APP-001200

OCEANGROWN NAMIBIA

MARICULTURE ACTIVITIES OF OCEANGROWN NAMIBIA AT LÜDERITZ

ENVIRONMENTAL MANAGEMENT PLAN

Prepared by:

Prepared for:

Oceangrown Namibia CC

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Project:	**MARICULTURE ACTIVITIES OF OCEANGROWN NAMIBIA AT LÜDERITZ: ENVIRONMENTAL MANAGEMENT PLAN**	
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1 INTRODUCTION

Oceangrown Namibia CC requested Geo Pollution Technologies (Pty) Ltd to undertake an environmental assessment for their oyster and abalone mariculture activities at Lüderitz. Culturing of the Pacific oyster (*Crassostrea gigas*) and ranching of South African abalone (*Haliotis midae*) have already been practiced at Lüderitz for many years. In short, oyster mariculture involves the offshore installation of long lines to which grow-out baskets, filled with juvenile oysters, are attached. Once the oysters reach marketable size they are collected for processing. Abalone ranching involves releasing of abalone spat into the sea area for settlement and collection of market size abalone by diving. The Proponent propose to culture oysters within the existing mariculture farm area in Lüderitz Harbour, while ranching of abalone will be in selected offshore locations between Lüderitz and Possession Island. The EMP is based on the environmental impact assessment conducted for the project (Faul & Coetzer, 2021).

2 OBJECTIVES OF THE EMP

The EMP provides management options to ensure impacts of the development are minimised. An EMP is a tool used to take pro-active action by addressing potential problems before they occur. This should limit the corrective measures needed, although additional mitigation measures might be included if necessary. The EMP acts as a stand-alone document, which can be used during the various phases (planning, construction, operational and decommissioning) of any proposed activity or development.

All contractors and sub-contractors taking part in both the construction and operations associated with the project should be made aware of the contents of the EMP, so as to plan the relevant activities accordingly, in an environmentally sound manner.

The objectives of the EMP are:

- to prescribe the best practicable control methods to lessen the environmental impacts associated with the planning, construction, operation and decommissioning activities;
- to monitor and audit the performance of the operational personnel in applying such controls; and
- to ensure that appropriate environmental training is provided to responsible personnel and contractors.

3 IMPLEMENTATION OF THE EMP

Section 4 outline the management of the environmental elements that may be affected by the different activities. Impacts addressed and mitigation measures proposed are seen as minimum requirements which have to be elaborated on. Delegation of mitigation measures and reporting activities should be determined by the proponent and included in the EMP. The EMP is a living document that must be prepared in detail, and regularly updated, by the proponent as the project progress and evolve.

The EIA, EMP and Environmental Clearance Certificate (ECC) must be communicated to the site managers. A copy of the ECC and EMP should be kept on site. All monitoring results must be reported on as indicated. Reporting is important for any future renewals of the ECC and must be submitted to the Ministry of Environment, Forestry and Tourism. Renewal of ECC will require six monthly reports based on the monitoring prescribed in this EMP.

4 MANAGEMENT OF IMPACTS

4.1 CONSTRUCTION AND OPERATIONS

The following section provide management measures for both the operational phase as well as construction activities related to development of the abalone ranching and processing activities.

4.1.1 Planning

During the phases of planning for future operations and decommissioning of the project, it is the responsibility of the Proponent to ensure they are, and remain, compliant with all legal

requirements. The Proponent must also ensure that all required management measures are in place prior to and during all phases, to ensure potential impacts and risks are minimised. The following actions are recommended for the planning phase and should continue during various other phases of the project:

