

## FREQUENTLY ASKED QUESTIONS

# Marine Aquaculture Research Lease (MARL)

June 2018

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## 1. Fish Feed

### Overview

Only pelleted feed is used on the Research Lease. The feed is produced under a quality control system which prevents the introduction of potential diseases, parasites and pests via the feed.

### Pellet composition

Part of the research trial is to develop cost-effective diets and test alternative raw materials that allow for the reduction in the use of fish meal and oil. The research also aims to improve the feed conversion ratio in farmed Yellowtail Kingfish. This ratio is the amount of dry feed required to increase the wet weight of a fish by 1 kilogram. For example, Atlantic Salmon production in Australia has a feed conversion ratio of 1.3:1.

A basic list of raw materials commonly used in commercial feeds fed to Yellowtail Kingfish includes:

- Fishmeal;
- Fish oil;
- Wheat;
- Soya protein;
- Poultry oil;
- Poultry meal;
- Lupin;
- Wheat gluten;
- Starch; and
- Small amounts of supplementary amino acids and antioxidants.

The raw materials used in the pelleted feed can vary depending on their availability and price, as well as manufacturing constraints.

Australia only produces relatively small quantities of fishmeal so Australian feed companies import fishmeal and fish oil from various places including South America. The fish used for fish meal and fish oil are mainly small bony, oily, fast growing but short lived fish with little demand for human consumption.

Medications including antibiotics, hormones and transgenic (GM) plant raw material are not used in feed on the Research Lease.

### Feeding regime

Appropriate feeding ensures all fish within a sea pen have access to adequate nutrition while minimising competition and social hierarchies being established. The main aim is to feed the fish to satiation (appetite) while at the same time minimising feed wastage.

Feeding is currently undertaken with a boat-mounted water cannon. However, in-pen feed hoppers are used at other Huon Aquaculture farms (in Tasmania) that utilise underwater video streams and pellet detection technologies to improve the delivery of feed and limit wastage. These systems may be deployed at the Research Lease in the future.

Avoiding feed wastage minimises impacts on water quality and the benthic environment surrounding the Research Lease.

### Feed management

Effective feed inventory management and storage is critical in maintaining the nutritional quality of feeds. Monthly routine maintenance actions are undertaken to prevent a potential feed spill event on land and at sea. Aquaculture feeds are stored in Huon Aquaculture’s land based facility at Shearwater Estate, Taylors Beach.



Figure 1: Feeding of stock by water cannon on the Research Lease.

## 2. Water Quality and Benthic Environment

### Overview

Four environmental sampling events have been undertaken to date. This includes one sampling event prior to fish stocking to provide baseline data, and three sampling events post stocking. Sampling has been conducted by an independent contractor and the University of Newcastle (Figure 2).



Figure 2: University of Newcastle collecting sediment samples using a Van Veen Grab (Source: NSW DPI, 2017).

### Environmental sampling

Water quality, benthic fauna, seafloor chemistry and seafloor particle size are parameters analysed to detect any environmental impact from fish farming activities. Samples have been collected from under the sea pens, on the edge of the Research Lease and at three locations away from the Research Lease in Providence Bay (control sites). A remote operating vehicle is also used to video seafloor transects from these locations. (Figure 3).

Supplementary water and benthic samples have been collected on top of the consent approval requirements. The supplementary samples aim to identify seasonal variations within Providence Bay and improve the baseline data available as fish grow. This will help to build a stronger picture of the effects of the operation at the Research Lease. An additional control site was also added to the sampling program just south of the lease.

The full environmental monitoring reports are available on Huon Aquaculture’s [website](#).

No significant impact on the benthic invertebrate ecology or water column chemistry has occurred to date. Monitoring will continue for the remainder of the research trial to ensure potential impacts are mitigated.

