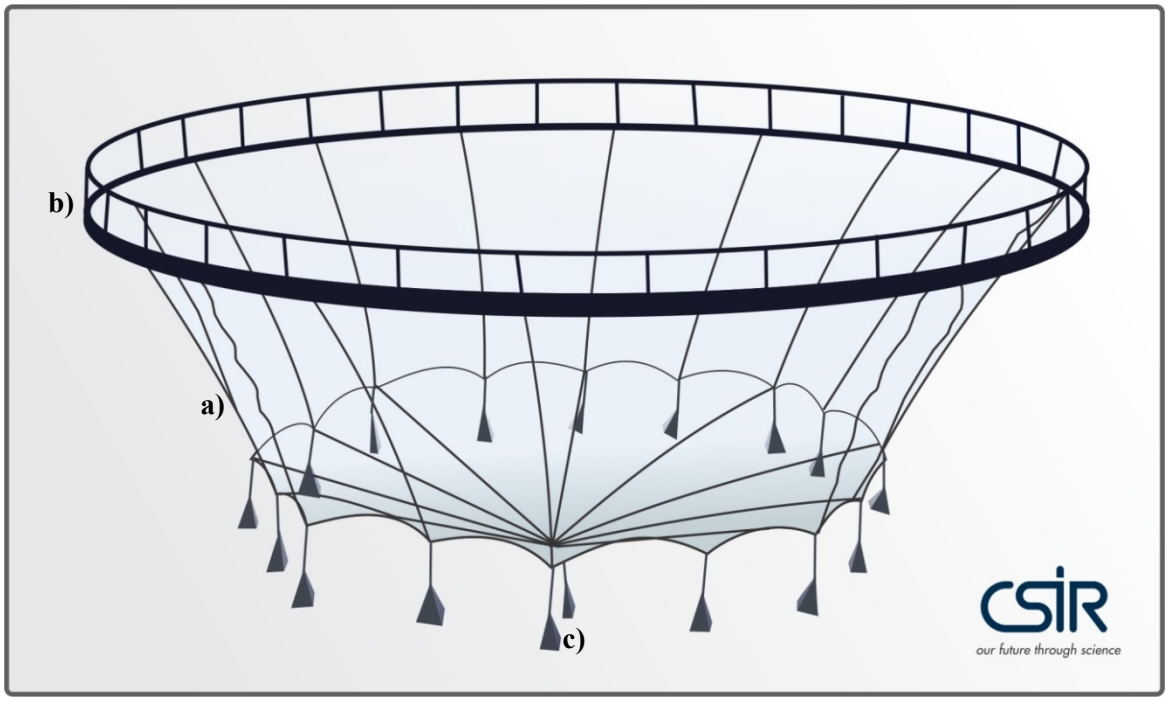

Figure 1: Typical example of a floating circled cage culture structure (after Victoria State Government Marine Aquaculture Industry, Australia). Main elements of this system include: a) wooden, mesh or net screens that enclose the cage; b) floating structures for buoyancy; and c) weights to stabilise the cage in the water column.

4.2 Longlines, racks and rafts

4.2.1 Longlines

Longline culture is a form of open-water suspended culture in which species are grown on ropes or in containers (e.g. baskets, stacked trays, lantern nets) suspended from anchored and buoyed surface or subsurface ropes (Figure 2) (DAFF, 2012b; WCADI, 2012). Longlines are commonly used for the culture of bivalve molluscs (such as mussels, oysters, scallops), and marine macro algae (WCADI, 2012).

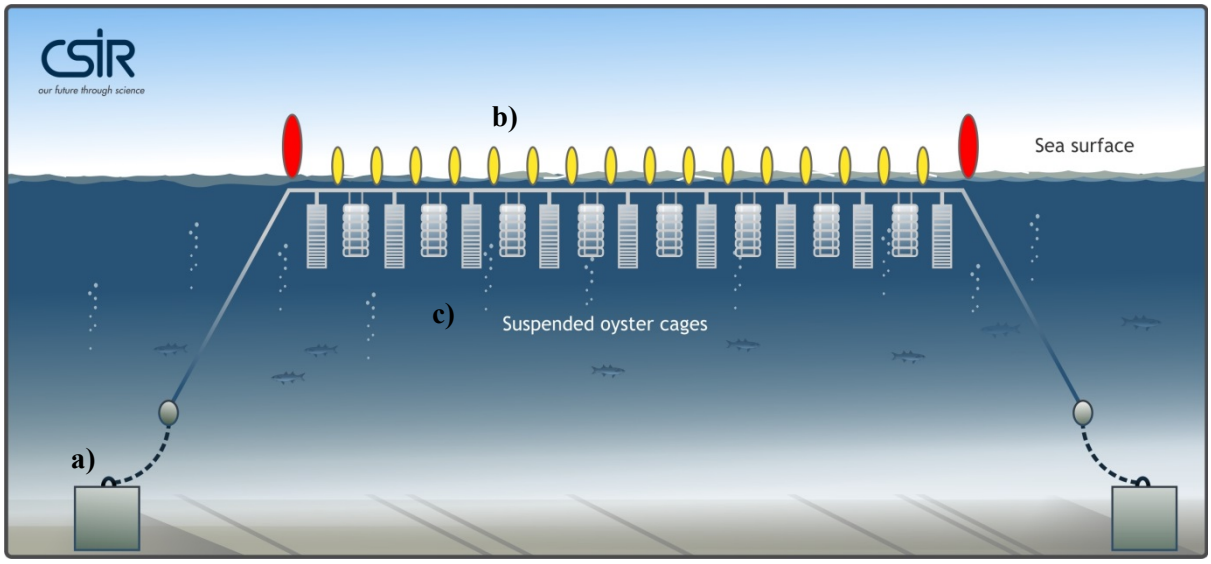

Figure 2: An example of oyster farming in cages or baskets hanging from suspended longlines (after Saldanha Bay Oyster Company, South Africa). Main elements of this system include: a) weights to anchor the system; b) floating structures for buoyancy; and c) suspended containers in which species are grown.

4.2.2 Racks

Racks are a hanging culture technique for oysters and mussels in which wooden or bamboo racks are built over the bottom of shallow coastal areas. Evenly spaced lines (e.g. nylon string or rope) are hung vertically from it with cultch (i.e. settlement materials such as shells) strung on them at regular intervals; the collected spat (bivalve larvae that have settled permanently onto a surface) are cultured on site (WCADI, 2012).

4.2.3 Rafts

Raft culture is a form of suspended culture in which the on-growing structures (e.g. ropes,) are suspended from a raft (Figure 3). It utilises moored, floating rafts mostly for coastal shellfish culture such as mussels. Holes are punched in old shells which are placed on strings and attached to the raft structure. After spat have settled on the shells, the rafts may be anchored in good growing areas (WCADI, 2012).

When the weight of the bivalves on a given rope exceeds a certain limit, the rope is taken out and again distributed over a greater length until a marketable size is reached. It is a continuous thinning of the mussel stock to provide ample space to grow. Marketable shellfish are detached from the rope and purified in basins before marketing (FAO, 2015).

The raft may be an old wooden boat with a system of outrigger built around it. Other kinds of rafts could be a catamaran-type boat carrying some 1 000 rope hangings, or just an ordinary plain wooden raft with floats and anchors. Floats can be made of plastic, wood, oil drums, etc. The raft is transferred from one place to another using a motor boat (FAO, 2016).

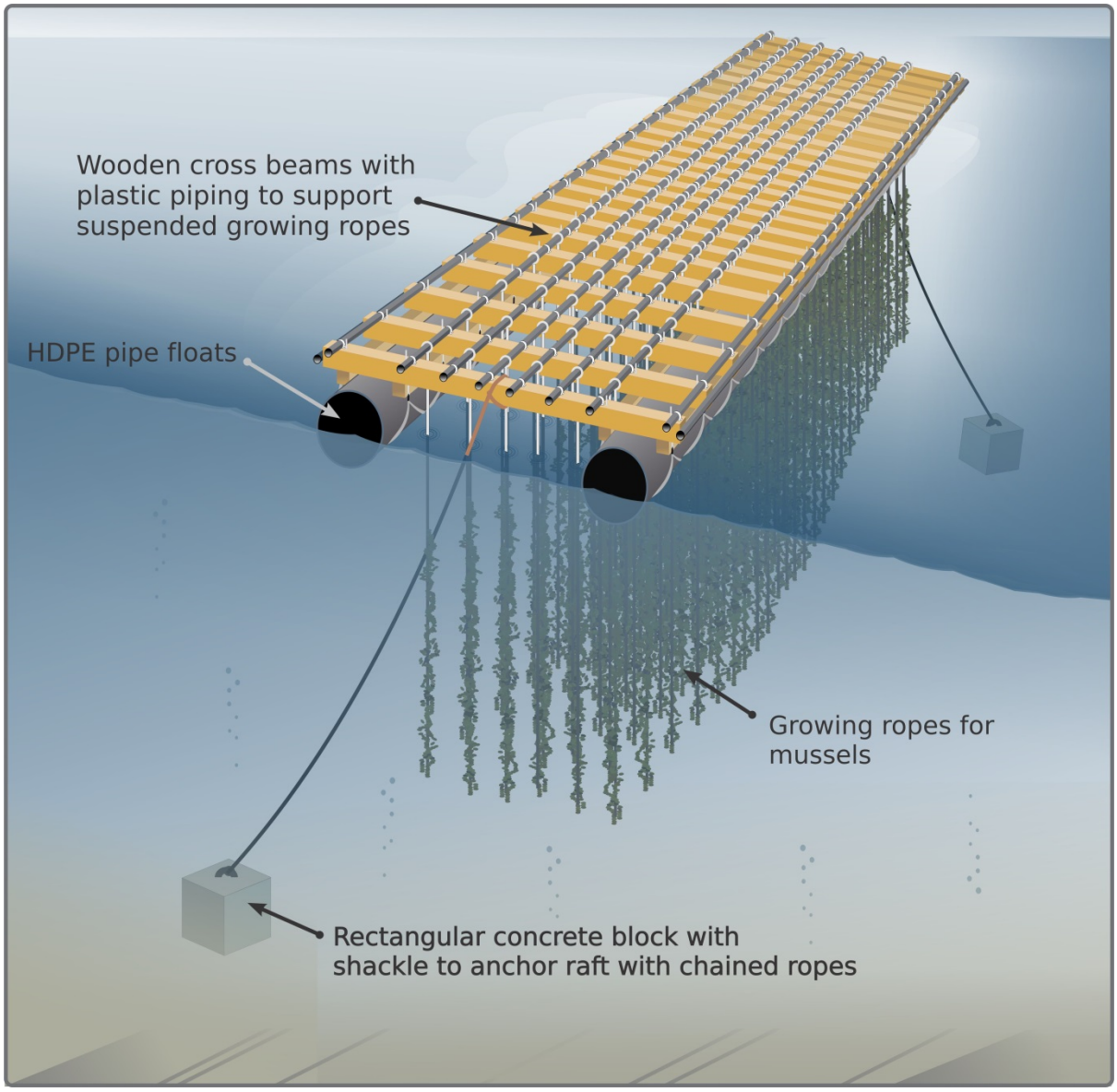

Figure 3: An example of mussel farming on floating rafts (source: Ferdie Endemann, Western Cape Department of Agriculture).

4.3 Land-based

4.3.1 Pond culture

The most simplistic fish culture system is one in which young fish are stocked at low to medium densities into small earthen farm dams or ponds (Hecht, 1988) (Figure 4). Pond culture uses various pond designs in different stages of an organism's development, such as spawning ponds, wintering ponds, fry ponds and on-growing ponds (WCADI, 2012).

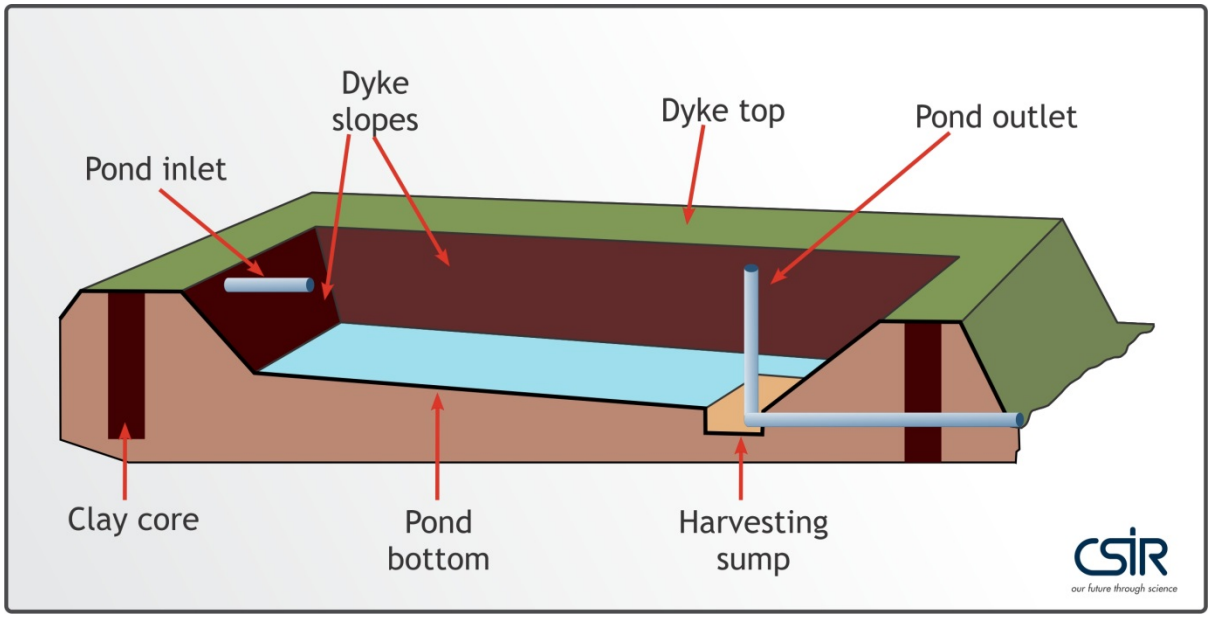

Figure 4: Cross section of a typical earthen fish pond showing the pond profile (source: Aquaculture – The Insight Series by Tom Hecht, ISBN 0798623241).

4.3.2 Flow-through

Flow-through systems are single-pass production systems where a continuous supply of water from the ocean, an estuary, a river, a storage reservoir or other water source is passed through tanks, ponds or raceways before being drained with no re-use of water (Hecht, 1988; DAFF, 2016a) (Figure 5).

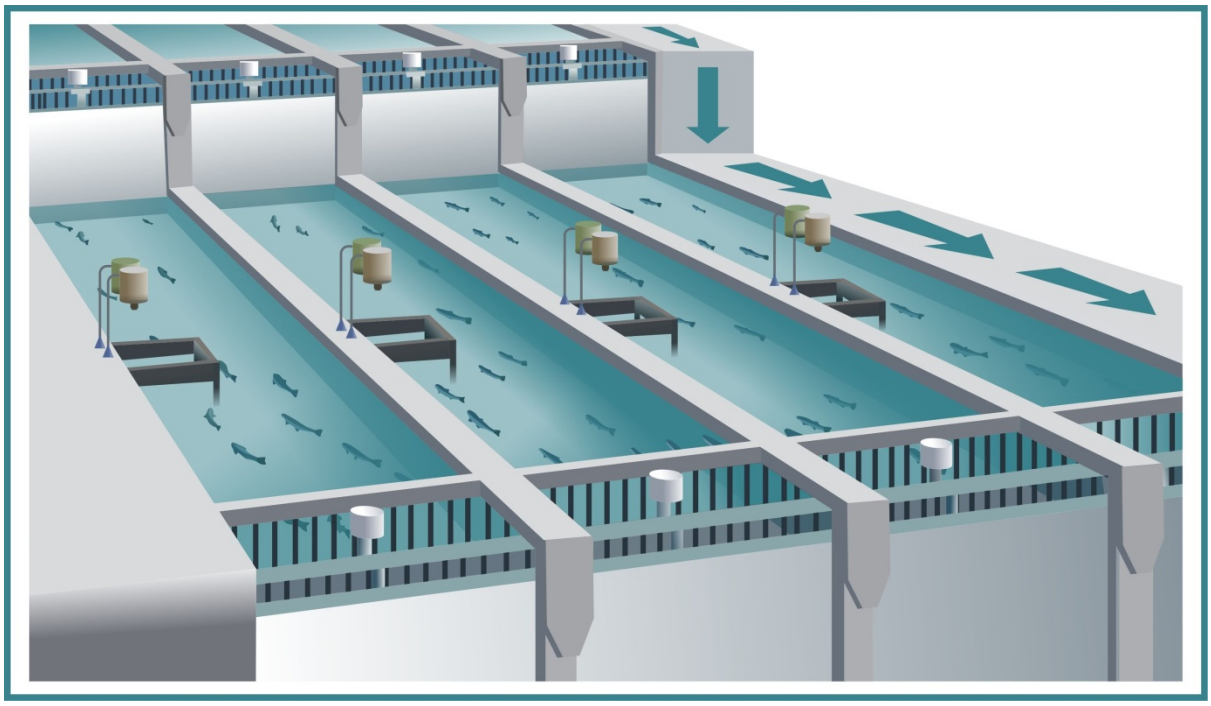

Figure 5: An example of a typical flow-through production system i.e. raceway for trout (after a photograph by Leslie Ter Morshuizen).

4.3.3 Recirculation

More advanced RAS operate by filtering water from the fish (or shellfish) tanks so it can be reused within the system (Hecht, 1988). This dramatically reduces the amount of water and space required to intensively produce aquaculture products. The steps in a RAS include solids removal, ammonia removal, CO2 removal and oxygenation (FAO, 2015a) (Figure 6 & Figure 7).

4.3.4 Hatcheries

Hatcheries form an integral part of an aquaculture facility and allow for artificial breeding, hatching and rearing through the early life stages of species, finfish and shellfish in particular. Generally hatcheries and nurseries are closely associated in any of the aforementioned fish farming production systems and can be tank culture (most often) or even raceway or cage e.g. trout farming (Etienne Hinrichsen, July 2017 pers.comm.). Contrarily, in shellfish farming specific nurseries are common, where larvae produced in hatcheries are grown until ready for stocking in fattening areas (WCADI, 2012).

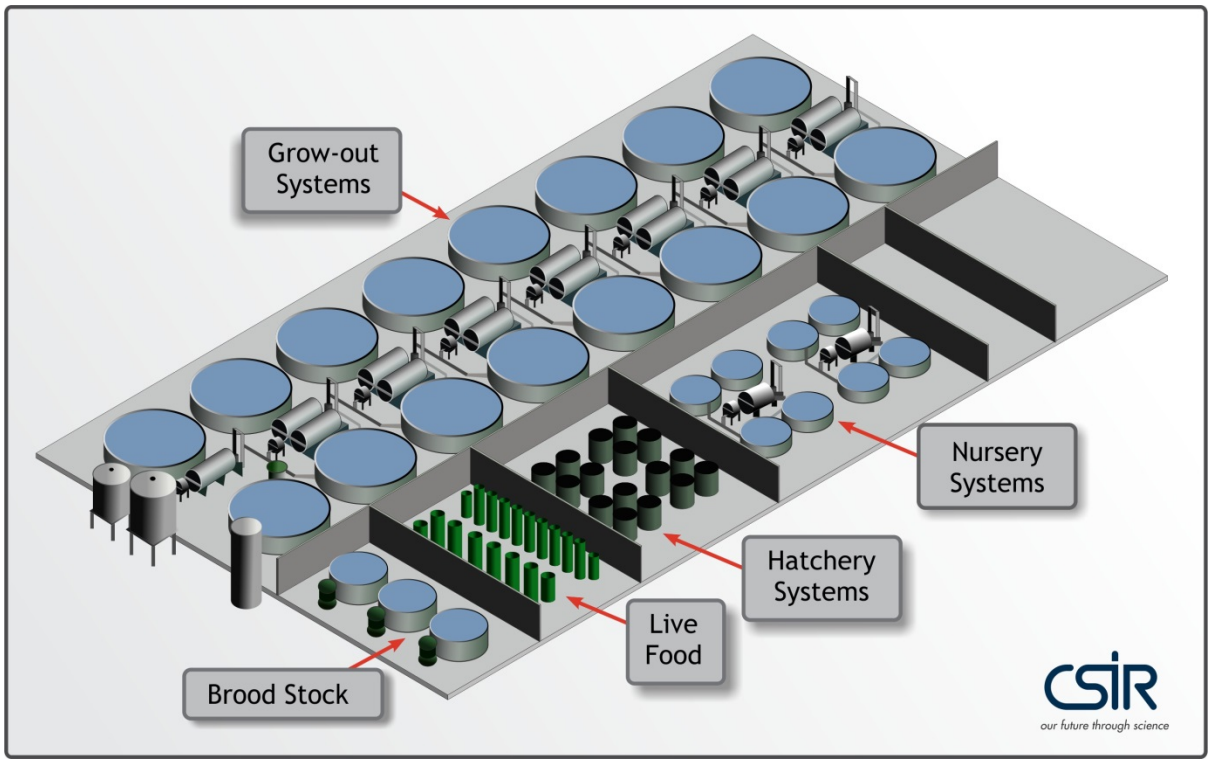

Figure 6: Schematic layout of a typical Recirculating Aquaculture System (RAS) (after Food and Agriculture Organization of the United Nations).

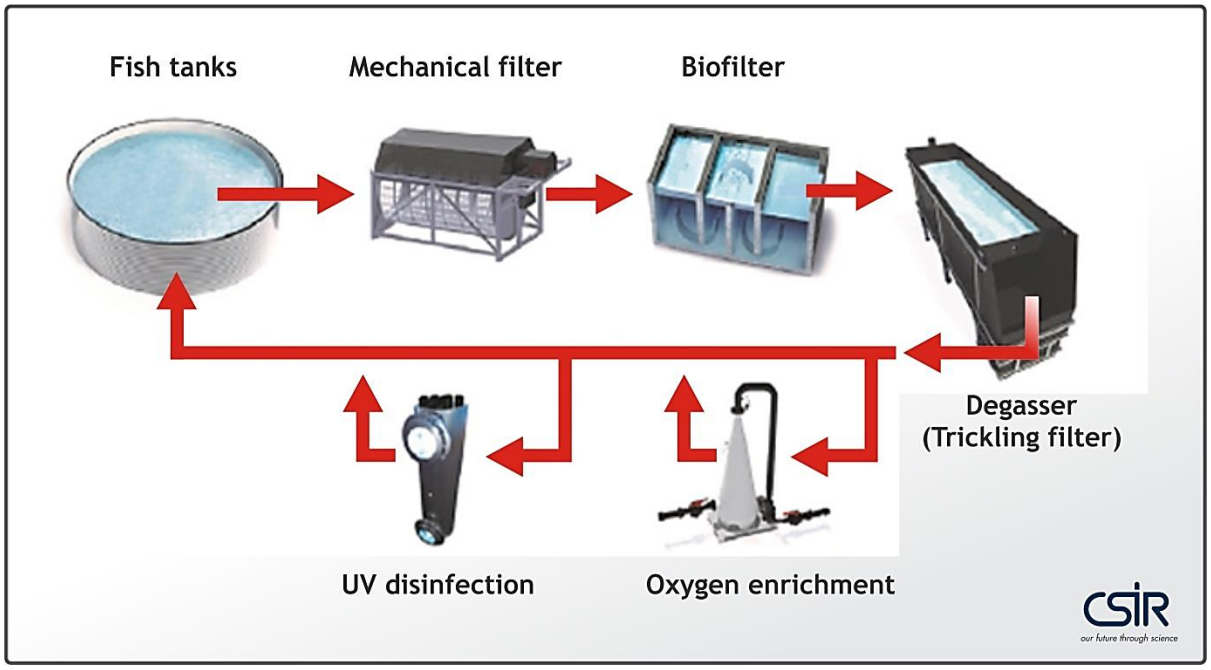

Figure 7: Schematic diagram illustrating the flow process in a Recirculating Aquaculture System (RAS) (after Food and Agriculture Organization of the United Nations).