- Ensure that all necessary permits from the various ministries, local authorities and any other bodies that governs the project are in place and remains valid.
- Ensure all appointed contractors and employees enter into an agreement which includes the EMP. Ensure that the contents of the EMP are understood by the contractors, sub-contractors, employees and all personnel present or who will be present on site.
- Make provisions to have a Health, Safety and Environmental Coordinator to implement the EMP and oversee occupational health and safety as well as general environmental related compliance at the site, by both the employees and contractors and their employees.
- Have the following emergency plans, equipment and personnel on site where reasonable to deal with all potential emergencies:
  - Risk management / mitigation / EMP/ Emergency Response Plan and HSE Manuals;
  - Adequate protection and indemnity insurance cover for incidents;
  - Comply with the provisions of all relevant safety standards;
  - Procedures, equipment and materials required for emergencies;
  - Biosecurity protocol and disease management plan.
- Establish and / or maintain a reporting system to report on aspects of operations and decommissioning as outlined in the EMP.
- Submit monitoring reports every six months to allow for environmental clearance certificate renewal applications when needed.
- Update the EIA and EMP if required and apply for renewal of the environmental clearance certificate prior to expiry.

4.1.2 National Development Strategy: Investment in Mariculture

The mariculture project pins down key development goals which were identified as part of NDP5. It may be considered as a mariculture project which aims at generating income from foreign sectors by providing a very high value per resource (seawater / habitat). In addition, the project is located in line with the regional planning initiatives which identified the location as an area for mariculture development. The project is unique in being one of only a handful of such growing projects in Namibia and is considered a long term project.

In addition to NDP5, the focus on mariculture development has further been carried forward in the draft Master Plan for Marine Aquaculture in Namibia (2012. The project therefore is considered to be a positive contributor to achieving national development goals.

Desired Outcome: Continued contribution to the development of the //Karas Region as well as implementation of project activities in line with NDP5 and Vision 2030.

Actions

Enhancement:

- Liaison with regional and national governmental agencies through appropriate financial and social responsibility reporting.
- Infrastructure maintenance long lines, on-shore facility. Where possible, public and private partnership regarding projects should be considered.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- All project contributions towards regional development, inclusive of communications held with relevant authorities, to be kept on file.

4.1.3 Contribution to the National Economy (Revenue & Investment Confidence)

During the operational phase, oyster and abalone will be exported to world markets generating revenue for Namibia and contributing to a positive trade balance. The successful implementation of the project, and related return on investment, will boost investors' confidence in Namibia. It will further contribute to Namibia's sustainable development of Vision 2030, the related development goals of NDP5 and the draft Master Plan for Marine Aquaculture in Namibia (2012). The project will contribute to stimulate growth and localised expenditure in the Region.

Desired Outcome: Contribution to national treasury, a positive trade balance and increased economic resilience in the local sector.

Actions

Enhancement:

- Maximise contribution to the Namibian economy by contribution to industry development and using Namibian suppliers. Adhere to all Namibian Labour Act requirements.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Service providers' contracts or agreement or records to be kept.

4.1.4 Employment and Remuneration

An increase in semi-skilled, skilled and professional labour will result from the mariculture activities. Successful implementation of the project is hinged on continued employment of labourers. Employees will be remunerated and this increases their economic stability which in turn increases their economic resilience.

Desired outcome: Reduced unemployment and poverty.

Actions

Mitigation:

- The proponent must employ local Namibians where possible. Deviations from this must be justified.
- If the skills exist locally, employees must first be sourced from the town, then the region and then nationally.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Financial records of contributions to social security and employees' salaries on file.
- Bi-annual report based on employee records.

4.1.5 Skills, Technology and Development

Training will be provided to employees in order to perform various functions for successful implementation and execution of the project. Skills will be transferred to an unskilled workforce for general tasks. New technologies are often investigated and introduced into the industry, thus aiding in operational efficiency. Development of people and technology are key to economic development.

Desired outcome: To see an increase in skills of local Namibians, as well as development and technological advancements in the mariculture industry.

Actions

Mitigation:

- If the skills exist locally, contractors must first be sourced from the town, then the region and then nationally. Deviations from this practice must be justified.
- Training and skills development must be focussed on Namibians.
- Skills development and improvement programs to be made available as identified during performance assessments.
- Employees to be informed about parameters and requirements for references upon employment.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Record should be kept of training provided.
- Ensure that all training is certified or managerial reference provided (proof provided to the employees) inclusive of training attendance, completion and implementation.
- Bi-annual report based on records kept.