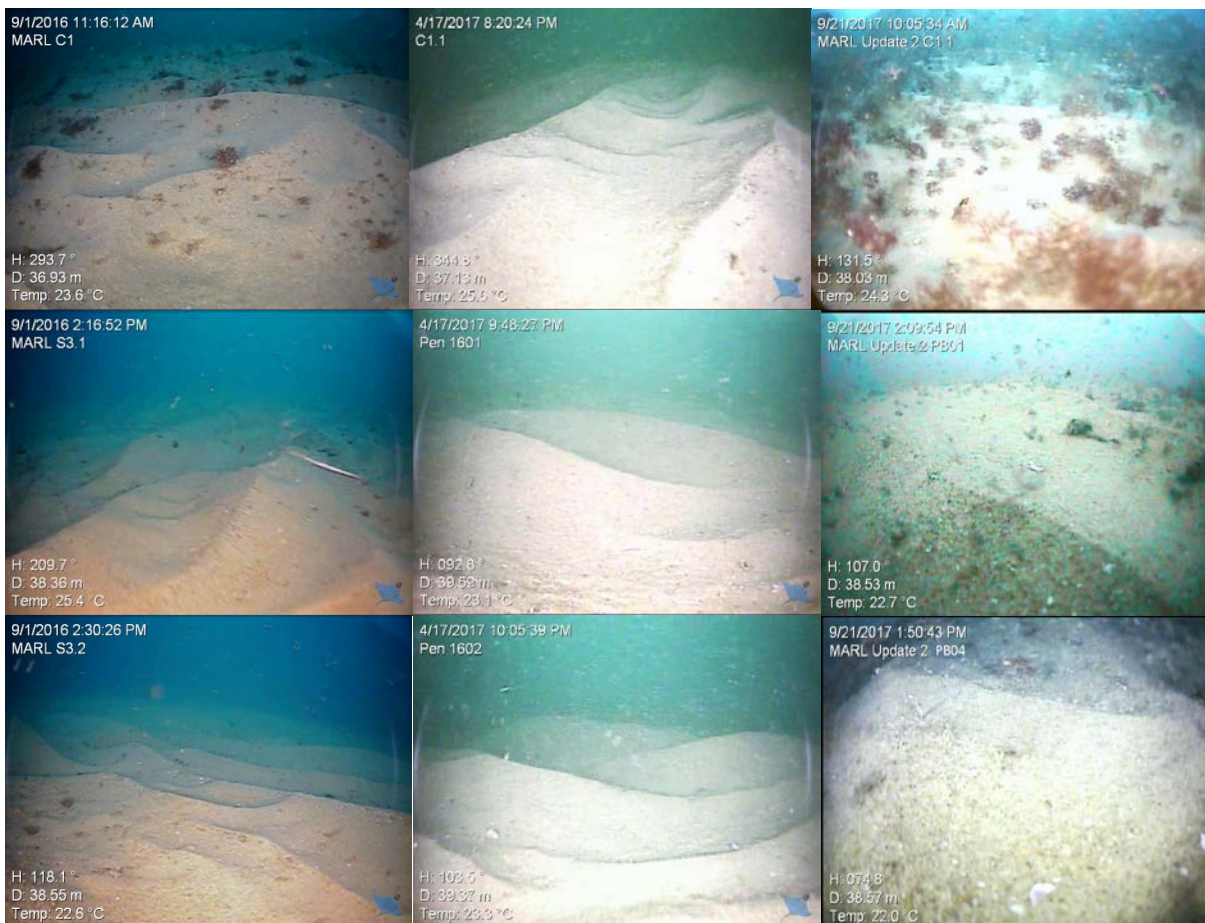


Figure 3: Timeline screenshots of the seafloor from site C1 (outside the lease - halfway to Broughton Island), under the first production sea pen 1601 (pen position PB01), and under the second production sea pen 1602 (pen position PB04) (Source: AMD, 2016, 2017).

