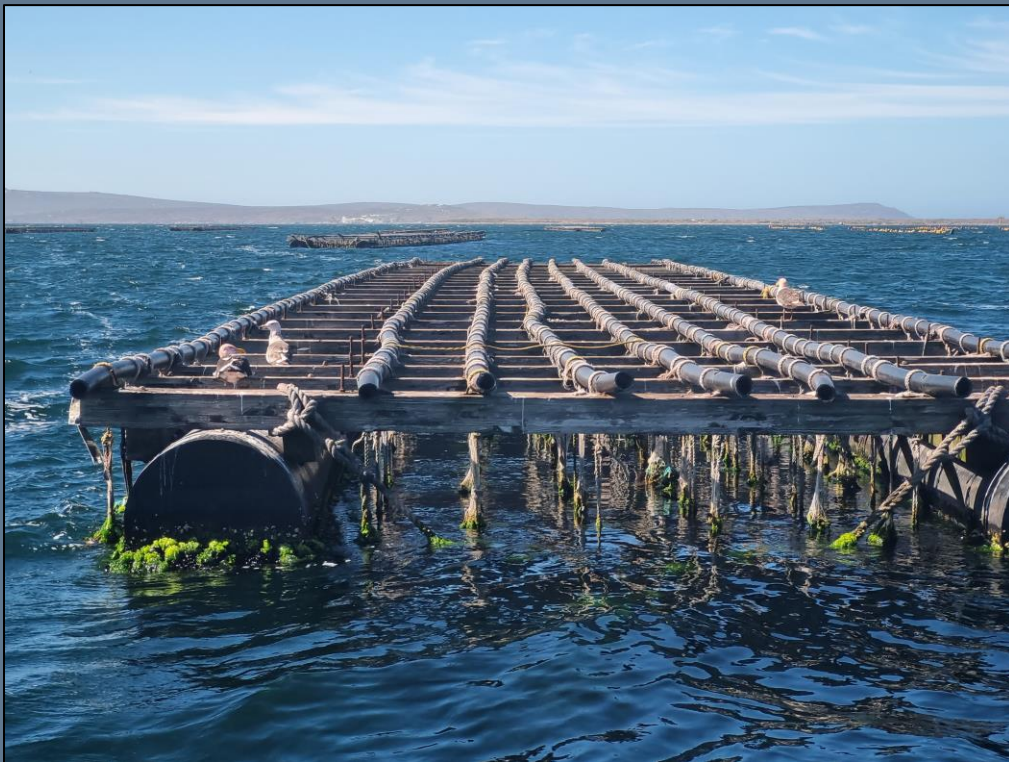




DEVELOPMENT OF A MANAGEMENT STRATEGY FOR ENDANGERED, THREATENED AND PROTECTED SPECIES ENCOUNTERED IN THE SALDANHA BAY ROPE GROWN MUSSEL FISHERY



June 2024



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2024

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GLOSSARY

Aquaculture: the cultivation of aquatic organisms, such as fish, shellfish, and plants, in controlled environments for purposes such as food production, restoration of endangered species, and commercial or recreational fishing.

Benthic: anything associated with or occurring on the bottom of a body of water, such as the ocean, a lake, or a river.

Bycatch: any species landed in addition to a target species for which a permit has been issued as defined under Regulation 1 of the MLRA Regulations.

Department: Department of Forestry, Fisheries and the Environment

Fisheries improvement programme: A step-wise, multi-stakeholder effort to improve fishing practices and management so that species, habitats, and people can all thrive.

Fishing: (a) searching for, catching, taking or harvesting fish or an attempt to do/carry out any such activity; (b) engaging in any other activity which can reasonably be expected to result in the locating, catching, taking or harvesting of fish; (c) placing, searching for or recovering any fish aggregating device or associated gear, including radio beacons; (d) any operation in support or in preparation of any activity described in this definition; or (e) the use of an aircraft in relation to any activity described in this definition.

Mariculture: specialized branch of aquaculture that involves the cultivation of marine organisms in the open ocean, enclosed sections of the ocean, or in tanks and ponds filled with seawater.

Pelagic: Within the water column.

Performance Indicator: A sub-division on the principles of the MSC Fisheries Standard. In an assessment, a fishery is scored against 28 performance indicators.

Commercial fishing permit: providing a person with the right to fish at a specific time and place.

Spat: term applied to the early juvenile stage of bivalve development and is perhaps the most commonly used term applied to juveniles in hatcheries.

Species: A category of biological classification ranking immediately below the genus, grouping related organisms. A species is identified by a two-part name; the name of the genus followed by a Latin or Latinised un-capitalised noun.

Target species: the species or species assemblages for which fishing rights have been granted and that are the primary or intended catch in a particular fishing sector as stipulated in the sector specific policies.

Upwelling: An oceanographic phenomenon that involves wind-driven motion of dense, cooler, and usually nutrient-rich water from deep water towards the ocean surface, replacing the warmer, usually nutrient-depleted surface water

LIST OF ABBREVIATIONS

ACAP	Agreement on Conservation of Albatross and Petrels
ACDR	Announcement Comment Draft Report
ADZ	Aquaculture Development Zone
AI	Artificial Intelligence
Anchor	Anchor Environmental Consultants
BB	Big Bay
BSASA	Bivalve Association of South Africa
CAB	Conformity Assessment Body
CAG	Catch And Grow
CE	Critically Endangered
CITES	Convention on International Trade in Endangered Species
CMS	Convention on Migratory Species
CPUE	Catch Per Unit Effort
DAFF	Department of Agriculture, Forestry and Fisheries
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorization
ECO	Environmental Control Officer
EEZ	Exclusive Economic Zone
EMP	Environmental Management Plan (for individual farms)
EMPr	Environmental Management Programme
EN	Endangered
ETP	Endangered, Threatened and Protected
EWS	Early Warning System
FAO	Food and Agriculture Organisation
FIP	Fisheries Improvement Project
FMR	Farm Monitoring Report
IBA	Important Bird Area
IPOA	International Plan of Action
IUCN	International Union for Conservation of Nature
IWC	International Whaling Commission
MLRA	Marine Living Resources Act 18 of 1998 (as amended)
MLRF	Marine Living Resources Fund
MPA	Marine Protected Area
MSC	Marine Stewardship Council
NBA	National Biodiversity Assessment
NDP	National Development Plan
NEM:BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM:PAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEMA	National Environmental Management Act No. 107 of 1998 (as amended)
NGO	Non-Governmental Organisation
NPOA	National Plan of Action
NSRI	National Sea Rescue Institute
OBN	Outer Bay North
OBS	Outer Bay South

PPA	Project Pre-Assessment
SAMSA	South African Maritime Safety Authority
SAPS	South African Police Service
SASC	South African Shark Conservancy
SAWDN	South African Whale Disentanglement Network
SB	Small Bay
SBM	Saldanha Bay Municipality
SCRS	Standing Committee Research and Statistics
TAC	Total Allowable Catch
TNPA	Transnet National Ports Authority
VU	Vulnerable
WWF	World Wildlife Fund

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I INTRODUCTION

I.1 PROJECT BACKGROUND

Saldanha Bay, situated on the west coast of South Africa, approximately 100 km north of Cape Town, is the primary area for bivalve production in South Africa, with the majority of oyster and mussel aquaculture production in South Africa to date originating there. As a result of improved opportunities for local mussel import substitution, opening of export markets for oysters, and improved access to water and land space through Operation Phakisa¹, there is a renewed interest in expanding and fully utilizing the bay for further oyster and mussel production. An Aquaculture Development Zone (ADZ) is an area that has been earmarked specifically for aquaculture activities with the purpose of encouraging investor and consumer confidence, creating incentives for industry development, to provide marine aquaculture services, manage the risks associated with aquaculture, as well as to provide skills development and employment for coastal communities. Saldanha Bay ADZ is the primary area for bivalve production in South Africa

Most established aquaculture farmers in the Saldanha Bay ADZ hold rights to farm mussels and pacific oyster. Raft culture of mussels has taken place in Saldanha Bay since 1985 (Stenton-Dozey et al. 2001). Larvae of the mussels *M. galloprovincialis* and *C. meridionalis* attach themselves to ropes (referred to herein as a 'rope grown mussel fishery') hanging from rafts and are harvested when mature. In 2015, the mussel sub-sector contributed 49 % to the total mariculture production and was the highest contributor to the overall mariculture productivity for the country (Clark et al. 2021).

The Saldanha Bay rope grown mussel fishery improvement project is part of WWF's Fish for Good project, which aims to improve environmental sustainability and bring about socio-economic benefits for fishing communities. Fish For Good is a Project Pre-Assessment (PPA) funded by the Dutch Postcode Lottery, administered by the Marine Stewardship Council (MSC) and with WWF-SA as the implementing partner in the project. So far, in South Africa, the Fish for Good project has mapped fifteen fisheries, conducted nine pre-assessments and selected five fisheries to go for development of action plans and implementation through Fisheries Improvement Projects (FIPs). One of the fisheries chosen for the FIP stage is the rope grown mussel fishery within Saldanha Bay ADZ.

One of the key aims of the Saldanha Bay rope grown mussel FIP is to devise an Endangered, Threatened and Protected (ETP) species management strategy for the Saldanha Bay ADZ operations aimed at minimizing impacts of the aquaculture industry on these ETP species, promoting sustainable fishing practices. Enabling the subsequent regular monitoring to mitigate the potential impacts of mussel farms on the ecosystem in Saldanha Bay. It is hoped that through the FIP, improvements will be made to fishing practices and management to

¹ Operation Phakisa is an initiative of the South African government. This initiative was designed to fast track the implementation of solutions on critical development issues. This is a unique initiative to address issues highlighted in the National Development Plan (NDP) 2030 such as poverty, unemployment and inequality.

enable the Saldanha Bay rope grown fishery to reach a level consistent with an unconditional pass against the MSC Fisheries Standard.

Anchor Environmental Consultants (Pty) Ltd (Anchor) were appointed to undertake a comprehensive review of ETP interactions of the rope grown mussel fishery in South Africa. This includes a delivery roadmap for the implementation of effective mitigation measures to improve the environmental impacts of this fishery. The project builds on outcomes from a comprehensive literature review and stakeholder consultation, which underpin the development of potential mitigation measures aimed at improving to status-quo with regards to current ETP interactions of this aquaculture fishery. Results and recommendations are guided by national and international best practice drawing on examples of ETP mitigation plans employed in others commercial fishing sectors of South Africa, and from plans of rope grown mussel fisheries around the globe.

1.2 THE MARINE STEWARDSHIP COUNCIL

The MSC, is an organization that sets standards for sustainable fishing practices and certifies fisheries that meet these standards. MSC certification ensures that seafood products come from fisheries that are managed responsibly and sustainably, minimizing their impact on marine ecosystems and helping to protect endangered, threatened, and protected species (MSC 'Principles').

The Marine Stewardship Council (MSC) certification process evaluates fisheries against a set of criteria to determine their sustainability. The process involves:

- **Pre-Assessment:** Before undergoing the full assessment, fisheries may choose to undergo a pre-assessment to gauge their readiness for certification. This step helps fisheries identify areas where they may need improvement before proceeding with the formal assessment.
- **Full Assessment:** The full assessment is conducted by an independent assessment team accredited by the MSC. This team typically includes scientists and fishery management experts. The assessment evaluates the fishery against the sustainability of the fish stock, minimization of environmental impact, and Effective Management:
- **Certification Decision:** Based on the assessment findings and public consultation, an independent certifier makes a decision on whether the fishery meets the MSC's standards for sustainability. If the fishery meets the criteria, it is awarded MSC certification.
- **Annual Surveillance Audits:** Once certified, fisheries must undergo annual surveillance audits to ensure ongoing compliance with MSC standards. These audits verify that the fishery continues to operate sustainably and address any issues that may arise.

