

**INSERT COMPANY LOGO**

# Health Management Plan

Prepared By:

*Insert Author*

**Insert Month Year**

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## 1 Introduction

The Health Management Plan has been developed to identify and mitigate potential impacts that may arise from disease, parasite or pest related matters on the **INSERT LEASE NAME**.

Disease and pest control in aquaculture production requires a holistic approach. Good site management, animal husbandry and rigorous biosecurity measures are central to reducing the risk of disease outbreaks and controlling the spread of infectious diseases and pests.

In accordance with consent condition **INSERT DETAILS (E.g. D10 of the State Significant Infrastructure Approval SS1-5118)**, the Health Management Plan details the following:

- **LIST DOT POINTS OF CONSENT CONDITIONS**
- **E.g. Details regarding the prevention of transfer of diseases; and**
- **E.g. Procedures for minimising chemicals.**

The Health Management Plan aims to identify and define areas of management and husbandry where agreed protocols and procedures are targeted at “Best Practice” to optimise **shellfish/finfish** health and welfare. The Health Management Plan will be supported with relevant policies, protocols and safe work method statements to promote a comprehensive approach to all farming operations that have the potential to impact negatively on **shellfish/finfish** health and welfare. The Health Management Plan will be continuously reviewed and improvements employed to meet this goal.

The Waste Management Plan also contains details on the management of wastes such as diseased **shellfish/finfish** that may also impact on the management of stock health and surrounding environment.

**INSERT PROPONENT** has developed the Health Management Plan to ensure a coordinated approach to the health management issues on the **INSERT LEASE NAME**.

## 2 Animal Welfare

It is accepted that **fish** experience suffering if they are stressed, injured or carrying a disease. **INSERT PROPONENT** aim to ensure high standards of animal welfare and good health of the cultured stock.

### RSPCA Welfare Standards

**RSPCA has not developed standards for the culture of shellfish. However, the welfare standards developed to represent good practice in the care and welfare of commercially farmed Atlantic salmon can be utilized to ensure high standards of shellfish welfare of the INSERT LEASE NAME cultured stock (RSPCA, 2015).**

The RSPCA welfare standards outline 'Five Freedoms' that are key considerations in the Health Management Plan (Web Reference 3). These include:

- *Freedom from thirst, hunger and malnutrition* – by access to an appropriate high quality diet and an environment in which fluid and electrolyte balance can be maintained;
- *Freedom from discomfort* – by maintaining the water at an appropriate temperature and chemical composition;
- *Freedom from pain, injury or disease* – by avoiding situations which are likely to cause pain, injury or disease, by rapid diagnosis and treatment of disease, parasites, pests and humane killing;
- *Freedom to express normal behaviour* – by providing the appropriate space and environment for the species; and
- *Freedom from fear and distress* – by minimising stressful situations such as handling or predator attack as far as possible by making gradual changes to husbandry and water quality, and by humane slaughter.

The attitudes and competence of the **INSERT PROPONENT** are a vital factor determining whether high standards of animal welfare can be achieved. This will be achieved by the employment of staff with good working knowledge of the husbandry system being employed on the **INSERT LEASE NAME** and the stock under their care. It will be the responsibility of management to ensure there is a welfare ethos among staff.

### 3 Biosecurity

Currently the provisions of the *Fisheries Management Act 1994* provides the legislative framework for biosecurity measures in the marine environment.

A new Act, *Biosecurity Act 2015*, has been developed and provides an exciting opportunity to better manage biosecurity risks that impact on our economy, environment and community. However, before the Act commences, the development of regulations, policies and procedures is needed to provide greater clarity about how risks are to be managed and what actions are required by government, industry and the community.

Disease can be caused by a range of agents, for example bacteria, viruses and parasites. It is critically important to implement biosecurity measures to prevent the spread of existing disease and pest agents as well as prevent the introduction of new diseases and pests such as those that exist overseas or might reside in local wild stock.