5 SELECTION OF PRIORITY SPECIES FOR AQUACULTURE

5.1 Marine

The priority marine species selected for assessment in the SEA are categorised as finfish, shellfish and plants (seaweed).

5.1.1 Finfish

The priority species of finfish comprise Atlantic salmon and Dusky kob.

5.1.1.1 Atlantic salmon

The Atlantic salmon, *Salmo salar*, (Figure 8) is a carnivorous salmonid species that is naturally distributed in the northern Atlantic Ocean, from Canada to the West of the USA, to the White and Barents Sea basins in the East, through North-eastern Europe to the Baltic and North Sea basins in North-eastern Europe. It has been introduced to New Zealand, Chile, southern Argentina, Australia and South Africa (DAFF, 2016a).

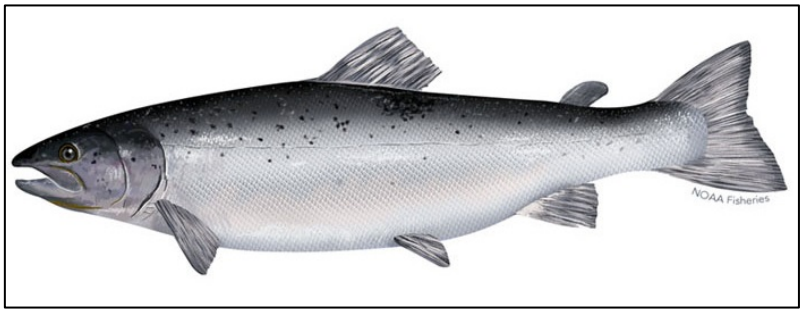

Figure 8: Illustration of Atlantic salmon (source: NOAA Fisheries, http://www.nmfs.noaa.gov/stories/201 5 /12/spotlight_atlantic_salmon.html).

Atlantic salmon have a complex life cycle, and life history styles may be highly variable among regions, rivers and within populations. The majority of Atlantic salmon are anadromous – fish that spend between 1-8 years in their natal river (longer durations at higher latitudes), migrate to the ocean as smolts where they may spend between 1-7 years, and subsequently return to their natal river to spawn. However, some Atlantic salmon individuals do not exhibit anadromy, maturing and spawning without ever migrating to the sea, while landlocked populations complete their entire life cycle in freshwater. Atlantic salmon attain a maximum length of 150 cm, an approximate weight of 46 kg, and a maximum reported age of 13 years (DAFF, 2016a).

Due to its large size, palatability, food value, as well as the diversity of habitats it occupies (freshwater rivers, estuaries and coastal waters) Atlantic salmon has been targeted by fisheries for centuries. A combination of overfishing, habitat alteration (mainly through dam building) and destruction, pollution and poaching has led to precipitous declines in wild salmon populations to the extent that commercially available Atlantic salmon is now exclusively farmed (DAFF, 2016a).

5.1.1.2 Dusky kob

The Dusky kob, *Argyrosomus japonicus*, (Figure 9) is a euryhaline, carnivorous fish usually found in shallow coastal and estuarine waters and is well represented in the Indo-Pacific, the Caribbean and in the temperate waters of the Atlantic and Pacific oceans. In Southern Africa it occurs on the east coast from Cape Point to Mozambique, but is especially abundant between Cape Agulhas and KwaZulu-Natal (DAFF, 2016a).

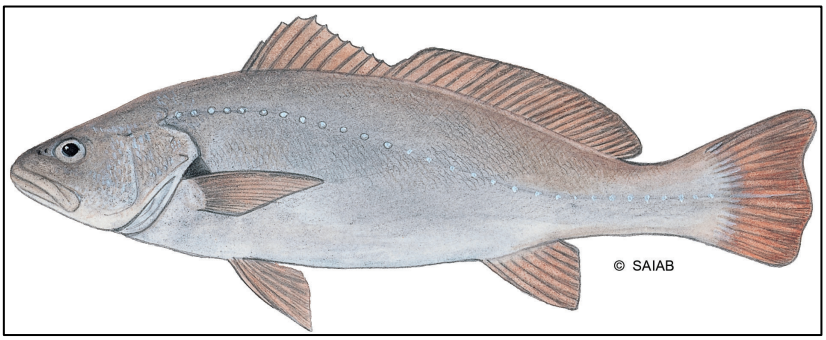

Figure 9: Illustration of Dusky kob (source: WWF SASSI, http://wwfsassi.co.za/fish-detail/56/)

The species exhibits rapid growth in South Africa and can reach a maximum length of 1.8 m, weight of 75 kg and 40+ years of age. Due to its large size, palatability and food value, Dusky kob is targeted by recreational and commercial fisheries throughout its natural distribution. Its rapid growth rate, late maturity, declining commercial catches and high market demand has resulted in the species being identified as a suitable aquaculture candidate species in Australia and subsequently in South Africa (DAFF, 2016a).

5.1.2 Shellfish

5.1.2.1 Abalone

Haliotis midae, known commonly as the South African abalone [Eng] or perlemoen [Afr] (Figure 10), is an endemic species of large sea snail, a marine gastropod mollusc of which the size of the shell varies between 12 and 20 cm (SANBI, 2015). South African abalone has a wide but patchy distribution and is generally found in shallow coastal waters and seems to prefer rocky surroundings. It is naturally distributed along the coast of Port St. Johns in the Eastern Cape through to Saldanha Bay in the Western Cape and as far north on the west coast as Port Nolloth (Troell et.al. 2006; Cloete, 2009).

Figure 10: Photograph of South African abalone (source: SANBI, https://www.sanbi.org/creature/south-african - abalone)

Abalone is generally herbivorous and feed mainly on floating kelp and red- and green algae. Abalone farming usually alternates sea weeds with synthetic food as food sources (SANBI, 2015). This economically important species is highly utilised and has a high market value. It is therefore one of the most sought-after and exported aquaculture invertebrates in the country (Troell et.al. 2006).

Abalone have a slow growth rate this species is extremely vulnerable to impacts of overharvesting. The increasing pressure put on South African abalone by both legal and illegal harvesting has led t abalone harvesting being banned. Abalone is currently commercially farmed at various aquaculture facilities along the Eastern Cape, Western Cape and Northern Cape coastlines (Britz & Venter, 2016).

5.1.2.2 Mediterranean mussel

The Mediterranean mussel, *Mytilus galloprovincialis*, (Figure 11) is a filter-feeding bivalve native to the Mediterranean and the eastern Atlantic, including Ireland and the United Kingdom to northern Africa. It has been introduced to the Pacific coast of North America, Hong Kong, Japan, Chile, Australia, New Zealand and South Africa. In South Africa, it is distributed along the entire west coast (Western Cape and Northern Cape coastlines) and the southern coast (Western Cape and Eastern Cape coastlines) up to East London (DAFF, 2016b).

Figure 11: Illustration of Mediterranean mussel (source: Blue Ocean Institute, http://www.blue oceaninstitute. com/seafood/species/102.html).

The species occupies the intertidal zone (mid-to-high rocky shores), forming dense beds where it attaches firmly to rocks by means of strong byssal threads secreted by a mobile foot. Mediterranean mussels are filter-feeders that obtain food by pumping water through enlarged, sieve-like gills and transporting particles using cilia from the gills toward the mouth for ingestion (DAFF, 2016b).

The Mediterranean mussel is listed as an alien invasive species in South Africa and is associated with the widespread displacement of the indigenous ribbed, brown and black mussels. Its success as an invasive species may be attributed to its high productivity, reproductive output, growth rate, tolerance of extended periods of desiccation and tendency to grow in dense beds. Better growth rates and adaptability to culture conditions has resulted in the Mediterranean mussel becoming a priority species for aquaculture production in South Africa (DAFF, 2016b).

5.1.2.3 Pacific oyster

The Pacific oyster, *Crassostrea gigas*, (Figure 12) is a filter-feeding bivalve species native to Japan. It has been introduced to at least 27 other countries in the Americas, Europe, Australasia and Africa. It is currently the most commercially marketed oyster globally and in South Africa (DAFF, 2016b).

Figure 12: Photograph of Pacific oyster (source: Sea Farmers, http://www.seafarmers.sg/pacific-oysters.html)

Pacific oysters attach to rocks or debris on firm-bottomed- or mud and sand-bottomed substrates, usually in estuarine environments up to a depth of 40 m. This species may reach a maximum length of 400 mm, although specimens in South Africa generally attain 200 mm and can live for up to 30 years (DAFF, 2016b).

Efforts to culture oysters in South Africa began as early as the late 1600's when European settlers unsuccessfully attempted to farm the native *Striostrea margaritacea* along the Cape coast. Following many failed attempts, the hardier and globally farmed Pacific oyster was eventually imported to South Africa with a batch of spat being introduced to the Knysna estuary in the 1970's. Since then, Pacific oyster has been effectively farmed at various facilities along the Northern Cape, Western Cape and Eastern Cape coastlines, with production volumes fluctuating between 250 to 300 tonnes during the period 2000 to 2013. This variation has been attributed to a number of farm closures during this period due to biotoxins and other hazardous substances concentrations exceeding the regulatory limit (DAFF, 2016b).

5.1.3 Plants (seaweed)

Seaweed is a very versatile product widely used for food in direct human consumption. It is also an ingredient for the global food and cosmetics industries and is used as fertiliser and as an animal feed additive (FAO, 2003). In South Africa seaweeds have been collected or harvested since the early 1950s, but are now increasingly cultivated on large scale using land-based paddle-wheel raceways due to its aquaculture potential. Seaweeds have been used commercially as feedstock for phycocolloid production, for the production of abalone feed, and the production of Kelpak® and Afrikelp®, which are plant-growth stimulants used in the agricultural sector (Amosu et.al. 2013). The green seaweed, *Ulva* species is one of South Africa's most important aquaculture products (Figure 13a), constituting an important feed source particularly for abalone (*Haliotis midae* L.). It is also utilised for integrated aquaculture, as a bioremediation tool and biofuel production. Other important aquaculture seaweeds in South Africa include *Gracilaria* spp. and *Porphyra capensis* (Figure 13b & c) (Anderson et.al. 1989; Troell et.al. 2006; Amosu et.al. 2013).

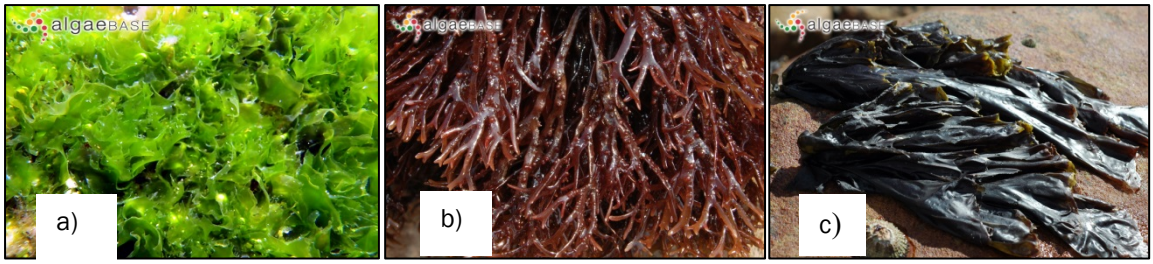

Figure 13: Photographs of a) *Ulva* spp, b) *Gracillaria* spp, and c) *Porphyra capensis* seaweed (source: Algaebase, http://www.algaebase.org/).

5.2 Freshwater

The priority freshwater species are categorised as finfish and crustaceans.

5.2.1 Finfish

The priority finfish species are trout (Brown and Rainbow), tilapia (Mozambique and Nile) and African Sharptooth catfish.

5.2.1.1 Trout

5.2.1.1.1 Brown trout

Brown trout, *Salmo trutta*, (Figure 14) is a coldwater fish which is naturally distributed in Europe and western Asia. It is primarily a freshwater species with a fusiform body shape and is commonly found in cool streams and rivers in mountainous regions. In South African dams, this species can grow up to 75 cm in length and over 6 kg in weight, whereas in rivers smaller specimens are usually found (Skelton, 2001; DAFF, 2012c).

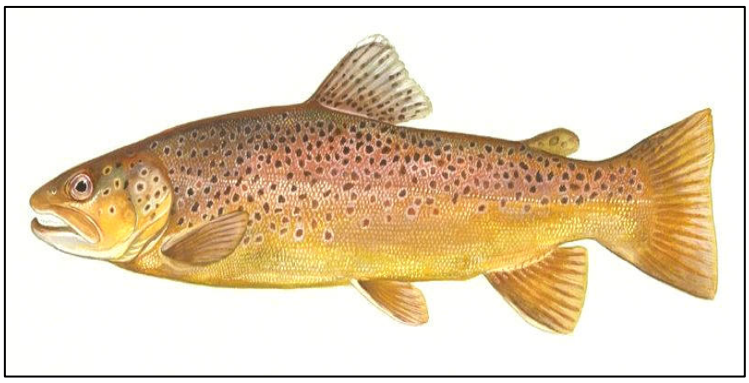

Figure 14: Illustration of Brown trout (source: Ontario Fish Species, http://www.ontario fishspecies.com/brown-trout.html)

Brown trout are opportunistic predators. As juveniles, brown trout eat plankton, whereas adults feed on zooplankton, aquatic and terrestrial invertebrates, small fish and frogs at any level of the water column (DAFF, 2012c).

5.2.1.2 Rainbow trout

Rainbow trout, *Oncorhynchus mykiss*, (Figure 15) is a coldwater fish native to North America. It is primarily a freshwater species with a fusiform body shape which requires high quality (unpolluted and well-oxygenated) water in order to survive. As a result, it is commonly found in fast flowing streams and open lakes or dams (Skelton, 2001; DAFF, 2012d).

Figure 15: Illustration of Rainbow trout (source: Federation of Southern African Flyfishers, http://www.fosaf.org.za/guide-trout.php).

Rainbow trout are opportunistic feeders predating on invertebrates (terrestrial and aquatic), other small fish, and fish eggs. O. mykiss can grow to lengths exceeding 1 m and weights of more than 15 kg. In South Africa, the average river rainbow trout is only 0.5 m in length and weighs up to 1.5 kg (DAFF, 2012d).

Rainbow trout was first imported to South Africa in 1897 for angling purposes, but two years later the first breeding programmes were underway and today rainbow trout is commonly farmed in intensive monocultures (DAFF, 2012d).

Trout requires the availability of good quality, well-aerated water and can be farmed in the following systems: i) concrete raceways or ponds which have a continuous supply of flowing river water (which is treated prior to discharge); ii) tanks which are connected to RAS; or iii) cages which are usually anchored in dams. In South Africa, brown trout is primarily farmed for purposes of recreational fishing, whereas rainbow trout is mainly produced as a food source (FAO, 2011).

5.2.1.3 Tilapia

5.2.1.3.1 Nile tilapia

The Nile tilapia, *Oreochromis niloticus*, (Figure 16) commonly known as Nyl kurper [Afr] is a deep-bodied fish with cycloid scales. It grows to a maximum length of 62cm, weighing up to 3.65kg and can live longer than 10 years. Nile tilapia are known to feed on phytoplankton, aquatic plants, invertebrates, benthic fauna, detritus, and even other fish and fish eggs (Skelton, 2001; DAFF, 2012e).

Figure 16: Illustration of Nile tilapia (source: Fish the Fly, http://fishthefly.co.za/fly-fishing-fish-species/freshwater-fish-species/nile-kurper-tilapia/).

Nile tilapia is native to Central and North Africa, and the Middle East. It is a tropical freshwater and estuarine species that prefers shallow, still waters on the edge of lakes and wide rivers with sufficient vegetation. Nile tilapia was first introduced into South Africa in 1959 with its release into dams in the Western Cape and KwaZulu-Natal. Since the 1980s, introductions in other parts of Southern Africa has led

to fish escaping into rivers and as a result, the Nile tilapia has established self-sustaining wild populations in some major rivers in KwaZulu-Natal and Limpopo (DAFF, 2012e).

This species has become a popular source of protein and Nile tipalia is currently being produced in South Africa using three different freshwater aquaculture systems i.e. i) seasonal pond culture; ii) seasonal cage culture in lakes, rivers and dams; or iii) thermally regulated intensive bio-secure recirculation systems in tanks and raceways (DAFF, 2012e).

5.2.1.3.2 Mozambique tilapia

The Mozambique tilapia, *Oreochromis mossambicus*, (Figure 17) commonly known as blou kurper [Afr] is native to southern Africa and is a popular fish species for aquaculture. It naturally occurs in coastal regions and the lower reaches of rivers in southern Africa, from the Zambezi River delta to Bushman River in the Eastern Cape. It generally prefers slow moving water bodies such as lagoons, rivers and impoundments, but can also colonise faster-flowing rivers and streams. In addition to fresh waters, the Mozambique tilapia can also live in tidal habitats such as the upper reaches of estuaries and coastal lagoons (Skelton, 2001; El-Sayed, 2006).

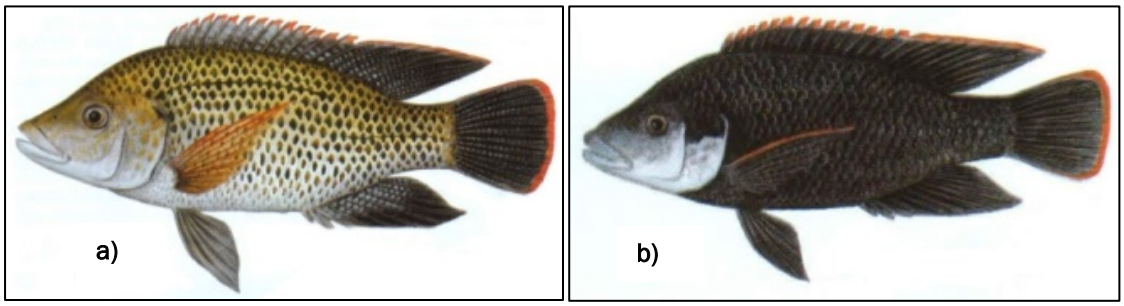

Figure 17: Illustration of a) Mozambique tilapia, and b) a breeding male with darker colouration (source: I Love Fishing, http://www.ilovefishing.co.za/freshwater-species/blue-kurper/).

Mozambique tilapia is threatened in its home range by competition with the invasive Nile tilapia. Dull coloured, the Mozambique tilapia often lives up to a decade in its native habitats. Due to human introductions, it is now found in many tropical and subtropical habitats around the globe, where it can become an invasive species because of its robust nature (El-Sayed, 2006).

The Mozambique tilapia is laterally compressed, and has a deep body with long dorsal fins, the front part of which have spines. Native colouration is a dull greenish or yellowish, and there may be weak banding. Adults reach approximately 40 cm in length and can weigh up to 2 kg. Mozambique tilapia has a high potential for hybridization and are often crossbred with other tilapia species in aquaculture. They are also fairly resistant to wide varieties of water quality issues and pollution levels, which make them an ideal species for aquaculture (El-Sayed, 2006).

5.2.1.4 Catfish (African sharptooth)

African sharptooth catfish, *Clarias gariepinus*, (Figure 18) is a typical air-breathing catfish with a scaleless, bony, elongated body with long dorsal and anal fins, and a helmet like head. It can grow to a maximum length of 170 cm and can weigh up to 60 kg (Skelton, 2001). It is considered to be omnivorous displaying both scavenging and predatory behaviour with an extremely varied diet consuming fruits and seeds, all types of aquatic invertebrates and small vertebrates, small mammals and even plankton (DAFF, 2012f).

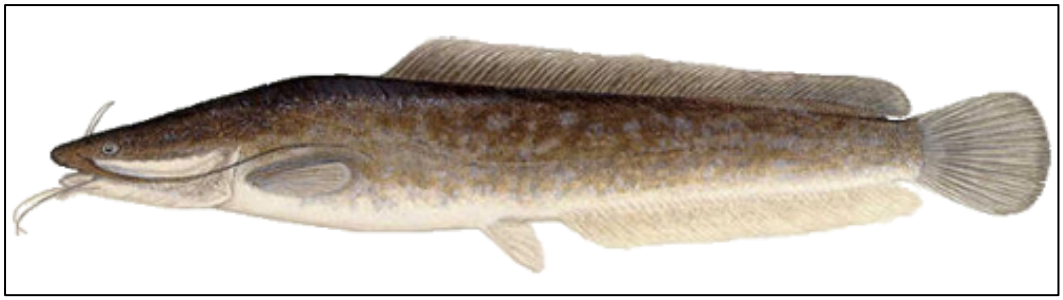

Figure 18: Illustration of African sharptooth catfish (source: Best Fishing Spots, http://www.bestfishingspots.co.za/fish.php?fish=1).

The native range of *C. gariepinus* covers most of the African continent, with the exception of Maghreb, Upper and Lower Guinea, and the Cape provinces of South Africa (Skelton, 2001). The African sharptooth catfish is widely tolerant of many different habitats, even the upper reaches of estuaries, but is considered to be a freshwater species. It favours floodplains, slow flowing rivers, lakes and dams (DAFF, 2012f).

C. gariepinus is considered to have a rapid growth rate (in length and weight) and is known to endure extremely harsh conditions. These characteristics allow for advanced adaptability and has led to it been widely farmed all across Africa. With recent advances in aquaculture technologies this species has become a sought after aquaculture species mainly as food source, but also as a biocontrol species in tilapia farms (DAFF, 2012f).

5.2.2 Crustaceans

5.2.2.1 Freshwater crayfish (marron)

The marron crayfish, *Cherax tenuimanus*, (Figure19) is a robust freshwater species that is native to south-western Australia. It was first introduced into South Africa in the 1970's and since has been successfully farmed at aquaculture facilities in the Western Cape and Eastern Cape (DAFF, 2012g).

Figure 19: Photograph of marron crayfish (source: Department of Fisheries Western Australia, http://fish.wa.gov.au/Species/Marron/Pages/default.asp).

Marron prefers the sandy bottoms of rivers or dams, where they can find shelter from predators and access to accumulated organic matter, but can survive in a variety of habitats. It is a temperate water species, but will tolerate larger temperature fluctuations, with adults being more resilient to low temperatures (DAFF, 2012g).

C. tenuimanus is an omnivore and scavenger, mostly feeding on dead plants and other forms of organic debris. The marron can grow to a maximum of approximately 40 cm and weigh up to 2.5 kg. The species is considered to have high invasive potential in South Africa and pose a high biosecurity risk in terms of escapement risk and transfer of pathogens and diseases to native species. Due to the negative impact of

introduced parasites that is often associated with marron, and its disappointing results in terms of aquaculture production to date, the potential environmental impact is likely to outweigh the economic benefits of farming whit this species (DAFF, 2012g).

6 OVERVIEW OF THE KEY ENVIRONMENTAL, SOCIAL AND ECONOMIC ASPECTS OF AQUACULTURE IN SOUTH AFRICA

6.1 Water quality and quantity

The availability of sufficient water quantity of appropriate quality is essential for all aquaculture species and systems. Quantity of water however is particularly important for land-based systems (FAO, 2016). Aspects of water quality that could impact on aquaculture activities relate to temperature, depth, salinity, turbidity, pH levels, dissolved oxygen levels, elevation, flow rates, currents, tides, sedimentation, eutrophication, nutrient loading and toxicity (harmful algal blooms). Aspects of water quantity that could impact on aquaculture activities relate to presence, extent and seasonality of water sources, as well as liability to pollution (Barnabé, 1990).