1.2.1 ENDANGERED, THREATENED AND PROTECTED (ETP) SPECIES

MSC certified fisheries must carefully manage and reduce any negative interactions with endangered, threatened and protected (ETP) species. They must also make sure nothing they do hinders the species' recovery. ETP species (MSC Component 2.3) are assigned as follows:

- Species that are recognised by national ETP legislation

- Species listed in binding international agreements (e.g. CITES, Convention on Migratory Species (CMS) etc.)
- Species classified as ‘out-of-scope’ (amphibians, reptiles, birds and mammals) that are listed in the IUCN Redlist as vulnerable (VU), endangered (EN) or critically endangered (CE).

1.2.2 ASSESSMENT SCORING

There are usually 25 Performance Indicators that sit under the three principles of the MSC Fisheries Standard.

However, the default MSC assessment tree is not valid for a rope grown mussel fishery, as they are catch and grow (CAG) fisheries. Therefore, CAG fisheries are evaluated under the ‘Enhanced Bivalve’ assessment. As a result, there is no requirement to score MSC Principle 1. This is on the basis that the fishery has no significant impact on the mussel stock and the wild seed capture does not constitute translocation. Principle 2 (Primary and Secondary species) also does not need to be scored. However, impacts on ETP species are taken into account.

The fishery under assessment will be scored for each Performance Indicator (where applicable), where 60 is the minimum acceptable performance, 80 is global best practice and 100 is state of the art performance.

To become certified, a fishery must score at least 60 for each of the 25 performance indicators. If a fishery scores between 60 and 79 for any performance indicator, it will be required to take appropriate action as a condition of certification. Action is then required needs to improve the performance of the fishery against the Performance Indicator, so that it scores 80 or above. The timeframe to make these improvements is typically five years or less.

The fishery must also score an average of 80 across all Performance Indicators under each of the three principles (ETP Principle = Principle 2).

Currently Performance Indicator 2.3.2, ‘ETP management’, the fishery currently scored SG60 in the MSC pre-assessment report based on the lack of interactions between ETP species and the fishery, and based on global known impacts of mussel farming on ETP species (Jones et al. 2018). However, to score SG80 or above, additional management measures and an ETP management strategy are required, especially in light of recent reported interactions between ETP species and mussel farms in Saldanha Bay. This is to be addressed as part of WWFs FIP.

1.3 WWF FISHERIES IMPROVEMENT PROJECT (FIP)

WWF South Africa’s Fish for Good projects aim to improve environmental sustainability of certain fisheries and bring about socio-economic benefits for fishing communities. Certain fisheries are mapped according to their target species, areas fished, gear(s) used and catch volumes. Stock status, environmental impacts and market potential are also taken into account. The Fish for Good advisory group evaluated the findings and selected nine South African fisheries to be pre-assessed against the MSC Fisheries Standard. Following this, the advisory group selected five of the nine fisheries to undertake action plan development and proceed into FIPs. FIPs are multi-stakeholder efforts to improve fishing practices and management so that species, habitats, and people can all thrive. They are also encouraged to achieve certification from the MSC. The project aims to contribute to the building of fisheries

sustainability infrastructure in South Africa to improve environmental sustainability and bring about socio-economic benefits for fishing communities. The geographic scope of the FIP is specifically the 'Saldanha Bay' and the rope grown mussel species are the black mussel *Choromytilus meridionalis* and the Mediterranean mussel *Mytilus galloprovincialis*.

The Saldanha Bay rope grown mussel fishery FIP (July 2020 - December 2024) builds on 2018 fisheries MSC pre-assessment conducted by the Conformity Assessment Body (CAB) Control Union and is currently in Stage 4 (Year 4) 'Improvements in Fishing Practices or Fishery Management' of the programme (Jones et al. 2018). This FIP is within an Enhanced Bivalve fishery and therefore is scored against a modified MSC scoring tree, which includes additions (or modifications) to the default assessment tree. As part of the pre-assessment, scoring against Performance Indicators (PI) 2.3.2 and 2.3.3, under MSC Principle 2, 'Management' and 'Information' of ETP species only scored enough to pass SG 60 and not SG 80 so actions to address this were required.

Therefore, the FIP seeks to achieve the following ETP objectives to meet SG80 for the PIs by 2024:

- Develop an **ETP management strategy** for active bivalve production sites in the Saldanha Bay ADZ by drafting Environmental Management Programmes (EMPr) for existing farms in historical sites in Small Bay. This is to be coupled with the development of detailed ETP mitigation procedures and reporting on environmental impacts annually which will also be included in the ETP management strategy.
- Produce baseline and monitoring information on potential risks and ETP species susceptibility and thereby ensuring that data is collected, analysed and shared at the site level. This will be accompanied by the setting up of training materials, sightings report forms, a site-level training plan and the training of all site managers/staff on ETP sightings and reporting procedures. Moreover, the Environmental Control Officer (ECO) reports will also be used to publish an annual summary analysis of quantitative information on ETP species interactions.

1.4 APPROACH

This project focussed on devising an ETP species management strategy for all active rope grown mussel operations within the Saldanha Bay ADZ, aimed at minimizing impacts of this aquaculture industry on ETP species. The project also aimed to enable subsequent regular monitoring to mitigate the potential impacts of mussel farms on ETP species in Saldanha Bay.

Site specific EMPrs were developed for all sites within the ADZ including the impact procedures for the protection of ETP species in March 2021. The recommendations from the ETP strategy are to be included in these site-specific EMPrs for existing farms to ensure that the mitigations are implemented on a farm level. This is to be coupled with the development of detailed ETP mitigation procedures and progress of the findings will be included in the Department of Forestry, Fisheries and the Environment (DFFE) Annual yearbook (overseen by DFFE).

This work is closely related to work commissioned by the DFFE regarding visual surveys of the presence or absence of ETP species which already being implemented. However, there are a number of issues regarding data capture and reporting efficiency of these data. This project therefore assists in refining and improving this data reporting and assists in the

development of a cohesive database to be used for analysis and reporting of ETP interactions in the industry. Data produced from this ETP strategy, and DFFE data reporting, will help define baseline on potential risks and ETP species susceptibility.

To achieve the aims of this project, and to deliver an ETP management strategy for this fishery, we followed the following plan.

1.4.1 TASK 1: ETP RISK ASSESSMENT

Monitoring of ETP species has been carried out in the Saldanha Bay ADZ since 2022 (by DFFE), recording species observed, number of individuals seen, location, and date recorded. Using this data, in combination with a desktop literature review, ETP species were assessed based on their temporal and spatial interactions with this fishery, and an attempt to quantify these interactions was made. A risk assessment was conducted to assess what the ETP species are that interact with this fishery, the potential impacts the fishery has on these ETP species. This assessment also considered the biology of the ETP species, stock status, distribution of the ETP species in the ADZ, and the fishing gear and practices used by the fishery. Interactions were compared with similar interactions elsewhere globally. The ETP species identified in the risk assessment informed the ETP management strategy.

1.4.2 TASK 2: DEVELOPMENT OF MITIGATION MEASURES

Building on the outcomes and outputs of both the literature review, data review, and from engagement with some stakeholders, key risks of the rope grown mussel fishery and its interactions with ETP species, potential impacts and key challenges (operational, environmental, financial) were highlighted. Based on these, we developed initial mitigation measures as part of the strategy to undergo further consultation. Adopting scientifically proven, practical and cost-effective mitigation measures, or combinations of mitigation measures was prioritised, however, adaption and the development of new measures in future may be required to overcome restraints.

Where possible international best practice was followed. Mitigation measures from other parts of South Africa and the world were assessed and successes were drawn upon to inform and support this current project and its strategy.

1.4.3 TASK 3: MONITORING AND EVALUATION

To assess success of proposed mitigation against the principles listed above, a monitoring and evaluation framework was developed. The framework is built into the ETP Management strategy in the form of a 'regular review' (See Section 5.4.1, 'Implementation Measures'). This review ensures periodic assessment of each measure's efficacy by assessing the 'evidence' requirements for each measure. The strategy/framework follows this process:

- Identification of key issue(s) within the fishery in regard to ETP interactions
- Development of measure(s) to address each issue, plus their rationale for inclusion.
- If required, baselines values will be established (i.e., the value before the mitigation measure is implemented) from which targets will be defined (i.e., the desired value after the mitigation measure is implemented). This will involve further stakeholder engagement outside of this project.

- For each measure, a responsible party(ies) is identified for implementing each measure.
- For each measure, evidence requirements are listed to inform evaluation of each measure.
- This framework strives to be clear, concise, and user-friendly, and is presented in a workable template/format.
- As part of the framework, a review process is outlined for implementation

1.4.4 TASK 4: DATA CAPTURE

DFFE have commissioned (in 2022) visual surveys of the presence or absence of ETP species around the mussel farms inside the Saldanha Bay ADZ. The farm operators themselves report on their sightings and the data is combined into a database of information from which the data is summarized into text and findings which are reported in the Quarterly Environmental reporting for the ADZ as well as is to be recorded in the DFFE Annual Yearbook. This data recording currently takes the form of an excel data input sheet. However, this database is time consuming to use for both data input and data analysis.

Working with DFFE, as part of the ETP management strategy, we refined the current ETP species data capture methods (for DFFE, farm operators) and developed an ETP species database more efficient for data capturing and reporting purposes.

1.4.5 TASK 5: REPORTING

A summary report (this report) was compiled which provided background to the project, methods, findings and a draft ETP species management strategy for rope grown mussel fisheries in Saldanha Bay.

Specifically, this project delivers the following outputs:

- ETPs identified from the risk assessment, along with impacts from the rope grown fishery.
- An ETP species management strategy rope grown mussel fisheries in Saldanha Bay.
- A cohesive database to be used for analysis and reporting of ETP interactions in the industry.

2 MUSSEL AQUACULTURE IN SOUTH AFRICA

2.1 BACKGROUND

The DFFE is driving sustainable development of the marine aquaculture sector in South Africa with the aim to create jobs for marginalised coastal communities and to contribute towards food security and national income. The development of the marine aquaculture sector is considered an important opportunity that can contribute to job creation and the local economy and was therefore identified as a key priority of Operation Phakisa. Marine aquaculture which refers to the breeding, rearing, and harvesting of aquatic plants and animals in either the ocean, or tanks and ponds on land.

In South Africa, aquaculture is still in a developmental stage and has the potential to grow and contribute towards job creation, food security and improving the inclusivity of the sector. Aquaculture has the potential of reducing the fishing pressure on wild fisheries stocks. South Africa's aquaculture industry currently consists of a limited range of marine and freshwater species of plants and animals. In recent years the Aquaculture industry had expanded substantially, with production levels increasing by almost 5 418 tons in 2015 to 7 085 in 2019. The abalone, mussel and trout production are the most valuable marine aquaculture production methods, contributing just over 80% of the total value of the industry. Currently the industry provides approximately 7 000 tons per annum, which is less than 1% of South Africa's total marine wild catch (AgriSETA 2024).