Biosecurity in its broadest definition is the prevention of disease and pest causing organisms entering or leaving any site where they pose a risk to farmed stock, other animals, the

environment, humans or the safety and quality of food. Biosecurity in an aquatic environment poses many challenges as often potential pathogens can be carried in wild fish or other hosts or carriers and never be totally eliminated from aquatic systems.

The Health Management Plan and supporting documents identify potential disease risks and implements effective preventative strategies.

### **Potential Pathways for the Introduction and Spread of Disease and Pests**

Specific pathways by which exotic or new diseases or pests not currently occurring in the New South Wales environment could be introduced or by which existing diseases or pests could be spread between sites include:

- Hatchery produced juveniles including the water in which they are transported;
- Infected shellfish/finfish products including harvest shellfish/finfish and shellfish/finfish products;
- Contaminated equipment including farm equipment, transport trucks and boats;
- Staff, contractors and visitors including vehicles, equipment and protective clothing;
- Wild aquatic organisms (e.g. fish, birds, crustaceans, zooplankton and algae). These species may also be carrying potential pathogens not yet introduced into farmed stock; and
- Other waterway users including contaminated equipment, vehicles and personnel.

Once viable disease or pest organisms have entered and established infection at a farm site, it becomes very difficult to prevent spread of that organism within the site and limit the impact of the disease or pest. Therefore, it is critical that all reasonable measures are taken to minimise the risk of introduction of disease or pest organisms to all sites.

In general, the more often a potential pathway occurs, the more likely a disease or pest organism will be introduced. Therefore, the potential risk of a disease or pest organism entering a site and infecting fish or equipment is a function of three factors:

- Are there enough viable disease or pest organisms present to cause infection or establish viable infestations?
- How likely is it that the disease or pest organism will remain viable during the movement? and
- How frequently does the movement occur?

Disease organisms may be carried by wild aquatic organisms (e.g. fish, shellfish and plankton) that either live in or move into and out of sites. Minimising contact between farmed

shellfish/finfish and other aquatic organisms is more difficult. However, the transfer of disease from wild shellfish/finfish is less likely if shellfish/finfish are healthy and conditions are optimal (i.e. strong immune system, low stress and no physical damage).

The use of vessels and equipment imported (particularly from overseas) into NSW is a potential pathway for the introduction of exotic pests or disease agents. NSW DPI prohibits the importation of used aquaculture infrastructure from overseas to mitigate this risk. Infrastructure and vessels being translocated from interstate must undergo a risk assessment and if required undertake treatments to mitigate the translocation of potential diseases or pests risks.

### **Contingency Planning and Emergency Response**

In the event that a serious new disease or pest emerges either at the INSERT LEASE NAME or at another aquaculture site, it is essential to have an agreed “Contingency Plan” in place that clearly outlines what processes and procedures will be undertaken to manage such an event. INSERT PROPONENT have developed the Health Management Plan to ensure this occurs when and if a health issue arises.

A disease emergency exists when a population of aquatic animals is recognised as having undergone a severe mortality event and/or significantly decreased productivity and the responsible authority within New South Wales (Chief Veterinary Officer) believes that the cause may be an infectious organism. The Chief Veterinary Officer (CVO) may also consider latent events, such as the presence or identification of an infectious organism (particularly certain exotic organisms), without signs of disease, as an emergency.

There are three broad options in the event that a serious disease or pest emerges:

- Eradication – the scale of eradication may vary but in worst case scenario may be across a whole lease or even area;
- Containment, Control and Zoning – these measures aim to confine a new or exotic disease or pest to a defined geographic area and affected populations (e.g. by quarantine); and
- Control and Mitigation – these measures aim to manage the frequency and severity of disease episodes or pest establishment in infected environments and keeping them within acceptable levels.

Events will be assessed on a case by case basis. However, it is essential that decisions and actions are implemented quickly to achieve the best outcome.