4.1.6 Demographic Profile and Community Health

The project relies on labour during the operational phase. It is not foreseen that the project will create a change in the demographic profile of the local community, as employment will be sourced locally as far as possible. The community may still to some extent be exposed to factors such as communicable disease (e.g. HIV/AIDS) and alcoholism/drug abuse. This impacts on overall community health. Should an increase in foreign people (e.g. migrant workers) in the area take place, this may potentially increase the risk of criminal and socially/culturally deviant behaviour.

Desired Outcome: To prevent the spread of communicable diseases and prevent / discourage socially deviant behaviour.

Actions:

Prevention:

- Employ only local people from the area, deviations from this practice should be justified appropriately.
- Adhere to all municipal by-laws relating to environmental health, such as sanitation requirements.
- Provide educational, awareness information for employees on various topics of social behaviour such as alcohol abuse and HIV/AIDs.
- Disciplinary steps, within the legal parameters of Namibia, to be taken for socially deviant behaviour during working hours should be clearly stipulated in employment contracts.
- Adopt a policy wherein derogatory and discriminative talk towards any gender or race is punishable under employee contracts.

Mitigation:

- Educational programmes for employees on HIV/AIDs and general upliftment of employees' social status.
- Appointment of reputable contractors.
- Take disciplinary action against employees not adhering to contractual agreements with regard to socially deviant behaviour (e.g. alcohol or drug abuse during working hours).

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Municipal by-laws
- Bi-annual summary report based on employee demographics, educational programmes and training conducted.

4.1.7 Traffic

Transport requirements include the transport of equipment, of employees, and of abalone and oysters to various markets. This may cause a slight increase of traffic to and from the site and increase congestion and increase the risk of incidents and accidents in the town. Traffic on the road near schools are of specific concern where school children cross the road. Due to the scale and location of the proposed operations, these impacts are expected to be minimal.

Desired Outcome: Minimum impact on traffic and no transport or traffic related incidents.

Actions

Prevention:

- All drivers must be properly trained with valid and required driver's licences.
- Erect clear signage regarding access and exit points at the processed product collection points.
- Proper route determination to avoid problem areas if required.
- Training and information sharing with drivers of vehicles to ensure vigilance at hot spots. This include the town centre, schools and areas with occasional animal crossings (e.g. brown hyena).

Mitigation:

- If any traffic impacts are expected, traffic management should be performed to prevent these.
- The placement of signs to warn and direct traffic where necessary will mitigate traffic impacts.

Responsible Body:

- Contractors
- Proponent

Data Sources and Monitoring:

- Any complaints received regarding traffic issues should be recorded together with action taken to prevent impacts from repeating itself.
- A bi-annual report should be compiled of all incidents reported, complaints received, and action taken.

4.1.8 Health, Safety and Security

Activities associated with the mariculture projects relies on human labour and therefore exposes them to potential health and safety risks. The major risks involved with the proposed activities are drowning, hypothermia, decompression sickness, physical injury such as accidental cuts, vehicle accidents, etc. Security risks are related to unauthorized entry, theft (abalone and oysters) and sabotage. The quality of abalone and oysters is important as cases of PSP and DSP can be serious.

Desired Outcome: To prevent injury, health impacts and theft.

Actions

Prevention:

At minimum the proponent must:

- Provide adequate training to employees or ensure competent employees and contractors are appointed. This include certified divers and licenced drivers.
- Where applicable, clearly label dangerous and restricted areas as well as dangerous equipment and products.
- Provide all employees with required and adequate personal protective equipment (PPE).
- All health and safety standards specified in the Labour Act should be complied with.
- Sampling as per the existing standard for mariculture industry in Namibia as performed by the Namibia Standards Institution.
- Develop a security protocol for transport of oysters and abalone which can include monitoring of vehicle movements (GPS tracking), emergency procedures, etc.
- Regularly patrol areas where abalone is resettled for poachers.