2.2 OVERVIEW OF MUSSEL FARMING IN SALDANHA BAY

Mussel farming in South Africa is primarily concentrated along the country's southern and western coastlines, particularly in regions with sheltered bays and estuaries. Saldanha Bay is a highly productive marine environment and constitutes the only natural sheltered embayment in South Africa (Stenton-Dozey et al. 2001). These favourable conditions have facilitated the establishment of an aquaculture industry in the Bay since the 1980s. Mussel farming has occurred in Saldanha Bay since 1981 and was subsequently followed by oyster farming in the early 2000s. The most commonly cultivated mussel species is the black mussel (*Choromytilus meridionalis*), and the Mediterranean mussel (*Mytilus galloprovincialis*). The black mussel is native to the region and is well-suited for aquaculture due to its rapid growth and adaptability to various environmental conditions. The Mediterranean mussel is invasive but has been successful in its invasion and establishment on large portions of the South African West Coast, including Saldanha Bay since the mid-1990s (Hanekom & Nel 2002).

With the support of finances and capacity allocated to the Operation Phakisa, in January 2018 the then Department of Agriculture, Forestry and Fisheries (DAFF) was granted Environmental Authorisation (EA) to establish a sea-based ADZ in Saldanha Bay and expanded the total area available for aquaculture in the Bay to a maximum area of 884 ha (from 464 ha allocated area) and the ADZ is located within four precincts (Small Bay, Big Bay, Outer Bay North and Outer Bay South) (Figure 2-1).

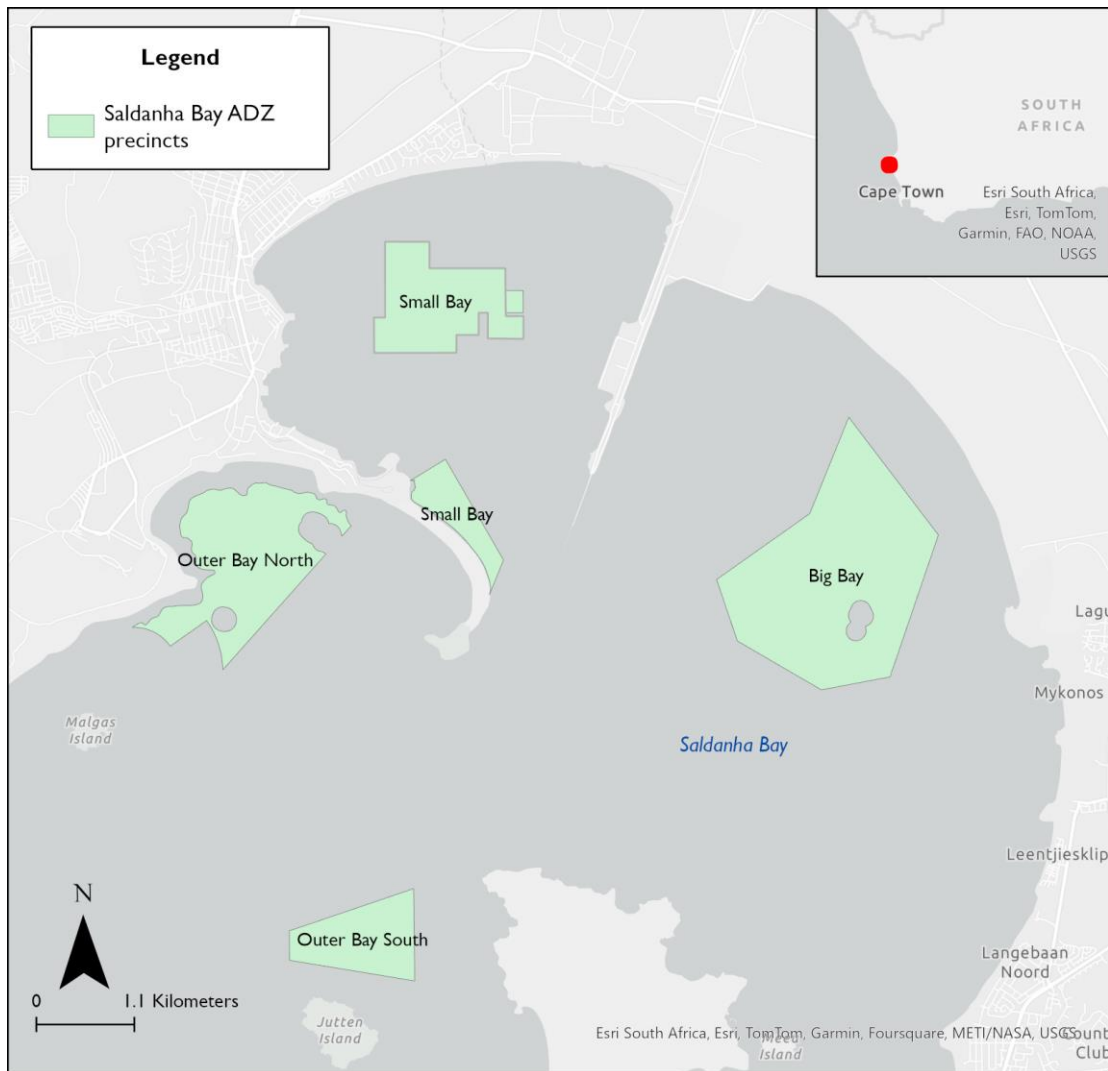


Figure 2-1. Saldanha Bay ADZ precincts, 2024.

An ADZ is an area that has been earmarked specifically for aquaculture activity. The purpose of an ADZ is to encourage investor and consumer confidence, create incentives for industry development, provide aquaculture services, manage risk associated with aquaculture, as well as to provide skills development and employment for coastal communities. Bivalve, fin fish and kelp are all earmarked for aquaculture production inside the Saldanha Bay ADZ.

Various guidelines and protocols have been developed for managing the ADZ, these include an ADZ Entanglement Guideline (May 2020), Compliance Strategy (June 2020) and Incident and Emergency Response Protocol (March 2021) and an Operational and Management guideline (Nov 2020). The farms themselves and their activities are then managed through further guidelines. The ADZ is audited monthly by the ADZ Environmental Control Officer (ECO) to manage the compliance of the operators at a farm level as well as an ADZ level.

2.2.1 ROPE GROWN MUSSEL FARMING

The cultivation of mussels in South Africa typically involves the use of suspended rope culture systems. Mussel spat (young mussels) are collected from the wild or obtained from hatcheries and then attached to ropes or other structures suspended in the water (This can be done

using various methods, including immersion in a spat suspension, manual seeding, or natural settlement onto the ropes.). The ropes with attached mussel spat are suspended in the water column using buoys or other flotation devices. 'Raft' culture of mussels has taken place in Saldanha Bay since 1985 (Stenton-Dozey et al. 2001). Ropes submerged from floating rafts, where the mussels (*M. galloprovincialis* and *C. meridionalis*) feed and grow until they reach market size and are harvested. Ropes are positioned at a depth where the mussels can access sufficient nutrients and plankton for growth. The ropes may be arranged in long lines or grids to maximize the farming area and facilitate management (Figure 2-2).

In addition to raft culture, there is a dropper longline method of farming bivalves where a surface rope with floats is moored at each end. Production ropes are ten suspended from the surface rope. A dropper is a vertical line or length of rope that is attached to a horizontal surface line or raft as described above (Figure 2-3). A continuous cultivation rope is another method also used, where a continuous rope is looped and attached to the surface rope negating the need for 'dropper' (Figure 2-3).

To alert traversing vessels, radar-reflecting surface buoys are attached to the end of each longline. Additional floats may be added along the longline compensate for their weight and maintain the longline geometry and surface visibility.

Cultivation ropes are typically made of synthetic materials such as polypropylene or polyethylene. These ropes are cut to the desired length and treated to remove any contaminants or biofouling organisms. They are then attached to floating structures or anchored to the seabed, depending on the farm's design and location.

Mussels grown on the ropes typically reach market size within 12 to 18 months, depending on environmental conditions and growth rates. Harvesting involves removing the ropes from the water and carefully detaching the mussels. Harvested mussels are typically rinsed and sorted (graded) on board the boat, before being landed and packaged for sale or further processing.

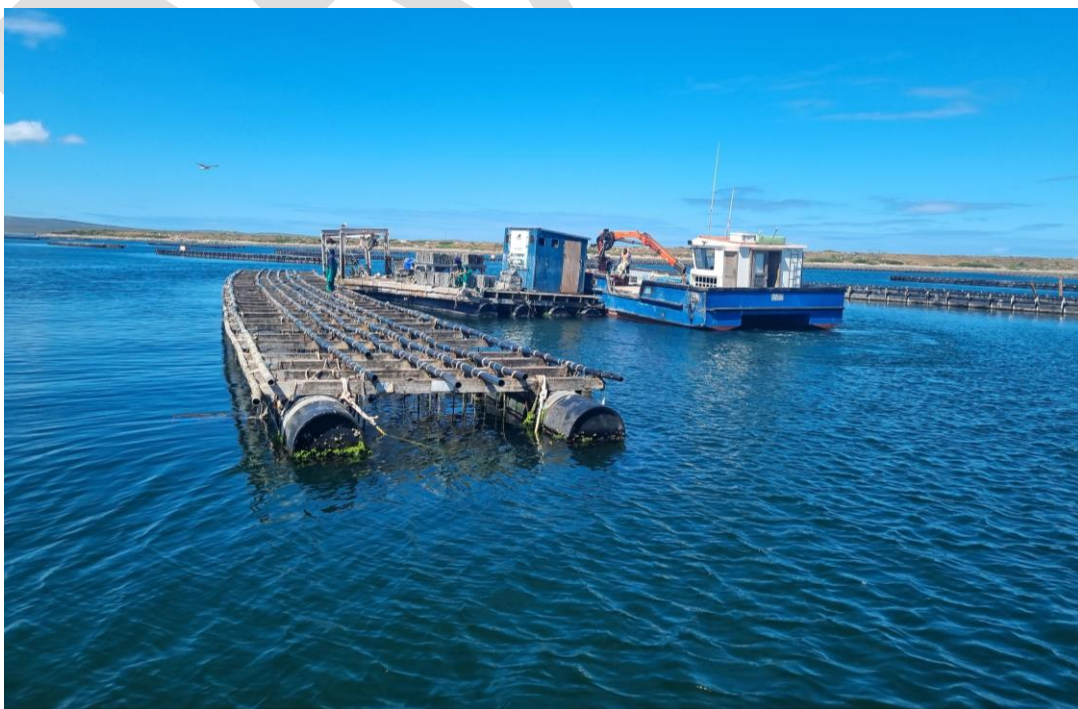


Figure 2-2. Floating raft for rope grown mussel cultivation inside Saldanha Bay (Photo: Anchor, 2024)