### **Notifiable Diseases**

The *Fisheries Management Act 1996* and subordinate legislation requires the **INSERT PROPONENT** by law to report any case or suspicion of a notifiable animal disease or pest. These notifiable diseases and pests are all serious and therefore require:

- Any suspect case of a new disease or pest to be reported immediately; and
- Any disease that is causing deaths or production losses and which is not readily diagnosed is deemed to be an unknown disease. Any unknown disease must also be reported immediately and the suspect animals isolated pending further investigation of the signs.

The list of notifiable diseases and pests are regularly reviewed and updated and can be found on the [NSW DPI aquatic biosecurity website](#). The website also provides details on reporting a potential notifiable disease or pest along with sampling and submission of samples for diagnosis.

## **AQUAVETPLAN**

AQUAVETPLAN is the Australian Aquatic Veterinary Emergency Plan. It is a series of manuals that outline Australia's approach to national disease preparedness and propose the technical response and control strategies to be activated in a national aquatic animal disease emergency. The manuals also provide guidance based on sound analysis, linking policy, strategies, implementation, coordination and emergency management plans.

The benefit of these plans lies in the fact that they are prepared during 'peace time' so that the information is readily available in the event of an actual emergency.

AQUAVETPLAN manuals are developed by Australian aquatic animal health experts with extensive stakeholder consultation. Each manual undergoes a formal endorsement process through government and private sector committees.

AQUAVETPLAN manuals are working documents that are updated as required and take into account research, experience and field trials, and cover emerging disease threats.

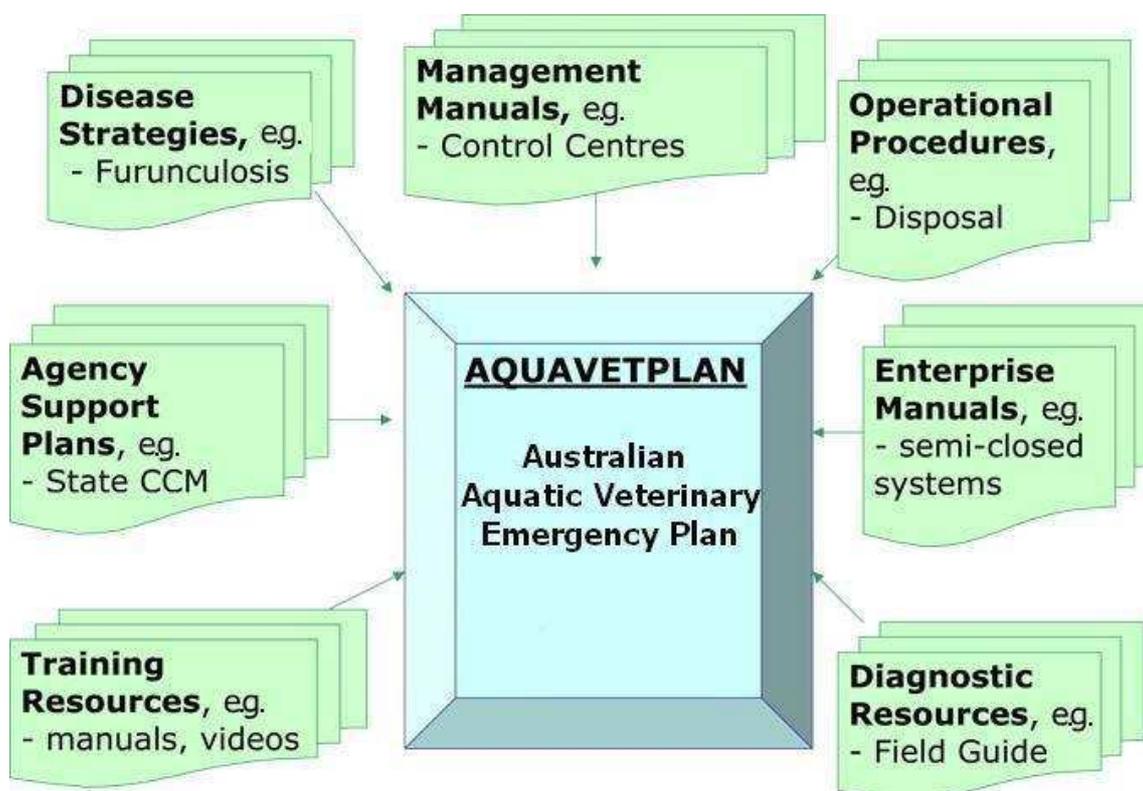
The full list of AQUAVETPLAN manuals includes:

- Enterprise Manual – includes sections on:
  - Open Systems;
  - Semi-Open Systems;
  - Semi-Closed Systems; and
  - Closed Systems.
- Operational Procedures Manuals

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- Disposal;
- Destruction; and
- Decontamination.
- Management Manual
  - Control Centres Management (In event of emergency response required)
- Disease Strategies (specific strategies for individual diseases)
  - Infectious salmon anaemia (ISA);
  - Piscirickettsiosis;
  - Viral Haemorrhagic Septicaemia;
  - Furunculosis; and
  - Whirling Disease.

In the event of a significant disease outbreak, **INSERT PROPONENT** has staff trained in emergency response to be used in the event of an exotic or emergency disease incursion utilising the AQUAVETPLAN for such events.



**Figure 1:** Summary of the components of the AQUAVETPLAN (Source: Department of Agriculture and Water Resources, 2016).

## 4 Hatchery

The hatchery component of this plan considers the health management requirements for broodstock and juveniles.

If a disease problem occurs the cause must be identified as soon as possible. Once the cause of the disease is known, specific treatments can be used to reduce further losses and the impact of the disease. Constant routine measurement of water quality variables is essential as is vigilance in continually maintaining variables within tolerable limits.

The maintenance and frequent reference to water quality records will help managers identify underlying factors that pre-dispose shellfish/finfish to disease and to take early action that may prevent recurrence or at least reduce the severity of the disease.

The initial step in preventing the occurrence of diseases and parasites in aquaculture stocks starts with the production of quality disease and parasite free hatchery spat. This is accomplished through the implementation of strict hatchery procedures. The NSW DPI hatchery facility at the Port Stephens Fisheries Institute may be used to produce the juveniles for stocking the INSERT LEASE NAME is accredited under the NSW Hatchery Quality Assurance Scheme (HQAS) (Web Reference 4) and all juveniles deployed to the lease will be produced under the HQAS Health Management Plan. The objectives of the HQAS standards are to ensure that all shellfish/finfish reared at hatcheries will be genetically sound, healthy and free of pest species.

The *Manual for Hatchery Production of XXXXXXXXX* will be used as a guideline for the development of hatchery best practices. Notably, the manual provides details of symptoms and control/prevention methods for specific pathogens in hatcheries (O'Connor *et al.*, 2008).

### *Translocation*

The hatchery produced juveniles will be subject to stringent hatchery practices and surveillance regimes, as well as possibly ozone treatment to mitigate any risk of introducing disease or parasites to the INSERT LEASE NAME.

Hatchery produced juveniles will be sampled and thoroughly examined before they are translocated to the leases. Visual inspections for any signs of disease or parasites, histopathological examinations and the polymerase chain reaction (PCR) investigations may be used to test for pathogens. If any known or suspected case of disease or parasites is detected, the infected stock will be quarantined and treated or if unable to be treated they will be destroyed and appropriately disposed.

Natural juveniles sourced from outside of **Jervis Bay** will also be subject to the above examinations and testing along with any required treatment protocols to mitigate the potential to introduce diseases or pests.

Movements of **shellfish/finfish** between estuaries or a hatchery to an estuary will also have to be recorded (**e.g. shipment log book**) in order to track **shellfish/finfish** shipments to support biosecurity controls.