Images of the seafloor (taken during video surveillance) outside the lease area and under the sea pens show no build-up of waste materials (uneaten pellets or faeces) Figure 3. The “before

farming” shots in 2016 and the September 2017 shots show an accumulation of naturally occurring drift algae to the north of the lease. This drift algae dissipates the further south you move in Providence Bay and appears to be a result of circulation patterns in the north of the Bay.

### 3. Biofouling Management

#### Overview

The sea pen infrastructure and nets are naturally colonised by a range of marine biofouling organisms, including algae, ascidians, molluscs and barnacles. The removal of this biofouling is important to reduce resistance to currents and wave action which may jeopardise the integrity of the infrastructure e.g. stress moorings and deform nets.

#### Biofouling removal

No chemicals are used to remove biofouling. Submersible cleaning robots using high pressure water jets are used to clean culture nets regularly. This can be more frequent in the summer months as biofouling grows more quickly in warmer water temperatures.

High-pressure cleaners are also used to remove biofouling from sea pen walkways and collars.

The submersible cleaning robots are in the process of being upgraded to more powerful models.

### 4. Marine Fauna Interactions

#### Overview

All marine fauna interactions within the Research Lease, notably threatened species, have been monitored since the sea pen infrastructure was installed in September 2016. A NSW Office of Environment and Heritage (OEH) approved observer was present during this stage of the project and during the installation of additional pens in September 2017 to monitor any marine fauna interactions.

Marine fauna monitoring has also been undertaken on all vessel trips when travelling to, from, within and around the lease. Particular attention has been given to the movements of threatened, protected and migratory species. Regular updates on marine fauna observations can be accessed on Huon Aquaculture’s [website](#).

#### Marine Fauna Interaction Training

Port Stephens Fisheries Institute hosted 24 personnel from Marine Parks, National Parks and Wildlife Service, NSW Department of Primary Industries (DPI), Huon Aquaculture and Dolphin Swim Australia for accredited wildlife interaction training provided by the Victorian Department of Environment, Land, Water and Planning in February 2017.

The training was initiated under the Marine Fauna Interaction Management Plan to: develop a response plan to deal with incidents with NSW OEH and other relevant departments; and to have a number of staff members appropriately trained in wildlife rescue techniques to ensure appropriate response to potential incidents.

#### Shark interactions

Acoustic listening stations have been installed near Hawks Nest and on the Research Lease. These have provided information about the presence of tagged sharks (Bull, White and Tiger).

Specifically, an acoustic listening station was deployed at a temporary mooring 3 km northeast of Cabbage Tree Island in November 2015 to obtain data prior to sea pen installation. An acoustic listening station was also deployed on the Research Lease in October 2016 after the first sea pen was stocked with Yellowtail Kingfish.

The receiver near Cabbage Tree Island was in position until mid-June 2016 where 11 tagged sharks were detected during that time (six Bull Sharks, four White Sharks and a Dusky Shark). The most common visitor was a Bull Shark that was detected on 40 separate days, while on average, each shark visited the site for approximately six separate days. The receiver on the Research Lease was in position until mid-August 2017.

A total of 19 tags were recorded and included 14 White Sharks, two Bull Sharks and three Grey Nurse Sharks. The maximum time a tag was detected was nine days, with most individuals detected on only one day. Since August 2017, 33 sharks have been recorded over seven months. Up to December 2017, the majority of the detections were White Sharks, which were transiting past the lease. After Christmas the overall number of detections fell, with White Sharks becoming less common and Bull Shark numbers increasing. It was uncommon for sharks to remain on the lease; however, one Bull Shark remained for over a week following the escape in late January.

The patterns observed from acoustic tag monitoring suggest that sharks routinely visit the Research Lease and most detections are thought to be of transient animals undertaking broader migrations.

There have been two short periods in which shark numbers have increased, however, including the end of 2017, which is consistent with records of migratory shark movements in the area over time, as well as after the escape incident in January 2018.

Two direct interactions have occurred since the Research Lease commenced operation. The first interaction involved five Grey Nurse Sharks which were observed swimming between the predator net and inner net in January 2018. These sharks swam out of a breach in the net and were no longer seen.