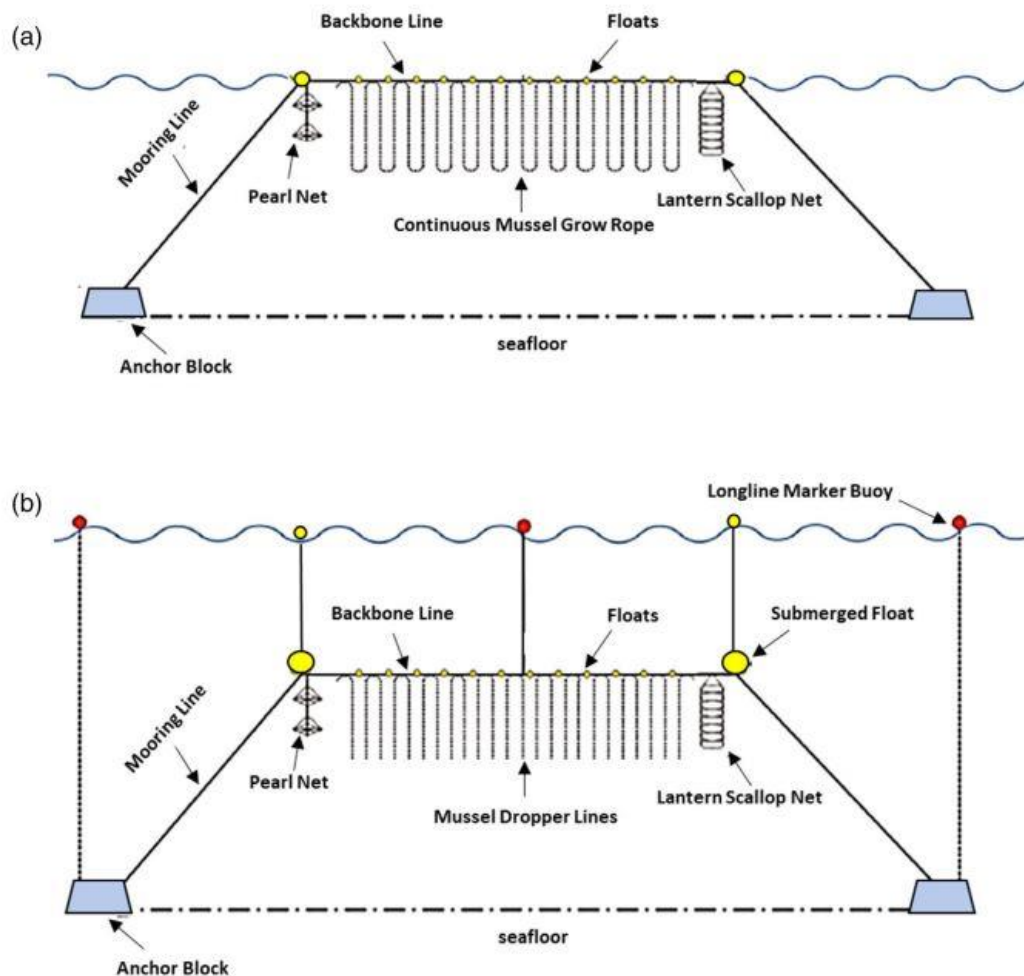


Figure 2-3. Cross section of typical mussel farm (excluding raft) a) continuous line systems, and b) dropper line system, and associated surface markers and moorings. Note lantern scallop nets and pearl nets do not apply to Saldanha Bay mussel farms. Taken from Bath et al. 2023.

2.2.2 MUSSEL FARM INFRASTRUCTURE

This management plan considers ETP interactions associated with mussel farm infrastructure, which of course incorporates the floats/rafts and ropes but for clarity, we also document all farm infrastructure here. ETP species interactions with all this infrastructure is to be considered.

Sea-based:

- Rafts, lines, barrels, moorings, floatation devices required for the mussel farm.
- Navigations lights demarcating aquaculture area(s).
- Mooring facilities for boats.

Land-based:

- Basic mussel farm land-based support infrastructure (if used) includes landing quays and loading/unloading equipment.

- Product holding facilities.

2.2.3 SALDANHA BAY AQUACULTURE FARM OPERATORS

As of September 2023, 30 entities have been granted marine aquaculture rights in the ADZ in terms of section 18 of the Marine Living Resources Act of 1998 (MLRA). 24 of these right holders are currently operational, with two of these entities having more than one right allocated to them (Table 2-1). Of these 24 rights holders, 19 are involved in mussel production (although active numbers are not known). All the producers belong to the Bivalve Shellfish Farmers Association of South Africa (BSASA). In Saldanha, most of the aquaculture farming occurs in the sheltered Small Bay, however, operations (particularly for mussels) have expanded in Big Bay, and mussels are also being grown on lines in Outer Bay North (Figure 2-1, Table 2-1)

Table 2-1. Current (2024) bivalve farm operators in the Saldanha Bay ADZ. SB = Small Bay, BB = Big Bay, OBN = Outer Bay North (Taken from 2023 ECO monthly reports).

Farm name	Species farmed	Precinct
African Olive Trading 232 (Pty) Ltd	Mussels	SB
Aqua Foods SA (Pty) Ltd	Mussels/ oysters	SB & BB
Blue Lagoon Products (Pty) Ltd	Oysters	BB
Blue Ocean Mussels (Pty) Ltd	Mussels/ Oysters	SB
Blue Sapphire Pearls CC	Mussels / Oysters	SB
Imbaza Mussels (Pty) Ltd	Oysters	SB
K2019005713 (Pty) Ltd	Mussels	BB
K2019005725 (Pty) Ltd	Mussels	BB
Lagoon Aqua	Oysters	BB
Madima General Agriculture Trading (Pty) Ltd	Mussels	BB
Molapong Aquaculture (Pty) Ltd	Salmon	BB
Mika Growers (Pty) Ltd	Mussels	BB
MMMAgri Consult (Pty) Ltd	Mussels	BB
Pluto Mussels and Trading (Pty) Ltd	Mussels	BB
Requa Enterprises (Pty) Ltd	Mussels	OBN
Saldanha Bay Oyster Company (Pty) Ltd	Oysters	BB
Salmar Trading (Pty) Ltd	Oysters	SB
Simunye Mussels (Pty) Ltd	Mussels	BB
Southern Atlantic Sea Farms (Pty) Ltd	Mussels	BB / OBN
Southern Cross Salmon Farming (Pty) Ltd	Mussels	OBN
Ulwazi Kukutya (Pty) Ltd	Mussels	BB
West Coast Aquaculture (Pty) Ltd	Mussels/ oysters	SB & BB
West Coast Oyster Growers CC	Oysters/ Mussels	SB & BB
Xesibe Aquaculture Project (Pty) Ltd	Mussels	OBN

3 KNOWN ETP INTERACTIONS

The Saldanha Bay rope grown fishery involves the use of floating rafts or floats, with submerged mussel growing longlines/ropes attached and suspended in the water column. Based on information from other similar fisheries using this method, ETP captures are expected to be relatively low (Bath et al. 2023). However, there is limited provision in for the recording of interactions with ETP species within this industry and so assessing and quantifying ETP interactions within the fishery can be difficult.

To assess the ETP species that area likely to interact with mussel farm infrastructure and operations, within the Saldanha Bay ADZ, we draw on several quantitative and qualitative data sources. Using these sources, we assess the likelihood and the actual risk to each species to better inform the management strategy. This is supported by a desktop review which examines practices in other countries for managing interactions between ETP species and mussel farm operations.

3.1 DATA SOURCES

3.1.1 ENVIRONMENTAL MANAGEMENT PROGRAMME

An EMPr is a detailed plan outlining how environmental impacts of a project will be managed and mitigated during both construction and operational phases. It is often required as part of the Environmental Impact Assessment (EIA) process. The main objectives of an EMPr are:

- **Mitigation of Environmental Impacts:** To ensure that potential negative impacts on the environment are minimized.
- **Legal Compliance:** To ensure that the project complies with South Africa's environmental laws and regulations.
- **Sustainability:** To promote sustainable development practices.

The Saldanha Bay ADZ EMPr is a 92 page document that provides a detailed overview of all the requirements that need to be met by both the Environmental Authorisation holder (in this case the DFFE: Branch Fisheries Management) and farm management over the entire life-cycle of the farms. The EMPr recognises for the mussel farms recognises that the environmental impacts of the mussel industry, if managed correctly, are relatively minor. The EMPr has, however, assessed and identified 'key' environmental issues of mussel farm operators and their operations. The environmental risk assessment was harmonised to the risk assessment undertaken for the ADZ, with no additional risks identified. Both identify that marine mammals' entanglement with mooring lines and mussel ropes, and mortality as a result, is an environmental risk (Table 3-1).

The results of the risk assessment for this risk rates there being a low probability that marine mammals could become entangled in the moorings or mussel ropes on account that this has never been reported since mussel farming started (however, this is now outdated – see Section 4.1.4). Supporting this, the Guidelines and Standards to mitigate marine mammal entanglement for the Saldanha Bay Aquaculture Development Zone risk assessment shows that the placement of the farms are in an area that does not regularly receive whale visits.

Further to this, the mooring lines are heavy and taught lines and only single droppers are used for seed collection, so risk of entanglement is low. The overall risk was scored by the EMPr was low on account of the low severity and probability of this risk (Table 3-1).

Table 3-1. Risk assessment scoring within the EMPr for the marine mammal entanglement with mussel farms.

	Risk	Severity	Probability	Risk Value	Commentary
1	Marine mammals' entanglement with mooring lines and dropper ropes and mortality as a result	3	1	3	There has been no record of any such incidents in Saldanha. The mooring lines are taut which reduces the possibility of entanglement. Integrity of the infrastructure is managed using procedure 3.1.

The EMPr also acknowledges there is a risk of entanglement with mooring lines and dropper ropes by larger marine animals including sharks, turtles, dolphins, seals and birds as well as potential changes to these animals' behaviours due to the presence of the operation, including attraction of predators, or due to depletion or alteration of food sources, especially phytoplankton, for other organisms. In addition to whales, many of these marine megafauna, including all seabirds, would be classified as ETP species and this management strategy would apply.

As part of the EMPr there are a number of environmental management measures which are obligations for all farm operators. These measures have timelines and reporting structures in place for activities which might impact on the ETP species (for full list see Table 5.2 in the EMPr. If the identified entanglement happens there are measures already in place for incident reporting. Farm operators are required, to achieve EMPr compliance, to maintain an incident register in which all incidents (causing negative harm to the environment) caused by farming activities or farm infrastructure, such as species entanglement or negative interaction. This is a requirement throughout all farm operations and there is an incident register to assist in report which is then reported to DFFE: Branch Fisheries. This incident register records the species (it has accompanying ID guides for large marine animals) seen within 200m of the farm, as well as ETP interactions information where location (e.g., Farm2, License area 334) and event description (Animal hit by boat) is also captured.

Therefore, the data previously generated through incident reporting is used here as part of the ETP risk assessment and have been included in the table in Section 3.2.

The EMPr also stipulates that all cetaceans, seabirds and predators recorded in the vicinity of fish farms, including behavioural observations, are to be reported on daily. These data should be periodically compiled and analysed by experts. All marine vertebrate mortalities resulting either directly or indirectly from aquaculture operations are also to be recorded, however this is covered by the incident reporting procedures. Alongside this management strategy Anchor are assisting in improving the animal reporting system to be used by both farm operators and DFFE. A digital database is being developed to assist in reporting of species seen within the vicinity of the farms, which autogenerates summary statistics for reporting purposes. The use of the database is being rolled out and its use is encouraged as part of the ETP management strategy.

3.1.2 GLOBAL LITERATURE REVIEWS

Rope-grown mussel farms are established worldwide, with significant operations in regions such as Europe, North America, South America, Asia, and Oceania. These farms involve suspending ropes in coastal waters where mussels can naturally attach and grow.

- **Europe:** Countries like Spain, France, the Netherlands, and the UK have well-established rope-grown mussel farming industries. Spain, particularly the region of Galicia, is one of the largest producers.
- **North America:** The United States (especially in states like Maine and Washington) and Canada (notably in Prince Edward Island) have significant mussel farming operations.
- **South America:** Chile is a major player in mussel farming, with its long coastline providing ideal conditions for mussel cultivation.
- **Asia:** China and South Korea have growing mussel farming industries, contributing significantly to the global supply.
- **Oceania:** New Zealand is renowned for its high-quality green-lipped mussels, which are primarily grown using rope methods.