The risk of pollution to coastal waters and freshwater bodies due to the discharge of organic wastes may generally be attributed to land-based aquaculture facilities. Various chemical substances that may be used in aquaculture production, such as therapeutic chemicals for cultured stock and antifouling treatments for infrastructure, have the potential to pollute marine and aquatic environments that may in turn have indirect, downstream negative impacts on food chains and human health (Pillay, 2004). When monitoring the discharge water from an aquaculture facility it is important, especially with flow-through systems, to take a reading from the incoming water and thus work on the difference between the two to ascertain what the aquaculture facility is contributing to the environment. In other words, cognisance must be taken of the background concentrations of pollutants and waste (Neil Stallard, July 2017 pers.comm.).

6.2 Biodiversity and conservation

Alien species provide a valuable food source and an economic opportunity in both the fisheries and aquaculture sectors globally. However, there is environmental risk associated with the uncontrolled introduction and use of alien species in aquaculture activities (Pillay, 2004; DEAT, 2006).

Other impacts include: the risk of escape of farmed alien aquaculture species into natural environments where they are non-native; hybridisation due to inbreeding; genetic modification to increase productivity; overharvesting of wild broodstock; natural habitat modification and loss due to infrastructure development; eutrophication of waterbodies due to effluent; disease transmission to wild fish; and risks to fauna and flora due to entanglement in farm structures resulting in injury or death (Pillay, 2004; Diana, 2009).

6.3 Animal health and biosecurity

Aquaculture is regarded as the fastest growing food production sector in the world (FAO, 2016). Best practice and management for aquatic animal health are fundamental to the sustainability of the aquaculture industry. Disease management approaches need to encompass both the prevention and control of disease. Important disease management mechanisms include the maintenance of national aquatic biosecurity through import and export control, aquatic animal movement control, on farm biosecurity measures, and disease surveillance and monitoring (DAFF, 2015a).

Incubation and transmission of infectious diseases, pathogens and parasites from captive aquaculture species to wild populations pose serious risk to the receiving environment (DAFF, 2012h). With the increase in aquaculture trade, the importance of trans-boundary animal diseases (TADs) is a growing

concern due to its large socio-economic impact; potential public health impact; and potential loss in production. TADs are defined as epidemic diseases that are highly transmissible and capable of rapid spread through national borders (DAFF, 2015a).

6.4 Heritage resources and visual aesthetics

Most aquaculture systems comprise infrastructure with physical footprints. It is imperative the receiving environment be screened for the presence of any artefacts or structure of palaeontological, archaeological or cultural-historical importance when siting areas for potential aquaculture development (Hutchings et.al. 2011). Infrastructure may also create visual disturbances to sensitive visual receivers and retract from the '"natural beauty" and aesthetic character of an area. Sensitive visual receivers such as tourism facilities, public beaches and conservation areas may be impacted by improper siting of aquaculture facilities.

6.5 Availability of feedstock

Growth, health and reproduction of fish and other aquatic animals are primarily dependent upon an adequate supply of nutrients, both in terms of quantity and quality, irrespective of the culture system in which they are grown. Feed and fertiliser input us generally required to ensure the nutrients and energy requirements of the species under cultivation are met and the production goals of the system are achieved. Nutrition and feeding play an essential role in the sustained development of aquaculture, which results in fertilisers and feed resources playing a dominant role in the requirements for aquaculture facilities (Hasan, 2001). There are a number of specific issues relating to aquatic animal nutrition and feeding that are critical for sustainable aquaculture production. These include for example (i) nutrient requirements of fish and their supply under practical farming conditions, (ii) availability and supply of feed resources and their implication on the development of aquafeeds, (iii) forecasting of demand and supply of marine resources, and (iv) maintenance of environmental quality and sustainability of aquaculture systems (Hasan, 2001).

6.6 Climate change impacts and adaptation

Climate change will have a range of impacts on aquaculture. The main drivers that could have direct or indirect impacts on aquaculture include warming of waterbodies, sea-level rise, ocean acidification, weather pattern changes and extreme weather events (FAO, 2016). Links have been illustrated between predicted increased ocean carbon dioxide (CO2) levels and consequent ocean acidification; climate-induced temperature variability and growth rates, disease susceptibility, timing of spawning, mortality at certain life-cycle stages of aquaculture species (FAO, 2016). These climate change related impacts to aquaculture industries can also result in undesired micro- and macro-economic impacts. Furthermore, extreme weather events are linked to physiological impacts to aquaculture species through changes in salinity and temperature (FAO, 2016). There can also be various socio-economic impacts including escapes from aquaculture facilities in the event of floods, and damage to infrastructure and other livelihood assets (DEA, 2012a; FAO, 2016).

6.7 Land and sea space uses and planning

Due to security concerns, aquaculture farms will need to exclude other users from what was previously public land, water or sea space. As a result of the lack of sheltered sea space off South Africa's coast, as well as availability of sufficient inland freshwater bodies, most of the areas suitable for aquaculture are already heavily utilised for fishing, ecotourism and other commercial and recreational activities. However, opportunities also exist for synergies between aquaculture and other land uses, such as the use of effluent water from aquaculture facilities to water and fertilise crops. This type of synergistic approach is widely used in small- and household-scale "aquaponic" systems, where vegetables can be grown in the effluent from fish ponds.

Aquaculture growth worldwide involves the expansion of cultivated areas, a higher density of aquaculture installations and farmed individuals, and greater use of feed resources produced outside of the immediate

culture area. Such evolution of the sector could carry negative impacts on the environment and on portions of the society when unregulated and ineffectively managed. In terms of the FAO Code of Conduct for Responsible Fisheries (CCRF), an ecosystem approach for aquaculture (EAA) is a strategy for the integration of the activity within the wider ecosystem in such a way that it promotes sustainable development, equity, and resilience of interlinked social and ecological systems. Such strategy should be guided by three main principles that should ensure the contribution of aquaculture to sustainable development: i) aquaculture should be developed in the context of ecosystem functions and services with no degradation of these beyond their resilience capacity; ii) aquaculture should improve human wellbeing and equity for all relevant stakeholders; and iii) aquaculture should be developed in the context of (and integrated to) other relevant sectors, where possible (FAO, 2007; Staples & Funge-Smith, 2009; Burrows et.al., 2010).

6.8 Socio-economics

A key reason for promoting aquaculture is its potential to promote economic development (Bailly & Willmann, 2001). Aquaculture has been successfully promoted in several countries for economic growth and employment, especially in rural areas (FAO, 2016). South African aquaculture has made a significant contribution to local economies in areas such as Hermanus, Port Elizabeth and Saldanha.

As aquaculture is a growing industry, it provides opportunities for the promotion of equity through black economic empowerment and transformation. To date, this has included both BEE shareholding in established commercial ventures and also the promotion of small scale aquaculture ventures with participation from local communities (DAFF, 2015b).

Modern day aquaculture requires specific human skills which contribute to the socio-economic fabric of coastal communities who may have limited opportunities to develop new and economically valuable skills. As with skills, aquaculture is technologically advanced and often leads to the development of innovative technologies that can be applied to other areas of development (DAFF, 2015b).

Aquaculture may also result in negative socio-economic impacts through user conflicts, specifically on tourism and property values due to potential negative aesthetic impacts of fish farms (Hutchings et.al. 2011; FAO, 2016).

7 OVERVIEW OF A TYPICAL AQUACULTURE VALUE CHAIN

The value chain for aquaculture comprises of a number of primary activities. The “input supply” stage consists of four critical elements: (i) stock supply which originates from hatcheries or nurseries, locally or abroad; (ii) the feed supply which is either imported or produced locally; (iii) the labour supply which carry out the various activities within the facilities; and (iv) sufficient quality and quantity of water supply (DAFF, 2015b).

The second stage is that of “production technology” where the technology utilised depends on the type of business enterprise to be carried out (e.g. cages, ponds or tanks), as well as the various methods of transportation and capital equipment required.

The third stage is the maturing of the species to the correct age for distribution and sale. This is followed by trading of the particular species, either to the local or export market. Traders will either process the species, or sell the produce to designated processors who in turn will sell it to the consumers. Supporting products and services include the research and technology element of this value chain (DAFF, 2015b).

It is important to note that the activities involving on-site harvesting, cleaning and live packaging of aquaculture products are included in the scope of the SEA; however, processing including the production of

fresh and frozen products for sale to both the local and export markets are excluded from the scope of this SEA (Figure 20).

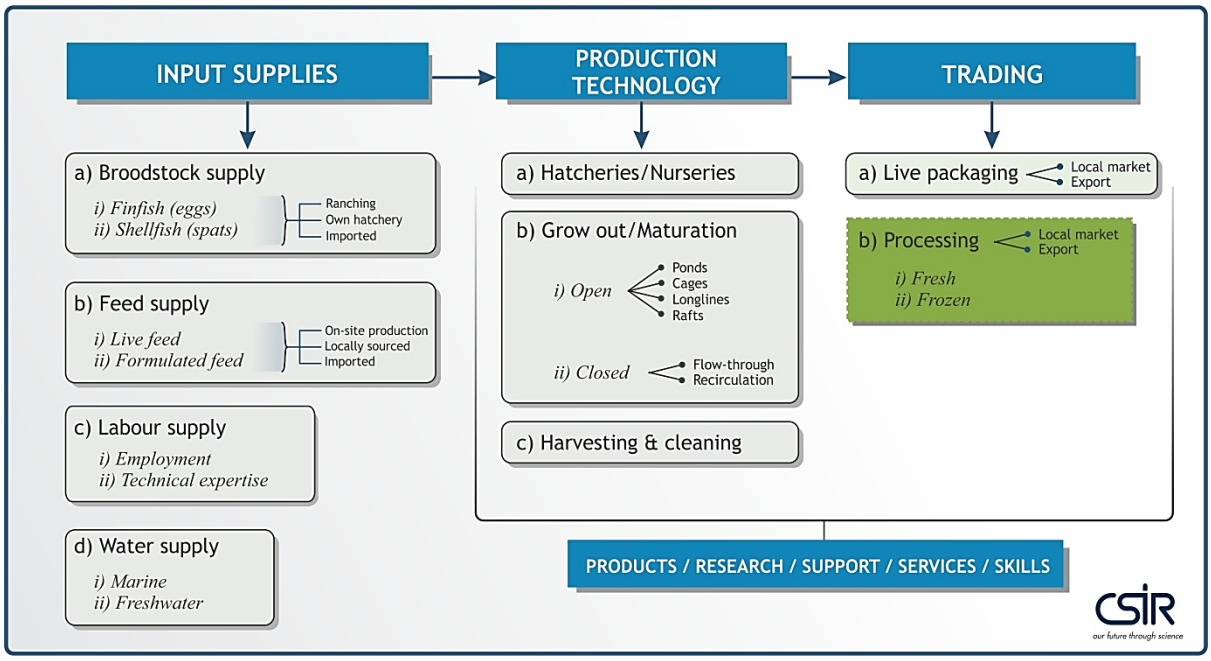

Figure 20: Schematic illustration of the typical South African aquaculture value chain. The green-shaded area represents processing of aquaculture products and is excluded from the scope of the SEA.

8 ENVIRONMENTAL LEGAL FRAMEWORK FOR AQUACULTURE IN SOUTH AFRICA

The South African aquaculture industry is governed by several parliamentary acts, policies, strategies and regulations (Urban-Econ, 2017). The following list of legislation constitutes the main legal framework guiding aquaculture development in South Africa:

1. The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
2. The National Environmental Management: Protected Areas Act, 2003 (Act No. 10 of 2003)
3. Marine Living Resources Act, 1998 (Act No. 18 of 1998)
4. National Environmental Management: Biodiversity Act, 2004 (NEMBA)
5. The National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008)
6. The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
7. The Sea Birds and Seals Protection Act, 1973 (Act No. 46 of 1973)
8. The Seashore Act, 1935 (Act No. 21 of 1935)
9. The National Water Act, 1998 (Act No. 36 of 1998)
10. The Water Services Act, 1997 (Act No. 108 of 1997)
11. Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947)

12. The Animal Diseases Act, 1984 (Act No 35 of 1984)
13. The Genetically Modified Organisms Act, 1997 (Act No. 15 of 1997)
14. The Animal Improvement Act, 1998 (Act No. 62 of 1998)
15. Animals Protection Act (Act No 71 of 1962)
16. Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)
17. Agricultural Pests Act, 1983 (Act No. 36 of 1983)
18. The Health Act, 1977 (Act No. 63 of 1977)
19. The National Regulator for Compulsory Specifications Act, 2008 (Act No. 5 of 2008)
20. The Standards Act, 2008 (Act No. 8 of 2008)
21. The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
22. The Cape Nature and Environmental Conservation Ordinance, 14 of 1974
23. Transvaal Nature Conservation Ordinance, 12 of 1983
24. National Aquaculture Strategic Framework, 2012 (NASF)
25. National Aquaculture Policy Framework, 2013 (NAPF)
26. Industrial Policy Action Plan, 2016/2017 (IPAP)
27. Policy for Development of Sustainable Inland Aquaculture
28. Strategic Plan for Development of Agriculture, Forestry and Fisheries (2015/16 to 2019/20)
29. Aquaculture Development and Enhancement Programme (ADEP)
30. Operation Phakisa, 2014
31. Draft Aquaculture Bill, 2016

This legal framework is supported by numerous national and provincial policies, gazetted regulations, and development planning documentation (DAFF, 2013). There have been significant improvements to the legal and regulatory frameworks in recent years, for example the introduction of the NEM:ICM (2008) has for the first time enabled areas of sea space outside the National Ports Authority jurisdiction to be zoned and leased for aquaculture – possibly the single most important development in terms of the promotion of the cage culture sub-sector. However, other frameworks impose constraints on sectoral growth, particularly with respect to Environmental Impact Assessment (EIA) Regulations of 2017, and issues related to the use of alien or invasive species (Alien and Invasive Species Regulations, 2014).

Despite government's commitment to sectoral development, institutional coordination (across national line departments, across spheres of government, with public research institutions and universities, and between the public and private sectors) remains a challenge. Successful implementation of recommendations to promote and streamline an integrated authorisation processes would require a coordinated effort across key role players.

Please refer to **Appendix 1** – Guide to the Authorisation Requirements for Aquaculture in South Africa, prepared by DAFF for a summary of relevant authorisations, licences and permits required to undertake marine and freshwater aquaculture activities in South Africa (DAFF, 2015c).

Appendix 2 - Summary of legal framework relating to authorisation, licences and permits required to undertake Aquaculture in South Africa, prepared by CSIR provides a tabled breakdown of relevant regulatory requirements for aquaculture in terms of key national and provincial legislation.

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Appendix 1: Guide to the authorisation requirements for aquaculture in South Africa. 2015. Department of Agriculture, Forestry and Fisheries (DAFF).

2015

Guide to the authorisation requirements for aquaculture in South Africa

agriculture, forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

Department of Agriculture, Forestry and Fisheries

2015

PREPARED BY

The Department of Agriculture, Forestry and Fisheries
Chief Directorate: Aquaculture and Economic Development
Directorate: Sustainable Aquaculture Management
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Cape Town
8012

FOR ENQUIRIES CONTACT

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Branch: Fisheries Management
Directorate: Sustainable Aquaculture Management
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Ms Zimasa Jika
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Email: ZimasaJ@daff.gov.za
Tel: (021) 402 3356

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Email: ImtiyazI@daff.gov.za
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Tel: (021) 402 3424

Table of Contents

Acronyms and Abbreviations

CITES	Convention on the International Trade in Endangered Species
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
FPE	Fish Processing Establishment
ITAC	International Trade and Administration Commission
MLRA	Marine Living Resources Act, 1998 (Act No. 18 of 1998)
NEMA	National Environmental Management Act
NEM: BA	National Environmental Management: Biodiversity Act

1. INTRODUCTION

1.1 Defining aquaculture in South Africa

Aquaculture is the farming of aquatic organisms, including fish, molluscs, crustaceans, seaweeds and invertebrates in a controlled or selected aquatic environment for all or part of their lifecycle. Typical means of enhancing production include good animal husbandry selective breeding programmes, feeding, regular stocking, grading and protection from predators. As with agricultural practices, aquaculture also implies individual or corporate ownership of the stock under cultivation. Aquaculture represents a sector with the potential to make a significant contribution towards the economy of our country through the creation of skills based employment and the selling of products on local or foreign markets.

The marine aquaculture sector in South Africa comprises mainly finfish, shellfish and seaweed culture, including mainly indigenous species in commercial production such as Abalone (*Haliotis midae*), Dusky kob (*Argyrosomus japonicus*), Silver Kob (*Argyrosomus inodorus*), Yellowtail (*Seriola lallandi*) and alien species such as the Mediterranean Mussel (*Mytilus galloprovincialis*) and Pacific Oyster (*Crassostrea gigas*), as well as indigenous seaweed (*Ulva*, *Gracilaria* and *Porphyra*) species used as a feed supplement in abalone farming. A number of marine species are also being researched as potential aquaculture species, including but not limited to the White Stumpnose (*Rhabdosargus globiceps*), River Snapper (*Lutjanus argentimaculatus*), Yellowbelly Rockcod (*Epinephelus marginatus*), Sea Cucumber (*Holothuria scabra*), Sea Urchin (*Tripneustes gratilla*) and Scallop (*Pecten sulcicostatus*).

The marine aquaculture sector also includes marine ornamentals, which is practiced both on a hobbyist and commercial scale. Currently the sector is sub-divided into three components, namely the small scale hobbyist breeding marine ornamentals for recreational purposes; a marine ornamental supplier importing for sale to local pet stores and the commercial marine ornamental operation producing marine ornamentals for sale on the local and international market.

Freshwater aquaculture in South Africa includes a vast array of mainly alien species ranging from Tilapia (*Oreochromis mossambicus* and *Oreochromis niloticus*), Sharptooth Catfish (*Clarias gariepinus*), Rainbow Trout (*Oncorhynchus mykiss*), Brown Trout (*Salmo trutta*), Ornamental Koi and Common Carp (*Ciprinus carpio*), and Marron (freshwater crayfish) (*Cherax tenuimanus*) forming the bulk of commercial production. Both sectors utilize extensive (e.g. earth ponds, rafts, long lines and sea cages) as well as intensive recirculating or flow through pump ashore systems, particularly in the marine aquaculture sector. The choice of aquaculture species is dependent on the market availability, site selection and available technology

1.2 Objectives of this guideline

The main objectives of this guideline are as follows:

a) To assist new entrants and existing operators wishing to expand, by providing a user - friendly information source on the types of permits and authorization requirements to undertake marine and freshwater aquaculture activities in South Africa.

b) To provide new entrants and existing operators with relevant contact details and information sources.

1.3 Legislative mandates

This guideline provides an information source regarding the authorisation requirements applicable to undertake an aquaculture activity in South Africa. It is not a legislative review and has no legal standing, but provides guidance to the legal frameworks, which are legally binding towards the protection and responsible use of our environment. The following South African legislation is of importance and can be used as additional information sources on the legal requirements in support of this guideline, but is not limited to the following:

- The Marine Living Resources Act, 1998 (Act No. 18 of 1998)
- The Animal Diseases Act, 1984 (Act 35 of 1984)
- Integrated Coastal Management Act, 2008 (No. 24 of 2008) (ICM Act)

  (An electronic version of the ICM Act, the User Friendly Guide to the Act and other relevant documentation is available for download on the DEA website, www.environment.gov.za.)
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM: BA)
- 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)
- Seashore Act, 1935 (Act No. 21 of 1935)
- The Genetically Modified Organisms Act, 1997 (Act No. 15 of 1997)
- The Health Act, 1977 (Act No. 63 of 1977)
- The National Regulator for Compulsory Specifications Act, 2008 (Act No. 5 of 2008)
- The Standards Act, 2008 (Act No. 8 of 2008)

- The Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Act No. 54 of 1972)
- The Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947)
- The Medicines and Related Substances Act, 1965 (Act No. 101 of 1965)
- The Animal Health Act, 2002 (Act No. 7 of 2002)
- The National Water Act, 1998 (Act No. 36 of 1998)
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- Land Use Planning Ordinance, 1985 (Ordinance 15 of 1985)

  This Ordinance is applicable to the zoning of land for any particular use.

- The Cape Nature and Environmental Conservation Ordinance, 14 of 1974

  This Ordinance is applicable in the Western, Eastern and Northern Cape as well as parts of the North West Province. It imposes a permitting requirement in respect of the sale or purchase of specific species of fish like endangered wild fish, live carp, bluegill, sunfish, trout, black bass, banded tilapia or exotic invertebrate freshwater fauna.

- The Transvaal Nature Conservation Ordinance, 12 of 1983

  This Ordinance is applicable in Gauteng, Mpumalanga and parts of the North West Province. It imposes permitting requirements in relation to Trout and the building of trout dams.

2. MARINE AQUACULTURE AUTHORISATION REQUIREMENTS AND REGULATIONS

2.1 Marine aquaculture rights, exemptions and permits

A "right to engage in marine aquaculture" is required by the Department of Agriculture, Forestry and Fisheries (DAFF) when undertaking any commercial marine aquaculture activity, in terms of section 18 of the Marine Living Resources Act, 1998 (Act No. 18 of 1998) (MLRA). An Exemption is granted in terms of section 81 of MLRA if in the opinion of the Minister there are sound reasons for doing so e.g. in the absence of a rights allocation process. No person shall exercise any right granted in terms of section 18 of MLRA or perform any such activity without a valid permit granted in terms of section 13 of MLRA.

There are various types of marine aquaculture permits, which are subject to conditions approved by the Minister, where applicable:

- Permit to engage in marine aquaculture activity
- Permit to collect brood stock for marine aquaculture purposes
- Permit to possess brood stock and operate a hatchery
- Permit to transport marine aquaculture product(s)
- Permit to process marine aquaculture product(s)
- Permit to access dive ban areas
- Permit to possess and sell undersized cultured abalone obtained from a Right Holder
- Permit to possess and sell undersized cultured kob species obtained from a Right Holder
- Permit for marine aquaculture scientific investigations and practical experiments
- Permit to collect brood stock for marine aquaculture scientific investigations and practical experiments
- Permit to import marine aquaculture fish and fish product(s)
- Permit to import marine ornamentals (e.g. ornamental fish and corals)
- Permit to export marine aquaculture fish and fish product(s)

A "right to engage in marine aquaculture" is valid for 15 years and all marine aquaculture permits with the exception of import permits are renewable on an annual basis. Import permits are valid for 6 months and thus renewed every 6 months. A "blanket" Exemption is currently implemented by the DAFF for the sale of undersized cultured abalone and kob products. A non-Right Holder (e.g. retailer or restaurant) is required to be in possession of a permit from the DAFF to be in possession of and sell any undersized cultured product (e.g. kob (*Argyrosomus* species) and abalone) obtained from a Right Holder. There are traceability protocols implemented by the DAFF for compliance purposes, which should be complied with by retailers and restaurants in possession of permits for the sale of

undersized cultured kob and abalone (See Figure 1. below), in terms of regulations applicable to MLRA.

An Exemption and permit is applied for through the DAFF to operate a Fish Processing Establishment (FPE) and process marine aquaculture product(s), which would either be on site (i.e. marine aquaculture establishment) or located elsewhere. An import permit is required for the import of any live or processed marine aquaculture product(s). Any entity that would like to export a marine aquaculture product should have a supplier agreement in place with the Right Holder and apply for the necessary export permit and transport permit.