**The eggs collected from each spawning event will be rinsed and treated with ozone to surface disinfect them of bacteria, fungi and viruses. This will minimise the potential for the transfer of any potential diseases from the broodstock facility into the hatchery facility.**

The waters within the hatchery facility will also be disinfected prior to the introduction of eggs into the facility. The water disinfection may be through ultra-filtration, chemical chlorination, UV treatment, ozonation or pasteurisation. Daily monitoring of water quality parameters will also assist in mitigating **shellfish/finfish** stress and the potential for a disease event.

Throughout the hatchery phase of the juvenile production, stock will be inspected daily for potential signs of disease, parasites or pests. In the event of an identified known disease the approved treatments in accordance with any provisions of the Australian Pesticides and Veterinary Medicines Authority (APVMA) will be undertaken. If an unexplained significant mortality event occurs then investigations will be undertaken and samples forwarded to an approved vet lab for diagnosis.

## **5 Longlines**

### **Spat Transfer**

The transfer of juveniles to the **longlines/sea pens** poses a significant biosecurity risk if unhealthy **shellfish/finfish** are moved from a hatchery to the leases. Therefore it is critical that:

- Only healthy populations are transferred to leases;
- **shellfish/finfish** are transferred at the optimal time;
- The stress of transfer is minimised; and
- Post-transfer husbandry is optimal.

It is critical that only healthy populations of **shellfish/finfish** are transferred to leases for several reasons, including:

- The stress of transfer is likely to escalate any existing health issues;
- Shellfish suffering health issues are more likely to succumb to other existing or emerging pathogens post-transfer; and

- shellfish/finfish suffering health issues are less likely to perform well post-transfer.

To ensure only healthy shellfish/finfish are transferred to the leases, a health check will be undertaken by a veterinarian or his delegate not more than X weeks prior to the scheduled date of transfer.

Following every health check, a Veterinary Health Certificate will be issued to the relevant Hatchery Manager. The Hatchery Manager will be responsible for notifying the veterinarian if there is any change in health status between the time of the health check and the transfer.

shellfish/finfish quality issues include:

- INSERT DOT POINTS RELEVANT FOR shellfish/finfish
- E.g. Skin and scale condition reflect the quality of husbandry. Key indicators are no excessive scale loss and no lesions.
- E.g. Fin condition is an indicator of hatchery environment and husbandry. The following criteria should be met.
  - No significant reddening or infection of fins; and
  - Minimal other damage to fins.
- E.g. Other criteria include:
  - Operculum should fully cover the gill margin;
  - Gill margins should be clean and well defined;
  - Lamellae should appear clear and bright;
  - No gross evidence of bacterial, fungal or parasitic infections (where significant the hatchery will consider treatment pre-transfer);
  - Both eyes must be present, clear and bright;
  - No lens opacity or cataracts; and
  - There should be no overt signs of infectious disease in fingerlings at transfer.

Transferring shellfish/finfish from the hatchery to the lease sites is a critical process potentially having a significant impact on current and future shellfish/finfish health and welfare. This process is undertaken in a timely manner to mitigate potential stressors. The steps in the transfer process involve:-

- INSERT DOT POINTS RELEVANT FOR shellfish/finfish
- E.g. A health check to ensure only healthy populations of fish are transferred;
- E.g. Fingerlings may be sedated;

- E.g. Fingerlings are placed into the transport tank. Transport tank is fitted with oxygen cylinders to maintain fish health;
- E.g. The transport tank is then delivered to the lease site and fingerlings placed into growout sea pen/s.

To assist in reducing the potential occurrence of a disease event transferred to shellfish/finfish the following will be undertaken:

- LIST DOT POINTS RELEVANT TO shellfish/finfish
- E.g. Disinfection of transport containers before and after they are used;
- E.g. Disinfection of transport water prior to use for transferring fingerlings;
- E.g. Monitoring of water quality (particularly dissolved oxygen) during transfer;
- E.g. Ensure pen integrity (culture and predator nets especially) is maintained so that physical damage is minimised;
- E.g. Minimise any shellfish/finfish movements or handling events; and
- E.g. Monitor shellfish/finfish health closely such that early mitigation can be implemented if necessary.