The primary risks posed to marine megafauna, notably mammals, by aquaculture facilities and operations are habitat exclusion, entanglement, and behavioural alterations (attraction, avoidance, or food preference) (Bath et al. 2023).

Most of the global marine aquaculture occurs in countries with no reporting. Thus, entanglement data are relatively sparse and rarely quantitative.

ENTANGLEMENT

Physical interactions between marine mammals and aquaculture farms increase the risk of entanglement in structures such as mooring lines. The potential for marine mammals to become entangled and drown is a predominant concern (Bath et al. 2023).

Known negative interactions related with mussel longline farms include the risk of marine animals such as turtles, seabirds, and mammals becoming entangled in the ropes and associated gear, leading to injury or death. A summary of some global examples is provided below, which all cite entanglement with either surface or subsurface ropes, or interactions with spat collection, to be the negative interaction (Table 3-2).

Table 3-2. Documented global examples of ETP interactions with mussel farms, adapted (Bath et al. 2023).

Species	Country	Year	Farm type	Interaction type	Source
Humpback whale	Namibia	2017	Mussel rafts	Entangled in surface and vertical lines	Elwen – Namibian Dolphin Project data
Humpback whale	USA	2005	Mussel spat collector	Entangled in subsurface ropes	(Groom & Coughran 2012, Young 2015)
Humpback whale	Iceland	2010	Mussel spat collector	Entangles in dropper rope	(Young 2015)

Species	Country	Year	Farm type	Interaction type	Source
North pacific right whale	Korea	2015	Mussel ropes	Entangled in subsurface ropes	(Young 2015)
Bryde's whale	South Africa	-	Mussel ropes	Entangles in ropes (Port Elizabeth)	SA Disentanglement Network
Bryde's whale	New Zealand	1996	Mussel spat collector	Entangled in subsurface ropes. Died.	(Lloyd 2003, Young 2015)
Leatherback turtle	Canada	2015	Mussel spat collector	Entangled in subsurface ropes.	-
Leatherback turtle	Canada	2015	Mussel spat collector	Entangled in subsurface ropes. Died	-
Leatherback turtle	Namibia	2007	Mussel rafts	Entangled in surface and vertical lines. Died	Namibian Dolphin Project data

Entangled animals have lower reproductive success, which results in population level effects, especially for small population (Stewart et al. 2021). In addition, injuries from entanglement can reduce movement, impede feeding ability, cause internal injuries from struggling, constrict blood flow, sever appendages, and cause infections (Andersen et al. 2008). Animals burdened by dragging gear maybe disconnected from social interactions and communications. While spatial overlap of farms and habitats increases the risk of interacting, marine mammals can be attracted to the structures that house potential prey or seek out aggregating wild fish near the farm sites, which increases the opportunity for entanglement (Würsig & Gailey 2002, Kemper et al. 2010, Froehlich et al. 2017). Young, naïve animals are typically more at risk of entanglement, compared with adults because of their inquisitive nature and inexperience. Larger, less agile species with flippers and fins that extend out from the body and species with feeding strategies that involve engulfing huge volumes of water (e.g., baleen whales including right, minke, and humpback whales) are considered more susceptible to entanglement in ropes and lines (Bath et al. 2023). It is unclear whether entanglement occurs because mammals are attracted to or unaware of shellfish-farming gear.

Entanglement poses the biggest threat to seabirds in mussel farms. However, entanglement data resulting in injury or mortality from these farms are rarely available. Seabirds are at risk of becoming entangled in lines or nets, colliding with structures while flying, and ingesting debris, all of which may result in injuries or death (Ford 2013). Ingestion and entanglement of marine debris from associated farm activities could block seabird digestive tracts and cause serious injury or death (Taylor 2000).

Sea turtle entanglement reports at aquaculture farms are rare; however, from commercial fishery gear observations, they are vulnerable to entanglement in both horizontal and vertical lines (Bath et al. 2023).

HABITAT ALTERATION AND DISTURBANCE

In addition, farms and their infrastructure can also lead to alterations in local ecosystems (habitat modification/exclusion), potentially displacing native species or changing the balance of the local marine environment. Some marine mammals may not be spatially excluded from farm areas, limited mobility in the vicinity may result in individuals being forced into suboptimal

foraging habitat. Species may alter their behaviour and be deterred from traversing or feeding if aquaculture structures present a navigation obstacle. In some cases, multiple farms are constructed within an area, and therefore cumulative impacts over time to individuals and populations are possible.

Furthermore, mussel farms can impact the behaviour of other species through disturbance or displacement of other species through the introduction of many individuals of one cultivated species. For example mussels may compete with other filter-feeding species, possibly impacting the local food web (Bath et al. 2023). Mussel farm operations also produce underwater noise from vessels, feeding systems, generators, aerators, net cleaning equipment, and acoustic deterrents (Olesiuk et al. 2010). There is evidence that underwater noise disturbances can alter the behaviour of marine mammals, cause temporary or permanent injuries, or cause death, trigger a stress response, cause habitat displacement or avoidance, and disturb underwater acoustic cues for communication, navigation, and foraging (Costello et al. 2016). Overhead and surface level lighting aids navigational and personnel safety, and farm security. However, these lights may attract or confuse marine mammals and birds to mussel farms leading to negative impacts occurring.

3.1.3 OTHER DOCUMENTATION

ENVIRONMENTAL CONTROL OFFICER REPORTS

There are number of documents which document ETP interactions with farm operations/operations inside the Saldanha Bay ADZ. As a farm operator the main point of contact for reports and environmental issues in the Environmental Control Officer (ECO). The ECO is appointed and fulfils environmental oversight such as checking farm reports, sampling and monitoring results and liaising with environmental service providers and farmers. The ECO undertakes routine monitoring and produce monthly compliance reports for each farm, outlining species farmed, methods, maintenance activities, issues identified and summarises ETP observations/ interactions. This reporting is used to inform the ETP risk assessment presented here. As part of the evaluation, ECO's consult Farm Monitoring reports which document the ongoing farm procedures, including maintenance and incident logging. The ECO then verifies these reports during monthly site inspections.

In October 2021, the ECO report includes a summary of a whale incident from the 9th of October 2021. There was an entanglement of a humpback whale which in Outer Bay North. The whale had become entangled in a mussel longline which was out of place and despite the efforts of the National Sea Rescue Institute (NSRI) resulted in the death of the whale. The events that transpired during the incident highlighted the need for the protocol to be revised to include additional parties which had previously not been include in the protocol as well as a need to revise the action steps so that the deficiencies in the protocol could be addressed.

ECO reports also provide summary information on other environmental incidents or hazards identified during site visits. This includes identification of poor waste management produces, loose or lost infrastructure and a list of actions to be taken to ensure compliance with EMPr regulation for each farm. These summary reports were used to inform the potential and actual risks posed to ETP species as a results of farm negligence and non-compliance (See Section 3.2). Many of these risks relate to entanglement and are further discussed below.

EMERGENCY RESPONSE PROTOCOL FOR THE SALDANHA BAY AQUACULTURE DEVELOPMENT ZONE

The approved EMPr for the Saldanha Bay ADZ requires the development of a guideline for the prevention and management of marine mammals in the aquaculture infrastructure (which includes ropes, cages and rafts). This guideline is to be implemented by all holders of aquaculture marine rights in the Saldanha Bay ADZ. Compliance will be monitored (as necessary) by the appointed ECO officer and will be reported on in the monthly ECO reports.

“Entanglements” may occur in a broader range of anthropogenic materials including “ghost” gear, shark nets, free floating plastic or ropes, mooring lines and increasingly aquaculture farms – the latter being applicable to this guideline. Three main mammalian taxa that are vulnerable to entanglement in aquaculture infrastructure in the Saldanha ADZ are whales, dolphins and seals (especially during the high upwelling period when large numbers of whales’ forage on the West Coast.). There are few records of interactions between whales and aquaculture because of low numbers of individuals inshore and small spatial overlap of the mostly pelagic baleen whales with aquaculture farms which are mostly placed within protected coastal waters. The risk of whales becoming entangled in ADZ aquaculture infrastructure is therefore low when the farms is managed appropriately.

Oceanic dolphins (*Delphinidae*) are the only members of the toothed cetaceans with a coastal and shelf habitat in Southern Africa. Dolphins include the Heaviside’s dolphin (the smallest) (*Cephalorhynchus heavisidii*) to the largest species the killer whale (*Orcinus orca*). Although there may be seasonal movements along the coast and changes in local numbers, these dolphins are all resident. All dolphins are predatory, eating fish or squid (only the killer whale is known to predate on other mammals in our waters). Dolphins rarely become entangled in well maintained single ropes.

The only resident seal in South Africa is the Cape fur seal *Arctocephalus pusillus*. They are similar in overall body size to most of the oceanic dolphins. They are more susceptible to bycatch in nets, rather than ropes. However, they are prone to becoming entangled around the neck in much smaller ropes and twines including fishing line.

The precautions detailed in the guideline for the prevention and management of marine mammals in the aquaculture infrastructure attempt to minimise the risk of such entanglements. It is clear that the ropes (mooring and production) of the mussel farms pose the biggest risk to marine mammals.

DISENTANGLEMENT PROTOCOLS

Disentanglement protocols have been developed to provide a guideline to prevent the entanglement of ETP species, improve the monitoring and reporting of entanglement events with ETP species in the ADZ. They also provide a step-by-step guide of procedures that need to be followed in the event of an entanglement incident.

Following the October 2021 whale entanglement new cutting tools were developed, collaboration with industry on mussel disentanglement was improved and the operational procedure to include a modification for cutting thick 40mm mussel longlines for aquaculture production was revised.

As part of this protocol WWF, DFFE, South African Police Service (SAPS) diving unit and South African Whale Disentanglement Network (SADWN) worked with mussel farmers to conduct a longline disentanglement training course in the Saldanha Bay aquaculture area which

included theoretical and practical training. In addition, a Whale Early Warning System (EWS) project has been launched to further support mitigation of whale entanglements. The EWS will use acoustic hydrophones, infrared cameras and Artificial Intelligence (AI) technology to detect whales in the vicinity of the Bay earlier and provide real-time alerts that will help trigger the ADZ Emergency Response Protocol. This work is a pilot and will also be useful in detecting other marine mammals, not just whales. Data from this pilot can further inform the ETP species risk assessment.

MSC DOCUMENTS

The MSC preassessment documents note the species groups where impacts are considered possible from mussel culture on ropes are marine mammals and birds. Possible effects considered are entanglement in mussel farm structures and spat catching structures, ingestion of litter from farms, changed prey abundance due to phytoplankton depletion, exclusion by farm structures, reduced or increasing prey availability, disturbance (noise or boat activity), creation of resting places on floats within farms. As dolphins and seals and majority of diving birds are piscivores interaction for food with mussel farms is less likely than would be expected with finfish farms (Jones et al. 2018).

3.2 SUMMARY OF ETP SPECIES INTERACTIONS

The EMPr Incident reporting, ECO reports, stakeholder input, MSC assessments and relevant global reviews have been combined to develop an accurate ETP species risk profile. A summary of the ETP species that occur and could be/have been incidentally caught in the Saldanha Bay rope grown mussel fishery, and their ETP 'status' (what makes them an ETP i.e. legal protection, IUCN status²), is presented in Table 3-3. Species which *could* be negatively impacted by mussel farms are included in this list as, although not documented yet, the recent whale interactions suggest that if ETP species occur in Saldanha Bay and interact (supported by farm monitoring data) with mussel farms then they should be considered as part of the ETP management strategy.