Mitigation:

- Selected personnel should be trained in first aid and a first aid kit must be available. The contact details of all emergency services must be readily available.
- Security procedures measures must be in place to protect workers.
- Report any suspicious activity that takes place offshore to the relevant authorities.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Sampling as per the existing standard for mariculture industry in Namibia as performed by the Namibia Standards Institution.
- Monitoring and analysis reports on file.
- Any incidents must be recorded with action taken to prevent future occurrences.
- A bi-annual report should be compiled of all incidents reported and all monitoring/analysis results. The report should contain dates when training were conducted and when safety equipment and structures were inspected and maintained.

4.1.9 Noise

Noise generated from the operational activities will be minimal and isolated to for example pressure washing of baskets, water pumps and occasional trucks.

Desired Outcome: To prevent any nuisance and hearing loss due to noise generated.

Actions

Prevention:

- Follow World Health Organization (WHO) guidelines on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment and noise levels for residential areas.
- All machinery must be regularly serviced to ensure minimal noise production.

Mitigation:

- Hearing protectors as standard PPE for workers in situations with elevated noise levels.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- WHO Guidelines.
- Maintain a complaints register.
- Bi-annual report on complaints and actions taken to address complaints and prevent future occurrences.

4.1.10 Waste Production

Minimal waste is expected from the project. Waste that will be generated will mainly include domestic waste, sewage, old baskets, shells and dead oysters and abalone, and biofouling when cleaning baskets and shells. Unconfined wastes / litter such as empty bags may be blown away by strong winds and end up in the surrounding environment.

Desired Outcome: To reduce the amount of waste produced and prevent pollution and littering.

Actions

Prevention:

- Waste reduction measures should be implemented and all waste that can be re-used / recycled must be kept separate.
- Beneficial use of shells is promoted e.g. as source of calcium carbonate, additive to feed, etc.
- Ensure adequate waste storage facilities are available where applicable.
- Ensure waste cannot be blown away by strong wind.
- Prevent scavenging (human and non-human) at waste storage.

Mitigation:

- Waste should be disposed of regularly and at appropriately classified disposal facilities, this includes hazardous materials (empty chemical containers, contaminated rugs, paper water and soil), if any.
- A contingency plan must be developed to handle any hazardous biological waste, for example disease-bearing organisms. This should include proper disposal methods to prevent spread of contamination or scavenging by animals or humans. Waste that present health or environmental impacts should be incinerated.
- Liaise with the municipality regarding waste and handling of hazardous waste (if any).

Responsible Body:

- Proponent

Data Sources and Monitoring:

- A record should be kept of any disposal of hazardous waste.
- Any complaints received regarding waste should be recorded with notes on action taken.
- All information and reporting to be included in a bi-annual report.

4.1.11 Terrestrial Ecosystem and Biodiversity Impact

Terrestrial impacts are limit as most activities occur offshore or at the Lüderitz Boatyard. Limited terrestrial impacts may be expected when boat launches are performed along the beach near the abalone ranching sites. This can include trampling of sensitive areas or bird breeding areas. Activity around islands may cause stress among bird populations like penguins.

Desired Outcome: To reduce disturbance and destruction of the ecological environment.

Actions.

Prevention:

- Reach an agreement with the Ministry of Fisheries and Marine Resources on areas that are restricted within the area earmarked for abalone ranching. This should include buffer zones and safety distances.
- Educate all workers on the value of biodiversity and promote vigilance while accessing rocky shores and beaches to avoid trampling any sensitive areas or bird nests.
- Keep a safe distance from rocky shores or islands where birds are nesting.

Mitigation:

- Workers to report any extraordinary ecological sightings (e.g. dead washed out fish or marine mammals, birds or other animals entangled in waste, oil covered birds, etc.) to the MEFT and/or Ministry of Fisheries and Marine Resources.
- Beach driving should be prevent where possible, and where required, should stick to existing tracks, if /where possible to reduce the ecological impact.
- Mitigation measures related to waste handling should limit ecosystem and biodiversity impacts.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- All monitoring information and extraordinary animal sightings to be included in a bi-annual report.

4.1.12 Impacts on Marine and Coastal Biota

Impacts in the marine environment include introduction of diseases, entanglement of large marine mammals in the long lines, abalone too densely resettled, temporary seabed disruption for anchor placement, physical pollution and injury of non-target species.