The second interaction involved two whaler sharks which became trapped in a sea pen after the storm event in January 2018 and exited without harm, then two smaller whaler sharks which became trapped and were subsequently removed.

### Seal interactions

The sea pen design with its double net system keeps predators away from workers and stock, and the fully enclosed walkway protects workers. Constant vigilance with maintaining the structural integrity of the sea pens and the positioning of the lease 5.6 km from the haul-out site on Cabbage Tree Island has also minimised direct seal interactions.

There have been several sightings of fur seals within the lease area, but mostly while travelling to and from the lease in close proximity to Cabbage Tree Island. There are records of fur seals feeding on stock around the pens following the escape incident in January 2018, but there are no records of entanglements or interactions with staff or sharks since the Research Lease commenced operation in October 2016.

Fur seals have been recorded using the sea pen access way as a haul-out site on three occasions. This part of the infrastructure is the entry point outside of the sea pen – no seal has breached the enclosed walkway that surrounds each of the sea pens.

### Seabird interactions

Seabird species such as shearwaters, cormorants, Australasian gannets, terns, seagulls, white-bellied sea eagles, albatrosses and the little penguin, have been observed in close proximity to the sea pens or resting on the walkways.

The sea pen design consists of an effective barrier to birds entering pens and to deter birds from resting on the nets. The design includes taut nets (60 mm mesh) that are well above the water and therefore keep the birds away from the fish and the fish feed. Thorough inspections of the bird exclusion nets have been part of the rigorous monthly inspection schedule. Observations are also made by staff as part of their daily checks, especially after storms and rough weather.

Only one direct bird interaction has occurred on the Research Lease since operation commenced in October 2016. Over a period of three weeks in January and February in 2017, five shearwaters were found on the Research Lease. Three birds were sitting on the walkways (released unharmed) and two birds were discovered entangled in the wall of the bird net (dead). There have been no further interactions since this incident.

### Dolphin interactions

A nominated observer has been present during all vessel movements and Research Lease activities, including the deployment stage, to minimise the risk of vessel strikes, monitor marine fauna interactions and ensure that recommended distances from marine fauna are maintained by service vessels when in transit.

Observations during the initial stages of the Research Lease indicate that dolphins displayed interest in the sea pen infrastructure as pods were aggregating in close proximity to the lease. However, this change in behaviour was only observed during the first two weeks while the sea pen infrastructure was being deployed (i.e. 26/9/16-9/10/16). Since then, dolphins have not been observed aggregating in close proximity to the leases for extended periods of time.

Many dolphins have been recorded within the lease area and while travelling to and from the lease within the wider area of Providence Bay and Port Stephens, but have not been observed directly interacting with the sea pen infrastructure in any way or aggregating around the sea pens since early October 2016. Similarly, there are no records of boat strikes or entanglements.

### Whale interactions

Humpback whales and Minke whales have been recorded within and around the Research Lease, however, there have been no entanglements since operation commenced in October 2016. The following two events are the only direct interactions recorded with whales:

#### *Interaction One*

On Saturday 8<sup>th</sup> October 2016 at approximately 7:12 am two Humpback whales were observed within the Research Lease by a tour operator. On closer inspection it was observed that one whale had a rope of approximately 25 mm diameter around its back, which it managed to dislodge.

NSW OEH, NSW Department of Planning and Environment and Commonwealth Department of Environment and Energy were notified of this event. NSW OEH requested an incident report from the tour operator. The Marine Fauna Interaction Committee reviewed the incident report and photographs provided by the tour operator and the NSW OEH approved observer (see Section 6.2.7 - [2017 Annual Environmental Management Report](#)).

The Committee concluded that:

- The black rope seen on the whale's back was consistent with fishing trap equipment;
- The whale was not entangled in the Research Lease orange anchor deployment lines or mooring lines; and
- The incident was not reported through the emergency hotlines (NPWS, OEH or NSW DPI/Huon Aquaculture).