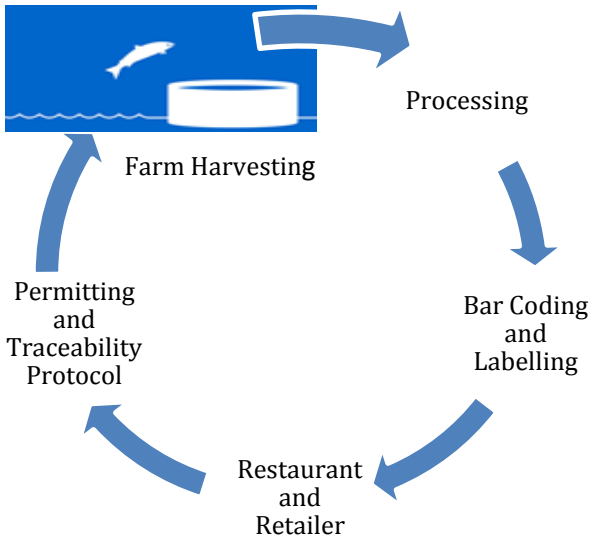

Figure 1. Illustration showing traceability of undersized farmed product to the consumer to minimize conflict with wild caught fish products sold on the local market.

A permit for scientific investigations and practical experiments is required to undertake any marine aquaculture or related research activity, which can be applied for through an academic institution or private company e.g. investigation into spawning and larval rearing trials with a new marine aquaculture species or conducting growth trials on a new marine aquaculture species. The DAFF currently does not legislate any pilot scale operations; as a result a marine aquaculture activity may either be experimental or commercial.

2.2 Requirements and process on applying for a marine aquaculture right

All requirements for a "right to engage in marine aquaculture" should be met prior to submission of an application, which will be assessed as per the "Assessment Criteria for New Applications" Notice 313 of 2009 (Government Gazette, No. 32043, 27 March 2009). All marine aquaculture right applications are lodged with the DAFF and assessed by the Marine Aquaculture Working Group (MAWG), which grants pre – approval to the Minister or the Delegated Authority (See Figure 2. below). The following requirements will be subject to an application for a "right to engage in marine aquaculture":

a) Application Form

An application form for a "right to engage in marine aquaculture" should be completed and can be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF), Branch: Fisheries, Customer Service Centre (CSC), Ground floor, Foretrust Building, Martin Hammerschlag Way, Foreshore, 8001, Tel. (021) 402 3180, Fax. (021) 402 3362, e-mail ZimasaJ@daff.gov.za and website www.daff.gov.za.

b) Company Registration and Identification Document(s)

Aquaculture is a commercial activity and therefore involves trading and operation of a business. All applicants will be required to register their business as a Partnership, Sole Proprietor, Company, Non-Profit Organisation (Section 21 Company), or Co-operative. True certified copies of all registration documents and identification documents of the applicant should accompany the application form.

c) Approval from the Local Authority

All land based activities need approval from the local authority (e.g. Municipality). This approval does not however exempt the applicant from undergoing a thorough Public Participation Process (PPP), which will ensure that all Interested and Affected Parties (I&AP) are informed and well aware of the activities around them. The approval should be put in writing and submitted with the application.

d) Land Use Planning and Access

This step consists of ensuring that the land assigned for a proposed aquaculture activity is rightfully owned by the applicant or that the applicant obtains consent for the use of the land, ensuring that the land use planning for a proposed aquaculture activity is in place or that it is in the process of being addressed. These land use planning aspects include:

i) Ensuring that the land is correctly zoned as an agriculture zone area and it is zoned as sustainable for aquaculture or that an application for rezoning has been lodged with the applicable local authority

ii) Ensuring that the intended aquaculture activities are in compliance with the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983).

The applicant should identify an appropriate site zoned for aquaculture, agriculture or industrial use. In the case where a site is not zoned specifically for the above, an application for re-zoning will have to be submitted to the relevant authority.

Table 1. The following relevant offices can be contacted for further information and enquiries on land use planning and access:

Province	Contact Person	Department	Contact Details
Eastern Cape	Peliwe Njemla-Mntukatandwa	Department of Rural development and Land Reform	Tel. 043 700 7073 e-mail PNjemla@drdlr.gov.za
KwaZulu Natal	Thabile Mzila	Department of Rural development and Land Reform	Tel. 033 355 4356 e-mail Thabile.Mzila@drdlr.gov.za
Mpumalanga	Ndodana	Department of Rural	Tel. 013 754 8071

	Khumalo	development and Land Reform	e-mail Ndodana.Khumalo@drdlr.gov.za
Northern Cape	Kgalalelo Marintlhwane	Department of Rural development and Land Reform	Tel. 053 830 4045 e-mail Kgalalelo.Marintlhwane@drdlr.gov.za
North West	David Mashiloane	Department of Rural development and Land Reform	Tel. 018 3977 609 e-mail Therekele.Mashiloane@drdlr.gov.za
Western Cape	Jug Fhaizer	Department of Rural development and Land Reform	Tel. 021 409 0335 e-mail Jug.Fhaizer@drdlr.go.za

e) Valid Lease Agreement or Title Deed

Depending on the ownership of the identified site, a valid lease agreement or a Title Deed will have to be obtained by the applicant, and should be submitted with the application form.

All applications for lease of sea space (outside of Transnet Port jurisdiction), pipelines below the High Water Mark (HWM) and coastal public property (CPP) should be lodged with the Department of Environmental Affairs (DEA). As the lead agency for coastal leases and concessions, the Department of Environmental Affairs (DEA) is the relevant department to submit this application, which may be initiated as a formal letter of request. For further queries concerning the relevant sections of the ICM Act you may contact the DEA, Directorate: Integrated Coastal Management Oceans and Coasts, Ryan Peter, Tel. (021) 819 2490 and e-mail Jpeter@environment.gov.za. For further enquiries on lease agreements for sea space (inside the Transnet Port jurisdiction) you may contact Transnet National Ports Authority, Marita du Plessis, Tel. (022) 703 5445 and e-mail marita.duplessis@transnet.net. All applications for lease of state land and/ or pipelines crossing state land will require a lease agreement from the Department of Public Works, Suzy Valentine, Tel. (021) 402 2157 and email suzy.valentine@dpw.gov.za.

f) Coastal Waters Discharge Permit/ General Authorisation

The Department of Environmental Affairs (DEA) is responsible for regulating the disposal of waste water into the marine environment (including estuaries). The discharge of effluent from land based sources into the marine environment (including estuaries) will require a Coastal Waters Discharge Permit or General Authorisation in terms of section 69 of the Integrated Coastal Management Act (No. 24 of 2008) (ICM Act), which came into effect on 1 December 2009. Stakeholders with authorisations that have already expired under the National Water Act are advised to make application to the Department immediately. The DEA is finalising a standard Coastal Waters Discharge Permit application form, with accompanying guidelines, and it is advised that stakeholders contact the relevant Department to initiate the application process. Stakeholders are encouraged to include any additional information deemed relevant to their application.

For further queries you may contact the DEA, Directorate: Coastal Pollution Management, Tel. (021) 819 2452 or (021) 819 2455 and e-mail marinepollution@environment.gov.za.

g) Site Map and Business Plan

A map (e.g. aerial, topographical) should be provided with GPS boundary co-ordinates of the site and location of the proposed operation, which can be obtained from the site owner or relevant authority. Any potential sources of pollution, intake and outlet pipelines should be indicated on the site map.

The applicant is required to submit a comprehensive business plan, including the following information with supporting documentation, where applicable:

- Company profile and shareholding structure (N.B. A certificate for Broad Based Black Economic Empowerment (BBBEE) should be provided as proof of the transformation status of the company, if applicable.).
- Species and product category to be farmed e.g. shellfish, finfish, crustaceans, seaweeds etc. in a mono or polyculture system.
- The proposed production of the proposed species per annum, including in the hatchery, nursery and grow out (where applicable).
- A detailed description of operation and maintenance plan, including but not limited to:
  - i) Description of the system design and technology
  - ii) Animal husbandry techniques
  - iii) Feed (i.e. artificial or natural e.g. seaweed) (if applicable)
  - iv) Effluent discharge and water treatment methods (if applicable)
  - v) Biosecurity and animal health management (N.B. a written agreement with a suitably qualified animal health service provider (e.g. veterinarian) should be provided as proof in the implementation of a biosecurity and animal health monitoring programme, if applicable).The method of application and use of any kind of chemicals, antibiotics, disinfectants, fertilizers, therapeutants and anesthetics, that may be used or result from the operation should be listed.
- A marketing plan and strategy should be included and a SWOT (Strengths, Weakness, Opportunities and Threats) analysis for the proposed venture.
- A financial overview should be provided with a financial plan including projections for start-up capital, expenditure, income, cash flow and financial indicators over a minimum two year period.
- Training facilities and employment opportunities that will be created should be highlighted in the business plan.
- Information on how the facility will minimize and prevent potential negative environmental impacts.

For further queries and assistance in reviewing your business plan, please contact the Department of Agriculture, Forestry and Fisheries (DAFF), Directorate Aquaculture Technical Services (ATS), Karabo Bopape, Tel. (012) 319 7457 and e-mail KaraboB@daff.gov.za.

h) Traceability Protocol

A traceability protocol is required for the local sale of cultured undersized or protected indigenous marine species in terms of regulations applicable to "the Act". This involves appropriate traceability from the farm to the market. Traceability is also important for ensuring food safety in case contaminated products are sold on the market and a mechanism is required to recall the products. The DAFF has developed generic compliance traceability protocols implemented for the sale of undersized culture abalone and kob products sold on the local market. If there is no generic traceability protocol in place, a proposal for a traceability protocol can be submitted by the applicant for approval by the DAFF.

i) Environmental Impact Assessment (EIA)

The requirement for an environmental authorization in some cases is based on the projected production level of the aquaculture farm. This step consists of ensuring that the necessary services and infrastructure (electricity, water, roads, sewerage etc.) are available at the required capacities, or that an application has been made for the service to the applicable service providers or local authorities to ensure that whatever activity is carried out is within acceptable environmental thresholds.

The Minister of Environmental Affairs published regulations that list activities which require a Basic Assessment or scoping and environmental impact reporting. These regulations were published on 18 June 2010 and amended on the 8th December 2014. Environmental authorisation may be required before the establishment of an aquaculture operation as certain activities are listed under the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998), Environmental Impact Assessment (EIA) regulations (GN R982) and accompanying listing notices 1 (R983), 2 (R984), and 3 (R985). Authorisation of aquaculture projects based on production capacity requires a basic assessment unless there are activities which are triggered under listing notice 2 or 3. It is the applicant's responsibility to appoint an independent and suitably qualified Environment Assessment Practitioner (EAP) as required for the completion of the environmental authorisation process. The applicant should ensure that the appointed EAP is qualified for conducting the required Environmental Impact Assessment (EIA) and environmental authorisation process. It is the responsibility of the applicant to provide the authorized Department with access to all information at their disposal, regarding the proposed activities and the application for environmental authorisation. The applicant is responsible for all costs of the environmental authorisation process. Proof of an environmental authorisation should be submitted with the application. If the applicant is advised that an environmental authorisation is required, they should register the DAFF as an interested and affected party (I&AP) and should forward all environmental impact reports for comments to the Department of Agriculture Forestry and Fisheries (DAFF), Directorate: Sustainable Aquaculture

Management (SAM), Fatima Daya, Tel. (021) 430 7006, Fax. (021) 434 2899 and email FatimaS@daff.gov.za.

Table 2. The following relevant offices can be contacted for further information and enquiries on EIA regulations

Province	Department	Contact Person	Contact Details
Eastern Cape	Department of Economic Development, Environmental Affairs	Jeff Govender	Tel. (041) 508 5811 e-mail Dayalan.Govendor@dedea.gov.za
Pretoria	Department of Environmental Affairs	Frans Scheepers	Tel. (012) 399 9285 e-mail Fscheepers@environment.gov.za
	Department of Environmental Affairs	Takalani Nemarude	Tel. (021) 399 9327 e-mail tnemarude@environment.gov.za
Gauteng	Department of Environmental Affairs (National)	Simon Moganetsi	Tel. (012) 399 9309 e-mail Smoganetsi@environment.gov.za
KwaZulu Natal	Department of Economic Development and Tourism	Malcolm Moses	Tel. (032) 437 7527 e-mail Malcom.Moses@kznedtea.gov.za
Limpopo	Department of Economic development, Environment and Tourism	Victor Mongwe	Tel. (015) 290 7090 e-mail MongweV@ledet.gov.za
Western Cape	Department of Environmental Affairs and Development Planning	Zaahir Toefy	Tel. (021) 483 2700 e-mail Zaahir.Toefy@westerncape.gov.za
Free State	Department of Economic development, Tourism and Environmental Affairs	Grace Mkhosana	Tel. (051) 400 4812 e-mail Mkhosana@detea.fs.gov.za
Northern Cape	Department of Environment and Nature Conservation	Onwabile Zumo	Tel. (027) 718 8804 e-mail onyndzumo@gmail.com
North West	Department of Rural, Environment and Agricultural	Portia Krisjan	Tel. (018) 389 5995 e-mail P.Krisjan@nwpg.gov.za

	development		
Mpumalanga	Department of Economic Development, Tourism and Environmental affairs	Selby Hlatshwayo	Tel. (013) 759 4079 e-mail Shlatshwayo@mpg.gov.za

j) Environmental Management Programme (EMP)

In the case where an applicant is not required to conduct an Environmental Impact Assessment (EIA) and/ or exempted from obtaining environmental authorization, the applicant should submit written proof from the relevant authority. An Environmental Management Programme (EMP) should be submitted with the application if not included in the EIR, which should be conducted by an independent and suitably qualified Environmental Assessment Practitioner (EAP) at the cost of the applicant.

k) Threatened and Protected Species (TOPS) and Alien Invasive Species (AIS) regulations

The Minister of Environmental Affairs published regulations for Alien Invasive Species (AIS) in 2014, which stipulate the requirement for a risk assessment and permit in terms of the National Environmental Management: Biodiversity Act (NEM: BA), 2004 (Act No. 10 of 2004). These regulations are available online at www.environment.gov.za , further queries concerning the NEMBA (10/2004): AIS Regulations of 2014 you may contact the Department of Environmental Affairs (DEA), Directorate: Biosecurity Services, Livhuwani Nnzeru, Tel. (021) 441 2748 or 021 819 2605/2606/2574 and e-mail Lnnzeru@environment.gov.za or AISpermits@environment.gov.za. Restricted activities relevant to TOPS that may apply to the manner of farming in an aquaculture project include the possession, breeding and killing of a threatened or protected species. Such activities require a TOPS permit from the national Department of Environmental Affairs (for marine aquaculture species) and from the relevant provincial department (for other aquaculture species). For enquiries regarding TOPS you may contact the Directorate: Biodiversity Enforcement, Ephraim Makhubele or Zizipho Madyibi, Tel. (012) 399 9600 and email EMakhubele@environment.gov.za or ZMadyibi@environment.gov.za.

Table 3. The following relevant offices can be contacted for further information and enquiries on TOPS and AIS regulations:

Province	Department	Contact Person	Contact Details
Western Cape	Cape Nature	Danelle Kleinhans	Tel. (021) 483 0121
Northern Cape	Nature Resources	Elsabie or Marietjie	Tel. (053) 807 7476
North West	Conservation and Tourism	Mashudu Nemutandani	Tel. (018) 389 5925
Kwazulu Natal (KZN)	Ezemvelo KZN Wildlife	Jenny Longmore	Tel. (033) 845 1349

l) Valid SARS Tax Clearance Certificate

The applicant is required to declare the financial status of the proposed business with the South African Revenue Services (SARS), which will grant a valid Tax Clearance Certificate that should accompany the application. Contact the National SARS Call Centre at 0800 00 72 77 (www.sars.gov.za).

m) Additional Information/ Documentation

The Minister or the delegated authority may require an applicant to provide any additional information/ documentation in relation to the application, which the Minister/ his or her delegated authority reasonably considers necessary, and may refuse to consider the application until such information/ documentation is provided.

n) Marine Aquaculture Right Application Checklist:

REQUIRED DOCUMENTATION	**X**
Company Registration Documentation	
Valid Tax Clearance Certificate	
Proposal & Business Plan (including minimum 2 year financial plan)	
Environmental Authorisation or Letter from Competent Authority	
Environmental Management Programme/ Plan	
BEE Certification (If Applicable)	
Valid Lease Agreement or Title Deed	
Traceability Protocol (If Applicable)	
Coastal Waters Discharge Permit or General Authorisation (If Applicable)	
Biodiversity Risk Assessment (If Applicable)	

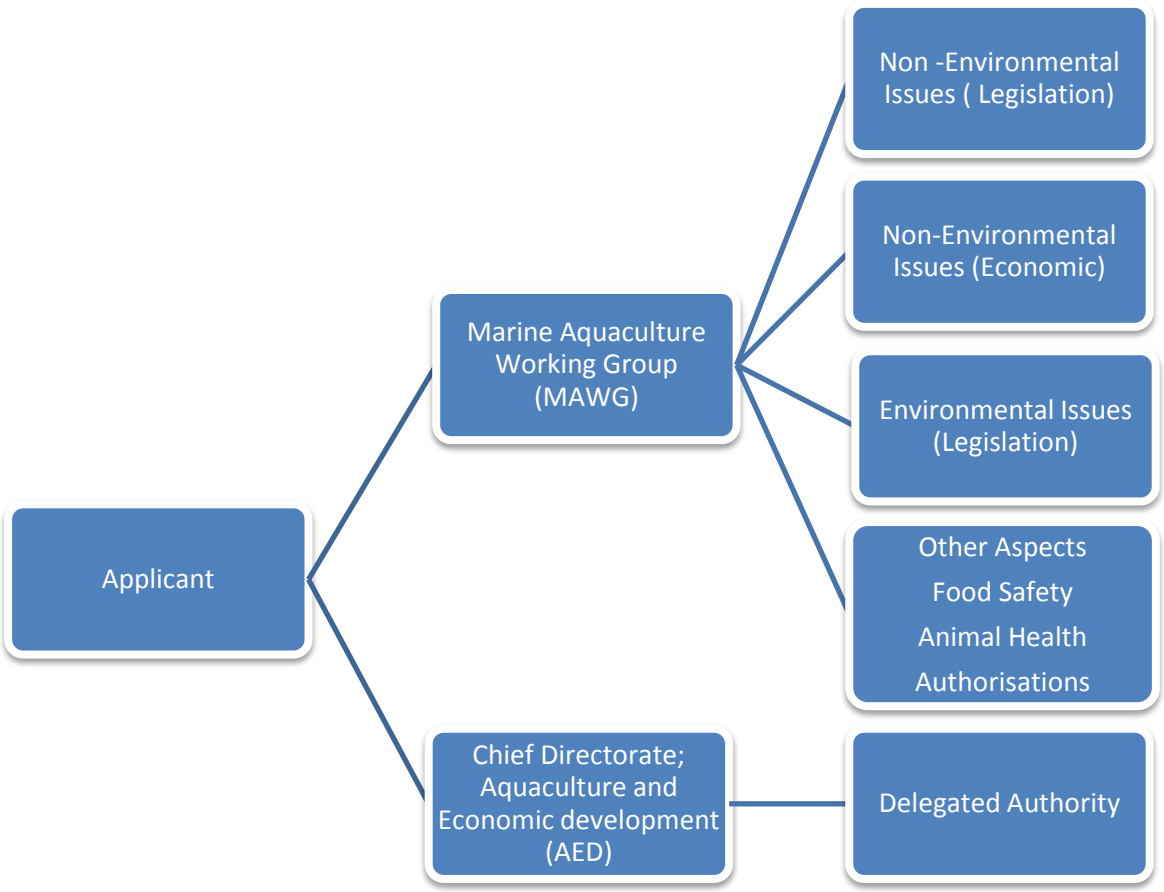

Figure 2. Simplistic diagrammatic representation of the marine aquaculture rights allocation and assessment process (Branch: Fisheries (DAFF)).

2.3 Requirements and process on applying for a marine aquaculture permit

All marine aquaculture permit applications are received by the Department of Agriculture Forestry and Fisheries (DAFF) (See Figure 3. below). An application form can be obtained by the Department of Agriculture, Forestry and Fisheries (DAFF), Branch: Fisheries, Customer Service Centre (CSC), Ground floor, Foretrust Building, Martin Hammerschlag Way, Foreshore, 8001, General Enquiries Tel. (086) 000 3474 and website www.daff.gov.za.

Banking details are as follows:

Bank: First National Bank (FNB)

Branch: Corporate Account Services – Cape Town

Branch Code: 204109

Account Name: Marine Living Resources Fund (MLRF)

Account No. : 62123256382

For a deposit reference number please contact our CSC refer to section 5) Useful Contact Information.

There are requirements when applying for a marine aquaculture permit, which is summarized in the list provided below (N.B. All certified copies documents should be no more than 3 months old.)

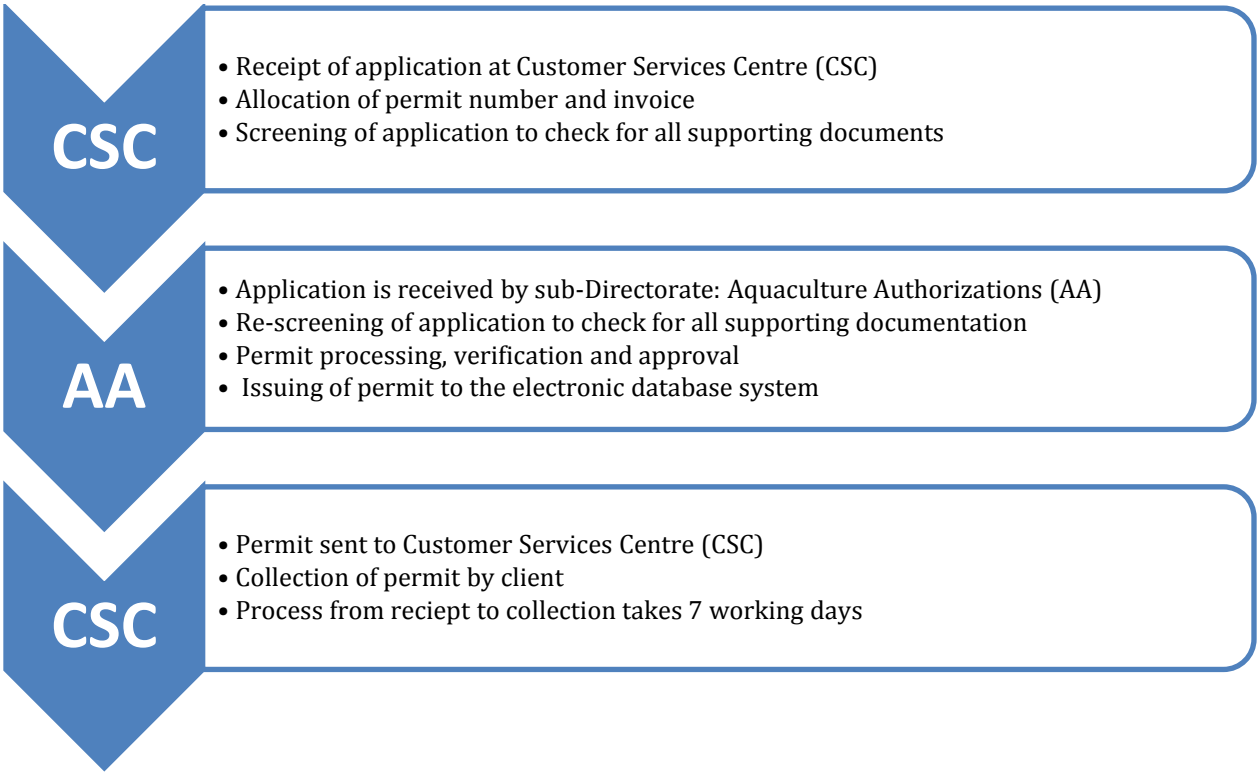

Figure 3. Flow chart showing the permit application process with Customer Service Center (CSC) (Branch Fisheries: DAFF).