Abalone mainly feed on drift kelp and significant competition with other species for food is not expected. Density of abalone resettlement will be carefully determined according to available food resources and this will prevent benthic impacts. Although outside of its natural range, abalone has been ranched at Lüderitz for many years.

Grow-out baskets acts as refuges for many marine organisms which may have a positive influence on local diversity.

Desired Outcome: To minimise destruction, degradation and disturbance of the ecological environment and prevent the introduction of diseases.

Actions.

Prevention:

- Implement a biosecurity and disease management plan (**Error! Reference source not found.**).
- This plan should continuously be improved and updated.
- All abalone are vetted prior to importation according to the requirements of Namibia and are certified disease and pathogen free.
- Benthic communities should be monitored to ensure no major changes in the local ecosystem and biodiversity takes place, including proliferation of abalone. At fixed reference areas within each abalone ranching area, photos should be taken every six months as record of the condition of the benthic ecosystem.
- Resettle abalone according to the availability of resources and restrict it to an upper limit of $5/m^2$.
- Non-target species in grow-out baskets of oysters must be returned to the water as soon as possible.
- Employees must be restricted from illegal harvesting of any marine resources.

Mitigation:

- Report any extraordinary sightings or occurrences to the MEFT and Ministry of Fisheries and Marine Resources.
- Ensure regular sampling of oysters and abalone according to the requirements of the Namibia Standards Institution (Appendix B).
- If changes in the benthic ecosystem that can be ascribed to the presence of abalone are detected, the ranching protocol must be adjusted. This may include reducing the number of individuals or excluding some areas altogether.
- Ensure stocking densities in oyster baskets are optimised to ensure a healthy, stress-free environment.
- Daily monitoring of long lines for any indications of entanglement of large marine mammals and corrective action to be taken.

Data Sources and Monitoring:

- Sampling as per the existing standard for mariculture industry in Namibia as performed by the Namibia Standards Institution.
- Regular environmental monitoring (diving) to monitor benthic rocky shore ecosystems for changes.
- Monitoring for entanglements with inspection sheets.
- Monitoring and analysis reports on file.
- All information and reporting to be included in a bi-annual summary report.

4.1.13 Surface Water Contamination

Spillages or illegal dumping of waste that may lead to surface water (ocean) contamination. Seawater abstraction and return from the onshore facility require an abstraction and effluent disposal permit from the Department of Water Affairs.

Desired Outcome: To prevent the contamination of seawater.

Actions

Prevention:

- All forms of waste must be prevented from entering the ocean and environment and must be discarded at appropriately classified disposal facilities, this includes the correct disposal of hazardous waste.
- Regularly service any motorised craft to prevent any oil or fuel from entering the water.
- Seawater return streams must comply with effluent disposal permit conditions.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Ministry of Agriculture, Water and Land Reform water abstraction and effluent permit conditions.
- A report should be compiled bi-annually of all pollution incidents and corrective action taken, inclusive of water quality monitoring if so required by the various permitting conditions.

4.1.14 Visual Impact

Poorly maintained infrastructure will have a negative visual impact. However, for oyster mariculture, the offshore infrastructure (buoys on long lines) has become part of the seascape character and is of interest to tourists. This may thus have a positive visual impact. The onshore facilities are earmarked for harbour use and is thus of an industrial nature.

Desired Outcome: To enhance aesthetically pleasing attributes of the existing seascape character.

Actions

Enhancement:

- Regular waste disposal, good housekeeping and routine maintenance on infrastructure will ensure that the longevity of structures are maximised and a low visual impact is maintained.

Mitigation:

- Any damage to structures or decommissioned elements (e.g. long lines) should be removed from site.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- A bi-annual report should be compiled of all complaints received and actions taken.

4.1.15 Cumulative Impact

Possible cumulative impacts associated with the operational phase include slightly increased traffic in the area. The cumulative visual impact is related to the buoys at sea. Employment is a positive cumulative impact. Cumulative impacts on seawater quality arise from mariculture activities, fish processing and port operations.

Desired Outcome: To minimise negative and enhance positive cumulative impacts associated with the operations.