#### *Interaction Two*

At 7:45am on Saturday 8<sup>th</sup> October 2016, the vessel Wandii II with NSW DPI/Huon Research Team staff and a NSW OEH approved marine observer approached the Research Lease for installation work and observed two Humpback whales within the lease area.

The whales swam through and around the lease infrastructure for approximately 40 minutes, interacting with it including tail fluke slapping, pectoral fin slapping and rubbing against the mooring lines. All interactions were documented with video and photographs. There was no sign of entanglement during this interaction. As per the Marine Fauna Interaction Management Plan, installation works were suspended for 40 minutes until the two whales left the lease area.

There have been no whale interactions since this time.

#### **Marine turtle interactions**

There have been no incidents of vessel strikes or entanglements of marine turtles since the Research Lease commenced operation in October 2016.

## **5. Visual Amenity**

### **Overview**

A number of design features have been used to minimise the visibility of the sea pen infrastructure, including the use of dark coloured materials (e.g. black stanchions), maximising subsurface infrastructure and ensuring surface infrastructure maintains a low profile. The Research Lease is located 9.1 km north east of Hawks Nest so the sea pens are not clearly discernible from the beach other than when vessels are in attendance. The service vessels are similar in appearance to the commercial and recreational vessels that transit the area.





Figure 4: Sea pens on a calm day from approximately 200m.

Six yellow cardinal markers with navigation lights have also been installed to clearly identify lease boundaries and ensure navigation safety. Orange ropes are used to secure the sea pens to the mooring grid to assist in making the infrastructure more visible to marine fauna, notably whales and dolphins.

## 6. Disease, Parasites, Genetics and Deformities

### Overview

The sea pen infrastructure and the stock cultured within the sea pens can potentially be exposed to a range of endemic diseases, parasites and pests. The risk of endemic diseases and parasites from wild populations of fish surrounding the sea pens is identified as the greatest risk to cultured stock. A number of preventative measures have been employed on the Research Lease to mitigate potential impacts of endemic diseases, parasites and pests on cultured stock including:

- Stocking only certified disease free fish from Port Stephens Fisheries Institute;
- Maintaining the sea pen infrastructure including predator nets which limits interaction between wild and farmed fish;
- Using high quality feed;
- Maintaining low stocking densities;
- Monitoring fish health regularly;
- Treating any infections promptly;
- Managing biofouling;
- Monitoring water quality; and
- Maintaining on and off-farm hygiene.

### Disease and parasites

Daily inspections are undertaken to assess the health of stock on the Research Lease and quantify any fish deaths.



Figure 5: Health and weight checks of fish are undertaken regularly.

No significant unexplained fish death or health issues have occurred since operation commenced in October 2016. External skin and gill flukes are the only health issue recorded on the Research Lease, which are managed through the project's Health Management Plan under veterinary supervision. The prevalence of skin and gill flukes was expected given that they are commonly found on wild populations of Yellowtail Kingfish and other fish species. In addition, similar infestations occurred on the previous Snapper farm in Providence Bay and they regularly occur on Yellowtail Kingfish farms in Australia. Treatment has involved bathing stock in low concentrations of hydrogen peroxide (see section on Chemical Use).

Veterinary investigations have also been undertaken into the cause of minor numbers of moribund fish.

As only certified disease free fish from Port Stephens Fisheries Institute are transferred onto the Research Lease, the transfer of disease or parasites from land based cultured stock to wild populations is highly improbable.

#### **Broodstock source**

Yellowtail Kingfish fingerlings stocked at the Research Lease are produced from broodstock that is sourced from the same genetic population of fish in Providence Bay. This mitigates the risk of introducing non-endemic diseases, parasites and pests into the broodstock at Port Stephens Fisheries Institute and or transferring them to the sea pen site.