Please note that the permit application for a "Right to Engage in Marine Aquaculture: growout" is streamlined and integrates many permit types. This form is two pages and includes a grow-out, broodstock collection, transport, Fish Processing Establishment (FPE) section. This means that most facilities will only need to apply for one application because all activities are covered. Please ensure that you attach all the required supporting documentation as per the checklist.

- As per the Notices done in December 2014, import and export permits may not be amended.
- All queries may be forwarded as follows:

  Import and Export permits: Vuyani Krala, Tel. (021) 402 3424, e-mail VuyaniK@daff.gov.za .

  Farm operations related permits: Nomvuyiso Dubazana, Tel. (021) 402 3108, e-mail NomvuyisoD@daff.gov.za .

The following requirements are applicable when applying or renewing a marine aquaculture permit for a marine aquaculture or related activity:

a) Requirements for a permit to engage in marine aquaculture activities including Transport, Vessel and on site Fish Processing Establishment (FPE)

- Original, completed, signed and dated application form.
- Original Tax Clearance Certificate as approved by South African Revenue Services (SARS).
- Proof of ownership of site (title deed) or a valid lease agreement for the site.
- If applying on behalf of a Right holder, a letter of authorization from the Right holder granting the nominated person permission to sign documents on his/her behalf or to collect the relevant permit(s) (True certified copies of the Identity documents of the Right holder and the nominated party must be attached).
- True certified copies of valid vehicle registration for all nominated vehicles.
- A true certified copy of a valid SAMSA (South African Maritime Safety Authority) Certificate.
- A true certified copy of a valid radio license (VMS), reflecting the call sign, as issued by SATRA (South African Telecommunications Regulatory Authority).
- A signed agreement between the vessel owner and farmer, if the vessel owner is not the farmer (True certified copies of the Identity documents of the Right holder and the nominated party must be attached).
- A certified copy of the nominated Skipper's Identity document.
- Production data (frozen, canned, live) for current year of operation in respect of the mass, size and number of marine aquaculture products harvested, sold and destination market.
- If processing occurs on the marine aquaculture operation/farm for export. a HACCP certificate is required from the National Regulator for Compulsory Specifications (NRCS).
- If processing of cultured animals is intended for human consumption for marketing within South Africa, a Certificate of Acceptability for Food Premises obtained from the local municipality/provincial authority must be obtained or a HACCP certificate from the NRCS. True certified copies of the original must be attached.

b) Requirements for a permit to collect broodstock to engage in marine aquaculture activities

- Original, completed, signed and dated application form.
- Original Tax Clearance Certificate as approved by South African Revenue Services (SARS).
- Proof of ownership of site (title deed) or a valid lease agreement for the site.

- If applying on behalf of a Right holder, a letter of authorization from the Right holder granting the nominated person permission to sign documents on his/her behalf or to collect the relevant permit(s) (True certified copies of the Identity documents of the Right holder and the nominated party must be attached).
- True certified copies of valid vehicle registration for all nominated vehicles.
- A true certified copy of a valid SAMSA (South African Maritime Safety Authority) Certificate.
- A true certified copy of a valid radio license (VMS), reflecting the call sign, as issued by SATRA (South African Telecommunications Regulatory Authority)
- Where applicable, a list of all authorised diver's and relevant I.D. documents for all diver's that will be collecting broodstock on behalf of the Right holder.
- Recognised and valid diver's qualification for all divers' that will be collecting broodstock on behalf of the company. (If applicable).
- A signed agreement between the vessel owner and farmer, if the vessel owner is not the Right holder. (True certified copies of the Identity documents of the Right holder and the nominated party must be attached).
- A certified copy of the nominated Skipper's Identity document.
- Production data for current year of operation in respect of the mass, size and number of broodstock held/ animals produced and destination market, if applicable.

c) Requirements for a permit to possess broodstock and operate a hatchery

- Original, completed, signed and dated application form.
- Original Tax Clearance Certificate as approved by South African Revenue Services (SARS).
- Proof of ownership of site (title deed) or a valid lease agreement for the site.
- If applying on behalf of a Right holder, a letter of authorization from the Right holder granting the nominated person permission to sign documents on his/her behalf or to collect the relevant permit(s) (True certified copies of the Identity documents of the Right holder and the nominated party must be attached).
- True certified copies of valid vehicle registration for all nominated vehicles.
- A true certified copy of a valid SAMSA (South African Maritime Safety Authority) Certificate.
- A true certified copy of a valid radio license (VMS), reflecting the call sign, as issued by SATRA (South African Telecommunications Regulatory Authority).
- A signed agreement between the vessel owner and farmer, if the vessel owner is not the farmer.
- (True certified copies of the Identity documents of the Right holder and the nominated party must be attached).

- A certified copy of the nominated Skipper's Identity document.
- Production data for current year of operation in respect of the mass, size and number of broodstock held/ animals produced and destination market, if applicable

d) Requirements for the purposes of diving and possession of prohibited gear within the listed areas in terms of regulation 3(3) of Government Gazette No. 30716 of 1st February 2008

- An original, completed, signed and dated application form.
- Certified true copies of an original Identity Document.
- Original Tax Clearance.
- Certified true copies of supporting documents.

e) Requirements for a permit to possess and sell under-sized cultured abalone obtained from an authorised Right Holder as per regulation 37 of the regulations promulgated under the Marine Living Resources Act, 1998 (Act No. 18 of 1998)

- Original, completed, signed and dated application form(s).
- Certified true copies of Company registration documents or ID document depending on the name of the applicant on the permit application form.
- Original Tax Clearance Certificate as approved and issued by the South African Revenue Services (SARS) in the name of the applicant.
- Certified true copies of Mariculture Rights holder's (supplier) current permit.
- A letter of authorization from the applicant granting the nominated person permission to sign documents on his/her behalf or to collect the relevant permits.
- Certified true copies of an agreement between the applicant and the supplier and the identity documents for both parties who signed the agreement.

f) Requirements for a permit to possess and sell under-sized cultured kob species obtained from an authorised Right Holder as set out in Annexure 4 (Government Gazette No. 27453, 6 April 2005) in terms of Regulation 25 promulgated under the Marine Living Resources Act, 1998 (Act No. 18 of 1998).

- Original, completed, signed and dated application form(s).
- Certified true copies of Company registration documents or ID document depending on the name of the applicant on the permit application form.
- Original Tax Clearance Certificate as approved and issued by the South African Revenue Services (SARS) in the name of the applicant.
- Certified true copies of Marine Aquaculture Right Holder or Wholesaler's current permit (supplier).
- A letter of authorization from the applicant granting the nominated person permission to sign documents on his/her behalf or to collect the relevant permits.

- Certified true copies of an agreement between the applicant and the supplier and the identity documents for both parties who signed the agreement. NB: All certified copies must not be older than 3 months.

g) Requirements for a permit to export marine aquaculture fish and fish product(s)

- Original, completed, signed and dated application form.
- Certified true copy(ies) of (an) original identity document (ID), Company or Closed Corporation should be submitted. (True certified copies of Identity documents. No more than 3 months old).
- Original valid Tax Clearance Certificate as approved by South African Revenue Services (SARS).
- A list of physical addresses of consignees should be provided (Please note Postal addresses are not permissible)
- Applicants who are non-right holders must submit the following with the export application (s)
  - i) Proof of purchase and supply agreement with the Right holder (attach certified copies of both signatories to the agreement ID's that are not more than 3 months old)
  - ii) Copy(ies) of permit(s) to engage in Marine Aquaculture if exporting marine aquaculture species.
- Copy of a National Regulator for Compulsory Specifications (NRCS) (Previously SABS) before submitting your application to the Department for processing. Product test results as per previous export permit(s)
- Data returns as per previous export permit(s) (filled in Export annexure that was issued with the previous permit);
- Invoices of purchase are required from non-Right holders only.
- Letter of authorization when applying on behalf of an applicant.
- True certified copy of the Right holder's ID.

h) Requirements for the renewal of fishing vessel licenses for marine aquaculture purposes

- Original, completed, signed and dated application form(s).
- The applicant shall produce a true certified copy of a valid SAMSA Safety Certificate.
- A true certified copy of a valid radio license, reflecting the call sign, as issued by SATRA (South African Telecommunication Regulatory Authority)

i) Requirements for a permit to import marine ornamental organisms

- Original, completed, signed and dated application form. Please complete page 2 (species list) including the scientific names of the species to be imported.

- Certified true copi(es) of (an) original identity document (ID), Company or Closed Corporation should be submitted.
- Original valid Tax Clearance Certificate as approved by South African Revenue Services (SARS).
- A list of physical addresses of exporters / suppliers shall be provided (Please note "various" and Postal Box are not permissible).
- If possible, Invoices and/ or certificate of origin and health certificate reflecting the full details of the exporter/ seller, the quantity or mass and species of the marine organisms to be sold must all be submitted with first application. These invoices and certificates of origin must be submitted on renewal of the import permit if these documents were not submitted with the first application.
- Indicate a single point of entry in South Africa (No more than one point of entry can be displayed on an individual permit).
- Data returns as per previous import permit(s). The importer is to fill in the annexure that was issued with the previous import permits.
- A CITES certificate for all CITES listed species is required.

j) Requirements for an import permit for cultured fish and fish product(s)

- Original, completed, signed and dated application form. Please, complete all 3 columns in page 2 (species list) including the scientific names of the species to be imported and attach to your application.
- Certified true copi(es) of (an) original identity document (ID), Company or Closed Corporation should be submitted.
- Original valid Tax Clearance Certificate as approved by South African Revenue Services (SARS).
- A list of physical addresses of exporters / suppliers should be provided (Please note Postal addresses are not permissible)
- International Trade (ITAC). ITAC is not applicable for Namibia, Swaziland, Lesotho & Botswana, for canned, processed (crumbled/buttered) food, and when importing of juvenile and larval oysters for further grow out.
- A separate application per point of entry (No more than one point of entry can be displayed on an individual permit).
- A certificate of origin for the import of Marine Aquaculture products/species.
- Animal Health Certificate is required for the importing of juvenile oysters and or any live marine aquaculture organisms.
- Health/ Sanitary certificate is required for importing Marine Aquaculture seafood products for human consumption.

- Copy of HACCP (Hazard Analysis and Critical Control Points) Certificate for European Union.
- Data returns and invoices as per previous imports. The importer must fill in the annexure that was issued with the previous import permits(s). NB: The application will not be accepted if the annexure is not attached. (Not applicable to new applicants)
- CITES certificate for all CITES listed species:

k) Requirements for a permit to operate a land- or vessel- based Fish Processing Establishment (FPE)

- Original, completed, signed and dated application form.
- A valid Tax Clearance Certificate (SARS).
- A true certified copy of a valid SAMSA (South African Maritime Safety Authority) Certificate.
- A true certified copy of a valid radio license (VMS), reflecting the call sign, as issued by SATRA (South African Telecommunications Authority).
- A signed agreement between the vessel owner and farmer, if the vessel owner is not the farmer.
- A certified copy of the nominated Skipper's Identity document.
- Certified true copies of both parties' Identity documents.
- Production data (frozen, canned, live) for current year of operation in respect of the mass, size and number of marine aquaculture products harvested, sold and destination market.
- Certification by the South African Bureau of Standards (SABS)/National Regulator for Compulsory Specifications (NRCS), and / or Certificate of Acceptability for Food Premises obtained from the local municipality.
- A letter of authorization from the Right/Exemption holder granting the nominated person permission to sign documents on his/her behalf or to collect the relevant permit(s), (True certified copies of the Identity documents of the Right holder and the nominated party must be attached)

l) Requirements for a permit to transport marine aquaculture product(s)

- Original, completed, signed and dated application form(s).
- A certified true copy of an agreement between the Right holder and the Non-Right holder to transport fish.(Please, also attach certified true copies of original South African I.D's for both parties who signed the agreement).
- Certified true copy of the company registration documents if transporting marine aquaculture species or products on behalf of a company(ies). If the applicant is an individual a certified true copy of the Identity document is required.

- The applicant to provide a certified true copy of a permit to engage in marine aquaculture.
- In the case of movement or transporting animals between the zoned areas outlined in the
- Abalone Movement Protocol, a valid Health Certificate is required.
- Certified copy(ies) of vehicle registration documents.
- The applicant to provide the list of additional vehicles to be utilized.

m) Requirements for a marine aquaculture Scientific Investigations and Practical Experiments permit

- Original, completed, signed and dated application form.
- Certified true copi(es) of (an) original identity document (ID) or Company Registration (if applicable) should be submitted. (True certified copies of Identity documents. No more than 3 months old).
- A valid Tax Clearance Certificate (SARS) (if applicable).
- A valid lease agreement (if applicable)
- A true certified copy of a valid permit of the Right holder that will be supplying animals for the scientific investigation or experiment.
- A comprehensive research proposal outlining the intended research to be conducted.

  The following brief description can be used when submitting a research proposal, the information submitted should include but is not limited to the following:

  i) Background

  - Provide information on the selected species and origin.
  - Describe the suitability of the proposed species for aquaculture.

  ii) Motivation, Aims and Objectives, Materials and Methods

  - Describe the purpose of the project.
  - Outline the aims and objectives of the project.
  - Outline materials and methods of the research to be conducted
  - Include information on any translocation/ movement and/ or collection of animals from the wild.

  iii) Environmental Impacts and Disease Management

  - Describe where relevant to the research, the nature of and extent of potential environmental and animal health impacts. Describe how animal health will be managed through the adoption of a biosecurity programme, animal health certification, animal health surveillance and the mitigation of any potential environmental impacts.

iv) Future plans and any other relevant information

- Include information on any future outcomes and plans for the project or research to be conducted.

- If applying on behalf of a Right holder, a letter of authorization from the Right holder granting the nominated person permission to sign documents on his/her behalf or to collect the relevant permit(s) (True certified copies of the Identity documents of the Right holder and the nominated party must be attached).
- Applicants who are non-Right holders must submit the following with the application (s)

(i) Proof of purchase or a supplier's agreement with the Right holder (attach certified copies of both signatories to the agreement ID's that are not more than 3 months old). The number of animals to be received by the applicant should be specified in the agreement.

2.4 Application fees

A new permit fee structure was put into effect from 01 October 2010, this requires a basic application fee of R240.00 and a unique permit fee is charged for all permit applications. An additional species fee of R200 is also charged for all imports and exports (refer to Table 1 below).

Table 1. Marine Aquaculture Right Application Fee Structure

Type of Marine Aquaculture Activity	**Application Fee**
Right to engage in marine aquaculture	R9123.00
Permit for a local fishing vessel licence for marine aquaculture related activities	R505.00
Permit for the purposes of diving and possession of prohibited gear within the listed areas in terms of regulation 3(3) of government gazette no. 30716 of 1 February 2008.	R505.00
Permit to collect and possess broodstock for mariculture purposes.	R505.00
Permit to export cultured abalone	R505.00
Permit to export cultured marine fish species and products thereof	R505.00 & R200 for every additional species
Permit to import cultured marine fish and fish products thereof.	R505.00 & R200 for every additional species
Permit to possess and sell under-sized abalone obtained from obtained from a marine aquaculture right holder	R505.00
Permit to transport marine aquaculture fish or any product thereof.	R505.00

Permit for scientific investigations and practical experiments	R505.00
Permit to collect and possess broodstock i.t.o scientific investigations and practical experiments.	R505.00
Permit to engage in mariculture activities: grow-out.	R1902.00
Permit to harvest ranched abalone.	R1902.00
Permit to operate a marine aquaculture fish processing establishment	R1902.00
Permit to possess broodstock and operate a marine aquaculture hatchery.	R1902.00
Permit to transport cultured marine fish species or any product thereof	R505.00
Permit to transport cultured abalone	R505.00
Permit to import marine ornamental organism	R505.00

3. FRESHWATER AQUACULTURE AUTHORISATION REQUIREMENTS AND REGULATIONS

3.1 Freshwater aquaculture species authorisations

This step involves deciding upon an appropriate species for an aquaculture activity. Permits for stocking, transporting fish from one location to another and the use of selected species is applied for at Nature Conservation and Provincial Authorities. In all cases where the use of an exotic, threatened or protected species is considered, the relevant authorities must be approached to obtain the necessary authorizations and legal frameworks in terms of species choice, primarily provided by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA). Species choice and the above legal frameworks inform the EIA authorisation process in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

Also, refer to section 2.2 k) Threatened and Protected Species (TOPS) and Alien Invasive Species (AIS) regulations.

Table 1. The following offices can be contacted for further information and enquiries on freshwater aquaculture species authorisations:

Province	Department	Contact Person	Contact Details
Mpumalanga	Mpumalanga Tourism and Parks Agency	Dries Pienaar	Tel. (013) 759 5329 e-mail dries@mtpa.co.za
	Mpumalanga Tourism and Parks Agency	Dorothy	Tel. (013) 759 5334 e-mail dorothy@mtpa.co.za
Western Cape	Cape Nature	Martin Jordan	Tel. (021) 866 8011 e-mail Mjordan@capenature.co.za
	Cape Nature	Dean Impson	Tel. (021) 866 8049 e-mail Dimpson@capenature.co.za
Gauteng	Department	Permit Office	Tel. (011) 355 1207

	of Agriculture and Rural development (Conservation Section)		
	Department of Agriculture and Rural development (Conservation Section)	Violet Ndogeni	Tel. (012) 316 1638 e-mail violet.ndongeni@gauteng.gov.za
Kwazulu - Natal	Ezemvelo KZN Wildlife	Ken Morthy	Tel. (031) 274 6900 e-mail Ken.Morty@kznwildlife.com
North West	Department of Agriculture, Conservation & Environment	Basi Diole	Tel. (018) 389 5671/ 5270 e-mail bdiole@nwpg.gov.za
Free State	Department of Economic, Tourism and Environment Affairs	Leon Barkhuizen	Tel. (051) 400 8425 e-mail barkhizenl@detea.fs.gov.za
Limpopo	Department of Eonomic Development, Environment and Tourism	Anthony van Wetten	Tel. (015) 290 7171/7081 e-mail VanWettenAA@ledet.gov.za

3.2 Land use planning and access

Refer to section 2.2 d) Land Use Planning and Access.

3.3 Water use authorisation

This step consists of determining the need for a water use authorisation in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) from the Department of Water Affairs (DWA), which is the primary legislative framework used by the DWA to protect, use, develop, conserve, manage and control South Africa's water resources. If established that a water use authorisation is required, an application must be made for this to DWA. Water use planning and the water use authorisation inform the environmental authorisation process in terms of NEMA. In this, the reasonable strengthening of aquaculture must take place without unnecessary impacts on freshwater resources, on the fitness for use of water by other activities and on the greater environment.

a) Water Use Authorisation Requirements and Process in terms of the NWA

In terms of using water for aquaculture purposes, such a use is categorised in the NWA as one of the following, for which authorisation is required:

- taking water from a water resource,
- storing water,
- impending or diversion of waterflow of water in a watercourse,
- discharging of waste or water containing waste into a water resource through a pipe, canal, sewer, ect.
- disposing of waste in a manner which may damagingly impact on a water resource whether rivers, groundwater ect.
- altering of the bed, banks, course or characteristics of a watercourse, or
- using water for recreational purposes.

b) If any of the above water uses are incorporated into any planned aquaculture activity, one of the following authorisation types will apply:

- A predetermined authorisation by means of the water use being classified as a Schedule 1 Use as defined in the NWA. This is limited to aquaculture activities wherein the use of water is integrated into the reasonable domestic use of water. This typically applies to very small aquaculture activities and requires no application for the authorisation of the water use.
- A predetermined authorisation by means of the water use being classified as an Existing Lawful Use as defined in the NWA. This typically applies to the use of water, which was authorised prior to, and took place in the 2-year period preceding, the promulgation and commencement of the NWA. Although no application is required in this regard, it may be necessary to have a competent authority recognise such an Existing Lawful Use.
- A predetermined authorisation by means of the water use being classified as a General Authorisation as defined in the NWA. General Authorisations intend to facilitate the legal access to water resources by eliminating the need for licence applications in instances where the potential harm to the water resources or the potential impact of pollution sources, are limited. In order to determine the applicability of this type of authorisation. In the event of a General Authorisation, a standardised registration form must be submitted to DWA.
- An authorisation process to obtain a Water Use Licence as defined in the NWA. A licence is required in the event that a particular planned use of water for aquaculture does not meet the criteria for a Schedule 1 Use, an Existing Lawful Use or a General Authorisation. If a licence is required, a standardised licence application form must be submitted to DWA together with a report containing at least the following information, which pertains to the proposed aquaculture activity:
- The aquaculture type in terms of water based activity (freshwater)

- The intended aquaculture species, whether the intended production species are exotic, indigenous, or indigenous but extralimital to the area,
- The intended production capacity in tons per annum (round weight and unprocessed),
- The type of aquaculture production system in which the water will be used (e.g. tank culture, raceways, pond culture or cage culture),
- The type of internal water management system (e.g. through flow, re-circulation or cage culture),
- The type of post-production water management system (e.g. biological filtration, settlement systems, drum filters etc.), and
- The intended feed quantity per annum and the feed type.

Table 2. The following offices can be contacted for further information and enquiries on water use authorisations:

Province	Department	Contact Person	Contact Details
Eastern Cape	Department of Water Affairs	Vien Kooverji	Tel. (043) 701 0371 e-mail Kooverjiv@dwa.gov.za
Free State	Department of Water Affairs	Willem Blair	Tel. (051) 405 9332 e-mail BlairV@dwa.gov.za
Gauteng	Department of Water Affairs	Ephraim Matseba	Tel. (012) 392 1374 e-mail MatsebaE@dwa.gov.za
Kwa-Zulu Natal	Department of Water Affairs	Sibusiso Mathonsi	Tel. (031) 3362730 e-mail MathonsiS@dwa.gov.za
Limpopo	Department of Water Affairs	Komape Martha	Tel. (015) 290 1463 e-mail KomapeM@dwa.gov.za
Mpumalanga	Department of Water Affairs	Standfort Macevele	Tel. (013) 932 2061 e-mail Maceveles@dwa.gov.za
Northern Cape	Department of Water Affairs	Nozi Mazwi	Tel. (053) 836 7602 e-mail MazwiR@dwa.gov.za
Western Cape	Department of Water Affairs	Nkhetheni Nthungeni	Tel. (021) 941 6295 e-mail NthungeniN@dwa.gov.za

3.4 Environmental planning

Refer to section 2.2 i) Environmental Impact Assessment (EIA).

4 IMPORT AND EXPORT AUTHORISATION REQUIREMENTS FOR AQUACULTURE PRODUCT(S)

In terms of Section 6 of the Animal Diseases Act, 1984 (Act no 35 of 1984), no animal or animal product may be imported into or moved in transit through South Africa without the importer obtaining a veterinary import permit from the Department of Agriculture, Forestry and Fisheries (DAFF). Directorate: Food Import and Export Standards. The DAFF has a regulatory function over the protection of agricultural resources and animal health

matters. The Veterinary Services of the Provincial Department(s) of Agriculture must be engaged for the export certification of live freshwater aquatic organisms. Below is a list of provincial State Veterinarians that have been nominated to undertake duties applicable to supporting export certification of freshwater aquatic animals and aquatic animal products within different provinces.

Table 1: Contact details of officials at Provincial authorities involved in export certification for aquatic animals.