Actions

Mitigation:

- Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.
- Reviewing biannual reports for any new or re-occurring impacts or problems would aid in identifying cumulative impacts and help in planning if the existing mitigations are insufficient.
- Should a reduction in seawater quality be expected, it is recommended that all industries in the area utilising seawater and discharging effluent into the ocean implement a joint monitoring program to ensure the localized water quality does not decrease.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Bi-annual reports provides a summary of the impacts of the operational phase and highlights cumulative impacts..

4.2 DECOMMISSIONING AND REHABILITATION

Decommissioning is not foreseen during the validity of the environmental clearance certificate. Decommissioning was however assessed. Should decommissioning occur at any stage, all offshore infrastructure must be removed as any remnants of long lines and anchors may impact on seafaring traffic and dredging of the ocean floor. . During the last abalone collection outings no new abalone will be resettled. It is unlikely that all abalone will be collected, but due to abalone's inability to proliferate in the area, they will eventually be predated or die-off. The environmental management plan for the facility will have to be reviewed at the time of decommissioning to cater for changes made to the site and implement guidelines and mitigation measures.

5 REFERENCES

Faul A, Coetzer W. 2021. Mariculture Activities of Oceangrown Namibia at Lüderitz: Environmental Assessment Scoping Report

Appendix A: Draft Biosecurity and Disease Management Guidelines

BIOSECURITY AND DISEASE MANAGEMENT GUIDELINES

ANIMALS

Objective: to minimise the risk of Pathogen (disease and parasite) introduction and spread by stock (e.g. spat, juvenile abalone and oysters and broodstock) and animal movement. New stock introduced to onshore facilities or ranching areas present the most significant risk for introducing pathogens, especially if the health status of the stock is unknown. Introductions and movements should be managed carefully to minimise the risk of introducing and spreading pathogens.

Onshore	Offshore
♦ All new stock is vetted and certified pathogen free and healthy as part of the import requirements of Namibia. ♦ All animals are inspected when received. ♦ Mortalities or unwanted stock are incinerated No dead or unwanted stock is returned to the environment or accessible to scavengers (e.g. birds). ♦ Animals with health problems (suspected diseases) are investigated with assistance from aquatic animal health professionals. ♦ All temporary holding tanks are regularly cleaned. ♦ Animal stress is kept to a minimum by maintaining good water quality in temporary holding tanks, good hygiene, optimum stocking density and minimum handling of animals. ♦ Quarantine tanks are isolated and the water does not form part of the normal return water to the ocean. If a disease is present, such water must first be sterilized before being returned to the ocean. ♦ Domestic animals (e.g. cats and dogs) do not have access to onshore facilities at any time. ♦ Vermin baiting occurs as necessary (i.e. if live rodents, droppings or nests are observed).	**Abalone** ♦ Potential ranching habitats are inspected and classified according to potential stocking density. ♦ Resettlement of abalone is performed according to each habitat's stocking density and then carefully monitored. Stocking densities of habitats are adjusted based on monitoring, if required. **Oysters** ♦ Stock stress is kept to a minimum by ensuring optimum stocking density of grow-out baskets, regular resizing and transfer to bigger baskets as well as regular cleaning of baskets. ♦ Escapees are prevented by ensuring all baskets are adequately secured to longlines and regularly maintained or replaced when damaged. **General** ♦ Staff are trained in, and aware of, their role and responsibility in reporting signs of disease, parasites and high mortality. ♦ Sampling and testing is performed according to the Molluscan Shellfish Sampling Schedule ♦ Relevant authorities are informed of any significant, unexplained mortality event or suspected reportable disease immediately and the necessary tests conducted to determine the presence of disease. The authorities and mariculture industry must, if a disease is identified, develop and action plan to monitor the extent of infection and the procedures for elimination of the disease.

PEOPLE

Objective: to minimise the risk of pathogen introduction and spread through the movement of people. The risk of people introducing pathogens is greatest if other farms, or environments potentially containing diseases of concern, have recently been visited. Contaminated skin, clothing and footwear can all potentially spread disease.