### **Grow-out Management of Stock**

The broodstock and hatchery procedures outlined above will mitigate the potential for disease, parasite and pest agents to be translocated to the INSERT LEASE NAME. However, the longline/sea pen infrastructure and the stock cultured on the longlines/sea pens will potentially be exposed to a range of endemic diseases, parasites and pests. The risk from wild populations of organisms in the surrounding environment is identified as the greatest risk to the cultured stock.

A number of preventative measures can be employed to mitigate the potential impact of endemic diseases, parasites and pests on cultured stock including the following:

- Maintaining the longline/sea pen infrastructure;
- Removal of fouling organisms from infrastructure;
- Water quality monitoring;
- Biofouling management;
- Maintaining appropriate stocking densities;
- Inspecting shellfish/finfish health;
- Treatment procedures;

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- Collecting samples for laboratory examination; and
- Maintenance of personnel and farm equipment hygiene.

Inspections of stock and infrastructure for disease, parasites and pests will provide the **INSERT PROPONENT** with an opportunity to compile a listing of pathogens which are a potential threat to cultured **shellfish/finfish** in NSW waters, as well as contribute to the database on native pathogens of wild **shellfish/finfish** populations.

The following provides an overview of the relevant reporting relating to disease, parasites and pests as well as stock performance and welfare.

- Daily
  - Health Observations;
  - Treatments;
  - Water Quality and Temperature;
  - Mort No. and Categories (cultured or wild); and
  - Marine Fauna Interactions.
- Weekly
  - Health observations;
  - Treatments;
  - Water quality and temperature;
  - Mort numbers and categories (cultured or wild);
  - Production (number, average weight, biomass); and
  - Marine fauna Interactions.

The above information and any management actions undertaken to mitigate issues arising will be included in the annual report.

To assist in the rapid response to disease, parasite and/or pest issues, if they arise, staff will be trained or have expertise in the identification of potential disease, parasite and pest agents that may occur in the **Jervis Bay region**. The NSW DPI Aquatic Biosecurity website <http://www.dpi.nsw.gov.au/content/biosecurity/aquatic> also provides detailed information on the identification of aquatic pests and diseases, particularly declared pests and diseases.

Table 1 has been prepared to assist in the identification and treatment of diseases and parasites that may potentially infect cultured **shellfish/finfish** in both the hatchery and on **longlines/sea pens**.




## 6 Removal and Harvest of Stock

### Diseased and Dead Stock

**INSERT FREQUENCY** or whenever practicable (and subject to weather conditions), **longlines/sea pens** will be inspected to check the health of the stock. Dead, seriously injured and/or diseased stock will also be removed wherever practicable. The probable cause of death, sickness or injury, and the associated quantities of **shellfish/finfish** will be recorded.

In accordance with the *Fisheries Management Act 1994*, any person undertaking aquaculture must notify the NSW DPI of the presence or suspicion of any notifiable disease within 24 hours of becoming aware of any disease or condition that the person cannot identify, or within 14 days if the disease is identified but has not been eradicated.

If a significant unexplained mortality or health issue arise then samples of affected **shellfish/finfish** will be sent for diagnosis at an approved veterinary laboratory.

All mortalities and/or diseased **shellfish/finfish** will be disposed of in accordance with the Waste Management Plan. Staff involved in the removal of mortalities, injured and/or diseased **shellfish/finfish** will employ hygiene procedures for personnel, their clothes and operational equipment utilised in the removal operations.

Post-harvest quality assessment data collected at wet processing will be recorded into the harvest report which may include any suspected disease, parasite or pest issues with the harvested **shellfish/finfish**. This report will be provided to the Marine Operations Manager to assess if any health management investigations and/or actions need to be undertaken.

## 7 Training

The ability of **INSERT PROPONENT** staff to recognise pests and abnormal or unusual signs in **shellfish/finfish** is fundamental to early detection of health and pest issues. Staff awareness of biosecurity issues and protocols is critical to avoid infestations and minimise the impact of diseases or pests.