In total there are **41 ETP species** at risk in the Saldanha Bay rope grown mussel fishery (Table 3-3).

² The International Union for the Conservation of Nature (IUCN) manages the global red List of threatened species - <https://www.iucnredlist.org/>. Global conservation status is provided here

Table 3-3. Combined Endangered, Threatened and Protected species that may, or are known to (* = recorded in Farm Reports or ECO reports), to interact with the rope grown mussel fisheries in Saldanha Bay based on EMPr incident reporting, ECO reports, Stakeholder input and MSC documentation. IUCN LC = Least Concern, NT = Near Threatened, EN = Endangered, VU = Vulnerable, CE = Critically Endangered, DD = Data Deficient (species considered ETP as per ICUN definitions are highlighted in red).

Group	Common name	Species name	IUCN status	Occurrence likelihood (based on EMPr)	ETP status
Mammals	Heaviside's dolphin*	<i>Cephalorhynchus heavisidii</i>	NT	High	MRLA
	Dusky dolphin*	<i>Lagenorhynchus obscurus</i>	LC	High	MRLA, NEMBA (TOPS)
	Common bottlenose dolphin*	<i>Tursiops truncatus</i>	LC	Vagrant	MRLA, NEMBA (TOPS)
	Killer whale	<i>Orcinus orca</i>	DD	Vagrant	MRLA, NEMBA (TOPS)
	Humpback dolphin	<i>Sousa plumbea</i>	EN	Vagrant	MRLA, NEMBA (TOPS), CITES APPENDIX I,
	Indo-Pacific Bottlenose dolphin	<i>Tursiops aduncus</i>	NT	Rare	MRLA, NEMBA (TOPS)
	Humpback whale*	<i>Megaptera novaeangliae</i>	LC	High	MRLA, NEMBA (TOPS), CITES APPENDIX I, CMS APPENDIX
	Bryde's whale*	<i>Balaenoptera brydei</i>	LC	Rare	MRLA, NEMBA (TOPS)
Turtles	Southern right whale	<i>Eubalaena australis</i>	LC	High	MRLA, NEMBA (TOPS)CITES APPENDIX I, CMS APPENDIX I
	Loggerhead turtle	<i>Caretta caretta</i>	VU	Vagrant	MRLA, NEMBA (TOPS), CMS APPENDIX I
	Green turtle	<i>Chelonia mydas</i>	EN	Vagrant	MRLA, NEMBA (TOPS), CITES APPENDIX I, CMS APPENDIX I
	Hawksbill turtle	<i>Eretmochelys imbricata</i>	CR	Vagrant	MRLA, NEMBA (TOPS), CMS APPENDIX I
	Olive ridley turtle	<i>Lepidochelys olivacea</i>	VU	Vagrant	MRLA, NEMBA (TOPS), CMS APPENDIX I
	Leatherback Turtle	<i>Dermochelys coriacea</i>	VU	Vagrant	MRLA, NEMBA (TOPS), CITES APPENDIX I, CMS APPENDIX I

Group	Common name	Species name	IUCN status	Occurrence likelihood (based on EMPr)	ETP status
Birds	Cormorant, Cape*	<i>Phalacrocorax capensis</i>	EN	High	South Africa Sea Birds and Seals Protection Act 1973, MRLA
	Cormorant, Bank*	<i>Phalacrocorax neglectus</i>	EN	High	South Africa Sea Birds and Seals Protection Act 1973, MRLA
	Cormorant, Crowned*	<i>Microcarbo coronatus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973, MRLA
	Cormorant, White breasted*	<i>Phalacrocorax lucidus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973, MRLA
	Flamingo, Greater*	<i>Phoenicopterus roseus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Flamingo, Lesser	<i>Phoeniconaias minor</i>	NT	High	South Africa Sea Birds and Seals Protection Act 1973
	Heron, Grey	<i>Ardea cinerea</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Pelican, Great White	<i>Pelecanus onocrotalus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973, CMS APPENDIX I
	Egyptian Goose*	<i>Alopochen aegyptiaca</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Cape Gannet*	<i>Morus capensis</i>	EN	High	South Africa Sea Birds and Seals Protection Act 1973
	African Penguin*	<i>Spheniscus demersus</i>	EN	High	South Africa Sea Birds and Seals Protection Act 1973
	Skua, Subantarctic*	<i>Stercorarius antarcticus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Giant Petrel (N&S combined)*	<i>Macronectes sp</i>	LC	Rare (offshore)	South Africa Sea Birds and Seals Protection Act 1973, ACAP Annex I
	White-chinned Petrel*	<i>Procellaria aequinoctialis</i>	VU	Rare (offshore)	South Africa Sea Birds and Seals Protection Act 1973, NEMBA (TOPS), ACAP Annex I
Gull, Kelp*	<i>Larus dominicanus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973	

Group	Common name	Species name	IUCN status	Occurrence likelihood (based on EMPr)	ETP status
	Gull, Hartlaub's*	<i>Chroicocephalus hartlaubii</i>	VU	High	South Africa Sea Birds and Seals Protection Act 1973
	Gull, Grey headed*	<i>Chroicocephalus cirrocephalus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Oyster Catcher*	<i>Haematopus moquini</i>	NT	High	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Swift	<i>Thalasseus bergii</i> *	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Sandwich	<i>Thalasseus sandvicensis</i> *	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Common*	<i>Sterna hirundo</i> *	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Caspian	<i>Hydroprogne caspia</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Roseate	<i>Sterna dougallii</i>	LC	Rare	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Damara	<i>Sternula balaenarum</i>	LC	Rare	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Antarctic	<i>Sterna vittata</i>	LC	Rare	South Africa Sea Birds and Seals Protection Act 1973
	Little Egret	<i>Egretta garzetta</i>	LC	-	South Africa Sea Birds and Seals Protection Act 1973
Seals	Cape Fur Seal*	<i>Arctocephalus pusillus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973, MRLA, NEMBA (TOPS)

The main risk to most of these species is entanglement with mussel farm ropes and lines, either mooring lines or mussel growing ropes. Farm operations can also impact these species through underwater disturbance (i.e. noise) boat strikes, or through alien species introduction/displacement of native species or alteration to their populations and pollution (mussel farm waste, lost gear/equipment).

In South Africa the Marine Living Resources Act (MLRA of 1998) and its successor the National Environmental Management Act: Biodiversity (NEMBA of 2004) for Threatened or Protected Species (TOPS) provide the main legal protection for most marine mammals and seabirds. In South Africa, seals and seabirds are also protected under the Sea Birds and Seals Protection

(Act No. 46 of 1973, DAFF (1973)). Specifically, the Cape fur seal, which is one of the most common seal species found in Saldanha Bay, is protected under this legislation. The seals are protected against hunting, harassment, and disturbance in their natural habitats. Additionally, South Africa is a signatory to international agreements and conventions aimed at protecting marine life, including seals. These include agreements such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Convention on the Conservation of Migratory Species of Wild Animals (CMS), International Whaling Commission (IWC) and the Convention for the Protection of the Marine Environment and Coastal Area of the South-East Atlantic (the Benguela Current Convention), which further support the protection of seals and other marine species in South Africa's waters. Permit holders in Saldanha Bay are subject to The Sea Birds and Seals Protection Act within their permit conditions.

Since around 2000, the numbers of whales feeding on the SA West coast during summer has massively increased, as have sightings in Saldanha Bay. They mainly occur between Cape Point and Lamberts Bay but there is feeding all through the Benguela. Humpback whale groups that feed for hours at a time for 4-6 months of the year. Simply, more whales increase the likelihood of more entanglements and encounters with mussel farms. Mussel farm infrastructure components that pose potential risk for entanglement and injury include anchor lines, horizontal backbone longlines, vertically suspended and looped grow lines, suspended nets, and surface buoy marker lines. Submerged longlines are set at depths of (5–20 m) to avoid interaction with navigation. The slack spat-collecting lines, grow-out lines, and surface marker buoy lines have specifically been implicated in documented entanglement cases around the world (Bath et al. 2023) and in Saldanha Bay Outer Bay North a mussel line entangled a humpback whale in 2021 (Table 3-3)..

The potential for marine mammals to become entangled and drown is a predominant concern. Larger, less agile species with flippers and fins that extend out from the body and species with feeding strategies that involve engulfing huge volumes of water (e.g. humpback whales) are considered more susceptible to entanglement in ropes and lines.

Saldanha Bay and Langebaan Lagoon provide extensive and varied habitat for seabirds and seals and dolphins. As dolphins and seals and the majority of diving birds are piscivores, interaction for food with mussel farms is less likely than would be expected with finfish farms. However, fish are attracted to the rafts and the mussel lines as they are a food source and therefore interactions with seals, birds and dolphins are possible. Several seabird species and Cape fur seals were recorded in the Farm Reports in 2023 (Table 3-3). Again, for seabirds in particular, the biggest impact is from entanglement in mussel farm structures and spat catching structures, but other impacts such as ingestion of litter from farms, changed prey abundance due to phytoplankton depletion, disturbance (noise or boat activity), creation of resting places on floats within farms can occur.

Like fishing gear, lost or discarded aquaculture gear from a farm can contribute to marine debris. Potential sources of marine debris mussel farms include rope, buoys, boat pollution (e.g., oil spills) farm related and general human litter. Marine wildlife is impacted by marine debris through ingestion, entanglement.

Mussel culture on ropes have limited interaction with fish species. Although fish may use the leases with rope grown mussels as deeding and refuge habitats, fish are not caught during the harvest of the mussels. There is therefore no effect on protected or endangered fish species, and these are not considered further in this assessment.

4 ETP MANAGEMENT STRATEGY

ETP management strategy for the Saldanha Bay rope grown mussel fishery

Prepared by: Anchor Environmental Consultants

Version control: V1.0

Date: June 2024

4.1 INTRODUCTION

The development of the marine aquaculture sector is considered an important opportunity that can contribute to job creation and the local economy and was therefore identified as a key priority of Operation Phakisa. Mussel farming has occurred in Saldanha Bay since the 1980s. The most commonly cultivated mussel species is the black mussel (*Choromytilus meridionalis*), and the Mediterranean mussel (*Mytilus galloprovincialis*). In 2018 a sea-based Aquaculture Development Zone (ADZ) was established in Saldanha Bay and expanded the total area available for aquaculture in the Bay to a maximum area of 884 ha, located within four precincts (Small Bay, Big Bay, Outer Bay North and Outer Bay South). The cultivation of mussels in South Africa typically involves the use of suspended rope culture systems. Mussel spat (young mussels) are collected from the wild or obtained from hatcheries and then attached to ropes or other structures suspended in the water. The ropes with attached mussel spat are suspended in the water column using buoys or other flotation devices.