Province	Contact person	Contact details
Eastern Cape	Dr Vusi Rozani	Tel. (043) 605 4223 Cell 082 779 9606 e-mail vusi.rozani@agr.ecprov.gov.za
	Dr Stuart Varrie	Tel. (043) 722 3081/2 Cell 079 696 5499 e-mail stuart.varrie@agr.ecprov.gov.za
Free State	Dr Sarah Mutsinze	Tel. 051 436 3677 Cell 071 267 1010 e-mail sarah.mutsinze@gmail.com
Gauteng	Dr Ambrose Kyandi	Tel. 011 411 4331 Cell 078 357 3573 e-mail ambrose.kyandi@gauteng.gov.za
Kwazulu Natal (North)	Dr Jenny Preiss	Tel. 035 550 0210 Cell 084 585 5143 e-mail drjennypreiss@gmail.com
Kwazulu Natal (South)	Dr Shavetha Dhanilall	Tel. 031 302 2800 Cell 079 506 1991 e-mail shavetha.dhanilall@kzndae.gov.za
Limpopo	Dr Johan Mentz	Tel. 015 297 1347 Cell 083 302 1850 e-mail jjmentz@gmail.com
Mpumalanga	Dr Boetie Oupa Rikhotso	Tel. (013) 773 1150 Cell 082 403 9646 e-mail brikhotso@mpg.gov.za
North West	Dr Ratule Mphuti	Tel. (018) 336 1121 /1113 Cell 079 105 5582 e-mail rmphuti@nwpg.gov.za
Northern Cape	Dr Nelson Matekwe	Tel. (053) 341 1045 Cell 083 452 9867 e-mail rutego@yahoo.com ; nmatekwe@ncpg.gov.za
Western Cape	Dr Gary Buhrmann	Tel: 021 808 5026 Cell 083 642 0602 e-mail garyb@elsenburg.com

An import and/ or export permit is required by the Department of Agriculture, Forestry and Fisheries (DAFF) for the import and/ or export of marine aquaculture product (refer to section 2.3 Process and Requirements on applying for a marine aquaculture permit). The DAFF is the responsible authority for the issuing of import permits for marine ornamentals intended for display purposes (i.e. aquarium hobbyist or commercial aquarium) or intended for marine aquaculture (i.e. commercial production). With regard to export

permits, if there are any CITES (Convention on the International Trade in Endangered Species) listed species on the permit application species list, then the applicant will have to apply for a CITES permit through the Department of Environmental Affairs, Directorate: Biodiversity, Pretoria. Please contact Ephraim Makhubele and Zizipho Madyibi at Tel (012) 399 9600 or email EMakhubele@environment.gov.za or ZMadyibi@environment.gov.za.

An ITAC (International Trade Administration Commission) import permit notification is required for the import of frozen fish and fish products, which can be obtained from the Department of Trade and Industry import permit notification. For further information please contact the International Trade and Administration Commission (ITAC), Mpho Tjiane, at tel. (012) 399 9600 and e-mail MTjiane@environment.gov.za. The following goods are subject to import control measures by the Department of Trade and Industry (dti), International Trade and Administration Commission (ITAC) in **Figure 1.** below.

Schedule 1	
Description of Goods	**Tariff Heading**
Fish, fresh or chilled	03.02
Fish, frozen	03.03
Fish, fillets and other fish meat (whether or not minced), fresh, chilled or frozen	03.04
Fish, dried, salted or in brine; smoked fish, whether or not cooked before or during the smoking process; fish meal fit for human consumption but excluding smoked salmon of subheading No. 0305.41	03.05
Crustaceans, whether in shell or not, live, fresh, chilled, frozen, dried, salted or in brine; crustaceans, in shell, cooked by steaming or by boiling in water, whether or not chilled, frozen, dried, salted or in brine	03.06
Molluscs, whether in shell or not, live, fresh, chilled, frozen, dried, salted or in brine; aquatic invertebrates other than crustaceans and molluscs, live, fresh, chilled, frozen, dried, salted or in brine excluding oyster spat of subheading 0307.10.10	03.07

Figure 1. Goods subject to import control measures by the Department of Trade and Industry (dti) when importing aquaculture product(s).

The National Regulator for Compulsory Specifications (NRCS) is recognised by importing countries as the Competent Authority for the issuing of health guarantees for the export of fish and fishery products intended for human consumption. The NRCS is responsible for the implementation of the Compulsory Specifications for canned fish (VC 8014), Live and fresh abalone (VC 9001) and frozen fish (VC 8017) in terms of the National Regulator for Compulsory Specifications Act, 2008 (Act No. 5 of 2008). The aquaculture product exported is required to comply with the relevant food safety programme i.e. South African Molluscan Shellfish Monitoring and Control Programme or the South African Aquaculture Marine Fish Monitoring and Control Programme that is implemented in terms of the Marine Living Resources Act, 1998 (Act No. 18 of 1998) by the DAFF and is required to comply with the importing country's import requirements.

The following Table 2. below provides a summary outline of the roles and function of the relevant authorities responsible for the regulation of imports and exports of aquaculture product(s) in South Africa.

Table 2: Contact details, roles and function of relevant authorities for the import and export of aquaculture product(s).

Official Name	Designation	Responsibility	Contact Details	Role
Ntomboxolo Meisie Katz	General Manager Food and Associated Industries	NRCS	Tel. (021) 526 3400 Fax (021) 526 3451 e-mail Katzmn@nrcs.org.za	• Import and export of live and processed aquatic animals for immediate human consumption is facilitated through the NRCS. • Frozen and canned fish or shell fish, any hermetically sealed fish products, commercially sterile and sealed in plastic • No NRCS control or specifications for fresh fish or fresh fish on ice (chilled) The following Compulsory Specifications (imported and local products) are administered: • Canned Fish, Canned Fish Products and Canned Marine Molluscs (VC 8014) • Canned Crustaceans (VC 8014) • Canned Meat Products (VC 8019) • Frozen Fish, Frozen
Maphuti Kutu	Technical Specialist: Food & Agro-processing Division: Regulatory Research and Development	NRCS	Tel. (012) 482 8930 e-mail Kutum@nrcs.org.za	
Deon Jacobs		NRCS	Tel. (021) 526 3400 Fax (021) 526 3451 e-mail jacobsdc@nrcs.org.za	
Kobus van der Merwe	Inspector	NRCS (Pretoria)	Tel. (012) 428 6469	
Johan van Heerden	Inspector	NRCS (Pretoria)	Tel. (012) 4828896	
Nomfanelo Mazungula	Inspector	NRCS (PE)	Tel. (041) 391 8400 Fax (041) 391 8427 e-mail Nomfanelo.Mazungula@nrcs.org.za	
Grant Hingle	Inspector	NRCS (Durban)	Tel. (031) 203 2940 Fax 031 203 2930 e-mail hinglegs@nrcs.org.za	
Fanie du Preez	Inspector	NRCS (Mossel bay)	Cell 082 529 1666	

Judi Basson	Inspector	NRCS (West Coast)	Cell 072 239 7039	Marine Molluscs, and Frozen Fish and Frozen Marine Molluscs Products (VC 8017) • Frozen Rock Lobster Products (VC 8020) • Frozen Shrimps (Prawns), Langoustines and Crabs (VC 8031) • Smoked Snoek (frozen) (VC 8021) • Live aquaculture abalone (VC 9001)
Victor Erasmus	Inspector	NRCS (Hermanus)	Tel. 028 -312 4820 Fax 028-312 4820 Cell 079 887 9098	
Mr Daniel Matlala (Acting Director)	Director of Food Control	Department of Health	Tel. 012 395 8789 Fax 012 395 8854 Tel. (012) 358 4656 (permits Pretoria) Tel. (011) 407 6812 (permits Johannesburg)	• Chilled and other types of fish not controlled by NRCS • Monitoring of consignments imported from other countries at ports of entry • (Durban, Cape Town, Port Elizabeth, Johannesburg Airport) • NOT involved with export of fish from South Africa to other countries
Ms Penny Campbell	Deputy Director: Biological Safety and Programme Support	Department of Health	Tel. 012 395 8788 Fax 012 395 8854 e-mail campbp@health.gov.za	
ITAC Certificate			Tel. (012) 394 3609 Fax (012) 394 0517 www.itac.org.za Customer Contact Center 0861 843 384	• Refer to Figure 1. above.
Dr C B Motsisi-Mehlape	State Veterinarian (import control)	DAFF, Directorate: Animal Health	Tel. 012 319 7648 Fax 012 329 6892 e-mail BoitumeloMOT@daff.gov.za Permit office: Tel. (012) 319 7514 / 7632 / 7633 / 7406 / 7500 / 7503 / 7461 Fax (012) 319 7644	• Live freshwater and tropical aquarium fish only (imports) • Import and export of ova (Salmonids) • Importation of live freshwater fish for research purposes • (White list of fish species allowed to be imported)
Dr Michelle Lewis	State veterinarian (Import Export Control)	DAFF, Directorate: Animal Health	Tel. (012) 319 7648 e-mail MichelleL@daff.gov.za	

Thule Cele	State veterinarian (Import Export Control)		Tel. (012) 319 6313 e-mail ThuleN@daff.co.za	
Dr Marietta Bronkhorst	State veterinarian (Import Export Control)	DAFF, Directorate: Animal Health	Tel. (012) 319 7536 Fax (012) 329 6892 e-mail MariettaB@daff.gov.za	• Registration of fish farms for export of live fish (salmonids and Koi carp)
Dr Sasha Saugh	DAFF, Directorate: Sustainable Aquaculture Management	Aquaculture Animal Health unit	Tel. (021) 430 7052 e-mail SashaS@daff.gov.za	• Marine fish and shellfish imports • Registration of marine aquaculture farms
Mr John Foord	Food Safety Officer	DAFF, Directorate: Sustainable Aquaculture Management	Tel. 021 430 7003 e-mail JohnF@daff.gov.za	• Food safety monitoring for finfish and shellfish
Ms Heidy Potgieter	Nature Conservation		Contact relevant provincial authorities: Permits Office GDARD Tel. (011) 240 3043 Fax 086 420 2203 / 011 240 3044	• Live fresh water fish (Importation)

5 SUPPORTING DOCUMENTATION

This guideline is supported by the following documentation, which can be used as additional information sources.

a) Department of Agriculture, Forestry and Fisheries (2013). A Directory of Development Finance and Grant Funding Organisations for Aquaculture in South Africa, 30 pp.

b) Department of Trade and Industry (2013). Aquaculture Development and Enhancement Programme, a sub-programme of the Enterprise Investment Programme, 18 pp.

c) Department of Agriculture, Forestry and Fisheries (2013). Legal Guide to Aquaculture in South Africa (First Edition), 94 pp.

d) Department of Environmental Affairs (2013). EIA Guideline for Aquaculture in South Africa, 72 pp.

e) Department of Water Affairs and Forestry. Guideline for Authorising the Use of Water for Aquaculture. Directorate Water Abstraction and Instream Use, Sub-directorate Environment and Recreation. [xiv] + [38] pp.

f) Department of Agriculture, Forestry and Fisheries (2012). Environmental Integrity Framework for Marine Aquaculture, 96 pp. (Available online at www.daff.gov.za)

g) Department of Agriculture, Forestry and Fisheries (2011). Agricultural Business Plan Guidelines, 16pp. (Available online at www.daff.gov.za)

h) Hinrichsen, E. 2008. Guideline to the Authorisation Requirements for Aquaculture in the Eastern Cape: Edition 1. Division of Aquaculture, Stellenbosch University Report. Republic of South Africa, Provincial Government of the Eastern Cape, Department of Economic Development and Environmental Affairs, Bhisho.

i) Hinrichsen, E. 2007. Guideline to the Authorisation Requirements for Aquaculture in the Western Cape: Edition 1. Division of Aquaculture, Stellenbosch University Report. Republic of South Africa, Provincial Government of the Eastern Cape, Department of Environmental Affairs & Development Planning, Cape Town.

6 USEFUL CONTACT INFORMATION

DEPARTMENT OF AGRICULTURE FORESTRY AND FISHERIES (DAFF) CUSTOMER SERVICE CENTRE (CSC)

Table 1. Contact details for officials at the Customer Service Center (CSC), Department of Agriculture, Forestry and Fisheries (DAFF).

Official Name	Designation	Contact Details
Ms Zugera Galant	Deputy Director : Customer Service Centre Operations	Tel. (021) 402 3443
Ms Magda Burger	Assistant Director : Customer Service Centre Operations	Tel. (021) 402 3180
Mr Naeem Abdurahman	Senior Admin Office: Walk in Centre. Supervisor/ Floor Manager	Tel. (021) 402 3180
Ms Lunga Madyibi	Consultant : Customer Service Centre	Use any of the above/ below telephone numbers.
Ms Jacquiline Majola	Consultant : Customer Service Centre	Use any of the above/ below telephone numbers.
Mr Mfundo Mata	Consultant : Customer Service Centre	Use any of the above/ below telephone numbers.
Ms Aurille Davids	Senior Admin Officer : Call Centre	Tel. 086 000 3474/ (021) 402 3259
Mr Haroon Stuurman	Senior Admin Clerk : Call Centre	Tel. 086 000 3474/ (021) 402 3436
Ms Aphiwe Nonkeza	Senior Admin Clerk : Call Centre	Tel. 086 000 3474/ (021) 402 3634

Mrs Berenice Steenkamp	Office Administrator : Customer Services Centre	Tel. 086 000 3474/ (021) 402 3670
Ms Bukeka Mehlo	Senior Admin Clerk : Customer Services Centre	Tel. 086 000 3474/ (021) 402 3670
Ms Lolwethu Sqithe	Senior Admin Clerk : Customer Services Centre	Tel. (041) 582 1871

DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES (DAFF), DIRECTORATE: SUSTAINABLE AQUACULTURE MANAGEMENT (SAM)

Table 2. Contact details for officials at the Directorate: Sustainable Aquaculture Management (SAM), Department of Agriculture, Forestry and Fisheries (DAFF).

Official Name	Designation	Responsibility	Contact Details
Mr Asanda Njobeni	Director	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (012) 402 3409 Email AsandaN@daff.gov.za
Ms Mbali Mginqi	Office Administrator/ Personnel Assistant	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (021) 402 3065 Email MbaliM@daff.gov.za
Ms Zimasa Jika	Deputy Director Sub - Directorate: Aquaculture Authorisation	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (021) 402 3356 Email ZimasaJ@daff.gov.za
Mr Tshepo Sebake	Assistant Director Sub – Aquaculture Policy Specialist	Directorate: Sustainable Aquaculture Management (SAM	Tel. (021) 403 3116 Email TshepoSE@daff.gov.za
Ms Gwen Bokwe	Administrative Officer Sub - Directorate: Aquaculture Authorisation	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (021) 402 3631 Email GwenB@daff.gov.za
Mr Vuyani Krala	Senior Administrative Officer Sub - Directorate: Aquaculture Authorisation	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (021) 402 3424 Email VuyaniK@daff.gov.za
Mr Imtiyaz Ismail	Environmental Officer (Specialised Production) Sub - Directorate: Aquaculture Authorisation	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (021) 402 3673 Email ImtiyazI@daff.gov.za

Ms Fatima Daya	Environmental Officer Control Grade B (Environmental Assessments) Sub – Directorate: Aquaculture Animal Health and Environmental Interactions	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (021) 430 7006 Email FatamaS@daff.gov.za
Ms Michelle Pretorius	Environmental Officer Production Grade C (Shellfish Farm Monitoring) Sub – Directorate: Aquaculture Animal Health and Environmental Interactions	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (021) 430 7034 Email MichellePR@daff.gov.za
Dr Sasha Saugh	Aquatic State Veterinarian Sub – Directorate: Aquaculture Animal Health and Environmental Interactions	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (021) 430 7052 Email SashaS@daff.gov.za
Ms. Primrose Lehubye	Animal Health Technician Sub – Directorate: Aquaculture Animal Health and Environmental Interactions	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (021) 430 7076 Email PrimroseL@daff.gov.za
Mr John Foord	Environmental Officer Specialized Production (Shellfish and Finfish Monitoring Programme) Sub – Directorate: Aquaculture Animal Health and Environmental Interactions	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (021) 430 7003 Email JohnF@daff.gov.za
Ms Portia Dwane	Environmental Officer Production (Shellfish and Finfish Monitoring Programme) Sub – Directorate: Aquaculture Animal Health and Environmental Interactions	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (012) 319 7620 Email Portia@daff.gov.za
Mr Mayizole Majangaza	Environmental Officer Production Grade C (Shellfish and Finfish Monitoring Programme) Sub – Directorate: Aquaculture Animal Health and Environmental Interactions	Directorate: Sustainable Aquaculture Management (SAM)	Tel. (021) 430 7065 Email MayizoleM@daff.gov.za
Mr Maxhoba Jezile	Enviromental Officer Production Grade C (Shellfish and Finfish Monitoring Programme)	Directorate: Sustainable Aquaculture	Tel. (021) 430 7037 Email MaxhobaJ@daff.gov.za

	Sub – Directorate: Aquaculture Animal Health and Environmental Interactions	Management (SAM	

DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES (DAFF), DIRECTORATE: AQUACULTURE TECHNICAL SERVICES (ATS)

Table 3. Contact details for officials at the Directorate: Aquaculture Technical Services (ATS), Department of Agriculture, Forestry and Fisheries (DAFF).

Official Name	Designation	Responsibility	Contact Details
Ms Khumo Morake	Director	Directorate: Aquaculture Technical Services (ATS)	Tel. 021) 402 3038 Email KhumoM@daff.gov.za
Mr Donald Nkgadima	Office Administrator	Directorate: Aquaculture Technical Services (ATS)	Tel.(021) 402 3116 Email DonaldN@daff.gov.za
Mr Alistair Busby	Control Scientific Technician	Directorate: Aquaculture Technical Services (ATS)	Tel. (021)430 7036 Email AlistairB@daff.gov.za
Ms Pontsho Sibanda	Production Scientist: Aquaculture	Directorate: Aquaculture Technical Services (ATS)	Tel. (012) 319 7404 Email PontshoS@daff.gov.za
Ms Claudia Melo	Scientific Control Technician	Directorate: Aquaculture Technical Services (ATS)	Tel.(021) 430 7074 Email ClaudiaM@daff.gov.za
Ms Karabo Bopape	Environmental Officer Specialised Production	Directorate: Aquaculture Technical Services (ATS)	Tel. (012) 319 7457 Email KaraboB@daff.gov.za
Mr Lloyd Sassman	Marine Aquaculture Research Assistant	Directorate: Aquaculture Technical Services (ATS)	Tel. (021) 430 7037 Email LloydS@daff.gov.za
Mr Alick Hendricks	Marine Aquaculture Research Assistant	Directorate: Aquaculture Technical Services (ATS)	Tel.(021) 430 7038 Email AlickH@daff.gov.za
Ms Matebo Yvonne Moroasui	Environmental Officer Specialised Production	Directorate: Aquaculture Technical	Tel.(021)402 3414 Email Matebo@daff.go.za

		Services (ATS)	

DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES (DAFF), DIRECTORATE: OPERATION PHAKISA DELIVERY UNIT

Table 4. Contact details for officials in the Operation Phakisa Delivery Unit, Department of Agriculture, Forestry and Fisheries (DAFF).

Official Name	Designation	Responsibility	Contact Details
Ms Andrea Bernatzeder	Operation Manager	Operation Phakisa Delivery Unit	Tel. (021) 402 3067 Email AndreaB@daff.gov.za
Ms Bongiwe Gxilishe	Senior Administrator Officer	Operation Phakisa Delivery Unit	Tel. (021) 402 3322 Email BongiweG@daff.gov.za
Ms Lisa Geswindt	Deputy Director: Investment Promotion	Operation Phakisa Delivery Unit	Tel. (021) 402 3331 Email LisaG@daff.gov.za
Mr Kishan Sankar	Aquaculture Advisor	Operation Phakisa Delivery Unit	Tel. (021) 402 3631 Email KishanS@daff.gov.za
Mr Keagan Halley	Aquaculture Advisor	Operation Phakisa Unit	Tel. (021) 402 3326 Email Keaganh@daff.gov.za
Ms Masuping Mofokeng	Assistant Director: Aquaculture Economics	Operation Phakisa Delivery Unit	E-mail MasupingM@daff.gov.za

Appendix 2: Summary of Legal Framework relating to authorisation, licences and permits required to undertake Aquaculture in South Africa. 2017. Aquaculture Strategic Environmental Assessment (SEA), Council for Scientific and Industrial Research (CSIR).