To ensure staff competency, regular on the job monitoring of **shellfish/finfish** health, inspections for pests and implementation of biosecurity measures is essential. This will be supported by ongoing regular training in **shellfish/finfish** health and biosecurity.

Training and awareness will be promoted through in-house and external training, continued reinforcement of the importance of monitoring for pests, **shellfish/finfish** health and biosecurity issues by management and **shellfish/finfish** health staff, as well as ongoing feedback about **shellfish/finfish** health and biosecurity matters as they arise.

### Induction Processes

All staff will go through an induction process to ensure awareness of operational requirements and production expectations. These programs include **shellfish/finfish** welfare, **shellfish/finfish** health and biosecurity as a part of the standard operating procedure training.

### Staff Qualifications

Employment of staff will apply a high level of emphasis on employing staff with the relevant qualifications from recognised universities and colleges and/or experience with key roles within the aquaculture industry.

### External and Internal Training

The training needs of staff will be reviewed regularly and training programs will be provided to ensure industry best practices are being employed.

This objective can be achieved through the following:

- Engaging a registered training organisation to deliver industry-recognised qualifications and a range of industry-based courses;
- Attendance at presentations, seminars, workshops, conferences to stay informed about the latest industry research, practices and technologies relating to **shellfish/finfish** health or aquatic pests; and
- Regular and ongoing on the job training, as well as specific training will be undertaken to promote the objectives and aspirations of the Health Management Plan, including:
  - **shellfish/finfish** welfare training;

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- Chemical handler training;
- Training against all standard operating procedures;
- Disinfection training;
- Presentations on key shellfish/finfish health and welfare topics; and
- Information sheets on key disease and shellfish/finfish health topics.

INSERT PROPONENT will promote a culture of information sharing to maximise the level of understanding on key pest, shellfish/finfish health and welfare issues across the operations and will encourage and support staff to participate in a broad range of external and internal training opportunities.

## 8 Consultation

In the preparation of the Health Management Plan the following personnel were consulted:

- E.g. XXXXXXXX Aquatic Biosecurity, NSW Department of Primary Industries
- E.g. XXXXXXXX Aquatic Biosecurity, NSW Department of Primary Industries
- E.g. Professor XXXXXXXX *Research Scientist*, NSW Department of Primary Industries;
- E.g. XXXXXXXX Research Scientist, NSW Department of Primary Industries; and
- E.g. XXXXXXXX *Marine Park*, NSW Department of Primary Industries.

## 9 References

O'Connor W.A., Dove M.C., Finn, B., O'Connor, S.J. (2008) Manual for Hatchery Production of Sydney Rock Oysters (*Saccostrea glomerata*). Final Report to Fisheries Research and Development Corporation, Deakin, ACT, Australia. NSW Department of Primary Industries- Fisheries Research Report Series No 20, 53 pp.

### **Web References**

#### **Web Reference 1**

[http://www.dpi.nsw.gov.au/\\_data/assets/pdf\\_file/0004/638680/ACEC-Guide-2015-FINAL-WITH-AQUI\\_S-2.pdf](http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/638680/ACEC-Guide-2015-FINAL-WITH-AQUI_S-2.pdf)

#### **Web reference 2**

<http://www.dpi.nsw.gov.au/fishing/aquaculture/publications/general/animal-care-and-ethics>

#### **Web reference 3**

<http://science.rspca.org.uk/sciencegroup/farmanimals/standards/salmon>

#### **Web Reference 4**

[https://www.dpi.nsw.gov.au/\\_data/assets/pdf\\_file/0003/638400/HQAS-Hatchery-Quality-Assurance-SchemeV8.PDF](https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0003/638400/HQAS-Hatchery-Quality-Assurance-SchemeV8.PDF)

#### **Web Reference 5**

<http://www.dpi.nsw.gov.au/fishing/aquaculture/publications/species-saltwater/hatchery-manual>