Endangered Threatened and Protected (ETP) species interactions with these mussel farms are expected to be relatively low, however, there is limited provision in for the recording of interactions with ETP species within this industry. This ETP management strategy has been created because as responsible members of the fishing community it should be recognised that ETP species are highly susceptible to overfishing, and efforts need to be made to reduce impacts of marine aquaculture activities on these species, by applying best practices. The intention of this document is to a) improve the monitoring, reporting and management of ETP interactions with the Saldanha Bay rope grown mussel fishery, minimising impacts where possible, and b) provide the client body with an effective ETP management strategy to support this fishery in its MSC full assessment (specifically under MSC Principle 2 Performance Indicators (2.1.2, 2.1.3, 2.2.3, 2.3.2, and 2.3.3) ensuring ETP species reporting and management are appropriate to score SG80 for these indicators when assessed. This management strategy builds on previous work (notably the Environmental Management Programme (EMPr) for mussel farms) and outlines the best practices and management measures for ETP interactions within this fishery. Specifically, this strategy is to be implemented *in addition* to legally binding; 1) Permit Conditions 2) EMPr Requirements, and 3) National and International legislation for the protection of at-risk species and the environment

The MSC process includes on-site audits, documentation review, and stakeholder engagement to ensure that fisheries are implementing effective **reporting, prevention, mitigation, remediation** and **implementation** measures. Measures in this management strategy align with these broad themes. The measures include information on the operational and evidence requirements to satisfy each measure when reviewed.

The strategy outlines 12 measures to improve ETP reporting and management. The strategy applies to all rope grown farm related infrastructure and operations, sea- and shore-based.

This strategy will be approved and voluntarily implemented by all farms/sites undergoing assessment. All Farm Managers should read this document and always have a hard copy accessible on site. This strategy shall be rolled out across all farms undergoing assessment on the **INSERT DATE**.

It is acknowledged that these measures will take time to implement, and therefore each member will commit to implementing these measures one year from implementation date.

For any issues or amendments please contact **INSERT CONTACT**.

4.2 DEFINITIONS AND ABBREVIATIONS

‘Endangered, Threatened Protected (ETP) species’:

- Any species that is recognised by South African national ETP legislation.
- Species listed in the relevant binding international agreements given below:
 - o Appendix I of the Convention on International Trade in Endangered Species (CITES), unless it can be shown that the particular stock of the CITES listed species impacted by the fishery under assessment is not endangered.
 - o Binding agreements concluded under the Convention on Migratory Species (CMS), including:
 - ♣ Annex I of the Agreement on Conservation of Albatross and Petrels (ACAP).
 - ♣ Table I Column A of the African-Eurasian Migratory Waterbird Agreement (AEWA).
 - ♣ Any other binding agreements that list relevant ETP species concluded under this convention.
- Species classified as ‘out of scope’ (amphibians, reptiles, birds and mammals) that are listed in the IUCN Red list as vulnerable (VU), endangered (EN) or critically endangered (CE).

‘Strategy’: represents a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome, and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery and should contain mechanisms for the modification fishing practices in the light of the identification of unacceptable impacts.

‘Interaction’: Species individual has become fixed, entangled, or trapped in such a way that it cannot move freely or free itself from any part of the fishing gear.

‘Event’: Any time fishing gear is deployed in the water.

ABBREVIATIONS

ACDR	Announcement Comment Draft Report
ADZ	Aquaculture Development Zone
DFFE	Department of Forestry, Fisheries and the Environment
ECO	Environmental Control Officer
IUCN	International Union for Conservation of Nature

MPA Marine Protected Area
MSC Marine Stewardship Council

4.3 ETP SPECIES RISK PROFILE

An ETP risk profile has been compiled using both ETP data generated from the Farm Reporting, EMPr Incident reporting, ECO reports, stakeholder input, MSC assessments and relevant global reviews. A species is considered an ETP as per the definitions above. A summary of the likely ETP species to be incidentally caught in the Saldanha Bay rope grown mussel industry, and their ETP status, is presented in Table 3-3. In total there are 42 protected or endangered species that could interact with rope grown mussel farms in Saldanha Bay, with 19 of these species specifically reported to interact with the farm in Saldanha Bay (from 2023 data), including whale, dolphin seabird and seal species.

Table 4-1. Endangered, Threatened and Protected species known to interact with the Saldanha Bay ADZ rope grown mussel industry.

Group	Common name	Species name	IUCN status	Occurrence likelihood (based on EMPr)	ETP status
Mammals	Heaviside's dolphin*	<i>Cephalorhynchus heavisidii</i>	NT	High	MRLA
	Dusky dolphin*	<i>Lagenorhynchus obscurus</i>	LC	High	MRLA, NEMBA (TOPS)
	Common bottlenose dolphin*	<i>Tursiops truncatus</i>	LC	Vagrant	MRLA, NEMBA (TOPS)
	Killer whale	<i>Orcinus orca</i>	DD	Vagrant	MRLA, NEMBA (TOPS)
	Humpback dolphin	<i>Sousa plumbea</i>	EN	Vagrant	MRLA, NEMBA (TOPS), CITES APPENDIX I
	Indo-Pacific Bottlenose dolphin	<i>Tursiops aduncus</i>	NT	Rare	MRLA, NEMBA (TOPS)
	Humpback whale*	<i>Megaptera novaeangliae</i>	LC	High	MRLA, NEMBA (TOPS), CITES APPENDIX I, CMS APPENDIX
	Bryde's whale*	<i>Balaenoptera brydei</i>	LC	Rare	MRLA, NEMBA (TOPS)
	Southern right whale	<i>Eubalaena australis</i>	LC	High	MRLA, NEMBA (TOPS)CITES APPENDIX I, CMS APPENDIX I
Turtles	Loggerhead turtle	<i>Caretta caretta</i>	VU	Vagrant	MRLA, NEMBA (TOPS), CMS APPENDIX I
	Green turtle	<i>Chelonia mydas</i>	EN	Vagrant	MRLA, NEMBA (TOPS), CITES

Group	Common name	Species name	IUCN status	Occurrence likelihood (based on EMPr)	ETP status
					APPENDIX I, CMS APPENDIX I
	Hawksbill turtle	<i>Eretmochelys imbricata</i>	CR	Vagrant	MRLA, NEMBA (TOPS), CMS APPENDIX I
	Olive ridley turtle	<i>Lepidochelys olivacea</i>	VU	Vagrant	MRLA, NEMBA (TOPS), CMS APPENDIX I
	Leatherback Turtle	<i>Dermochelys coriacea</i>	VU	Vagrant	MRLA, NEMBA (TOPS), CITES APPENDIX I, CMS APPENDIX I
Birds	Cormorant, Cape*	<i>Phalacrocorax capensis</i>	EN	High	South Africa Sea Birds and Seals Protection Act 1973, MRLA
	Cormorant, Bank*	<i>Phalacrocorax neglectus</i>	EN	High	South Africa Sea Birds and Seals Protection Act 1973, MRLA
	Cormorant, Crowned*	<i>Microcarbo coronatus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973, MRLA
	Cormorant, White breasted*	<i>Phalacrocorax lucidus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973, MRLA
	Flamingo, Greater*	<i>Phoenicopterus roseus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Flamingo, Lesser	<i>Phoeniconaias minor</i>	NT	High	South Africa Sea Birds and Seals Protection Act 1973
	Heron, Grey	<i>Ardea cinerea</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Pelican, Great White	<i>Pelecanus onocrotalus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973, CMS APPENDIX I
	Egyptian Goose*	<i>Alopochen aegyptiaca</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Cape Gannet*	<i>Morus capensis</i>	EN	High	South Africa Sea Birds and Seals Protection Act 1973
	African Penguin*	<i>Spheniscus demersus</i>	EN	High	South Africa Sea Birds and Seals Protection Act 1973
Skua, Subantarctic*	<i>Stercorarius antarcticus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973	

Group	Common name	Species name	IUCN status	Occurrence likelihood (based on EMPr)	ETP status
	Giant Petrel (N&S combined)*	<i>Macronectes sp</i>	LC	Rare (offshore)	South Africa Sea Birds and Seals Protection Act 1973, ACAP Annex I
	White-chinned Petrel*	<i>Procellaria aequinoctialis</i>	VU	Rare (offshore)	South Africa Sea Birds and Seals Protection Act 1973, NEMBA (TOPS), ACAP Annex I
	Gull, Kelp*	<i>Larus dominicanus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Gull, Hartlaub's*	<i>Chroicocephalus hartlaubii</i>	VU	High	South Africa Sea Birds and Seals Protection Act 1973
	Gull, Grey headed*	<i>Chroicocephalus cirrocephalus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Oyster Catcher*	<i>Haematopus moquini</i>	NT	High	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Swift	<i>Thalasseus bergii</i> *	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Sandwich	<i>Thalasseus sandvicensis</i> *	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Common*	<i>Sterna hirundo</i> *	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Caspian	<i>Hydroprogne caspia</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Roseate	<i>Sterna dougallii</i>	LC	Rare	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Damara	<i>Sternula balaenarum</i>	LC	Rare	South Africa Sea Birds and Seals Protection Act 1973
	Tern, Antarctic	<i>Sterna vittata</i>	LC	Rare	South Africa Sea Birds and Seals Protection Act 1973
	Little Egret	<i>Egretta garzetta</i>	LC	-	South Africa Sea Birds and Seals Protection Act 1973
Seals	Cape Fur Seal*	<i>Arctocephalus pusillus</i>	LC	High	South Africa Sea Birds and Seals Protection Act 1973, MRLA, NEMBA (TOPS)

4.4 MANAGEMENT MEASURES

4.4.1 REPORTING MEASURES

MEASURE 1

Monitor and record all ETP species in the vicinity or general region of the farm site.

Requirements: Farm operators will record all observations of any ETP species identified under or around or interacting with the farm structures and/or operations, on a daily basis. This will include the presence and the number observed for each species. Farm staff shall keep a log of all ETP species not usually observed and recorded in the vicinity of rafts, surface buoys, lines, lights etc., including behavioural observations. Records will be reported to the ECO on a monthly basis, in the Farm Monitoring Report.

The newly developed ETP database (excel) will be used for all ETP data capture henceforth.

Evidence

- ✓ Necessary farm personal have access to the new ETP database (excel) where all observations are to be recorded
- ✓ Daily farm monitoring undertaken; Farm Monitoring reports available.
- ✓ Monthly ECO reports include outputs from farm monitoring records
- ✓ Marine animal observations and monitoring data to be periodically compiled and sent to relevant experts (DFFE) for analysis.
- ✓ ECO to verify monitoring is occurring during site inspections.

Who is responsible: Farm Site Managers and operators

MEASURE 2

All incidents between the farm and ETP species will be recorded and reported as per the Incident Management Specification of the EMPr

Requirements: Using the new ETP excel database, all ETP data will be recorded (as per Measure 1) and any 'incidents' observed are to trigger the Incident Reporting as per the Incident Management Specification of the EMPr. A reportable incident is defined as either :

- Performance criteria specified in the EMPr or monitoring plan have been inadvertently contravened
- Or, any environmental facet (air, water, soil) has been polluted or degraded through a spill or similar event or
- Or, any part of the project infrastructure is lost or has become a danger or potential danger to marine traffic or animals

The Incident Register will be completed for all ETP interactions which captures data on the species interacted with, the interaction type and outcome, relating to all ETP interactions caused by farming activities or farm infrastructure that led to impacts on ETP species.

All incidents are reported to the DFFE Branch Fisheries and Site Operations Manager and the ECO. Upon receiving a report of an incident, the Site Operations Manager shall take any action required to contain or isolate the adverse effects. Once the incident area has been stabilised, the Site Operations Manager shall complete the incident investigation. This shall include a full investigation into the causes of the incident and how a recurrence can be avoided. Once the form has been completed it shall be submitted to the farm manager for review within one week of the incident who shall table any reports following significant incidents to branch Fisheries and the ADZ ECO. The Branch Fisheries and the ADZ ECO shall review the incident reporting forms of all significant incidents and provide technical input where appropriate. Annual reports on environmental impacts and incidents are to be produced annually by the relevant experts.