APPENDIX 2. SUMMARY OF LEGAL FRAMEWORK RELATING TO AUTHORISATION, LICENCES AND PERMITS REQUIRED TO UNDERTAKE AQUACULTURE IN SOUTH AFRICA (SOURCE: DEA, DAFF, DWA & PROVINCES)

Authority	Applicable Legislation		Authorisation / Licence / Permit requirements	Listed Activity
Department of Environmental Affairs (DEA)	National Environmental Management Act (Act 107 of 1998) (NEMA)	EIA regulation of 2014 GN 983 Listing Notice Item 6	Basic Assessment	For the construction of facilities, infrastructure or structures for aquaculture of: (i) finfish, crustaceans, reptiles or amphibians where such facility, infrastructure or structures will have a production output exceeding 20 000 kg but less than 200 000 kg per annum (wet weight); (ii) (ii) molluscs where such facility, infrastructure or structures will have a production output exceeding 30 000 kg but not exceeding 150 000 kg per annum (wet weight); (iii) (iii) aquatic plants where such facility, infrastructure or structures will have a production output exceeding 60 000 kg but not exceeding 200 000 kg per annum (wet weight); excluding where the construction of facilities, infrastructure or structures is for purposes of offshore cage culture in which case activity 7 in this Notice will apply.
		EIA regulation of 2014 GN 983 Listing Notice Item 7	Basic Assessment	For the construction of facilities, infrastructure or structures for aquaculture of offshore cage culture of finfish, crustaceans, reptiles, amphibians, molluscs and aquatic plants where the facility, infrastructure or structures will have a production output exceeding 50 000 kg but not exceeding 100 000 kg per annum (wet weight)
		EIA regulation of 2014 GN 983 Listing Notice Item 8	Basic Assessment	The construction of a hatchery or agri-industrial infrastructure outside industrial complexes where the development footprint covers an area of 2 000 square metres or more.
		EIA regulation of 2014 GN 983 Listing Notice Item 10	Basic Assessment	The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes (i) with an internal diameter of 0,36 metres or more; or (ii) (ii) with a peak throughput of 120 litres per second or more; excluding where- (a) such infrastructure is for bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve; or (b) where such development will occur within an urban area.
		EIA regulation of 2014 GN 983 Listing Notice Item 12	Basic Assessment	The development of- (i) canals exceeding 100 square metres in size; (ii) channels exceeding 100 square metres in size; (iii) bridges exceeding 100 square metres in size; (iv) dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size; (vi) bulk storm water outlet structures exceeding 100 square metres in size; (vii) marinas exceeding 100 square metres in size; (viii) jetties exceeding 100 square metres in size; (ix) slipways exceeding 100 square metres in size; (x) buildings exceeding 100 square metres in size; (xi) boardwalks exceeding 100 square metres in size; or (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; - excluding- (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;

APPENDIX 2. SUMMARY OF LEGAL FRAMEWORK RELATING TO AUTHORISATION, LICENCES AND PERMITS REQUIRED TO UNDERTAKE AQUACULTURE IN SOUTH AFRICA (SOURCE: DEA, DAFF, DWA & PROVINCES)

				(dd) where such development occurs within an urban area; or (ee) where such development occurs within existing roads or road reserves.
		EIA regulation of 2014 GN 983 Listing Notice Item 13	Basic Assessment	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.
		EIA regulation of 2014 GN 983 Listing Notice Item 15	Basic Assessment	The construction of structures in the coastal public property where the development footprint is bigger than 50 square metres, excluding (i) the construction of structures within existing ports or harbours that will not increase the development footprint or throughput capacity of the port or harbour. (ii) the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (iii) the development of temporary structures within the beach zone where such structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared; or (iv) activities listed in activity 14 in Listing Notice 2 of 2014, in which case that activity applies.
		EIA regulation of 2014 GN 983 Listing Notice Item 17	Basic Assessment	Development- (i) in the sea; (ii) in an estuary; (iii) within the littoral active zone; (iv) in front of a development setback; or (v) if no development setback exists, within a distance of 100 metres inland of the high water mark of the sea or an estuary, whichever the greater; in respect of- (a) fixed or floating jetties and slipways; (b) tidal pools; (c) embankments; (d) rock revetments or stabilising structures including stabilising walls; (e) buildings of 50 square metres or more; or (f) infrastructure with a development footprint of 50 square metres or more – but excluding- (aa) the development of infrastructure and structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) the development of temporary infrastructure or structures where such structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared; or (dd) where such development occurs within an urban area.
		EIA regulation of 2014 GN 983 Listing Notice Item18	Basic Assessment	The planting of vegetation or placing of any material on dunes or exposed sand surfaces of more than 10 square metres, within the littoral active zone, for the purpose of preventing the free movement of sand, erosion or accretion, excluding where – (i) the planting of vegetation or placement of material relates to restoration and maintenance of indigenous coastal vegetation undertaken in accordance with a maintenance management plan; or (ii) such planting of vegetation or placing of material will occur behind a development setback
		EIA regulation of 2014 GN 983 Listing Notice Item19	Basic Assessment	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from: (i) a watercourse; (ii) the sea; (iii) the seashore; (iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high water mark of the sea or an estuary, whichever distance is the greater -

APPENDIX 2. SUMMARY OF LEGAL FRAMEWORK RELATING TO AUTHORISATION, LICENCES AND PERMITS REQUIRED TO UNDERTAKE AQUACULTURE IN SOUTH AFRICA (SOURCE: DEA, DAFF, DWA & PROVINCES)

				but excluding where such infilling, depositing, dredging, excavation, removal or moving: a) Is for the maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or b) Occurs behind the development setback line
Department of Environmental Affairs (DEA)	National Environmental Management Act (Act 107 of 1998) (NEMA)	EIA regulation of 2014 GN 984 Listing Notice Item 26	Environmental Impact Assessment	Development— (i) in the sea; (ii) in an estuary; (iii) within the littoral active zone; (iv) in front of a development setback; or (v) if no development setback exists, within a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever is the greater; in respect of – (a) facilities associated with the arrival and departure of vessels and the handling of cargo; (b) piers; (c) inter- and sub-tidal structures for entrapment of sand; (d) breakwater structures (e) coastal marinas; (f) coastal harbours or ports; (g) tunnels; or (h) underwater channels; but excluding the development of structures within existing ports or harbours that will not increase the development footprint of the port or harbour.
Department of Environmental Affairs (DEA)	National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEMPAA)		Permit: Special nature reserves, nature reserves (including wilderness areas) and protected environments. Permit: World heritage sites.	
Department of Environmental Affairs (DEA)	National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA)	AIS Regulations TOPS Regulations	Authorisation For Use of Alien and Invasive Species Regulations, 2009 Authorisation For Use of Threatened or Protected Species Regulations, 2007 Authorisation for aquaculture activities in or adjacent to protected areas	
Department of Environmental Affairs (DEA)	National Environmental Waste Act (Act 59 of 2008) (NEMWA)		Authorisation for the disposal of domestic waste	Waste management licence application and authorisation is required for the disposal of domestic waste (typical to aquaculture facilities) in areas that are not serviced by municipal waste disposal services.
Department of Environmental Affairs (DEA)	National Environmental Integrated Coastal Management Act (Act 24 of 2008)	Coastal Waters Discharge Permit/ General Authorisation	Any liquid discharged into the coastal environment as waste, most marine aquaculture entities will require authorisation for such discharges by means of a Coastal Waters Discharge Permit. All existing effluent discharge pipelines (including discharges previously authorised under the National Water Act) will also require re-application for a Coastal Waters Discharge Permit.	
Department of Environmental Affairs (DEA)	Draft Marine Spatial Planning Bill	tbc	tbc	
Department of Environmental Affairs (DEA)	Sea Shore Act 21 of 1935		permit the construction or laying on the -bed of the sea within the three miles limit of cables, wharves, piers, breakwaters, sea walls, embankments, jetties, landing-stages or other structures, drainpipes or sewers, or any work of public utility ;	

APPENDIX 2. SUMMARY OF LEGAL FRAMEWORK RELATING TO AUTHORISATION, LICENCES AND PERMITS REQUIRED TO UNDERTAKE AQUACULTURE IN SOUTH AFRICA (SOURCE: DEA, DAFF, DWA & PROVINCES)

			permit the removal for industrial purposes of shells from the bed of the sea within the three miles limit ; reclaim land from the sea or permit the reclamation of land from the sea, and alienate or let any land so reclaimed	
Department of Environmental Affairs (DEA)	Sea Birds and Seals Protection Act 46 of 1973		prescribe the methods by which sea birds and seals may be captured or killed; prescribe the age, size, sex or kind of sea birds or seals which may be captured or killed; prescribe the time or season when or the area within which sea birds or seals may be captured or killed or their products gathered or processed; prescribe the prices at which the products of sea birds or seals may be sold; prohibit the export of the products of sea birds or seals; require the holder of a permit to furnish him with particular statistics and may prescribe the manner in which and the period within which those statistics shall be so furnished.	
Department of Water and Sanitation (DWS)	National Water Act (Act 36 of 1998) (NWA)		All aquaculture water uses that are recognised by Section 21 of the Act. 21 (a) taking water from a water resource. 21 (b) storing water. 21 (c) impeding or diverting the flow of water in a watercourse. 21 (f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit. 21 (g) disposing of waste in a manner which may detrimentally impact on a water resource. 21 (h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process. 21 (i) altering the bed, banks, course or characteristics of a watercourse.	
Western Cape	Western Cape Nature Conservation Law Amendment Act (Act 3 of 2000 Nature and Environmental Conservation Ordinance 19 of 1974 (Cape) Western Cape Biosphere Reserves Act 6 of 2011 Land Use Planning Ordinance 15 of 1985		Protection Of Fish In Inland Waters Angling licence Netting licence Transport and stock fish **<u>Annual permits</u>:** • West Rock Lobster • East Coast Rock Lobster • Molluscs, including octopus, squid, worms, other invertebrates and aquatic plants • Mud Crab • Marine aquarium fish	Subject to the provisions of sections 52 and 61, no person shall angle in any inland waters without a licence issued by the Board, a receiver of revenue or any person authorised to do so by the Board in the prescribed form on payment of the prescribed fee. Subject to the provisions of section 61, no person shall for any purpose whatsoever use any fyke-net, crab-net, staked net or trek-net in any inland waters without a licence in the prescribed form issued to him or her by the Board on payment of the prescribed fee. Subject to the provisions of sections 52 and 61, no person shall for any purpose what so ever use any cast-net in any inland waters without a licence in the prescribed form issued to him or her by the Board, a receiver of revenue or any person authorised to do so by the board on payment of the prescribed fee. Subject to the provisions of section 61, no person shall for any purpose whatsoever use any fyke-net, crab-net, staked net ortrek-net inland waters without a licence in the prescribed form issued to him or her by the Board on payment of the prescribed fee Subject to the provisions of sections 52 and 61, no person shall for any purpose whatsoever use any cast-net in any inland waters without a licence Promote the protection of areas of high biodiversity value and ecological importance in the Province as biosphere reserves designated in terms of the Man and the Biosphere Programme.

APPENDIX 2. SUMMARY OF LEGAL FRAMEWORK RELATING TO AUTHORISATION, LICENCES AND PERMITS REQUIRED TO UNDERTAKE AQUACULTURE IN SOUTH AFRICA (SOURCE: DEA, DAFF, DWA & PROVINCES)

			• Angling • Spearfishing • Use of cast or throw net • Fishing from vessel • Scuba diving in a Marine • Protected Area **<u>Short term permits:</u>** • Molluscs including octopus, squid, worms, other invertebrates and aquatic plants • Mud Crab • Marine aquarium fish • Angling • Spearfishing • Use of cast or throw net • Fishing from vessel • Scuba diving in a Marine Protected Area • Import permit Tilapia • Transportation permit Tilapia • Scooping report Tilapia	
Mpumalanga	Nature Conservation Ordinance 12 of 1983 (Transvaal) Nature Conservation Act 10 of 1998		• Breeding permit for the breeding of fish • Stocking permit if you want to stalk fish • Actuary permit • Fishing permit	The permits are issued by Provincial Nature Conservation authority
KwaZulu-Natal	Nature Conservation Ordinance 15 of 1974 Nature Conservation Management Act 9 of 1997 Prevention of Environmental Pollution Ordinance 21 of 1981 KwaZulu-Natal Planning and Development Act No. 6 of 2008			Permits are issued by DAFF National
North West	Nature Conservation Ordinance 12 of 1983 (Transvaal) Nature and			

APPENDIX 2. SUMMARY OF LEGAL FRAMEWORK RELATING TO AUTHORISATION, LICENCES AND PERMITS REQUIRED TO UNDERTAKE AQUACULTURE IN SOUTH AFRICA (SOURCE: DEA, DAFF, DWA & PROVINCES)

	Environmental Conservation Ordinance 19 of 1974 (Cape) Land Use Planning Ordinance 15 of 1985 North West Biodiversity Management Act No. 4 of 2016			
Gauteng	Nature Conservation Ordinance 12 of 1983 (Transvaal) Gauteng Nature Conservation Bill of 2014		• Release Permit • Import permit if the fish is from another province • Alien species fish permits are handled by DEA	
Free State	Nature Conservation Ordinance 8 of 1969 Prevention of Environmental Pollution Ordinance 21 of 1981		Angling licences	
Northern Cape	Northern Cape Nature Conservation Act (Act 9 of 2009) Nature and Environmental Conservation Ordinance 19 of 1974 (Cape) Northern Cape Planning and Development Act No. 7 of 1998		• Harvesting of Ranched Abalone • Seeding Abalone for Ranching	
Eastern Cape	Nature and Environmental Conservation Ordinance 19 of 1974 (Cape) Eastern Cape Nature Conservation Act (Act 10 of 1987) Land Use Planning Ordinance 15 of 1985		Rock Lobster Grow out Land based EC Harvesting of Ranched Abalone EC Seeding Abalone for Ranching EC Transport permit to introduce fish in land water (pond or dams)	Permits issued by DAFF

APPENDIX 2. SUMMARY OF LEGAL FRAMEWORK RELATING TO AUTHORISATION, LICENCES AND PERMITS REQUIRED TO UNDERTAKE AQUACULTURE IN SOUTH AFRICA (SOURCE: DEA, DAFF, DWA & PROVINCES)

Limpopo	Limpopo Environmental Management Act (Act 7 of 2003)			Permits are issued by DAFF
Department of Agriculture, Forestry and Fisheries (DAFF)	Marine Living Resources Act (Act 18 of 1998) (MLRA)		• Permit to engage in ranching activities of marine species (currently applicable to abalone ranching only). • Permit to collect broodstock for marine aquaculture activities. • Permit to operate a marine aquaculture fish processing establishment. • Permit for a local fishing vessel engaged in marine aquaculture related activities. • Permit to engage in marine aquaculture activities: grow-out. • Permit to possess broodstock and operate a hatchery. • Permit to transport marine aquaculture fish or any product thereof. • Permit for the local sale of undersized cultured marine aquaculture products, such as abalone and kob where size restrictions are imposed by the Marine Living Resources Act, 1998. • Permit for commercial import and export, including the permit for import of juvenile and larval oyster seed. • Permit to import marine ornamental organisms. • Requirements associated with monitoring in the South African Molluscan Shellfish Monitoring and Control Programme, when there is intent to farm any shellfish for human consumption. • Permit To Export Fish And Fish Products • Application for a permit to import fish and fish product • Marine Aquaculture Business Process • Permits For Marine Aquaculture Fish And Fish Products • Requirements For Import Permits For Marine Aquaculture Fish And Fish Products • Requirements For Marine Aquaculture Scientific Investigations And Practical Experiments • Requirements For Transport Permit For Marine Aquaculture Fish And Fish Products • Permit To Operate A Marine Aquaculture Fish Processing Establishment (Exemption) • Permit To Engage In Marine Aquaculture Activities: Grow-Out • Permit To Possess And Sell Undersized Abalone Obtained From A Marine Aquaculture Right Holder (Bona-Fide Wholesalers/Retailers/Restaurants/Hotel • Application To Possess Broodstock And Operate A Marine Aquaculture Hatchery • Permit To Engage In Abalone Ranching Or Stock Enhancement Pilot Project: Seeding • Permit To Engage In Abalone Ranching Or Stock Enhancement Pilot Project: Harvesting • Permit For The Purposes Of Diving And Possession Of Prohibited Gear Within The Listed Areas In Terms Of Regulation 3(3) Of government Gazette No. 30716 Of 1 February 2008 (Regulations For The Protection Of Wild Abalone) • Permit To Engage In Mariculture Activities (Transport, Fish Processing Establishment And Brood stock Collection) • Permit To Engage In Abalone Ranching Or Stock Enhancement Pilot Project: Harvesting • Permit To Engage In Abalone Ranching Or Stock Enhancement Pilot Project: Seeding • Permit To Operate A Fish Processing Establishment (Exemption Holder) • Permit To Possess And Sell Under-Sized Cultured Abalone Obtained From An Authorised Right Holder • Permit To Possess Brood stock And Operate A Hatchery **<u>Marine Aquaculture Permit conditions</u>:** • Kob Sales Protocol • Finfish hatchery management protocol (annexure 4) • Finfish Hatchery • Finfish Grow Out Sea based • Finfish Grow Out Land based • Finfish Broodstock Collection • Collection of Marine Ornamentals Broodstock • Collection of Abalone Broodstock • Bloodworm Hatchery and Grow out • Bloodworm Broodstock • Abalone Sales Protocol • Abalone Sales Annexure A • Abalone Ranching Catch Form • Abalone Hatchery • Abalone Grow out Seabased • Abalone Grow out Land based • Abalone Experimental Areas and Ranching Sites • Kob Sales Protocol • Abalone and Kob Sales Permit • Marine Aquaculture Export

			• Marine Aquaculture FPE • Marine Aquaculture Import • Marine Ornamental Hatchery and Grow Out • Oyster Hatchery • Oysters and Mussels Grow Out • Prawn Hatchery and Grow Out Land based • Redbait Collection (Biofouling) • Scientific Investigations and Practical Experiments • Seaweed Grow Out • Standard Abalone Ranching • Standard Marine Aquaculture **<u>Marine Aquaculture Right guidelines and application form</u>:** • Guide to Authorisation Requirements Aquaculture SA 2015 • Application for amendment of marine aquaculture right • (DAFF)Guidelines and Requirements on Applying for a Marine Aquaculture Right 2011 • Application for a right to engage in marine aquaculture , in terms of section 18 of the marine living resources act, 1998 (act no. 18 of 1998)(“the act”) **<u>Fees payable in respect of applications and the issuing of rights, permits and licences:</u>** • New tariffs as from 1 April 2011: import permits issued in terms of the Agricultural Pest Act, 1983 (Act No.36 of 1983)
Department of Agriculture, Forestry and Fisheries (DAFF)	Animal Improvement Act 62 of 1998		To provide for the breeding, identification and utilisation of genetically superior animals in order to improve the production and performance of animals in the interest of the Republic; and to provide for matters connected therewith.
Department of Agriculture, Forestry and Fisheries (DAFF)	Genetically Modified Organisms Act 15 of 1997		
Department of Agriculture, Forestry and Fisheries (DAFF)	Subdivision of Agricultural Land Act 70 Of 1970		
Department of Agriculture, Forestry and Fisheries (DAFF)	Animal Diseases Act No 35 of 1984		To provide for the control of animal diseases and parasites, for measures to promote animal health, and for matters connected therewith
Department of Agriculture, Forestry and Fisheries (DAFF)	Fertilizers, Farm Feeds, Agricultural Remedies And Stock Remedies Act 36 of 1947		Application for registration of a fertilizer, farm feed, agricultural remedy, stock remedy, sterilizing plant or pest control operator shall be made to the registrar in the prescribed manner and shall be accompanied by the prescribed application fee
Department of Agriculture, Forestry and Fisheries (DAFF)	Agricultural Product Standards Act No.119 Of 1990		To provide for control over the sale and export of certain agricultural products, control over the sale of certain imported agricultural products; and control over other related products; and for matters connected therewith
Department of Agriculture, Forestry and Fisheries (DAFF)	Agricultural Pests Act 36 Of 1983		To provide for measures by which agricultural pests may be prevented and combated; and for matters connected therewith.
Department of Agriculture, Forestry and Fisheries (DAFF)	Animal protection act 71 of 1962		To consolidate and amend the laws relating to the prevention of cruelty to animals
Department of Agriculture, Forestry and Fisheries (DAFF)	Conservation of Agricultural Resources Act (Act 43 of 1983)		

APPENDIX 2. SUMMARY OF LEGAL FRAMEWORK RELATING TO AUTHORISATION, LICENCES AND PERMITS REQUIRED TO UNDERTAKE AQUACULTURE IN SOUTH AFRICA (SOURCE: DEA, DAFF, DWA & PROVINCES)

Department of Agriculture, Forestry and Fisheries (DAFF)	Draft Aquaculture Bill			
Department of Agriculture, Forestry and Fisheries (DAFF)	Policy for the Small-Scale Fisheries Sector in South Africa			
Department of Agriculture, Forestry and Fisheries (DAFF)	National Aquaculture Policy Framework			
Department of Agriculture, Forestry and Fisheries (DAFF)	National Strategic Framework for Aquatic Animal Health in South Africa			
Department of Agriculture, Forestry and Fisheries (DAFF)	NEMA: Environmental Impact Assessment Guideline For Aquaculture In South Africa			
Department of Agriculture, Forestry and Fisheries (DAFF)	Policy for the Development of Sustainable Inland Aquaculture Sector in South Africa			
Department of Agriculture, Forestry and Fisheries (DAFF)	Aquaculture regulations & policies for the select committee on land and mineral resources meeting			
Department of Agriculture, Forestry and Fisheries (DAFF)	Policy For The Development Of Sustainable Inland Aquaculture Sector In South Africa			
Department of Agriculture, Forestry and Fisheries (DAFF)	Final Draft EIA and Environmental Management Guideline for Aquaculture in South Africa			
Department of Agriculture, Forestry and Fisheries (DAFF)	National Guidelines For Integrated Management Of Agricultural Water Use			

Appendix 3: Summary of Aquaculture production systems.

Table 1: Summary of Aquaculture Production Systems typically used in South Africa

Production system	Category	Aquaculture environment	Types	Design	Materials	Components (physical structure)	Visual components (farm)	Species commonly cultured	Average farm footprint (Ha)	Average structure footprint (m²)	Average length (m)	Average width (m)	Average diameter (m) for circular cages	Average height above water level (m)	Average depth below water level (m)	Average volume (m³)	Average production capacity (MT)	Employment numbers		Technical capability of staff (numbers)		Gender (numbers)		Expected market potential (local, national, export) IF export, where?
																		Construction phase	Operational phase	Skilled	Unskilled	Male	Female	
Cage culture	Marine	Offshore	Floating cages Submersible cages (not currently used in SA)	Circular Square Rectangular Polygonal	Wood Steel Plastic	HDPE pipes Filling material for pipes Brackets Stoppers/screws Nets (mainly polyethylene or nylon, but also other composites) for fish cages Bird nets Navigational buoys Lanterns (lights) Mooring lines (anchors, ground chains, ropes, shackles & buoys) Grid system (frame ropes, mooring buoys, connector rings or plates, bridles and shackles)	Cages Mooring area Launch harbour Jetties Vessels/boats Service decks/barges Buildings (incl. offices, ablutions, storage, processing, freezing, packaging) Access roads	Atlantic salmon	0.25 Ha (one circular cage)	2 000 – 50 000 m²	-	-	15 – 50	0.8 – 1.4 (excl. height of service boats & bird netting that can be 1 – 6 m above cages)	5 – 20 (Excluding grid and mooring systems)	1 500 – 60 000	589 (Range from 1 – 30kg per m³ depending on species and water quality)	33	18	4	14	12	6	Local
																		8 per 100 ton (for 1 month)	10 per 100 ton	4 / 100 ton	6 / 100 ton	10 / 100 ton	0 / 100 ton	Based on current market, mainly national with small volume export (mainly into Africa)
								Dusky kob Other species also cultured include: Yellowtail Spotted Grunter	0.04 Ha (one circular cage)	2 000 – 50 000 m²	-	-	15 – 50	0.8 – 1.4 (excl. height of service boats & bird netting that can be 1 – 6 m above cages)	5 – 20 (Excluding grid and mooring systems)	1 500 – 60 000	57 (Range from 1 – 30kg per m³ depending on species and water quality)	8	6	2	4	5	1	Local
																		8 per 100 ton (for 1 month)	10 per 100 ton	4 / 100 ton	6 / 100 ton	10 / 100 ton	0 / 100 ton	Pending market movement 10% local, 50% national and 40% export
		Near-shore	Floating cages	Circular Square Rectangular Polygonal	Wood Steel Plastic	HDPE pipes Filling material for pipes Brackets Stoppers/screws Nets (mainly polyethylene or nylon, but also other composites) for fish cages Bird nets Navigational buoys Lanterns (lights) Mooring lines (anchors, ground chains, ropes, shackles & buoys) Grid system (frame ropes, mooring buoys, connector rings or plates, bridles and shackles)	Cages Mooring area Launch harbour Jetties Vessels/boats Service decks/barges Buildings (incl. offices, ablutions, storage, processing, freezing, packaging) Access roads	Atlantic salmon	0.25 Ha (one circular cage)	2 000 – 10 000 m²	10 – 15	10 – 15	15 – 50	0.8 – 1.4 (excl. height of service boats & bird netting that can be 1 – 6 m above cages)	5 – 20 (Excluding grid and mooring systems)	1 500 – 60 000	589 (Range from 1 – 30kg per m³ depending on species and water quality)	18	12	2	10	8	4	Local
																		8 per 100 ton (for 1 month)	10 per 100 ton	3 / 100 ton	7 / 100 ton	10 / 100 ton	0 / 100 ton	Based on current market, mainly national with small volume export (mainly into Africa)
								Dusky kob	0.04 Ha (one circular cage)	2 000 – 10 000 m²	10 – 15	10 – 15	15 – 50	0.8 – 1.4 (excl. height of service boats & bird netting that can be 1 – 6 m above cages)	5 – 20 (Excluding grid and mooring systems)	1 500 – 60 000	57 (Range from 1 – 30kg per m³ depending on species and water quality)	8	4	1	3	3	1	Local
																		8 per 100 ton (for 1 month)	10 per 100 ton	3 / 100 ton	7 / 100 ton	10 / 100 ton	0 / 100 ton	Pending market movement 10% local, 50% national and 40% export
Cage culture	Fresh water	Instream (dams and ponds only)	Floating cages	Circular Square Rectangular Polygonal	Wood Steel Plastic	HDPE pipes Filling material for pipes Brackets Stoppers/screws Nets (mainly polyethylene or nylon, but also other composites) for fish cages Bird nets Navigational buoys Lanterns (lights) Mooring lines (anchors, ground chains, ropes, shackles & buoys) Grid system (frame ropes, mooring buoys, connector rings or plates, bridles	Cages Mooring area Launch harbour Jetties Vessels/boats Service decks/barges Buildings (incl. offices, ablutions, storage, processing, freezing, packaging) Access roads	Tilapia	1.5 Ha (60 square cages)	4 – 2 000 m²	5 – 15	5 – 15	5 – 15	0.2 – 1.2 (excl. height of service boats & bird netting that can be 1 – 6 m above cages)	1 – 10 (Excluding grid and mooring systems)	4 – 1 800	45 (Range from 1 – 30kg per m³ depending on species and water quality)	50-100?		2	6	7	1	Domestic only
																		30	5	1	6	6	2	Market demand is good.
																		4 per 100 ton (for 1 month)	8 per 100 ton	2 / 100 ton	6 / 100 ton	7 / 100 ton	1 / 100 ton	Pending market movement 20% local, 60% national and 20% export
																		2-4	3		3	2-3	2	Harvesting normally takes place based on pre-determined market demand
								Trout	0.46 Ha (20 circular	4 – 2 000 m²	10 – 15	10 – 15	5 – 15	0.2 – 1.2 (excl. height of service boats	1 – 10 (Excluding grid and mooring	4 – 1 800	94 (Range from 1 – 30kg per m³	20	8	2	6	6	2	Local