#### **Fish deformities**

Deformities in farmed and wild Yellowtail Kingfish can occur and can be caused by feed deficiencies, suboptimal environmental conditions and injury. Every effort is made in the

hatchery to optimise rearing conditions but minor jaw and gill operculum deformities do occur in a small percentage of fish.

## 7. Escapees

Concerns have been raised about the potential impact of escapees. These include concerns about predation on local fish species, including bait stocks used by commercial fishers, and competition with local wild population of Yellowtail Kingfish.

Research in Australia and overseas shows farmed fish are conditioned to human presence and the supply of high quality feed, and their foraging and survival skills in the wild are limited. NSW DPI is confident that there will be very little ecological impact as escapees:

- Disperse quickly;
- Are easy to catch;
- Are not used to predators;
- Have a large geographical range including New Zealand, Tasmania, and South Australia;
- Represent small numbers in context of the local wild population; and
- NSW DPI fisheries research have classed Yellowtail Kingfish as growth overfished.

## 8. Navigational Interactions

### Overview

A range of mitigation measures have been implemented throughout the deployment and operation stages of the Research Lease to ensure navigational safety, including surveying and delineating the lease with six cardinal markers, updating maps and issuing a 'notice to mariners' to highlight the change in navigable conditions in Providence Bay and the fitting of cardinal markers with auto-notification technology and with GPS trackers. See Section 8 in the [2017 Annual Environmental Management Report](#) for further examples.

### Navigational interactions

In the first year of operation, one navigational incident occurred on 30<sup>th</sup> September 2016 prior to sea pens being in position when a recreational boater collided with a black buoy on the lease. It was later confirmed that the cardinal markers were operational at the time of the incident but the recreational boater did not see them. Suggestions were made about having signs at the boat ramps. Flyers and notices about the construction of the Research Lease were subsequently placed at the boat ramps. Before Christmas 2017, NSW DPI provided handout flyers detailing the changes to navigational conditions in Providence Bay at recreational fishing stores, service stations and tourist offices.

A navigational issue also occurred on the Research Lease with recreational and commercial fishers throughout January 2018 after a severe storm event with the escape of fish from a sea pen. NSW DPI, NSW Roads and Maritime Service (RMS) and Water Police strongly advised fishers to keep away from the Research Lease due to safety concerns for personnel undertaking repair (including divers) and fish recovery efforts. Despite advisory efforts, the volume of boating traffic leading up to the Australia Day long weekend created hazardous conditions and were hindering repair and recapture efforts.

There were safety concerns for staff and investigators responding to the incident. Some recreational fishers were not adhering to the minimum separation distance of 60 m from divers in the water.

In order to safely enact the Emergency Protocol and attend to repair and recovery efforts, a temporary Section 8 Fishing Closure under the *Fisheries Management Act 1994* was put in place on the lease. The temporary fishing ban was initially in place up until, and including, the 28<sup>th</sup> February 2018. Advice on the closure was posted at boat ramps, the Newcastle Commercial Fishermen's Co-operative and tackle shops, along with Facebook postings. Officers also provided on water advice.

A post incident briefing was conducted with NSW RMS and Water Police to discuss future response actions.

## 9. Chemical Use

### Overview

Marine finfish aquaculture requires the use of chemicals to treat parasites, aid fish handling and assist with post-harvest transportation. Common chemicals such as motor fuels, oils, lubricants and degreasers are also used for operational boating activities.

### Regulation of chemical use

There are tight regulations on the types of chemicals available for use on aquaculture farms, and the associated treatment protocols. Therapeutic chemicals are administered in accordance with the Australian Pesticides and Veterinary Medicines Authority (APVMA) or a prescription from a licensed veterinarian may also be obtained.

### Types of chemicals

Low concentrations of hydrogen peroxide are used on the Research Lease to control skin and gill flukes arising from wild Yellowtail Kingfish. It is administered under Veterinary supervision under a permit approved by the Australian Pesticides Veterinary Medicines Authority.