Evidence

- ✓ All ETP data captured in the new database
- ✓ Incident Reports generated for all interactions
- ✓ Farm Monitoring reports and data.
- ✓ ECO to verify the Incident Management Specification of the EMP is followed.

Who is responsible: Farm Site Managers

MEASURE 3

All site managers and farm operators to undergo appropriate ETP species identification training.

Requirements: All personal involved in farm operations and/or activities are to undergo appropriate site-level identification training as part of the ADZ Environmental Awareness and Training Plan. Training to be provided by accredited providers. This training will include details on the farms legal and management obligations around the ADZ, with specific focus on how to recognise ETP species/sightings and training on the correct reporting procedures for ETP interactions.

Evidence

- ✓ Training reports produced for ECO monthly monitoring reporting
- ✓ Training log of all individuals identified; certification issued.
- ✓ Training undertaken annually at site-level.

Who is responsible: All farm operators

MEASURE 4

Produce/distribute identification training information

Requirements: Identification cards / posters of ETP species identification and reporting training material to be displayed at site level.

Evidence

- ✓ Material suitably displayed at site level

Who is responsible: Farm Site Managers and operators

4.4.2 PREVENTION MEASURES

MEASURE 5

Follow all measures in the Guidelines and Standards to mitigate marine mammal entanglement for the Saldanha Bay ADZ risk assessment.

Requirements:

- Farms should be placed as close together (10-20m between lines in Small Bay and approximately 30m in Outer Bay North and Big Bay) as possible without compromising the productivity of the installations. Support and service vessels should drive with caution and avoid mammals.
- Anchor lines used should not have any loose ends to minimise entanglement risk.
- Any ground lines used must be made completely of sinking line.
- Non-mooring ropes such as for marker buoys should be minimised and not have loose ends.
- Monitoring requires to record number of whale and dolphin species within 1km of the farms and reporting in ADZ ECO reports (Measure 1).

Evidence:

- ✓ ADZ ECO to verify Guidelines and Standard are followed during site inspections.
- ✓ Daily farm maintenance report log (see Measure 7).
- ✓ Farm Monitoring reports available.

Who is responsible: Farm Site Managers and operators, ECO

MEASURE 6

Correct positioning of farm leases

Requirements: In addition to positioning farms correctly in relation to other existing farms (Measure 5), leases should place farms far enough away (appropriate buffer applied) from important bird areas (IBAs) marine protected areas (MPAs), important haul sites and rookeries etc. These conservation designations protect aggregations and important habitats for sensitive species in Saldanha Bay, many of which are ETP species. To reduce the likelihood of interactions, leases should be sited correctly in relation to these designations

Evidence:

- ✓ Saldanha Bay ADZ mussel farm leases are placed > 1km from all conservation designations (MPAs, IBAs,)

Who is responsible: DFFE, ECO, ADZ Management Committee

MEASURE 7

Maintain ongoing inspection and maintenance of all farm related infrastructure.

Inspection requirements:

- Ongoing daily visual inspection and maintenance of ropes, moorings etc. reported in the monthly visual precinct level monitoring reports submitted to the ADZ ECO.
- Ongoing inspection and maintenance of surface ropes (10-20m between lines in Small Bay and 30m in Outer Bay North and Big Bay), moorings etc. to ensure loose lines.
- Ongoing weekly inspection and maintenance of ropes, moorings etc at the farm level and audited by the ADZ ECO on monthly site inspections.
- Any lost droppers or ropes that could pose a hazard shall be traced and retrieved before they pose a hazard to marine life.

Maintenance requirements:

The following infrastructure shall be inspected by the farm production supervisor or site operations manager or a third-party specialist appointed by farm manager weekly and before and after bad weather intervals:

- Mooring system (raft attachment points, bridles, mooring lines and chains)
- Work boat
- Office and storage site

Maintenance and replacement of worn components identified during the inspections contemplated above shall be undertaken as soon as detected. The work boat shall be inspected to check for oil or fuel leaks and undue generation of smoke or noise and repaired immediately as required. Serious infrastructure failure shall be investigated per the Incident Management Procedure and action taken in order to avoid repeat incidences. All maintenance will be captured in the Farm Reports and the ADZ ECO monthly reports.

Evidence:

- ✓ Farm monitoring reports submitted to ECO, detailing daily inspections and maintenance reports.
- ✓ Weekly infrastructure inspection checklists complete.
- ✓ ECO monthly monitoring reports demonstrate farm compliance RE maintenance.
- ✓ Farm infrastructure does not contravene infrastructure requirements outlined in the Guidelines and Standards to mitigate marine mammal entanglement for the Saldanha Bay Aquaculture Development Zone risk assessment.

Who is responsible: Farm Site Managers and operators

MEASURE 8

Pilot Whale Early Warning System (EWS) technology, where possible

Requirements: a Whale Early Warning System (EWS) project has been launched to further support mitigation of whale entanglements. The EWS will use acoustic hydrophones, infrared cameras and Artificial Intelligence (AI) technology to detect whales in the vicinity of the Bay

earlier and provide real-time alerts that will help trigger the ADZ Emergency Response Protocol. This work is a pilot and will also be useful in detecting other marine mammals, not just whales. Data from this pilot can further inform the ETP species risk assessment. The pilot should be continued with the aim of full roll-out across all farms. Farm operators and SAPS continue to be trained in the use of the EWS.

Evidence

- ✓ Whale Early Warning System deployed and operation

Who is responsible: FIP, Farm Site Managers

4.4.3 MITIGATION MEASURES

MEASURE 9

The latest version of the Emergency Response Protocol of entanglements, for the Saldanha Bay ADZ, to be followed.

Requirement The Emergency Response Protocol document details the Standard Operating Procedure (SOP) to follow when incidents or emergencies occur within the Saldanha Bay ADZ, and this extends to entanglement prevention of marine organisms. The ADZ operations as such have been designed to limit the potential for marine animals (including birds, turtles, seals, whales and dolphins) to be entangled. However, in the event of such entanglements occurring, the following key actions (either immediate or within 7 calendar days) must be taken:

- Correct reporting of incident (SAWDN and NSPCA if marine mammals are involved, SANCCOB and NSPCA if marine birds are involved).
- Farm vessel/ operator to ensure they are on standby to assist with the disentanglement as instructed by the NSRI/ SAWDN if required such as lifting the lines to allow for disentanglement.
- The Farm Manager:
 - must notify all relevant parties.
 - should remove parallel lines and floats in close proximity to the animal where appropriate so that it cannot be captured further within the gear.
 - remove floating buoys and ropes if appropriate where close to the animal to prevent overwraps.
 - remain on site to guide the rescue teams to the animal through submerged infrastructure.
 - prevent unauthorised vessels from approaching.
 - assist SAWDN/ NSRI/ SANParks and/or TNPA with the release of the animal under their instruction.
 - In the event that any farm infrastructure is damaged, the Farm Manager shall initiate critical repairs to prevent any further entanglements within 24hrs of the event.

After the event, an Incident Report (Measure 2) is to be completed and submitted to ADZ ECO, from which the ECO will register the Incident Report in the Incident Register, review

the Incident Report and request additional information or actions before sign-off if required. Complete transcripts and summaries of the event will then be sent to DFFE Branch Regulatory, Compliance and Sector Monitoring and SAWDN.

Evidence:

- ✓ ADZ ECO to verify Emergency Response Protocols are followed if an event occurs during site inspections.
- ✓ Incident Reports correctly completed and submitted after each event

Who is responsible: Farm Site Managers, ECO

MEASURE 10

Monitor the farm infrastructure/operations for ETP species entanglements on a daily basis.

Requirements: All farm infrastructure should be monitored for ETP species entanglements on a daily basis and any animals caught should be freed, or assistance summoned assistance from local marine conservation authorities as required as per the Incident Reporting (Measure 2). This monitoring will likely form part of the daily ETP monitoring (Measure 1). Contact should be made with the DFFE as stipulated in the Entanglement Guidelines issued for the ADZ if large marine mammals become entangled.

Evidence:

- ✓ Farm monitoring reports submitted to ECO; daily inspection log detailed.
- ✓ ECO monthly monitoring reports demonstrate farm compliance.

Who is responsible: Farm Site Managers

4.4.4 REMEDIATION MEASURES

MEASURE 11

Prohibit, as far as possible, all farm related waste entering the marine environment.

Requirements: The potential for litter entering the marine environment should be minimised as this could lead to entanglement of ingestion by ETP species. Remote impacts on the ecosystem from farm waste (plastics, ropes etc) are a possible are of concern and pollution should be minimised, controlled, and responsibly recycled or disposed of through a sound Waste Management Plan, part of the EMPr. This measure will likely be supported by the maintenance requirements outlined in Measure 7.

Evidence:

- ✓ ECO monthly monitoring reports demonstrate farm compliance
- ✓ Waste Management Plan, EMPr

Who is responsible: Farm Site Managers

4.4.1 IMPLEMENTATION MEASURES

MEASURE 12

The Saldanha Bay rope grown mussel ETP management strategy is reviewed once during every MSC cycle (5-year period) to assess the effectiveness measures.

Requirements: The aim of this management strategy is to reduce ETP species interactions and improve reporting. The measures outlined in the strategy should be effective in achieving this. With respect to MSC Performance Indicators 2.2.2 and 2.3.2, there is a requirement for a regular review of the potential effectiveness and practicality of measures to minimise mortality of ETP species by the fishery. Therefore, the management plan should have mechanisms in place to modify practices if any current measure is not considered effective or, in the light of new scientific/stakeholder/auditor information, needs to be amended.

An external audit of the management strategy by a suitably qualified independent expert will be undertaken. The review will assess all the evidence submitted for each measure to assess the effectiveness of management measures. Where evidence is not available, this will form part of the review and the reasons behind evidence not being submitted/available will be investigated and recommendation to ensure evidence is available going forward will be put forward. The available data, if sufficient, will be used to assess ETP interactions within the Saldanha Bay rope grown mussel fishery. Where applicable, recommendations will be made to improve this management strategy in terms of its efficacy, applicability and implementation success. It is suggested that in the first round of implementation, a review of this management strategy should be undertaken annually to identify and address shortcomings. Thereafter an external audit should be conducted once per 5-year MSC cycle.

Monitoring and evaluation process:

1. As an initial step, all evidence requirements and the proposed evaluation process should be supplied to the MSC's Conformity Assessment Bodies for ratification.
2. Once approved, assign independent expert for ETP management strategy audit.
3. Evidence requirements for each measure in the strategy will be compiled as part of the audit.
4. Evidence provided to be assessed against evidence requirements to identify areas of pass and fail.
5. For instances where evidence is not available, or the evidence submitted is not sufficient or appropriate (i.e. auditing fail), a summary of the failings will be provided as part of the audit. Following these two approaches can be followed:
 - i. Gap closure Action Plan developed with steps to gather additional evidence during the next review cycle.

ii. Amendments developed, tabled and implemented should measures require amending. This may include changes to the overall measure, its requirements or evidence.

6. An audit report will then be presented to the client body for review and implementation.

Evidence:

- ✓ In the first round of implementation, annual ETP management strategy review report
- ✓ External audit report per 5-year MSC cycle.
- ✓ Review/ audit reports submitted to the client group

Who is responsible: Client body, appointed independent auditor

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