						and shackles) An average inland square cage does not consist of HDPE piping, but wood and steel, which is usually floated on plastic drums. Pre-moulded floating jetties are sometimes used as cage frames.			cages)				& bird netting that can be 1 – 6 m above cages)	systems)		depending on species and water quality)	4 per 100 ton (for 1 month)	8 per 100 ton	2 / 100 ton	6 / 100 ton	7 / 100 ton	1 / 100 ton	Pending market movement 20% local, 70% national and 10% export
								General comments: Tilapia and Catfish cage culture is currently not common in SA	0.5 – 10 Ha per cage farm	In large lakes cages may be duplicated up to 50 times (Kariba, lakes Volta & Victoria)	5 – 15	5 – 15	6 – 28	0.2 – 1.2 (excl. height of service boats & bird netting that can be 1 – 6 m above cages)	1 – 10 (Excluding grid and mooring systems)	4 – 1 800	Cage farms vary in production from 2 tons per cage to 8 000 tons per year for major producers within Africa.							
Production system	**Category**	**Aquaculture environment**	**Types**	**Design**	**Materials**	**Components (physical structure)**	**Visual components (farm)**	**Species commonly cultured**	**Average farm footprint (Ha)**	**Average structure footprint (m^2)**	**Average length (m)**	**Average width (m)**	**Average diameter (m) for circular cages**	**Average height above water level (m)**	**Average depth below water level (m)**	**Average volume (m^3)**	**Average production capacity (MT)**	**Employment numbers**		**Technical capability of staff (numbers)**		**Gender (numbers)**		**Expected market potential (local, national, export)**
																		Construction phase	**Operational phase**	**Skilled**	**Unskilled**	**Male**	**Female**	**IF export, where?**
Pond culture	Marine & Fresh water	Land-based	Earthen (embankment) ponds Constructed (dugout or excavated) ponds Can be lined with plastic or concrete	Square Rectangular Under greenhouse tunnels	Earthen Reinforced concrete Polyester resin Lined ponds (HDPE and other plastics)	Dam or embankment Spillway/drainage canals Core trench/culverts Pool area Water control gates Monk weir Earth ponds are constructed to be 100% drainable, with inflow control and exit control structures (Valves, monks, catching basins, etc.).	Ponds Pump house Buildings (incl. offices, ablutions, storage, processing, freezing, packaging) Access roads Road dikes/bridges Fish tanks Water supply structures, canals, pipelines, holding reservoirs, wild fish traps, etc. Hatcheries and associated tunnel or RAS structures Electricity grid (poles & overhead cables) Canal system to supply and drain water Aeration system (units in ponds or ducted oxygen or air)	Dusky kob Spotted grunter	42.4 Ha (53 ponds)	4 900 m^2	70	70			1.5	7350	466	150	22	Skilled = 5 Semi-skilled =5	12	16	6	Local
																		6 per 100 ton (for 6 months)	6 per 100 ton	1 / 100 ton	5 / 100 ton	5 / 100 ton	1 / 100 ton	Pending market movement 10% local, 50% national and 40% export
								Tilapia	4.8 Ha (40 ponds)	800 m^2	40	20			1.2	960	63	100	23	3	20	22	1	Domestic only
																		25		10	1	5	5	
																		6 per 100 ton (for 6 months)	6 per 100 ton	1 / 100 ton	5 / 100 ton	5 / 100 ton	1 / 100 ton	Pending market movement 20% local, 60% national and 20% export
																		12	5		5	3-4	1-2	External sales are sporadic most often harvest serves as some form of subsistence farming
								Trout	6 Ha (50 ponds)	800 m^2	40	20			1.2	960	55	30	10	1	9	5	5	Local
																		6 per 100 ton (for 6 months)	6 per 100 ton	1 / 100 ton	5 / 100 ton	5 / 100 ton	1 / 100 ton	Pending market movement 20% local, 70% national and 10% export
								Catfish	2.4 Ha (20 ponds)	800 m^2	40	20			1.2	960	66	12	6	1	5	4	2	Local
																		6 per 100 ton (for 6 months)	6 per 100 ton	1 / 100 ton	5 / 100 ton	5 / 100 ton	1 / 100 ton	Pending market movement 30% local, 60% national and 10% export
								Marron	5 Ha (30 ponds)	1 000 m^2	50	20			1.3	1300	45	25	10	2	8	4	6	Local Export: Eurasia
																		6 per 20 ton (for 6 months)	6 per 20 ton	1 / 100 ton	5 / 100 ton	4 / 20 ton	2 / 20 ton	Pending market movement 10% local, 80% national and 10% export
								General comments	0.5 – 95 Ha 20 Ha pond is a viable unit = 18 Ha under water	2 500 – 10 000 m^2 Varies depending on design. Can be up to 5 Ha open pond or 240 m^2 if under greenhou	5 – 100	5 - 100	5 - 100	1 - 5	0.5 – 3	2 500 - 20 000	10 – 18 tons / Ha / year (tilapia) 14 MT per 0.5 Ha (Dusky kob) 0.2 – 10 kg per m^3							

										se tunnel													
Production system	**Category**	**Aquaculture environment**	**Types**	**Design**	**Materials**	**Components (physical structure)**	**Visual components (farm)**	**Species commonly cultured**	**Average farm footprint (Ha)**	**Average structure footprint (m²)**	**Average length (m)**	**Average width (m)**	**Average diameter (m) for circular cages**	**Average height above water level (m)**	**Average depth below water level (m)**	**Average volume (m³)**	**Average production capacity (MT)**	**Employment numbers**		**Technical capability of staff (numbers)**		**Gender (numbers)**		**Expected market potential (local, national, export)**
																		Construction phase	**Operational phase**	**Skilled**	**Unskilled**	**Male**	**Female**	**IF export, where?**
Longlines	Marine	Near-shore	Suspended culture Suspended lines Suspended racks and baskets	Linear	Mooring/anchor blocks: reinforced concrete Rope: polyethylene Cages/baskets: HDPE / Synthetic plastic	Rope lines with buoys/floats Baskets/Lantern nets Mooring blocks (concrete anchors, ground chains, ropes, shackles and buoys)	Longlines Mooring area Launch harbour Jetties Vessels/boats Sorting / processing barges Buildings (incl. offices, ablutions, storage, processing, packaging) Access roads	Oysters Mussels	5 – 60 Ha	10 – 200 m²	10 – 200	0.5	0.5	Normally no higher than 0.5 m above water surface (buoys)	1 – 8	Open ocean	0.5 – 200 MT per annum	10 per 100 ton (for 1 month)	20 per 100 ton	4 / 100 ton	16 / 100 ton	16 / 100 ton	4 / 100 ton	Pending market movement 20% local, 70% national and 10% export
Production system	**Category**	**Aquaculture environment**	**Types**	**Design**	**Materials**	**Components (physical structure)**	**Visual components (farm)**	**Species commonly cultured**	**Average farm footprint (Ha)**	**Average structure footprint (m²)**	**Average length (m)**	**Average width (m)**	**Average diameter (m) for circular cages**	**Average height above water level (m)**	**Average depth below water level (m)**	**Average volume (m³)**	**Average production capacity (MT)**	**Employment numbers**		**Technical capability of staff (numbers)**		**Gender (numbers)**		**Expected market potential (local, national, export)**
																		Construction phase	**Operational phase**	**Skilled**	**Unskilled**	**Male**	**Female**	**IF export, where?**
Rafts	Marine	Near-shore	Floating rafts	Rectangular Square	Plastic Wood Reinforced concrete Steel	HDPE pipes Wooden cross beams Growing ropes or baskets Mooring lines (concrete anchors, ground chains, ropes and shackles)	Rafts Mooring area Launch harbour Jetties Vessels/boats Sorting / processing barges Buildings (incl. offices, ablutions, storage, processing, packaging) Access roads	Mussels Oysters	Approx. 1 raft per Ha 1 – 60 Ha	50 – 400 m²	5 – 50	5 – 50	-	0.5 – 1.2	1	Open ocean	0.5 – 200 MT per annum	10 per 100 ton (for 1 month)	20 per 100 ton	4 / 100 ton	16 / 100 ton	16 / 100 ton	4 / 100 ton	Pending market movement 20% local, 70% national and 10% export
Production system	**Category**	**Aquaculture environment**	**Types**	**Design**	**Materials**	**Components (physical structure)**	**Visual components (farm)**	**Species commonly cultured**	**Average farm footprint (Ha)**	**Average structure footprint (m²)**	**Average length (m)**	**Average width (m)**	**Average diameter (m) for circular cages**	**Average height above water level (m)**	**Average depth below water level (m)**	**Average volume (m³)**	**Average production capacity (MT)**	**Employment numbers**		**Technical capability of staff (numbers)**		**Gender (numbers)**		**Expected market potential (local, national, export)**
																		Construction phase	**Operational phase**	**Skilled**	**Unskilled**	**Male**	**Female**	**IF export, where?**
Racks	Marine	Near-shore	Off bottom culture	Rectangular Square	Wood Metal Plastic	HDPE Mesh bags/Perforated plastic trays Wood frames/Rebar steel trestles	Racks Mooring area Launch harbour Jetties Vessels/boats Sorting / processing barges Buildings (incl. offices, ablutions, storage, processing, packaging) Access roads	Oysters	0.5 – 10 Ha	50 – 400 m²	5 - 20	5 - 20	-	0.5 – 1.0 (buoys and surface support)	1 – 8 depending on water quality and availability of feed plankton	Open ocean	0.5 – 200 MT per annum	6 per raft (2 weeks construction)	16 people on 30 rafts	1	15	16	0	RSA
																		10 per 100 ton (for 1 month)	20 per 100 ton	4 / 100 ton	16 / 100 ton	16 / 100 ton	4 / 100 ton	Pending market movement 20% local, 70% national and 10% export
Production system	**Category**	**Aquaculture environment**	**Types**	**Design**	**Materials**	**Components (physical structure)**	**Visual components (farm)**	**Species commonly cultured**	**Average farm footprint (Ha)**	**Average structure footprint (m²)**	**Average length (m)**	**Average width (m)**	**Average diameter (m) for circular cages**	**Average height (m)**	**Average depth below water level (m)**	**Average volume (m³)**	**Average production capacity (MT)**	**Employment numbers**		**Technical capability of staff (numbers)**		**Gender (numbers)**		**Expected market potential (local, national, export)**
																		Construction phase	**Operational phase**	**Skilled**	**Unskilled**	**Male**	**Female**	**IF export, where?**
Flow-through	Fresh water	Land-based	Constructed raceways	Rectangular Square	Reinforced concrete Polyester resin	Basins/Canals/Ponds Water intake Water outlet	Raceways Pump house Buildings (incl. offices, ablutions, storage, processing,	Trout	0.48 Ha (40 tanks)	5 – 250 m²	5 - 50	1 – 5	-	Sunken at ground level or elevated up to 1.5 m	0.5 – 1.5	5 – 300	1 – 200 MT per annum	40	12	2	10	7	5	Local (eggs exported)
																		6 per 100 ton (for 3 months)	6 per 100 ton	1 / 100 ton	5 / 100 ton	5 / 100 ton	1 / 100 ton	Pending market movement 20% local, 70% national and 10% export

							packaging) Access roads Road dikes/bridges Nursery tanks	Catfish	0.075 Ha (40 tanks)	20 – 30 m^2	5 - 50	1 – 5	-	Sunken at ground level or elevated up to 1.5 m	0.5 – 1.5	5 – 300	1 – 200 MT per annum	30	7	1	6	4	3	Local
																		6 per 100 ton (for 3 months)	6 per 100 ton	1 / 100 ton	5 / 100 ton	5 / 100 ton	1 / 100 ton	Pending market movement 30% local, 60% national and 10% export
								Tilapia	0.225 Ha (60 tanks)	10 – 30 m^2	5 - 50	1 – 5	-	Sunken at ground level or elevated up to 1.5 m	0.5 – 1.5	5 – 300	1 – 200 MT per annum	35 20	10 5	2 1	8 5-7	5 4-5	5 2-3	Local If sold fresh/chilled strong demand in informal and formal markets
																		6 per 100 ton (for 3 months)	6 per 100 ton	1 / 100 ton	5 / 100 ton	5 / 100 ton	1 / 100 ton	Pending market movement 20% local, 60% national and 20% export
	Fresh water	Land-based	Earthen raceways	Rectangular Square	Plastic liners	Basins/Canals/Ponds Water intake Water outlet Bird netting	Raceways Pump house Buildings (incl. offices, ablutions, storage, processing, freezing, packaging) Access roads Road dikes/bridges Nursery tanks	Trout	0.5 – 5 Ha 1.6 Ha (20 tank system)	240 – 480 m^2	30 – 200	8 – 50	-	Sunken at ground level or elevated up to 1.5 m	0.5 – 2	400 - 5 000	14 – 64 tons / Ha / year	40	14	2	12	9	5	Local
																		6 per 100 ton (for 3 months)	6 per 100 ton	1 / 100 ton	5 / 100 ton	5 / 100 ton	1 / 100 ton	Pending market movement 20% local, 70% national and 10% export
								Catfish	0.5 – 5 Ha 1.4 Ha (20 tank system)	160 – 600 m^2	20 – 50	8 – 12	-	Sunken at ground level or elevated up to 1.5 m	1	350	140 tons / Ha / year	25	7	1	6	4	3	Local
																		6 per 100 ton (for 3 months)	6 per 100 ton	1 / 100 ton	5 / 100 ton	5 / 100 ton	1 / 100 ton	Pending market movement 30% local, 60% national and 10% export
								Tilapia	0.5 – 10 Ha 1.4 Ha (20 tank system)	160 – 600 m^2 Fertilized and supplemental feeding	20 – 50	8 – 12	-	Sunken at ground level or elevated up to 1.5 m	1	350	56 tons / Ha / year	10	6	1	5	4	2	Local
																		12	5	1	5	1-5	1-2	Primarily subsistence market activities
																		6 per 100 ton (for 3 months)	6 per 100 ton	1 / 100 ton	5 / 100 ton	5 / 100 ton	1 / 100 ton	Pending market movement 20% local, 60% national and 20% export
	Marine & Fresh water	Land-based	Ponds Tanks	Circular Rectangular Square Hexagonal / Octagonal D-ended	(Rarely: Glass fibre, Polyester resin) A range of plastics Coated steel Concrete Bricks Pre-moulded	Ponds/Tanks Water intake Water outlet Filtration pools Side drains Central drains and stand pipes	Tanks (grow out) Tanks (nursery) Hatcheries Pump house Buildings (incl. offices, ablutions, storage, processing, freezing, packaging) Access roads Water feeder channels	Abalone Seaweed Oysters Mussels Tilapia Trout Catfish Marine Finfish Ornamentals Crocodiles	1 – 20 Ha	300 – 500 m^2 factory area (oysters & mussels) Smallest ponds and tanks can be as little as 0,5 m^2 Large units can be up to 250 m^2 each with farms containing multiple units	0.5 – 50	0.5 – 50	50	Sunken at ground level or elevated up to 1.5 m	0.2 – 2	0.5 – 300	Typically 5 – 40 kg per m^3 (higher for catfish), which will give a farm production of 1 to 200 tons (and more) per annum	Can be as much as 20 people along with earthmoving equipment	0.8 staff per Tonne (including overhead/ admin staff, HR etc) 0.55 production staff per tonne	0.2 staff per tonne (including overhead/ admin staff, HR etc) 0.07 production staff per tonne	0.55 production staff per tonne	0.12 production female staff per tonne	0.44 production male staff per tonne	Very good export market but requires fairly specialised abalone marketing ability. Far-east (Abalone)
																		Manual labour 10 -20 people	Depending on size it can be 10 people	1	5-7	4-5	2-3	Good local demand for fresh and chilled products in the formal and informal market (Tilapia)

Production system	Category	Aquaculture environment	Types	Design	Materials	Components (physical structure)	Visual components (farm)	Species commonly cultured	Average farm footprint (Ha)	Average structure footprint (m^2)	Average length (m)	Average width (m)	Average diameter (m) for circular cages	Average height (m)	Average depth below water level (m)	Average volume (m^3)	Average production capacity (MT)	Employment numbers		Technical capability of staff (numbers)		Gender (numbers)		Expected market potential (local, national, export) IF export, where?
																		Construction phase	Operational phase	Skilled	Unskilled	Male	Female	
Recirculation	Marine & Fresh water	Land-based	Ponds Tanks	Circular Rectangular Square Octagonal Hexagonal	Blocks A range of plastics Coated steel Concrete	Ponds/Tanks Sediment trap Mechanical filter ((including drum, sand and other filters) Skimmer/foam fractionation filter	Ponds/Tanks (grow out) Hatchery facility Live feed tanks Pump house	Tilapia	0.3 – 100 Ha	100 – 20 000 m^2	3 – 100	3 – 100	3 - 10	1 - 10	0.3 – 1.8	0.5 – 200 m^3 per tank	3 – 18 MT per annum (100 - 5 000 kg per tank)	5-10		2	4	5	1	Niche markets in cities
																		8 per 100 ton (for 6 months)	6 per 100 ton	2 / 100 ton	4 / 100 ton	4 / 100 ton	2 / 100 ton	Pending market movement 20% local, 60% national and 20% export

					Bricks Pre-moulded (Rarely: Glass fibre, Polyester resin)	Biofilter Nitrate remover Oxygen input (blowers) Oxygen cones UV sterilisation Trickling filter (degasser) Oxygen enrichment (aeration) UV treatment pH regulation Temperature regulation Pumps Buffer tank Waste treatment Water intake Water outlet (clean) Sludge outlet (waste) Side drains and floor drains Central drains and stand pipes	Buildings (incl. offices, ablutions, storage, processing, freezing, packaging) Oxygen generators Access roads										5	3	1	2	2	1	Local
															10-20	10	1	5-7	4-5	2-3	Good local demand for fresh and chilled products in the formal and informal market
								Catfish	0.3 – 20 Ha 0.1 Ha (40 tank system)	100 – 20 000 m^2 (20 m^2 per tank)	3 – 100	3 – 100	3 - 10	1 - 10	0.3 – 1.8	0.5 – 200 m^3 per tank	3 – 392 MT per annum (100 - 5 000 kg per tank)	55	22	Skilled = 5 Semi-skilled =5	12	16	6	Local
															8 per 100 ton (for 6 months)	6 per 100 ton	2 / 100 ton	4 / 100 ton	4 / 100 ton	2 / 100 ton	Pending market movement 30% local, 60% national and 10% export
								Trout	0.3 – 20 Ha 0.1 Ha (40 tank system)	100 – 20 000 m^2 (20 m^2 per tank)	3 – 100	3 – 100	3 - 10	1 - 10	0.3 – 1.8	0.5 – 200 m^3 per tank	3 – 38 MT per annum (100 - 5 000 kg per tank)	10	6	1	5	5	1	Local
															8 per 100 ton (for 6 months)	6 per 100 ton	2 / 100 ton	4 / 100 ton	4 / 100 ton	2 / 100 ton	Pending market movement 20% local, 70% national and 10% export
								Oysters	-	300 – 500 m^2 (factory area)	-	-	-	-	-	-	-	8 per 100 ton (for 6 months)	6 per 100 ton	2 / 100 ton	4 / 100 ton	3 / 100 ton	3 / 100 ton	Pending market movement 20% local, 70% national and 10% export
								Mussels	-	300 – 500 m^2 (factory area)	-	-	-	-	-	-	-	8 per 100 ton (for 6 months)	6 per 100 ton	2 / 100 ton	4 / 100 ton	3 / 100 ton	3 / 100 ton	Pending market movement 20% local, 70% national and 10% export
								Dusky kob	0.1 Ha (40 tank system)	20 m^2 per tank	-	-	5	0.5 – 10	0.3 – 1.8	0.5 – 200 m^3 per tank	50 MT per annum	10	7	1	6	4	3	Local
															8 per 100 ton (for 6 months)	6 per 100 ton	2 / 100 ton	4 / 100 ton	4 / 100 ton	2 / 100 ton	Pending market movement 10% local, 50% national and 40% export

Appendix 4: Summary of Generic Aquaculture production systems.

TABLE 2. AQUACULTURE SEA: SUMMARY OF GENERIC AQUACULTURE PRODUCTION TYPES

Production system	Aquaculture environment	Types	Species commonly cultured	Generic farm footprint
Marine				
Cage culture	Water-based (Offshore)	Floating cages	Salmonids Dusky kob Spotted Grunter Yellow tail	50 Ha (of which 1000-2000m² is land-based)
	Water-based (Near-shore)	Floating cages	Salmonids Dusky kob	10 Ha (of which 1000-2000m² is land-based)
Pond culture	Land-based	Earthen (embankment) ponds Constructed (dugout or excavated) ponds Can be lined with plastic or concrete	Dusky kob Spotted grunter	50 Ha
Longlines	Water-based (Near-shore)	Suspended culture Suspended lines Suspended racks and baskets	Oysters Mussels	30 Ha (of which 1000-2000m² is land-based)
Rafts	Water-based (Near-shore)	Floating rafts	Oysters Mussels	30 Ha (of which 1000-2000m² is land-based)
Racks	Water-based (Near-shore)	Off bottom culture	Oysters	10 Ha (of which 1000-2000m² is land-based)
Flow-through	Land-based	Ponds Tanks	Abalone Seaweed	3 -10 Ha
Recirculation (RAS)	Land-based	Tanks	Dusky kob Salmon Oysters Mussels	0.5 -1 Ha
Freshwater				
Cage culture	Water-based (Dams)	Floating cages	Tilapia Trout	2-4 ha (of which 1000-2000m² is land-based)
Pond culture	Land-based	Earthen (embankment) ponds Constructed (dugout or excavated) ponds Can be lined with plastic or concrete	Tilapia Trout Catfish Marron	20 Ha
Flow-through	Land-based	Constructed raceways (mostly reinforced concrete)	Tilapia Trout Catfish	1 – 3 Ha
Flow-through	Land-based	Earthen raceways Danish ponds	Tilapia Trout Catfish	3 -5ha Ha
Flow-through	Land-based	Tanks	Tilapia Trout Catfish	3 Ha
Recirculation (RAS)	Land-based	Tanks	Tilapia Trout Catfish	3 Ha