Onshore	Offshore
♦ Farm entry requirements are clearly displayed to visitors at the sign-in point. ♦ Access for visitors must be approved by the farm manager. ♦ Visitors must sign-in on arrival (by completing the farm visitor log) and undergo a farm biosecurity induction. ♦ Footbaths (or the ability to change into zone specific boots) and hand sanitation stations are located at the processing facility entrance/exit so as to provide for effective disinfection at all times. ♦ Staff/visitors who visit other aquaculture sites or seafood processors prior to facility entry go through a thorough disinfection process and wear clean overalls and PPE. ♦ Boots worn in onshore facilities are not worn or taken outside the specific area to which they are designated. ♦ Staff attend work in laundered, clean clothes each day. ♦ Only designated staff are permitted to routinely enter quarantine areas. ♦ Visitor access to quarantine zones is restricted. ♦ Routine maintenance work required within quarantine area/s is, where possible, conducted by contractors between batches and prior to final disinfection. ♦ Visitors are at all times accompanied when on site.	♦ Staff goes through a disinfection process prior to going out on sea to dive for abalone resettlement, harvesting or monitoring.

EQUIPMENT, VEHICLES AND VESSELS

Objective: to minimise the risk of pathogen introduction and spread by equipment, vehicle or vessel movement. Depending on the history of use, contaminated equipment, vehicles or vessels can carry and spread pathogens.

Onshore	Offshore
♦ All surfaces, tanks, containers where disease carrying organisms, or those suspected of carrying disease, were kept or handled, are disinfected immediately once the oysters and abalone are removed. ♦ Equipment used in the quarantine area are not removed and used elsewhere in the processing facility. ♦ All areas are regularly cleaned and kept free of rubbish and clutter. ♦ Contractor tools are cleaned before entry and free of dust/organic matter.	♦ All equipment that will be used for resettlement, harvesting or monitoring purposes are disinfected prior to being loaded onto the vessel ♦ Any containers which held diseased or potentially diseased animals are returned to shore for adequate cleaning and disinfection. ♦ Seagoing vessels that transported any diseased or potentially diseased animals are disinfected immediately upon removal of such animals. ♦ Seagoing vessels that may potentially be contaminated by disease causing organism may not go near any other mariculture areas before being cleaned and disinfected.

RECORD KEEPING

Objective: to record information necessary to support good biosecurity practices, in accordance with the biosecurity plan.

Good record keeping is necessary for farm biosecurity plan auditing and to provide demonstrable proof that biosecurity protocols are being followed. In the event of a disease outbreak records are used to trace the potential source of disease, identify breakdowns in adherence to biosecurity protocols and aid in the review and improvement of practices and protocols.

The minimum information that should be recorded is outlined below.

Stock Movements

Objective: Detailed stock records, regarding stock movements and inventory, are maintained and readily accessible. Records of stock movements and inventory are essential for forward and backward tracing activities in the event of a disease outbreak.

Suggested minimum details include:

- Source of stock, including original and most recent source (if different).
- Movement of stock within (for movement between different zones e.g. acclimation tanks, long line or ranching areas).
- Movement of stock to other farms or to processors.

Records for each movement should include the following at a minimum:

- Date of movement
- Batch or other identifier
- Number of individuals
- Buyer (for sales) or stock origin, including contact details

Stock Health, Mortality and Water Quality Records

Objective: Detailed stock health, mortality and quality records are maintained and readily accessible. Health and performance records provide evidence that regular stock monitoring is occurring. Records, especially of mortalities, assist monitoring for unusual health problems. For ranching, mortality monitoring may be difficult as animals do move around. The presence of shells is an indication of mortality.

Suggested minimum details include:

- Mortalities (quantities, including the method of disposal and if any samples have been archived)
- Details of any poorly performing oysters and abalone
- Results of laboratory testing - associated with clinical disease or undertaken for the purpose of health certification.

REFERENCES

Matthews, E., Roberts, S., Deveney, M., Bradley, T., Dang, C., Wronski, E., Walker, M., Savva, N. and Zippel, B., PIRSA Fisheries & Aquaculture, 2017, Development of sector-specific biosecurity plan templates and guidance documents, Adelaide, November.