Hydrogen peroxide is considered to have low environmental risk as it quickly breaks down into oxygen and water. It has been used for over 20 years in the aquaculture industry. There are no persistent contaminants arising from hydrogen peroxide that accumulate in the environment. The 3% active solution available from supermarkets, which is often used for at-home wound care, is approximately 100 times stronger than the highest concentration used in the sea pens for fluke control.

Stakeholders have been advised of the use of hydrogen peroxide in regular stakeholder updates and in the [2017 Annual Environmental Management Report](#).

Low doses of an approved anaesthetic Aqui-S are also used during fish weight and health checks. The active ingredient is derived from cloves. Clove oil has commonly been used to manage toothache in humans.

There has been a misconception by some stakeholders that Chlorine is used to treat fish. Chlorine has never been used on the Research Lease.

No chemicals are used to remove biofouling from sea pens. Robots with high pressure water jets are used to dislodge any biofouling. This is mostly comprised of algae.

### Preventative measures

Preventative measures employed to minimise chemical use on the Research Lease include:

- Stocking only certified disease free fish from Port Stephens Fisheries Institute;
- Using high quality feeds;
- Maintaining low stocking densities;
- Monitoring fish health regularly;
- Treating any fluke infestations promptly;
- Maintaining the sea pen infrastructure including predator nets;
- Managing biofouling;
- Monitoring water quality; and
- Maintaining of on and off-farm hygiene.

## 10. Regulating Marine Aquaculture

Concerns have been raised about NSW DPI's involvement in the regulation of the Research Lease while also being a partner in the project.

Conditions of approval were issued by the NSW Department of Planning and Environment (NSW DPE) and the Commonwealth Department of Environment and Energy to regulate the project. This followed an assessment of a State Significant Infrastructure and Modification applications and environmental impact statements and involved extensive community consultation.

NSW DPE are responsible for enforcing compliance with the conditions of approval for the Research Lease. Notably, they are currently reviewing the incident investigation report submitted on 2nd February 2018 involving structural damage and escapees due to severe weather. The incident investigation report was also submitted to the Commonwealth Department of Environment and Energy. The incident investigation was conducted by an independent incident investigation facilitator and a summary was provided to all key stakeholders, as well as being available on Huon Aquaculture's and NSW DPI's [websites](#).

The environmental monitoring component of the project is undertaken independently by University of Newcastle.

## 11. Aquaculture in a Marine Park

Marine parks are areas of marine waters and lands permanently set aside to protect the biological diversity of our marine animals and plants, and to provide protection for unique and representative areas. Marine parks are zoned for multiple uses such as recreation, fishing and tourism.

The Port Stephens-Great Lakes Marine Park covers an area of approximately 98,000 hectares. It is a multi-use park catering for a wide range of commercial and recreational activities, and is managed via a zoning plan consisting of sanctuary, habitat protection, special purpose and general use zones.

The Port Stephens area has had a long history of aquaculture. Oyster farming commenced in approximately 1885 and there was a commercial fish farm in operation in the area before the Marine Park was declared.

The site selection process for the Research Lease carefully considered the habitat types within Providence Bay and avoided sensitive habitats and areas of conservation significance, such as rocky reefs, seagrass beds and sanctuary zones. The lease is located within a habitat protection zone over a habitat type consisting of soft sediment (predominately sand), which is extensively represented in Providence Bay. For further information on the site selection process, see Sections 3.9, 3.10, 8.1 and 8.2.2.12 of the [Environmental Impact Statement](#).

### More information

#### 2017 Annual Environmental Management Report

[https://www.dpi.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0009/795645/MARL-Annual-Report-2017-pdf.pdf](https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/795645/MARL-Annual-Report-2017-pdf.pdf)

[Environmental Impact Statement](#).

Contact NSW DPI, Aquaculture Management on (02) 4982 1232.



Figure 6: Market ready Yellowtail Kingfish

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