Appendix B: Molluscan Shellfish Sampling Schedule

MOLLUSCAN SHELLFISH SAMPLING SCHEDULE: FY 2021 to 2022 (April 2021 to March 2022)

	Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec
Sun								1				
Mon								2			1	
Tues		1	1			1		3			2	
Wed		2	2			2		4	1		3	1
Thurs		3	3	1		3	1	5	2		4	2
Fri		4	4	~~2~~		4	2	6	3	1	5	3
Sat	1	5	5	3	1	5	3	7	4	2	6	4
Sun	2	6	6	4	2	6	4	8	5	3	7	5
Mon	3	7	7	~~5~~	3	7	5	9	6	4	8	6
Tues	4	8	8	6	~~4~~	8	6	10	7	5	9	7
Wed	5	9	9	7	5	9	7	11	8	6	10	8
Thurs	6	10	10	8	6	10	8	12	9	7	11	9
Fri	7	11	11	9	7	11	9	13	10	8	12	~~10~~
Sat	8	12	12	10	8	12	10	14	11	9	13	11
Sun	9	13	13	11	9	13	11	15	~~12~~	10	14	12
Mon	10	14	14	12	10	****14	12	16	13	11	15	13
Tues	11	15	15	13	11	15	13	17	14	12	16	14
Wed	12	16	16	14	12	16	14	18	15	13	17	15
Thurs	13	17	17	15	~~13~~	17	15	19	16	14	18	16
Fri	14	18	18	16	14	18	16	20	17	15	19	17
Sat	15	19	19	17	15	19	17	21	18	16	20	18
Sun	16	20	20	18	16	20	18	22	19	17	21	19
Mon	17	21	~~21~~	19	17	21	19	23	20	18	22	20
Tues	18	22	22	20	18	22	20	24	21	19	23	21
Wed	19	23	23	21	19	23	21	25	22	20	24	22
Thurs	20	24	24	22	20	24	22	~~26~~	23	21	25	23
Fri	21	25	25	23	21	25	23	27	24	22	26	24
Sat	22	26	26	24	22	26	24	28	25	23	27	25
Sun	23	27	27	25	23	27	25	29	26	24	28	26
Mon	24	28	28	26	**24	28	26	30	27	25	29	27
Tues	25		29	27	~~25~~	29	27	31	28	26	30	28
Wed	26		30	28	26	30	28		29	27		29
Thurs	27		31	29	27		29		30	28		30
Fri	28			30	28		30			29		31
Sat	29				29		31			30		
Sun	30				30					31		
Mon	31				31							
	LIP, PST, MICRO		Cd, LIP, PST		LIP, PST		AST, LIP, PST, MICRO		HM, LIP, PST		~~LIP, PST, PAH, PCBs, RAD~~	

ACRONYMS:
HM = Heavy Metals (Arsenic, Cadmium, Lead, Mercury); AST= Amnesic shellfish toxin; RAD = Radionuclides
LIP= Lipophilic toxins (DSP toxins); Cd = Cadmium; PAH = Polycyclic aromatic hydrocarbon; MICRO = (Microorganisms = E. coli, Salmonella, vibrio)
PSP= Paralytic shellfish toxin; PCBs = Polychlorinated biphenyls

Vibrio Testing is for screening purposes only for MFMR to determine prevelence. To be tested montly basis	
ABALONE:	1. PST - To be sampled every two weeks *(see Sampling Schedule 2021/22 Review Report)*
	2. AST and LIP - To be sampled based on phytoplankton alert by MFMR *(see Sampling Schedule 2021/22 Review Report)*
NOTE:	(**) Sampling and request for testing on 24/05/2021 shall include Cadmium Tesing
	(****) Sampling and request for testing on 14/06/2021 shall include Arsenic
NOTE: (X) PAH, PCBs & RAD testing Done for 2021 in FY2020/2021	

Compiled by: Tobias Kuugongelwa

Updated on 30 July 2021

Approved by: Dr Heidi Skrypzeck

30/07/2021

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